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Traditional knowledge in policy and practice

Traditional knowledge in policy and practice: Approaches to development and human well-being

Edited by Suneetha M. Subramanian and Balakrishna
Pisupati



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United Nations University, 53-70, Jingumae 5-chome,
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Tel: +81-3-5467-1212 Fax: +81-3-3406-7345
E-mail: sales@unu.edu general enquiries: press@unu.edu
<http://www.unu.edu>

United Nations University Office at the United Nations, New York
2 United Nations Plaza, Room DC2-2062, New York, NY 10017, USA
Tel: +1-212-963-6387 Fax: +1-212-371-9454
E-mail: unuony@unu.edu

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Endorsement

“International debates on traditional knowledge (TK) protection are ongoing. However, negotiations are not always informed by any clear understanding of the various ways that TK is so essential to sustainable development and to the livelihoods of hundreds of millions of people. This collection, which comprises chapters by experts from a wide range of backgrounds, including traditional knowledge-holding communities, should leave policy makers in no doubt that protecting TK is not only vital for indigenous peoples but for the common future of all of humanity.”

***Graham Dutfield**, Professor of International Governance, School of Law,
University of Leeds*

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Contributors

Fatima Alvarez Castillo is professor of Politics and Social Research at the University of the Philippines, Manila. She conducts multidisciplinary studies on issues relevant to human rights and justice. Women's rights and gender inequity are consistent themes in her research and advocacy. Her current research includes developing gender-sensitive indicators of poverty and inequity, constructing a global system for motivating pharmaceuticals to invest in drug development for diseases that plague the poor and the gender issues in benefit sharing in research.

Salvatore Arico is special advisor to UNESCO's assistant director-general for Natural Sciences on all matters relating to the environment and biodiversity in UNESCO's Division of Ecological and Earth Sciences in Paris, France. His areas of expertise encompass marine biodiversity, ecosystem services

assessments and the science-policy nexus. His current area of scientific interest and specialization is biodiversity and the sustainable development dimensions of climate change and in this regard he has acted as an invited expert of the IPCC AR5 Scoping Meeting (2009). He is affiliated to several international and scientific bodies.

Kelly Bannister is an ethnobiologist with expertise on ethical and legal issues in research involving biodiversity, indigenous knowledge and cultural heritage. She is director of the POLIS Project on Ecological Governance and an adjunct professor in the Studies in Policy and Practice Program, Faculty of Human and Social Development at the University of Victoria (Canada) and current chair of the Ethics Committee of the International Society of Ethnobiology. Her main area of interest is the intersection of ethics guidelines and local

governance mechanisms (e.g., codes of ethics, community research protocols) to address power relations and facilitate equitable research practices in research that involves communities. She is a consultant for the Canadian government on Access and Benefit Sharing policy and an advisor on national research ethics policy in Canada.

Marie Battiste, a Mi'kmaq educator from Potlo'tek First Nations, Nova Scotia, is a full professor in the College of Education and director of the Aboriginal Education Research Centre (AERC) at the University of Saskatchewan. She has worked actively with First Nations schools as an administrator, teacher, consultant and curriculum developer, advancing aboriginal epistemology, languages, pedagogy and research. Her research interests are in initiating institutional change in the decolonization of education, language and social justice policy and power, and postcolonial educational approaches that recognize and affirm the political and cultural diversity of Canada and the collective healing required for transformation from colonial trauma. She leads a national hub at the University of Saskatchewan for the SSHRC Canadian Prevention Science Cluster aimed at identifying approaches to culturally appropriate school-based violence prevention, and she is involved in the ethical protection and advancement of indigenous knowledge.

Kabir Bavikatte is a lawyer and the co-director of Natural Justice, an Africa-based network of legal practitioners working internationally

on community rights in the context of environmental law and policy. He has worked on issues relating to biodiversity and law by facilitating processes that secure the rights of communities in Africa and South Asia, supporting African governments in the development and implementation of biodiversity law and policy, and as legal advisor to the African Group of countries in their negotiations towards the International Regime on Access and Benefit Sharing and in the Working Group on Article 8j of the Convention on Biological Diversity.

Gerard Bodeker is chair of the Global Initiative for Traditional Systems of Health, an international policy and research project, based in Oxford. An Australian, whose doctoral studies were undertaken at Harvard, he is a senior faculty member in public health in the Division of Medical Sciences at Oxford University and is adjunct professor of Epidemiology at Columbia University, New York. Professor Bodeker has written extensively on traditional medicine. He is editor-in-chief of the *World Health Organization Global Atlas of Traditional, Complementary & Alternative Medicine* (2005) and senior editor of a book published in 2007 by Imperial College Press on public health and policy perspectives on traditional and complementary medicine.

Agni Klintuni Boedhihartono is currently a senior lecturer in Tropical Livelihoods at James Cook University in Cairns, Australia and an associate with IUCN Forest Conservation Programme in Gland, Switzerland. She is a visual

anthropologist, ethnologist and graphic artist. She has been working with multidisciplinary scientific teams in numerous countries in Africa, Asia and Latin America on balances between conservation and social, cultural and economic development and with communities from different cultures, especially forest-dependent people and nomads. Her main research interest is in cultural diversity, traditional healing practices and traditional knowledge on use of natural resources. Her goal is to influence global efforts to support indigenous peoples and communities to improve their livelihoods whilst retaining their cultural identity, diversity, natural assets and traditional knowledge.

Ademola K. Braimoh is a professor at the Center for Sustainability Science, Hokkaido University, Japan and executive director of the Global Land Project, Sapporo Nodal Office in Japan. His research interests include soil quality–land use interactions and the application of geospatial technology for land-change studies, vulnerability assessment and environmental management. His recent publication is *Land Use and Soil Resources*, an edited volume that analyses the pattern, driving factors and socio-economic impacts of land degradation across world regions.

Guillen Calvo Valderrama is an independent consultant specializing in issues related to biocultural diversity conservation, origin-based products development, promotion of market access based on goods and services with identity, conservation

and sustainable use of agricultural biodiversity. He is also currently in charge of the design, implementation and coordination of activities related to the sustainable development of agro-ecosystems at UNESCO's Ecological and Earth Science Division. In 2009, he founded "Agri-Cultura", a consulting firm for the promotion of innovative sustainable territorial development strategies and knowledge dialogue in developing countries. He is also coordinating an international exchange platform to promote local identities, living heritage and traditional knowledge as rural development factors.

Maria Nadja A. Castillo is a community development worker with a particular interest in issues of grass-roots empowerment, equitable state policies and services as these impact on the poor and vulnerable, especially women. She has conducted research on the impact of armed conflict on the health of poor communities and on the dislocation of communities brought about by government projects. Currently she is a lead researcher of CENPEG on automated elections in the Philippines.

Susan Forbes is an archaeologist specializing in cultural landscapes and advocacy for protection of heritage as identity. Most of her work involves working alongside indigenous communities in the protection of their own ancestral places and values. Archaeology, carried out as an active ethical principle of *aroha*, is her professional motivation. Love for her children and *tane* is her personal motivation.

Bernard Y. Guri is executive director, Center for Indigenous Knowledge and Organizational Development, Ghana. His background is in agricultural sciences, education and development planning. His area of expertise is institutional development, with particular interest in indigenous institutions and knowledge systems. He is the regional coordinator of COMPAS Africa and a co-founder of the Alliance for Food Sovereignty in Africa.

Bertus Haverkort trained as an agronomist and social scientist. He worked in rural development programmes in Colombia and Ghana and managed the information centres of institutions such as ILEIA and COMPAS. At present he is visiting professor of CAPTURED (capacity and theory building for universities and research centres on endogenous development), a joint programme of the University of Development Studies in Ghana, the Universidad Mayor San Simon in Bolivia and the Foundation for the Revitalisation of Local Health Traditions in India, which aims to introduce innovation into curricula and research to enhance local knowledge and stimulate co-evolution of the sciences involved.

Harry Jonas is a lawyer and co-director of Natural Justice, an Africa-based network of legal practitioners working internationally on community rights in the context of environmental law and policy. His current focus is on developing community level rights-based approaches to ensure that environmental laws are

implemented in accordance with customary laws and procedures. In this context, he is working on the legal empowerment of communities regarding access and benefit sharing, REDD and the establishment of indigenous peoples in community conserved areas.

Alphonse Kambu is programme officer in the Division of Environmental Law and Conventions (DELIC) at the United Nations Environment Programme (UNEP). His background is in environmental law and policy. Prior to joining UNEP he was director at Ishikawa International Cooperation Research Center of the United Nations University Institute of Advanced Studies and was also responsible for initiating the Sub-global Assessment (SGA) in Japan as a follow-up initiative to the Millennium Ecosystem Assessment (MA) and was science director for the SGA in Japan until April 2008. His specific interests are in water regulation and governance, the legal protection of traditional knowledge and access and benefit sharing, conservation of *satoyama* (eco-cultural landscapes) and *satoumi* (coastal and seascape) of Japan, and sustainable use of living natural resources.

Stephen B. Kendie is associate professor of Development Planning and Environmental Management at the Institute for Development Studies, University of Cape Coast, Ghana. His background is in geography and micro-regional planning. His publications cover issues ranging from rural drinking water and sanitation to environmental and social impact assessments,

decentralization and local governance, sustainable development and rural livelihood improvement.

Sarah A. Laird, co-director of Peoples and Plants International, works in the field of forest and biodiversity conservation. In part her work has focused on building equity into the genetic resources trade and the development of policies to guide “access and benefit sharing” under the Convention on Biological Diversity. She also undertakes and manages research and applied projects on non-timber forest products, primarily in Africa. For the past four years Sarah has served on the Board of the International Society of Ethnobiology (ISE), and helped to launch and directs the ISE’s Darrell Posey Fellowship for Ethnoecology and Traditional Resource Rights.

Tom Lanauze is a Moriori, Maori farmer on Rekohu. Rekohu (or the Chatham Islands) are situated 800 km to the east of Aotearoa/New Zealand. Mr Lanauze is a man of the land and combines his love of hunting and fishing with a deep commitment to caring for the landscapes of his ancestors. He is part of the Hokotehi Moriori Trust cultural research team currently working on recording traditional knowledge associated with land use and Moriori settlement on the islands.

Ikechi Mgbeoji is associate professor at Osgoode Hall Law School, York University, Toronto. Educated in Nigeria, Canada and Germany, his main research and teaching interests are in the areas of international

intellectual property law and environmental law. An author of dozens of scholarly articles, he is also author of *Global Biopiracy: Patents, Plants and Indigenous Peoples* (2006).

Oladimeji Idowu Oladele is a socioeconomist and professor, Department of Agricultural Economics and Extension, North-West University, Mafikeng Campus, Mmbatho, South Africa. His research interest covers the development and dissemination of appropriate technology, suited to the socio-economic milieu of farmers. He has researched into several factors that affect farmers’ practices and the organizational setting of the research and extension agencies with a view of identifying such practices as inputs into further development for the overall sustainability of farmers’ production and the environment.

Unnikrishnan Payyappalli is an Ayurvedic physician and a medical anthropologist. For the past two decades he has been actively engaged in action research programmes on traditional medicine with the Foundation for Revitalization of Local Health Traditions, India. Currently, he is doing his doctoral research in International Development Studies at the Yokohama National University, Japan. His research interests include medical pluralism and the role of traditional medicine in primary health care.

Balakrishna Pisupati currently coordinates activities on biodiversity-related Multilateral Environmental

Agreements (MEAs) in UNEP's Division for Environmental Law and Conventions. He holds a Ph.D. in Genetics. He has worked extensively on science and policy linkages for the past twenty years in various capacities including as the head of the IUCN Regional Biodiversity Programme, Asia and as coordinator of the UNU-IAS Biodiplomacy Programme. His interests include conservation and development policy, sustainable development and environmental governance.

Noemi Miyasaka Porro has worked in rural development for grass-roots organizations in the Amazon since 1986. Her background is in agricultural engineering and anthropology. She is a professor and researcher at the Family Agriculture graduate programme, Centre for Agrarian Science and Rural Development, Federal University of Pará, Brazil. Her current interests are in rights, gender, child work and traditional knowledge in forest management and livelihoods.

José Antonio Puppim de Oliveira is assistant director and senior research fellow at the United Nations University Institute of Advanced Studies. He has academic interests in the political economy of sustainable development. He is particularly interested in researching patterns of environmental governance and policy implementation at different levels.

Amejali Ramos Castillo is an adjunct research fellow working on the Water Management and Climate Programmes at the UNU-IAS Traditional Knowledge Initiative.

Her work focuses on exploring interlinkages between global environmental issues and indigenous knowledge systems and on highlighting the role that traditional knowledge plays in developing sustainable solutions to pressing global environmental challenges. Her current research focuses on understanding the transformation of urban water governance arrangements and indigenous governance systems in Latin America.

Coen Reijntjes trained as a land use planner at Wageningen University. He worked in integrated development programmes in Niger and Cape Verdian Islands for six years. Thereafter he became content editor for the Information Centre for Low External Input Agriculture (ILEIA) and later for the COMPAS Network Programme on Endogenous Development. Currently, he is a freelancer supporting initiatives to strengthen family farming, local economies and endogenous development.

R. Rengalakshmi is principal scientist at the M. S. Swaminathan Research Foundation, Chennai, India. Her research interests are sustainable agriculture and rural livelihoods, gender and development, and information and communication technology (ICT) enabled development. Currently she is involved in a project on ICT-enabled community development for sustainable rural livelihoods of small and marginal agricultural farm holders and agricultural labourers. She has fifteen years of grass-roots level experience working with an interdisciplinary team as a

development practitioner, trainer and researcher.

Doris Schroeder is professor of Moral Philosophy and director of the Centre for Professional Ethics at the University of Central Lancashire. She is also a professorial fellow in the Centre for Applied Philosophy and Public Ethics at the University of Melbourne. Her background is in philosophy, politics and economics. Her main areas of interest are international justice, human rights, benefit sharing and global bioethics. To date, she has conducted four international projects on benefit sharing funded by the European Commission and the Wellcome Trust, and published widely in the area.

Joaquim Shiraishi Neto is a lawyer who has focused on environment law, specifically following new social movements, social conflict and social development. Since 2005, he has been professor of the Master's Program in Environmental Law at the University of Amazon and a researcher at the National Council for Scientific and Technological Development.

Maui Solomon is a Moriori, Maori barrister, who has been a strong advocate for the better recognition and protection of the human rights of indigenous peoples. He specializes in treaty claims, cultural and intellectual property rights, and negotiation of matters between tribes and government. Maui finds inspiration from the 500-year legacy of peace practised by his Moriori ancestors and believes the world can learn a lot from their commitment to peaceful co-existence.

Suneetha M. Subramanian is research fellow at the United Nations University's Institute of Advanced Studies, Japan. She has been researching on bio-enterprises, benefit sharing and their socio-economic-political implications. Her current research interests pertain to ecosystem services valuation from a multi-stakeholder and multi-scalar perspective, and in identifying policy-practice linkages that improve the well-being of local communities and their ecosystems.

Johanna von Braun is a postdoctoral fellow at the University of Cape Town's Intellectual Property Law and Policy Research Unit, where she works on intellectual property rights and development. She focuses primarily on issues related to genetic resources and the related rights of indigenous and local communities, as well as public health and access to medicines. Johanna also works as an associate with Natural Justice, specifically on issues related to the implementation of national and international frameworks related to access and benefit sharing regulations.

Rachel Wynberg is an academic, activist and policy advisor, specializing in the commercialization and trade of biodiversity, and the integration of social justice into biodiversity concerns. She is based at the Environmental Evaluation Unit, University of Cape Town. Over the past fifteen years Rachel has worked closely with governments, NGOs and research institutions to formulate appropriate policy frameworks for biotrade, access and benefit sharing; intellectual property

rights and traditional knowledge; and community-based natural resource management. She is actively involved in civil society movements, and is trustee and

founding member of two South African NGOs: the Environmental Monitoring Group and Biowatch South Africa.

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Foreword

This volume comes at a critical moment in the fight for a sustainable future. In 2002, the heads of state attending the Johannesburg World Summit on Sustainable Development agreed to substantially reduce the rate of biodiversity loss worldwide by 2010 – the so-called 2010 Biodiversity Target. However, today biodiversity is being lost more quickly than ever, with the current rate of extinction estimated to be up to 1,000 times higher than the natural background rate. This rapid and unprecedented loss of our biological resources poses a serious threat to humanity's long-term health, well-being and prosperity.

The United Nations declared 2010 the International Year of Biodiversity as an opportunity to learn from our successes and failures to date and to forge a new road ahead. Respect for and promotion of the knowledge, innovations and practices of indigenous and local communities will be central to these future efforts to save life on Earth. Indigenous and local communities have a special relationship with nature in general and biodiversity in particular, which makes them crucial partners of the Convention on Biological Diversity (CBD). They are stewards of the Earth's biological diversity and their diverse cultures and languages are the pillars of humanity's cultural diversity.

Indigenous and local communities have accumulated vast stores of biological diversity-related knowledge in their long history of managing the environment. We see this in the Andes, where indigenous farmers are using their knowledge to work with the Government of Peru in order to reintroduce diverse potato crops as insurance against extreme climate

change, and in order to interbreed highland and lowland lamas to produce hybrid animals more resistant to extreme climatic events.

Moreover, most indigenous and local communities are situated in areas where the vast majority of the world's plant genetic resources are found. Communities living in biological hotspots have cultivated and used biological diversity in a sustainable way for thousands of years. These communities therefore know better than anyone else how to preserve local flora and fauna. Preserving linguistic diversity is also extremely important for preserving biological diversity. When languages become extinct, associated traditional ecological knowledge in local communities is often lost as well. We cannot afford to let languages and cultures, and the ecological wisdom they have accumulated over centuries, disappear.

The contribution of indigenous and local communities to sustainable development is not limited to their role as natural resource managers. Local knowledge is increasingly being used to produce marketable commodities and as the basis for eco and cultural tourism. For example, indigenous and local communities in India, Madagascar, Australia and Brazil have been working with the world's aromatic, perfume and cosmetics industries to produce new fragrances and products using local biodiversity. These communities have realized that their unique biological and cultural diversity is a marketable product in the modern world, and a sound basis for community entrepreneurialism.

Given the huge potential contribution of indigenous and local communities to sustainable development worldwide, we need more books to comprehensively explore this topic. Hence the seminal importance of *Traditional Knowledge in Policy and Practice: Approaches to Sustainable Development and Human Well-being*. Ultimately, the book will go a long way to putting traditional knowledge where it deserves to be: front and centre in the consciousness of the international community and our efforts to save life on Earth.

Ahmed Djoghlaif
Executive Secretary of the Convention on Biological Diversity

Abbreviations

ABS	Access to Genetic Resources and Fair and Equitable Sharing of Benefits arising from their utilization
ANMs	Auxiliary nurse midwives
ASSEMA	Association in the Settlement Areas of the State of Maranhão
BCPs	Biocultural community protocols
C	Organic carbon
CBD	Convention on Biological Diversity
CBNRM	Community-based natural resource management
CBOs	Community-based organizations
CDS	Centre for Development Studies (University of Cape Coast, Ghana)
CGEN	Council for Management of Genetic Resources at the Ministry of Environment (<i>Conselho de Gestão do Patrimônio Genético</i> in Portuguese)
CIAT	International Centre for Tropical Agriculture
CIFOR	Center for International Forestry Research
CIKOD	Center for Indigenous Knowledge and Organizational Development
CIM	Community Institutional Mapping
CIPRES	Centre for Promotion of Rural and Social Development
CIRAD	<i>Centre de coopération internationale en recherche agronomique pour le développement</i>
CRiSTAL	Community Based Risk Screening Tool – Adaptation and Livelihoods
CRS	Catholic Relief Services
ED	Endogenous Development
ENGOS	Environmental non-governmental organizations
FAO	United Nations Food and Agriculture Organization
FBOs	Farmer Based Organizations

FIOs	Functional Indigenous Organizations
GAD	Gender and Development
GIAHS	Globally Important Agricultural Heritage Systems
GIS	Geographical Information System
HHGs	Herbal home gardens
ICARDA	The International Center for Agricultural Research in Dry Areas
ICBG	International Cooperative Biodiversity Group
ICSU	International Council for Science
IDRC	International Development Research Centre
IFOAM	The International Forum for Organic Agriculture Movement
IIED	International Institute for Environment and Development
IIs	Indigenous institutions
IISD	International Institute for Sustainable Development
IK	Indigenous Knowledge
ILC	Indigenous and Local Communities
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
ISE	The International Society of Ethnobiology
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	The International Union for Conservation of Nature
LEISA	Low External Input Sustainable Agriculture
LINKS	UNESCO's Local and Indigenous Knowledge Systems Programme
LOs	Local organizations
MA	Millennium Ecosystem Assessment
MAT	mutually agreed terms
MDG	Millennium Development Goals
MEAs	Multilateral Environmental Agreements
MIQCB	Interstate Movement of Women Babassu Breakers (<i>Movimento Interstadual das Quebradeiras de Coco Babaçu</i>)
MPF	Federal Public Attorney (<i>Ministério Público Federal</i>)
MSP	Marine Spatial Planning
NGOs	non-governmental organizations
Nuffic	Netherlands Organization for International Cooperation in Higher Education
OHCHR	Office of the High Commissioner for Human Rights
PAS-L	Presbyterian Agricultural Station, Langbeni
PECS	Programme on Ecosystem Change and Society
PIC	prior informed consent
PPB	Participatory Plant Breeding
PPBMA	Participatory Plant Breeding in Meso-America
RCAP	Royal Commission on Aboriginal Peoples
REDD	Reduced Emissions from Deforestation and Degradation
SADC	Southern Africa Development Community
SHGs	Self-help groups

SWC	Soil and Water Conservation
TCAM	Traditional, Complementary and Alternative Medicine
THPs	Traditional health practitioners
TK	Traditional Knowledge
TMPs	Traditional medicine practitioners
TRIPS	Agreement on Trade Related Aspects of Intellectual Property
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNPFII	UN Permanent Forum on Indigenous Issues
WHO	World Health Organization
WID	Women in Development
WIPO	World Intellectual Property Organization
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Introduction

Suneetha M. Subramanian and Balakrishna Pisupati

The ingenuity of humankind to constantly innovate and adapt over the millennia has put all contemporary thinkers on development into cycles of dismay and disbelief when they consider the manner in which humans in their own times have survived. In our journey through history, starting from discovering the utilities of different resources, modifying them to suit our requirements to technological refinements to our innovation processes, we have witnessed several changes, especially related to how we use, manage and govern resources, territories and the values we attach to production, consumption and exchange processes. As a consequence, today we find ourselves with two sets of divergent worldviews: (1) the mainstream, dominant Cartesian worldview (also commonly referred to as the western/European) and (2) other worldviews, commonly referred to as traditional knowledge (TK), which are different from the mainstream and include those from non-western cultures.

Many argue that the predominant discourses on knowledge and science show an inherent bias towards the Cartesian/modern worldview, preferring principles advocated by this stream of knowledge system to explain the underlying basis of all phenomena and actions. The relevance of TK knowledge systems has generally been considered obscure, irrelevant and/or exotic, despite the fact that almost 370 million indigenous people are estimated to live in 90 countries, with the population in some countries predominantly subscribing to traditional worldviews.¹ The colonization of indigenous territories (that gained momentum during the late fifteenth century) facilitated the rapid diffusion of the Cartesian

worldview, which was effectively supported by political institutions. The impact this has had on local cultures has been tumultuous.

Consider the following, in a timeline extending from pre-colonization to the present, while the global economy in terms of industrial output and services has increased (and become more technologically sophisticated), it has also resulted in a decline in the diversity of natural and social systems. To illustrate this, we will examine changes to indigenous populations and natural ecosystems in the last 1,000 years. This timespan can be divided here into three periods, the pre-colonial (before the late fifteenth century), colonial (late fifteenth century) and modernization/industrialization periods (late eighteenth century to mid- to late nineteenth century) period. During this 1,000-year period around 60 per cent of supporting ecosystem services such as fresh water, fisheries, air and water, and regional climate regulation were degraded or used unsustainably. And since then, in a period coinciding with the Green Revolution, ecosystems have changed more markedly than in any other period. For instance, it is estimated that we have lost 35 per cent of mangroves since the 1980s and 20 per cent of the world's coral reefs. An analysis by the Millennium Ecosystem Assessment (MA, 2005) reveals that those regions with highest GDP have also seen the highest transformation, and this includes urban centres, forest lands (led by temperate forests) and cultivated lands (MA, 2005). While this change corresponds to increased demand for food, fuel, timber, fibre and basic necessities due to increasing population pressure, it also corresponds to increasing conversion of land to croplands. Croplands expanded in Europe during the eighteenth century, and in the Soviet Union and North America during the mid-nineteenth century (during the industrial period), resulting in a 70 per cent loss of original temperate forests, grasslands and Mediterranean forests by the mid-twentieth century. Coupled with the intensive use of nitrogen fertilizers (especially since 1985), this has led to a consequent loss of diversity of life, threatening up to 30 per cent of mammal, bird and amphibian species with extinction (MA, 2005). The rate of known species extinctions during the twentieth century surpassed fossil records of extinctions (0.1–1 extinction per 1,000 species per 1,000 years) by a range of 5 to 500 times. Other services that have been widely compromised are capture fisheries and fresh water, estimated to be at levels insufficient to even sustain current demands (*ibid.*). These changes to natural assets are likely to significantly affect our productive capacities and the livelihood opportunities of communities dependent on these ecosystems and resources.

In the same vein, there has also been a decline in the diversity of cultures and use of traditional ways of managing natural resources. It is estimated that today around 3,000 languages are endangered, with about 250

languages becoming extinct since 1950 (UNESCO, 2009). It is believed that the population of indigenous people in the Americas during the pre-colonization period was about 8 to 140 million, 80 per cent of whom lost their lives during colonization, chiefly due to new diseases, with population regaining pre-colonization levels during the industrial period (Kolebka, 2007). Clearly, in the modern era, the world has become more homogenous – not just in terms of races but also biodiversity: for instance, of the over 50,000 edible plants in the world, currently only 15 species contribute to total food energy intake and three species (rice, maize and wheat) supply 60 per cent of that energy (Loftas, 1995).² This is believed to have affected the nutritional security of the foods we consume, and increased human vulnerability to natural and economic shocks to the supply of these limited numbers of foods (Johns and Stapith, 2004). Loss of resources also implies loss of cultures, as arts, crafts and livelihoods centred on the resource(s) are no longer relevant. The conventional quest for higher growth has brought forth a paradox: while GDP levels have gone up over the years, we also see that almost 40 per cent (of 179) countries do not show a corresponding improvement in overall Human Development Index (UNDP, 2007/2008). Sustained poverty in several regions of the world, inequities in economic growth and distribution, food insecurity, inadequate access to health and services, and unsustainable consumption and production patterns are some of the challenges that confront us.

Hence, it is clear that the visible progress of the human race has been to the detriment of the well-being of the world's productive biophysical systems and supportive socio-cultural systems. The relevant policy forums have taken cognizance of this issue, and the mid-twentieth century saw the coming together of various determined and concerned voices on how we use our resources,³ which eventually led to a rethink on how alternative worldviews could be included in development activities. The emergence and development of several multilateral environmental agreements are indicative of such a change in attitudes, whereby decision-makers recognize the need to put in place formal mechanisms to identify, encourage and share the benefits of traditional systems of managing human well-being.

It is in this context that this book is set. Traditional knowledge as a dynamic knowledge system distinguishes itself from mainstream knowledge in its methods of knowledge generation, transmission and the principles and values related to its use for various purposes. It advocates, in general, a respectful and reciprocal relationship with natural resources, including habitats and plants and animals that humans interact with. With this in mind, customary norms for use, governance and access to resources are evolved and adhered to. The Cartesian worldview considers nature and

its components as productive resources with marginal utility; clearly, there are epistemological and political tensions in the interactions between these different knowledge systems. To assess one knowledge system using parameters at total variance with its philosophy (for example, to assess TK using modern scientific parameters) is likely to lead to misplaced conclusions, and indeed this has often been the case. While it is true that today there are many initiatives that address the conservation of cultural diversity, whether this is a basis for us to enhance our well-being and meet objectives of sustainability is a question that requires further enquiry and action. There is certainly a need to develop appropriate methodologies to understand and assess TK, as we move to better integration between the two streams of knowledge, modern and traditional.

Traditional communities have, within the values of mutuality and reciprocity, obtained several services from the ecosystem – food (from agricultural activities and prey), water, medicine, crafts, spiritual satisfaction (e.g., sacred groves, totems, etc.), among others. To reiterate a point made earlier, since the sustained availability of these products and services was (and still is) crucial to their livelihoods and well-being, traditional communities have also devised ways and measures to maintain homeostasis and adapt to changes in the status of the services, based on their worldviews and ingenuity. Hence, such knowledge systems are constantly evolving, adapting to changing circumstances and realities, and contributing at the same time to ecological resilience. It bears noting that the approach of traditional knowledge is not one of linear causality (single problem–single solution), but usually attempts to include a multi-causality framework (multiple factors–multiple impacts) and synergistic effects. As mentioned above, more work needs to be done linking these different aspects of the knowledge systems and their utilities to the global good. We hope that this book will to some extent fill a gap in this literature.

To understand the significance of such knowledge systems, identify opportunities and challenges in their adoption through different models and experiments that have been initiated in various parts of the globe, and determine how they can possibly be integrated into a modern milieu we believe that a sectoral understanding of contributions of TK will be useful. Hence, the chapters have been organized into categories dealing with production activities/services (agriculture, health, water management, biodiversity, arts, economic development), adaptive capacity (environmental management, climate adaptation), learning and governance processes (communities, women, education, governance, ethics and equity, intellectual property rights), highlighting in the process how traditional practices relevant to a sector or theme have been influenced by

mainstream policies, and how again there is a move to include these practices in planning processes. All chapters are written by experts in their field, by virtue of their research interests, activities and in some cases by their belonging to traditional communities. Consequently they have an in-depth understanding of and perspective on the various challenges involved in the promotion of traditional knowledge especially pertinent to their sector.

Bertus Haverkort and Coen Reijntjes highlight the diversity and evolution of worldviews among knowledge communities and point out possible relations between different knowledge societies and sciences. Advocating the need for a healthy co-existence between dominant and other worldviews, they argue the need for fostering processes including appropriate higher education programmes that facilitate the co-evolution of different streams of knowledge and mechanisms that help address real issues using available tangible and intangible resources to achieve what they term “endogenous development”. This is a concept that the authors have been working on and promoting with local communities in different parts of the world. By illustrating the differences in pedagogical methods between indigenous and conventional education, Marie Battiste brings out the challenges faced by indigenous communities when they are exposed to an educational process that is insensitive to their cultural learning. She goes on to demonstrate how an integration of different worldviews is possible through an initiative of the Canadian Council of Learning – the Aboriginal Learning Knowledge Centre – that brings indigenous organizations together with academic institutions to foster aboriginal lifelong learning. Marie has been personally involved in the implementation of these programmes, and her chapter vividly captures challenges in bicultural education.

Equity within traditional societies is multi-layered. There is clearly a hierarchy within societies regarding the division of rights and obligations due various members of a community. Stephen B. Kendie and Bernard Y. Guri use the case of traditional leadership in Ghana to highlight the importance of traditional governance to achieve development objectives, while at the same time showing the challenges to and opportunities for these traditional structures when they operate within a broader national governance framework. The chapter captures both an insider and an outsider perspective. The role(s) and status of women in traditional societies is another issue of interest from the viewpoint of both equity and governance. Fatima Alvarez Castillo and Maria Nadja A. Castillo highlight the challenges women in such societies face both on account of their gender and the communities they belong to. They demonstrate that policy approaches suffer from “gender blindness”, which does not help in forming a desegregated view of the impacts of loss of resources or implementation

of policies on different members of a society. They go on to suggest some practical ways to address gender inequities. All this brings us to the question of what equity and ethics mean in traditional societies, and whether they can be integrated into the value systems of modern societies. Doris Schroeder brings out subtle and inherent intercultural contradictions, clarifying what ethics, exploitation and justice mean in different contexts during interactions between those who provide knowledge and resources and those who commercialize them. Kelly Bannister, Sarah A. Laird and Maui Solomon highlight a best practice case of intercultural research partnership, with the development of the International Code of Ethics by the International Society of Ethnobiologists (ISE), which is based on the concept of “mindfulness” promulgated by the late Darrel Posey. One of the most contentious issues on TK relates to ownership rights of the intellectual contributions from such knowledge systems. This, again, is an issue of governance, ethics and equity since traditional worldviews regarding the exclusivity of knowledge are steeped in a value system different from contemporary intellectual property rights (IPR) models. While clearly bringing out the inconsistencies relating to IP protection between the two broad value systems and exploring how these different worldviews can co-exist, Ikechi Mgbeoji makes an argument for the need for TK-rich countries to have regional initiatives and protocols to protect TK on terms they deem appropriate.

The management of ecosystems for survival and well-being has been pursued actively by traditional communities over generations. Management includes production activities such as agriculture, services for health and maintenance, regulation and adaptation activities such as water management, environmental management and adaptation to climate changes/variability. R. Rengalakshmi dwells on traditional land management and crop improvement practices, the roles of women in traditional agricultural practices and highlights global initiatives that seek to ensure sustainable agriculture by incorporating best practices from the chemical input-based agriculture and principles followed in traditional farming. In a similar vein, Oladimeji Idowu Oladele and Ademola K. Braimoh draw attention to traditional soil and land management practices that can be effectively deployed to mitigate the impacts of climate change on agricultural production. Gerard Bodeker examines health cultures around the world, and provides a comprehensive account of policies related to promotion of traditional medicine in certain countries, particularly in the tropics. He argues that traditional medicine practitioners should be recognized and provided with the necessary requirements to deliver health care to the populations they cater to, since they are the first points of health care contact for such peoples. Additionally, he also draws attention to the fact that traditional medicine can easily fit into public health care

programmes and into affluent sectors of lifestyle care. Using the case of traditional medicine, Unnikrishnan Payyappalli argues that in addition to focusing on traditional practices there is an urgent need to focus on the plight of the practitioners who constantly add to the body of traditional knowledge and practices. Guillen Calvo Valderrama and Salvatore Arico make a case for using traditional environmental management principles as the basis for territorial development. Environmental management spans all activities related to enhancing and maintaining the productive capacity of the ecosystems they are dependent on. Hence, depending on the ecosystem, various landscape-use decisions have been patterned that closely link to the development of subcultures (such as food cultures, etc.). Fikret Berkes's example of the relevance/appropriateness of Traditional Ecological Knowledge (TEK) and practices, based on his long interactions with the James Bay Cree communities, demonstrates the fact that there is much to be gained by including insights from knowledge-rich communities.

The chapter on biodiversity by Suneetha M. Subramanian focuses on traditional communities' use and management of biological resources and the challenges involved in ensuring the co-evolution of human cultures and biodiversity. While, on the one hand, it is well recognized that biological diversity is coterminous with cultural diversity, such resources and the knowledge associated with them were long considered the common heritage of mankind and hence appropriated by commercial and research interests for economic gain, without thought for the providers of the resource/knowledge as partners in the product development. Perhaps this can be considered one sector that has catalysed the articulate demonstration of the different concerns of traditional communities. A policy forum where discussions on issues related to resources and traditional knowledge are held is the Convention on Biodiversity (CBD). At the time of writing, intense negotiations are under way between various countries with the objective of finding a mechanism to ensure commercial access to genetic resources on equitable terms with all stakeholders, especially indigenous and local communities. Commonly referred to as principles related to access to genetic resources and fair and equitable sharing of benefits (ABS), the concept serves as a rallying point for discourses on equity and economic development. For this reason, readers will also note that the arguments of most contributors here are in line with CBD principles. Joaquim Shiraishi Neto, Noemi Miyasaka Porro and José Antonio Puppim de Oliveira use the example of the babassu breaker women in Brazil to clearly bring out the challenges faced by businesses and communities in the context of new definitions of community rights and regulations related to the access and use of biological resources in their custody. Rachel Wynberg highlights the various challenges that arise in decisions related to accessing shared genetic resources and traditional

knowledge and sharing benefits, through the example of the *Hoodia* case in Southern Africa.

Water is given a premium position, both in material and spiritual terms, in most communities, and hence its access and use are governed by norms and rules relevant to the ecosystem and culture. Alphonse Kambu throws light on community water management practices and international policies that aim to regulate the use of water. He concludes by calling for an expansion of participatory planning processes. This argument is strengthened by Ameyali Ramos Castillo, who presents a best practice case of urban water management in the San Cristobal region of Mexico, based on traditional principles of water use by the Chiapas.

That traditional communities can be considered the sentinels of the impacts of climate change is gaining global acknowledgement. Agni Klin-tuni Boedhihartono provides several examples of this in her chapter, elaborating on various adaptation techniques deployed by traditional communities, especially in areas vulnerable to droughts and floods. She also provides case studies of the successful integration of traditional and modern technologies in addressing problems impacting on human welfare, and calls for the sensitive integration and co-evolution of knowledge systems.

Kabir Bavikatte, Harry Jonas and Johanna von Braun critically examine the current trend to commoditize traditional knowledge as a means for securing economic development. Through relevant case studies, and by basing their arguments within current international negotiations within the Convention on Biodiversity related to fair and equitable sharing of benefits from commercial use of genetic resources, they identify how the best intentions of fairness and equity can be misplaced during implementation, in the absence of adequate consultations with traditional communities and failing to account for their priorities and definitions of TK.

Tom Lanauze, Susan Forbes and Maui Solomon narrate the renaissance of the Moriori community through sensitive research and documentation of its archaeological “art”, in which all of them are actively involved. The case study effectively captures some of the major challenges faced by communities on how their art forms, totems and sacred symbols have to be treated. In the process the authors also subtly bring out the tensions present between communities with varying cultural beliefs and political strengths.

Together, these chapters highlight the relevance of TK on two fronts. First, from an epistemological view, each chapter provides evidence that traditional communities generally base their decisions and actions on clear precepts and principles within an overarching cosmo-vision of the interrelatedness of all things in nature; secondly, each chapter clearly

brings out practical and ecologically sound ways in which communities have used their knowledge and skills to address their various needs. Another feature that emerges is that traditional worldviews are essentially holistic and encompassing in nature. This is evident from the similarity of arguments and principles for ensuring sustainable resource use that is described across the chapters. Similarly, human well-being is achieved through balancing various needs, from basic material needs to equity and spiritual needs: it cannot be assessed merely in terms of material possessions. Traditional land and resource use mechanisms across ecosystems are premised on achieving a balanced co-existence between humankind and nature.

An underlying challenge faced by traditional communities is the relegation by mainstream science and society of their rights to their traditional lands and the practice of their knowledge and beliefs and the increasing tendency to modernize (homogenize) at the cost of traditional values. On the global platforms, these issues are brought to the fore by institutions such as the International Labour Organization (ILO) and the UN Permanent Forum on Indigenous Issues (UNPFII). There is also a growing international consensus that such knowledge and the principles underlying the use of such knowledge and practices can be integrated into mainstream planning processes to bring about equitable development and sustainable consumption and production processes. On the other hand, it is also important to note that there are challenges both from within traditional societies and from outside. As several of the authors point out, inter- and intra-community conflicts are as damaging as conflicts with mainstream society.

The way forward

By bringing out best practices and challenges regarding the inclusion of traditional principles and practice within any given sector, the chapters emphasize two issues: (1) while there certainly are sector-specific measures that need to be taken, we also need to think beyond sectors because most practices extend beyond the cognitive boundaries of a single sector, (2) it is clear that in the development of policies related to any sector, the involvement of traditional communities, even in cases where it is of direct relevance to them, is generally a *reactive* process. More often than not, traditional communities, as a stakeholder group, have to struggle to make a point regarding opacity and non-inclusiveness of policy measures. The evolution of proactive institutions representing their interests, the increasing ability of members of such communities to articulate their views in the terms and language of mainstream society, and the role of

postmodern researchers in highlighting traditional practices without derision or romanticism have certainly enabled a realistic portrayal of the strengths and shortcomings of these knowledge systems. One of the overlapping conclusions in all the chapters is to encourage participatory planning processes and facilitate endogenous development pathways that allow people to choose from the abundance of tools and methods and from different knowledge systems, those that are appropriate to their well-being and that create minimum disturbance to the environment. It is a sign of the times that cultural legacies are now examined for their economic attribution. The reverse paradigm, where mechanisms for economic development also promote meaningful principles from our cultural legacies, are definitely welcome winds of change. Such processes also enable stronger linkages between different cultures, and it is to be hoped that they will also help us to secure the diversity and richness of the natural and human landscapes we have managed to create and evolve over time. We have done reasonably well over the years discussing these issues: it is now time to start acting on them effectively. We hope that this book will be the “spark” to initiate such action.

Notes

1. For more details, see UNPFII at <<http://www.un.org/esa/socdev/unpfii/en/history.html>> (accessed 20 July 2009).
2. For more details see <<http://www.fao.org/docrep/u8480e/u8480e07.htm>> (accessed 30 June 2009).
3. Highlighted by Rachel Carson (1962) in *Silent Spring*, The Club of Rome's *The Limits to Growth* (Meadows et al., 1972), the UN Conference on the Human Environment (Stockholm, 1972) and the work of ecologists researching traditional ecological knowledge and related areas, which culminated in the Rio Summit of 1992.

REFERENCES

- Carlson, Rachel (1962) *Silent Spring*. Boston: Houghton Mifflin; Cambridge, Mass.: Riverside Press.
- Johns, Timothy and Bhuwan R. Sthapit (2004) “Biocultural diversity in the sustainability of developing country food systems”, *Food and Nutrition Bulletin* 25(2): 143–155.
- Kolebka, Héloïse (2007) “La catastrophe démographique” (The demographical catastrophe), *L'Histoire* 322: 14–17. Available at <http://www.histoire.presse.fr/content/2_recherche-index/article?id=6492> (accessed 21 April 2010).
- Loftas, Tony (ed.) (1995) *Dimensions of Need: An Atlas of Food and Agriculture*. Rome: FAO.

- MA (Millennium Ecosystem Assessment) (2005) *Ecosystems and Human Well Being: Synthesis*. Washington, DC: Island Press, p. 31.
- Meadows, Donella H., Dennis L. Meadows, Jørgen Randers and William W. Behrens III (1972) *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. New York: Potomac Associates.
- UNDP (2007/2008) *Human Development Report*. New York: UNDP.
- UNESCO (2009) "Atlas of the world's languages in danger". Available at <<http://www.unesco.org/culture/ich/index.php?pg=00139>> (accessed 30 June 2009).

1

Diversities of knowledge communities, their worldviews and sciences: On the challenges of their co-evolution

Bertus Haverkort and Coen Reijntjes

Diversity of worldviews, ways of learning and ways of knowing

Human knowledge covers all aspects of human life such as: the notions on the origin of the cosmos, characteristics of territories, ancestral relations, food and health system, its institutions, skills and resources, its experiences and history, how to react to disaster and changing conditions, in all their dimensions, social, natural and spiritual, and at all levels: individual, family, community, society, world and cosmos. Only part of our knowledge is conscious, directly accessible and expressible in language. The other part is subconscious and intuitive, linked to our deepest source of knowledge and centre of life.

The conventional idea is that there is only one, superior way of knowing. That is rational and scientific knowledge, which is considered to be universally applicable because it is based on rational theoretical concepts and robust methods of research characterized by, amongst other features, objective methods, quantification, randomizing, replications, statistical analyses, logical reasoning and controlled experiments.

Yet, across the globe, people perceive reality in different ways, and the resulting worldviews lead to different ways of learning and different ways of knowing. Within the many distinguishable knowledge communities on the globe, people interact according to their perceptions, interpretations and lessons learned and between themselves come to a certain consensus about what is valid or acceptable knowledge. Therefore, knowledge sys-

tems, or sciences, have a plurality of dynamics and expression, which varies according to the cultural context and knowledge community in which they emerge. In this sense a specific science refers to a specific body of knowledge and its classification under a specific theoretical framework. It includes the production of knowledge based on a specific worldview and its general principles, theories and methodologies about which a specific knowledge community has reached consensus. The knowledge acquired and the resulting science is always limited and subject to modification in the light of new learning. Each science has its own history and is based on a specific worldview, way of learning, theoretical framework and social dynamics. There is no fundamental difference between the mainstream modern knowledge system or science and other traditional, indigenous or local knowledge systems, which therefore can be considered as belonging to science as well.

All knowledge may at best be seen as an approximation to truth within a specific knowledge tradition and therefore no knowledge can make exclusive claims on truth, or superiority. But, of course, there are major differences in the degree to which certain knowledge traditions have had the chance to develop into a robust science: differences in levels of investments in knowledge development and in the dynamics of knowledge communities, in the methods used, but also in the impact of its interaction with other knowledge communities and the degree of domination of, or suppression by, other knowledge traditions – all these account for differences in the rigour, vitality and comprehensiveness of existing ways of knowing and science.

Modern science

The roots of modern science go back to the ancient Greeks, who tried to understand reality by observation, common sense, and logical reasoning. Modern science emerged in Europe in the seventeenth-century scientific revolution, at the beginning of the Enlightenment. Knowledge is accumulated through a rigorous process of rational reasoning, logical thinking, empirical perception, measuring, quantification, and experimenting within physical, biological and social reality.

In modern science there is a certain order in the way reality can be understood: *the pyramid of science*. Mathematics is the very foundation of logic. It allows the ordering of quantitative data about matter, space and time, and movement. This is why mathematical knowledge is a precondition for understanding mechanics, mechanics for physics, physics for chemistry, chemistry for the science of living beings (biology) and biology

for human activities which can be understood by anthropology, psychology, sociology, history and economics.

This notion leads to the thesis that modern science is universal because of its robust and universal methods of research and rational and tested theories. The empirical research cycle is a methodological framework that combines induction and deduction by the formulation of researchable hypothesis based on theories, systematic collection and processing of data.

Postmodern science

The materialistic worldviews and mechanistic paradigms of modern science are still dominant in scientific communities across the globe, but from the beginning of the twentieth century they have been challenged by new scientific insights.

In addition to new insights that emerged from the early part of the twentieth century such as Relativity, Quantum physics and Chaos theory, the changing interpretations of ways of knowing from other cultures have influenced and diversified the western approach to knowledge. The recognition that knowledge is gained in a social learning process focused attention on the role of common people in knowledge accumulation. The postmodern sciences do not belong to one single scientific paradigm, do not accept one overall big theory, and can be based on very different epistemologies. They coincide in the fact that they transcend the modern notions of material reality and apply a wide variety of methods. They also agree on the idea that science is not able to provide the ultimate truth but may only provide an approximation to it. The interpretation of the world is no longer limited to mechanistic and materialistic paradigms. Alongside quantitative information, qualitative information and participatory research are also being used. Information is not only processed data, but also the outcome of a social learning process.

Traditional knowledge and science

A historical perspective

European sociologists and anthropologists have studied the worldviews and practices of different peoples from the colonial period of the sixteenth–nineteenth centuries. In the *Encyclopedia of the History of Science, Technology and Medicine in Non-Western Cultures* (Selin, 1977) Micheal Adas asserts that scientific curiosity was a major motive for the

European expeditions of discovery and conquest. Astronomers and cartographers often sailed with merchants for the purpose of testing new instruments, taking astronomical and nautical readings from distant latitudes, and charting unknown regions. These developments greatly enhanced European advantages over other peoples in navigation, trade and warfare by sea.

Ethnological studies became the basis for allegedly scientific and invariably hierarchic classifications of human types, usually termed races. The titles of studies by influential twentieth-century anthropologists, such as Levy Bruhl's *Primitive Mentality* and *How Natives Think* (1910 and 1923) and Levy Strauss's *The Savage Mind* (1966) illustrate the Eurocentric and racist position of scientists.

Science was considered to be value-neutral, objective in its procedures, privileging abstractions and reason, empirically grounded and transcending time and space, and therefore universally valid. These attributes gave confidence to practitioners and scientists that the spread of this epistemology – and the institutions and procedures associated with it – to the rest of the peoples of the globe was both beneficial and inevitable. It was seen as a strategy to rationalize the world and to banish superstitious or subjective, intuitively oriented epistemologies. Western science was also aggressively expansive and intolerant of non-western epistemologies – just as it has been of indigenous ways of knowing in Europe itself.

According to Adas, early nineteenth-century western science was inextricably linked to the great technological advances that led to the Industrial Revolution and the market-oriented, fossil-fuel intensive and interdependent global order and western hegemonic ideologies.

The process by which western science was diffused, however, and its impact on overseas societies differed greatly according to the timing of European interaction with non-western cultures, the colonizers' assumptions about the level of sophistication of indigenous technologies, and the actual attainments of colonized peoples in science and technology. In South Asia and China colonizers met densely populated areas with highly developed scientific and technological traditions, as well as small and scattered populations in Africa, America and Australia. The latter were barely integrated into the scientific network of the European metropolis, Great Britain. The pursuit of science in Latin America was stunted because of Spain's political and economical decline and its marginalization as a centre of scientific learning.

Nonetheless, in all the settlement colonies, indigenous systems for understanding, learning, teaching and experimenting were pushed to the periphery. Ethnologists studied indigenous belief systems and traditions for their folklore or antiquarian value, not because they had something to teach to the colonizers.

In India, China and the Middle East the European colonizers acknowledged some aspects of ancient civilization, such as writing, specialized intellectual elites and cities. This fed mutual curiosity and interchange. In China, the Jesuits studied astronomy, chemistry and medical techniques. In India, Portuguese and Dutch merchants consulted Indian physicians and accepted their superiority in treating some tropical diseases.

The Muslim leaders of the Middle East were ready to integrate western concepts in their knowledge, whereas the Chinese and Japanese resisted the introduction of alien concepts. Indian surveyors, engineers and medical practitioners received training and served in colonial administrations and worked for European firms. In much of the rest of Asia, sub-Saharan Africa, Latin America and the Pacific islands, opportunities for advanced training were minimal. In these areas, scientific work was the monopoly of the European colonizer.

Adas then concludes that racist assumptions about the mental capacity of the indigenous peoples ensured that little or no training in science was made available to them. This left most colonized peoples ill-prepared for the postcolonial world, where western concepts of science, law, nation-building and administration were still dominant and determined economic competition, development planning and intellectual discourse.

Traditional science in a present-day perspective

The Eurocentric vision of non-western ways of knowing has been challenged both by western philosophers of science and by scholars who have studied the basic notions of traditional science. Paul Feyerabend (1975) demystified the elitist position of scientists and went so far as to reject the existence of universal methodological rules. In his *Against Method* (1975) he asserts that objective science is an illusion, in that all observation, perception and interpretation are based more or less on deficient instruments and theories. What is considered to be a “*fact*”, is essentially an agreement by a group of scientists. There is not one universally valid method of research (“*anything goes*”) and the monopolistic claims to truth of conventional science are not justified.

Criticizing western scientific arrogance and scientific imperialism, Feyerabend notes that exporting western science and technology has not brought only well-being to indigenous peoples. He advocates a stop to the one-way traffic and proposes, rather, a mutual learning process. Peter Raine (2001) asserts that the modern myth of rationalism and objective thinking is becoming increasingly destructive for the majority of the world’s people. Cultural liberty, the right of each people to choose and create its own culture (World Bank, 2004), also means that each culture

has the right to understand the world through its own ways of knowing. In the end it is the responsibility of science to provide the knowledge needed for sustainable living for the culture it is serving. This further reiterates the argument “there is no sound basis for deciding that one worldview offers a superior reference point for ‘reality’ than another” (Nakashima and Roué, 2002). H. R. Gadamer (2001) concludes that there is a need to prepare pathways for science to accept the truth from other worldviews, which could result in a fusion of the horizons of human wisdom.

Regional studies on worldviews and science

A cross-cultural study of the characteristics of traditional knowledge and science in Latin America, Africa and India was carried out by the COMPAS programme. COMPAS (Comparing and Supporting Endogenous Development) is an international cooperative programme founded in 1995 by NGOs and universities from Africa, Asia, Europe and Latin America with some ten years of action research and learning from local knowledge. Based on years of experience with participatory development approaches, these organizations were convinced that a more culture-sensitive approach towards development was needed if the well-being of the people in different cultural and ecological environments was to be improved. They called their approach endogenous development. Initially they focused on case studies of farmers’ worldviews and indigenous knowledge relating to natural resource management as a starting point for participatory rural development. Later, emphasis was put on developing and testing endogenous development methodologies, and on understanding the diversity of knowledge and science.

The COMPAS programme is committed to support field programmes of Community Based Organizations (CBOs) and NGOs to develop, test and improve the endogenous development approach in dialogue with modern western-based science and in close cooperation with universities and research centres. Intercultural dialogues between CBOs, NGOs, universities and research centres across countries and continents are facilitated to enable systematization and co-evolution of knowledge and science.

The field activities of the 25 partner organizations include support to local people in their endogenous development processes. This is mainly development-based, though not exclusively, on the locally available resources, local knowledge, culture and leadership. Endogenous development is open to integrating traditional as well as outside knowledge and

practices. It has mechanisms for local learning and experimenting, building local economies, and retention of benefits in the local area.

Local and outside knowledge are always interacting, sometimes competing, replacing or confronting each other, sometimes as an intercultural dialogue. The COMPAS partners try to understand these interactions and influence them in such a way that social learning and co-evolution can take place.

The COMPAS partners have ongoing programmes in the domains of poverty reduction in marginal areas, participatory development, local management of natural resources and ecological processes, low external input and sustainable agriculture, biodiversity, and local health systems. These programmes build on local knowledge and enhance cultural diversity. Based on their experiences, the partners have concluded that the conventional approach to support development, consisting of transfer of technologies, knowledge and values from the modern world to the underdeveloped world, needs to be revised. Rather, traditional knowledge and values that exist within the communities, with their technical, social and spiritual dimensions, need to be accepted as the starting point for development, from within their own culture.

Between 1998 and 2006 more than 50 case studies were made to describe traditional worldviews, ways of learning and ways of knowing. These studies were not made by external scientists, but by local experts: CBOs or local NGOs, sometimes in cooperation with researchers from national universities. The case studies have been assessed by regional workshops and published in the Worldviews and Sciences series (COMPAS publications). These assessments revealed that traditional knowledge systems are very diverse in their specific expressions, but that they share a number of *common characteristics*:

1. The most important lesson is that traditional ways of knowing are **holistic**. Even with the immense diversity in the ways local knowledge is phrased and expressed, a common feature is represented by conceiving life in terms of three interrelated and inseparable domains: the natural world, the social world and the spiritual world (see Figure 1.1).
- Local knowledge in the natural domain includes knowledge about soils, plants, climates and animals, and has given rise to traditional land use, agricultural and health practices.
 - The social domain includes knowledge about local organization, local leadership and the management of natural resources, mutual help, conflict resolution, gender relations, art and language.
 - The spiritual domain includes knowledge and beliefs about the invisible world, divine beings, spiritual forces, ancestors, and translates into values and sense-giving and related practices such as rituals and festivals.

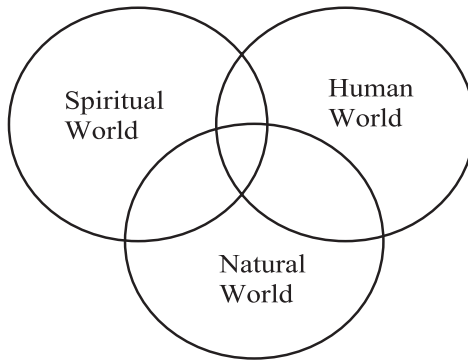


Figure 1.1 In the real world, the social, natural and spiritual worlds interact

An important feature is that none of these domains exist in isolation. In many traditional ways of knowing a notion of unity exists according to which the natural, social and spiritual worlds are considered to be inseparable and integrated. The following extracts include definitions of indigenous knowledge.

Indigenous knowledge represents the accumulated experience, wisdom and know-how unique to cultures, societies, and for communities of people, living in an intimate relationship of balance and harmony with their local environments. These cultures have roots that extend into history beyond the advent of colonialism. They stand apart as distinctive bodies of knowledge, which have evolved over many generations within their particular ecosystem, and define the social and natural relationships with their environments. They are based within their own philosophy and cognitive system, and serve as the basis for community-level decision-making in areas pertaining to governance, food security, human and animal health, childhood development and education, natural resource management, and other vital socio-economic activities. It is embedded in community practices, rituals and relationships. (Emery, 2000)

It is through the fine-grained interplay between society and environment that indigenous knowledge systems have developed diverse structures and content; complexity, versatility and pragmatism; and distinctive patterns of interpretation anchored in specific worldviews. Whereas knowledge is conceived in western culture as an abstract entity independent from practice (e.g. science as opposed to technology), such a compartmentalized view is alien to indigenous societies. It would be self-defeating to consider farmers' knowledge of rain patterns, soil types and crop varieties apart from the ways in which this information is put in practice in their fields. In other words, indigenous knowledge includes not only knowledge, but also know-how. Transmission is not only oral, but also in the context of doing. Finally, unlike (modern) science, indigenous knowledge does not separate the empirical and objective from the sacred and

intuitive. In indigenous societies, such boundaries are permeable. On the one hand, much knowledge of nature falls within the empirical realm. Hunters have detailed knowledge of the habitat, behaviour, diet and migration patterns of their prey. Farmers know how crops should be rotated to maintain soil fertility and which plant products have insecticidal or medicinal properties. This “science of the concrete”, however, blends imperceptibly into the metaphysical realm. For the hunter, the success of the hunt is as much due to assistance from spirit helpers, as it is to skilful tracking and steady shooting. The continued flow of water for the farmers’ field is attributed as much to their respect for the deity of the sacred headwater forests, as to the water-drawing properties of the trees themselves. The concrete and the spiritual co-exist side by side, complementing and enriching rather than competing and contradicting. (Nakashima and Roué 2002)

Further, the case studies revealed that TK systems tend to be:

2. **Non-dualistic:** Do not make a distinction between research subject and object, between mind and matter or man and nature.
3. **Dynamic:** Each knowledge tradition has its own ways of learning, experimenting, teaching and consensus-seeking.
4. **Informal:** Learning takes place as part of daily life. It takes place within families, within ethnic groups, in local communities as part of the daily activities. Lessons are not always documented or written down.
5. Sometimes TK may be **secret and or sacred** when certain knowledge is monopolized by certain traditional experts, such as healers, sacred persons, initiated persons.
6. TK systems are linked with **spirituality**. They involve both living and spiritual beings, while ancestors and persons yet unborn play a role. Sacred persons, places and books may be important sources of knowledge.
7. The notion of **time** is not seen as linear (going from the past through the present to the future). Time is often considered to be cyclic or spiralling. Times do not always have the same quality; they can be auspicious for certain activities at certain moments. Time-frames can involve very long periods.
8. **Methods** are not limited to rationality and quantitative or verifiable qualitative research. Intuitive and meditative methods, learning from the inside, by being part of reality, play an important role. Experience, participation, the insight of seers, communities of practice, councils of elders, dreams, initiation rites, the use of alcohol and stimulants, reflection and communication with ancestral spirits – all these can be important.
9. **Reciprocity** of humans with the natural and spiritual world is expressed in respectful rules, sacrifices and festivals.

These characteristics run close to a defining statement from the International Council for Science (ICSU): “Traditional Knowledge interweaves empirical, spiritual, social and other components. In general, by isolating elements from such a holistic worldview one runs the risk of misrepresenting both the elements and the whole” (ICSU, 2002).

Yet it was also found that, in most traditional societies, traditional knowledge and science have a marginal position. In all corners of the globe, the mainstream, modern sciences have gained the position of officially recognized science, which is taught at schools from primary education to university and forms the basis for formal research and decision-making at development and government levels.

Traditional worldviews and knowledge, however, persist in local communities and still today play a very important role in communal and individual decision-making about, for example, farming, health care, land use, local governance, family affairs, interpersonal relations and exchanges. Responses to the mainstream worldview and knowledge system varies.

The level of sophistication of certain knowledge is the result of a historic process – the degree of robustness or quality of the methods used to observe, interpret and assess a specific reality is not only the result of indigenous ingenuity. Historical processes have led to encounters between different ways of knowing. In most cases the most powerful political system dominated the indigenous systems and has led to conflicts and complementarity, to synergy and substitution.

Relations between different sciences and forms of knowledge

Interaction between different cultures may result from trade, migration, missionary activity, tourism, war or mass communication as well as from friendships and networks of solidarity and cooperation. The degree of reciprocal influence may vary greatly. In many cases, the more powerful culture dominates and, deliberately or by implication, has an influence on the less powerful culture.

When analysing the different ways in which sciences and forms of knowledge inter-relate it would be impossible to discuss them all. There is much variety in the way different positions of power and differences in the effectiveness of available technologies are being used, and differences, too, in the way people react to domination. Without claiming to be comprehensive, therefore, we have presented some of the possible relationships between different forms of knowledge in Table 1.1 (Haverkort, 2006).

Table 1.1 Typology of relations between different forms of knowledge

Type	Characteristics	Examples
1. Clash or hostilities	Violent occupation, wars, resistance, fights between civilizations.	Fights between religions or political lines; independence or resistance movements; terrorism and anti-terrorism.
2. Going underground	The suppressed knowledge continues to exist but not openly. In order to avoid repression, hostilities or rejection, local knowledge continues in a clandestine way.	Many local knowledge systems: shamanism in Sri Lanka; spirit mediums in Africa; traditional leaders in the Andes.
3. Parallel knowledges	Different ways of knowing co-exist openly without interaction.	Conventional medicine and Ayurvedic medicine co-existing in India; Islam, Christianity and other religions co-existing in Europe; conventional and bio-dynamic or organic farming; voluntary isolation from certain aspects of international exchange of a country like Bhutan.
4. Utilitarianism and selective inclusion	Elements of local knowledge which can be scientifically understood or validated are accepted for enhancing the stock of scientific knowledge; may imply assessment of local knowledge by outside scientists and lead to <i>ex situ</i> conservation of local knowledge.	Aspirin is made, based on a local practice already used by the Ancient Egyptians and Greeks, without their knowing its active ingredient. Local medicinal practices for malaria treatment; adoption of Arab mathematics and Chinese gunpowder by western scientists.
5. Substitution	The dominant system forces the introduction of exogenous concepts to substitute local traditions.	Missionary activities to substitute traditional religions, privatization of land, introduction of European languages as national language, exogenous rule of law to replace traditional juridical systems, republican and democratic systems of governance.

Table 1.1 (cont.)

Type	Characteristics	Examples
6. Paternalism	Traditional knowledge is a starting point but must be “updated” by scientific contributions.	Transfer of technology in education, health and agricultural extension programmes.
7. Syncretism	The dominant and dominated systems merge and incorporate each other’s rituals, beliefs and knowledge in such a way that <i>both</i> systems believe that their knowledge is the one that is dominant.	European knowledge with Cartesian knowledge and Catholicism merged with Andean or Maya beliefs, health practices and rituals.
8. Complementarity	Two different ways of knowing using mechanisms of exchange and mutual learning aiming at complementing each other.	Foundation for the Revitalization of Local Health Traditions, an NGO in India exchanging and comparing health care traditions: folk knowledge of rural people, classical Indian (Ayurvedic) sciences and western biomedicine.
9. Romanticism	Local knowledge is romanticized and considered basically “good” and should have the right to remain as it is.	“Going native”, rejecting possible contributions of global science; enhancing capacity of resistance of local actors.
10. Co-evolution	Different forms of knowledge evolve simultaneously, in the first place on the basis of their own dynamics (revitalization) and partly as a response to their interaction/ dialogue with other forms of knowing.	Experiences of COMPAS partners in Europe (co-existing farming styles), Africa (Ghana), Bolivia (Picads). Revitalization of endo-sciences and inter-scientific dialogues in CAPTURED program.

Dealing with traditional knowledge in international contexts

In the contemporary international context, a number of different approaches are being used in dealing with TK. It is obvious that some of these approaches may contradict each other. In specific countries or areas these approaches may be used at the same time, but by different actors.

Substituting TK with modern knowledge

In former colonial countries a deep schism remains to this day between western and indigenous knowledge. The former is still considered universal, progressive and the latter as limited in its application, static and generally retrogressive. Thus a false dichotomy still exists between indigenous traditions that seek to come to terms with the present, and an alien super-imposition from the West that, for hegemonistic purposes, imposes its own modern cultural constructs as the universal strategy for modernization. This approach extends to systematic efforts to replace indigenous ways of knowing by western knowledge and science. As a result, the majority of schools, universities and research programmes in non-western countries have western-based curricula and research approaches.

Documentation of indigenous knowledge as objects of study

Anthropological research and a number of current initiatives (UNESCO, World Bank and Nuffic) have *documented* the scope and incidence of indigenous knowledge. This has resulted in publications such as the database for best practices of indigenous knowledge (UNESCO/Nuffic and World Bank) (Nuffic and MOST, 1999, 2002) and the *Encyclopedia of the History of Science, Technology and Medicine in Non-Western Cultures* (Selin, 1977). These databases and this encyclopaedia can be looked upon as *ex situ* information systems. They generally study and describe indigenous knowledge (IK) from the perspective of western researchers or donor agencies.

IK generally is not studied as a holistic system but as a set of practices of which only the empirical aspects are of interest. Often there is no interest in the spiritual dimension of IK, which is seen as unscientific or even as superstition. IK is assessed on the basis of scientific criteria that are fundamentally different from indigenous criteria.

Complementing TK with western knowledge

A number of development programmes seek *complementarity* between IK and external knowledge (examples are: ILEIA, the information centre

on Low External Inputs and Sustainable Agriculture, and ISWC, the programme on Indigenous Soil and Water Conservation) These programmes have shown to be effective to the extent that complementarity and synergy can indeed be realized (Reijntjes et al., 1992; Reij et al., 1996). However, in general, development programmes are interested only in empirical knowledge. Knowledge related to the spiritual domain, religion, beliefs, values, rituals, ceremonies, spiritual technologies and so forth, is not usually considered of interest to development activities.

Revitalizing and strengthening IK

In a number of situations, indigenous people and indigenous experts choose to “re-indigenize” their societies and give priority to *revitalizing and strengthening their indigenous knowledge*. To quote Tuhivai Smith, a Maori, “Although communities have a critical perspective of universities and what they represent, at the same time these same communities want their members to gain western educations and high-level qualifications. But they do not want this to be achieved at the cost of destroying people’s indigenous identities, their languages, values and practices.”

Communities therefore see intracultural learning and endogenous development as a necessary prerequisite and first step towards intercultural dialogue and sustainable development. These initiatives aim at strengthening the dynamics of indigenous knowledge systems. Such initiatives take the indigenous perspective as a starting point, look at IK from an indigenous perspectives and aim for endogenous development. Such initiatives start with understanding and appreciating the culturally embedded worldviews, ways of learning and theoretical frameworks of peoples. Experience indicates that such an approach culminates in revitalizing and enhancing indigenous knowledge and value systems (Haverkort and Reijntjes, 2006; Smith, 1999; Rist, 2002; Coetzee and Roux, 1998; Emalgit, 2004; Wiredu, 1998). This approach is generally called endogenous development (ED).

Supporting endogenous development

Endogenous development refers to development that is mainly, though not exclusively, based on local knowledge, skills, values, leadership and the way people have organized themselves. External knowledge and resources are often used as complements to local resources. It has mechanisms for local learning and experimenting, building local economies and retention of benefits in the local area. Endogenous development

does not imply isolation, nor does it limit its attention to local processes; it may use opportunities provided by globalization.

Thus supporting endogenous development does not imply a narrowly defined development approach: endogenous development seeks to address local needs and contradictions, to use local potential to enhance local economies and link them to international systems with optimal terms of trade. It supports the co-existence and co-evolution of a diversity of cultures. Intercultural research, exchange and dialogues can be helpful in finding the most desired development path in specific contexts, building on accumulated experience.

Indigenous knowledge and practices may not have all the answers to present-day challenges. It may even have certain limitations or setbacks. But farmers and others in the South take decisions and define their relationship with outside knowledge and agencies based on their own culture and values. Therefore, for development organizations to be effective in supporting endogenous development they need to understand the basic characteristics and acknowledge the existence of local forms of knowledge and the worldviews that these are based on.

The COMPAS partners started their work supporting endogenous development by carrying out systematic activities for learning with and from rural people about their knowledge, practices and worldviews. Subsequently, initiatives have been taken to test, adapt and improve traditional practices and to enhance endogenous development. Networking and training have taken place and a number of workshops and publications have led to a further systematization of the experiences so far.

In the course of these processes the COMPAS partners have identified the following components for supporting endogenous development:

1. Building on locally available resources;
2. Objectives based on locally felt needs and values, acknowledging the interests of different social categories;
3. In situ reconstruction and development of local knowledge systems: understanding, testing and improving local practices, and enhancing the dynamics of the local knowledge processes;
4. Maximizing local control of development;
5. Identifying development niches based on the characteristics of each local situation;
6. Selective use of external resources;
7. Retention of the benefits in the local area;
8. Exchange experiences between different localities and cultures;
9. Training and capacity-building for rural people, development staff and researchers;
10. Networking and strategic partnerships;

11. Further understanding of systems of knowing, learning and experimenting.

Learning together

The experiences of organizations that support endogenous development indicate that this approach can lead to empowerment, enhanced self-awareness of the local population groups and a better use of locally available resources.

Understanding endogenous development as a process of collective learning among professionals, researchers and local people is a challenge to conventional forms of research and training. It requires a critical reflection on the policies for research and education and on the institutional arrangements. It implies a change in the idea of “knowledge transfer” into one of “intra- and intercultural communication and learning together”. This means that scientists and indigenous people can accept that they do not necessarily have the same worldview, learn in the same mode or have the same way of organizing their knowledge. The extract below highlights some of the challenges faced by the knowledge communities.

In many communities, there is an urgent need to reconsider the articulation between exogenous and endogenous knowledge flows and the pedagogical methods that guide these processes. Actions are urgently needed to enhance the intergenerational transmission of local and traditional knowledge, in order to empower communities to build their own sustainable futures upon both endogenous and exogenous knowledge. Greater emphasis must be placed on levelling the playing field and appreciating traditional knowledge not as sets of information but as integral components of other living and dynamic societies and cultures. Traditional knowledge conservation therefore must pass through the pathways of conserving language (as language is an essential tool for culturally-appropriate encoding of knowledge); ensuring knowledge transmission; strengthening the control of traditional societies over the processes of change that affect them; and conservation and continued access to the environments upon which their way-of-life depends. We must enhance and harness knowledge and our scientific capabilities (modern as well as traditional) to develop sustainably. (ICSU, 2002)

The intra- and intercultural learning processes can be enhanced through appropriate platforms that allow local and indigenous people to meet with development workers or researchers. One such platform is CAPTURED, a programme between universities, research centres and

rural communities in Ghana, Bolivia and India. Participating institutes are the University for Development Studies (UDS), the Universidad Mayor de San Simon (UMSS) and the Foundation for the Revitalization of Indigenous Health Traditions (FRIHT). These three institutions are also participants in the COMPAS programme. The aim of the programme is to strengthen the institutional capacity of higher education establishments in the South so that they can carry out strategic research, development and capacity-building programmes to support endogenous development.

Three steps are envisaged for achieving the programme's objectives. First, activity is directed to enhance the capacities of the three lead agencies. Curricula are being developed and undergraduate and postgraduate students are being trained in the theories and methods of endogenous development. A start has been made in conducting research and elaborating theories that build on local and indigenous knowledge. Newly trained staff are to be employed by the universities to increase the human resources for education and research. In the second phase, the focus will shift to outreach, enhancing the capacities of 13 other universities in the regions. The third phase will involve deepening and broadening the endogenous development activities within universities and research institutes.

Conclusion

The challenges presented in this chapter are to acknowledge the existence of a wide range of traditional and conventional knowledge communities and to see this diversity as an asset for the possibility of joint learning about different worldviews, ways of learning and ways of knowing. To this end, traditional and conventional knowledge communities are invited to reflect on their own dynamics. In this intra-science process the knowledge communities can take initiatives to revitalize and improve their own knowledge system. They can choose the extent and the modalities to link with other knowledge communities for intercultural exchange and joint learning.

Research and field experiences have revealed that the approach of intra- and inter-scientific dialogues has a good potential. However, these approaches require specific policies, methods for development, learning, training research and theory building that enhance diversity, revitalization, joint learning and the co-evolution of different ways of knowing. Two conditions have to be fulfilled for successful co-evolution: acceptance of diversity and symmetry in accessing resources, respect and

power. In this respect, mainstream science and traditional science have different positions and will have to give and take differently.

REFERENCES

- Coetzee, P. H. and A. P. Roux (1998) *The African Philosophy Reader*. London: Routledge.
- Emagalit, Zeverin (2004) "Contemporary African philosophy". Available at <<http://faculty.msmc.edu/lindeman/af.html>> <<http://www.compasnet.org>> (accessed 19 April 2009).
- Emery, A. R. (2000) "Guidelines: Integrating indigenous knowledge in project planning and implementation", KIVU Nature Inc.
- Feyerabend, Paul (1975) *Against Method: Outline of an Anarchistic Theory of Knowledge*. London: Humanities Press.
- Gadamer, H. R (1975) *Truth and Methods*. London: Sheed and Ward, quoted in Peter Raine (2001), "The shaman and the ecologist", *Inter-Culture* 140.
- Haverkort, B. (2006) "Dialogues within and between different sciences: issues and strategies for endogenous development", in B. Haverkort and C. Reijntjes (eds), *Moving Worldviews: Reshaping Sciences, Policies and Practices in Europe*. COMPAS Series Worldviews and Sciences. Leusden: ETC/COMPAS. Available at <<http://www.compasnet.org>> (accessed 19 April 2009).
- Haverkort, Bertus and Coen Reijntjes (eds) (2006) *Moving Worldviews: Reshaping Sciences, Policies and Practices in Europe*. COMPAS Series Worldviews and Sciences. Leusden: ETC/COMPAS. Available at <<http://www.compasnet.org>> (accessed 19 April 2009).
- ICSU (International Council for Science) (2002) "Science, traditional knowledge and sustainable development", ICSU Series on Science for Sustainable Development No. 4. UNESCO Local and Indigenous Knowledge Systems (LINKS) Programme. Available at <http://www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/65_DD_FILE_Vol4.pdf> (accessed 19 April 2009).
- Nakashima, D. and M. Roué (2002) "Indigenous knowledge, peoples and sustainable practice", in T. Munn (ed.), *Encyclopedia of Global Environmental Change*. Chichester: John Wiley & Sons.
- Nuffic (IK-Unit) and MOST (1999 and 2002) "Best practices on indigenous knowledge". Available at <<http://www.unesco.org/most/Bpikpub2.pdf>> (accessed 19 April 2009).
- Raine, Peter (2001) "The shaman and the ecologist", *InterCulture* 140.
- Reij, Chris, Ian Scoones and Camilla Toulmin (eds) (1996) *Sustaining the Soil: Indigenous Soil and Water Conservation in Africa*. London: Earthscan.
- Reijntjes, C., B. Haverkort and A. Waters-Bayer (1992) *Farming for the Future*. London: Macmillan.
- Rist, S. (2002) *Si estamos de buen Corazon, siempre hay produccion*. La Paz: Ed. Plural.
- Selin, H. (1977) *Encyclopedia of the History of Science, Technology and Medicine in Non-Western Cultures*. Dordrecht: Kluwer.

- Smith, L. T. (1999) *Decolonising Methodologies: Research and Indigenous Peoples*. London: Zed Books.
- UNDP (2004) *Human Development Report 2004: Cultural Liberty in Today's Diverse World*. New York: UNDP.
- Wiredu, K. (1998) "Towards decolonizing African philosophy and religion", *African Studies Quarterly, The Online Journal for African Studies* 1(4). Available at <<http://web.africa.ufl.edu/asq/v1/4/3.htm>> (accessed 19 April 2009).

2

Indigenous knowledge and indigenous peoples' education

Marie Battiste

How do we learn? We learn through dreaming. Earth is a good place for dreaming. It is why our spirits came here.

Tsistsistas Elder

Lifelong learning, rather than education, has been the heart and spirit of traditional knowledge (TK) in indigenous societies and civilizations.¹ Traditional knowledge is systemic and holistic, covering both what can be observed and what can be thought; it is tangible and intangible, material and cognitive. It is a complete knowledge system with its own concepts of epistemology, philosophy, and scientific and logical validity, not a collection of stories, ceremonies and objects (Daes, 1994: para. 8).

Every indigenous people has its own knowledge, learning processes and assets. Each group develops expertise in their ecosystem that spans trans-systemic approaches to knowledge, which animate and manifest in languages, communication forms, ceremonies and teaching. Learning through the transmission of indigenous knowledge² (IK) between or among generations over a lifetime is a shared learning process, reflected in the education of the next generation. To understand these learning processes and their contributions, one must engage in the complex task of learning the indigenous traditions and the languages that inform them.

Today, as in past centuries, learning and the control of IK, whether by families, communities or initiated societies within exclusive knowledge societies,³ have gone hand in hand with widespread inequality, exclusion and conflict, exemplified in aborted achievements in schools, lack of

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self-esteem, fragmented identities and self-awareness, and underdeveloped capacities.

The European, settler majority has either disregarded IK and its teachings as invalid epistemologies or sought to appropriate IK in order to receive monetary or professional rewards. Disrespect for indigenous epistemologies and theft of knowledge and its products have alienated indigenous learners from formal learning and contributed to a legacy of mistrust between institutions of higher learning and indigenous peoples, their governance bodies and their institutions of learning. Thus, formal education has not been what Stonechild (2006) calls “the new buffalo” (p. 1) for First Nations, Métis and Inuit peoples or any indigenous peoples around the world. To make the necessary connections and applications with indigenous learning, processes with conventional learning programming will require a respectful interchange and knowledge translation. This educational transformation does not invite us to do something easy; on the contrary, it summons us to do something difficult. Yet it asks us to create a better learning system for future education.

Strained relations between researchers and indigenous peoples have resulted in notable absences in academic works. For example, relatively little is known about indigenous science or the principles, practices and knowledge held by kin, places and languages. Indigenous science remains a neglected field of knowledge and enquiry, and the teachings of indigenous science have not been applied to conventional education. Likewise, the indigenous humanities have been forced into Native Studies, which has forged its traditions from history and anthropology, leaving their humanities as another subset of marginalized disciplinary knowledges. Therefore, indigenous children and youth do not see their own epistemologies reflected in science or humanities curricula.

Thus, in order to identify, comprehend and nourish linkages between indigenous science and conventional systems of scientific research and knowledge, scholars of diverse professional, scholastic, racial and cultural backgrounds must engage in a respectful interchange and agree on the principles for knowledge translation and dissemination. This proposed educational transformation obligates us to build an environment where indigenous elders, old people, healers and knowledge keepers feel safe and proud (Ball and Pence, 2006). We must do this if we are to re-establish relationships founded on mutual respect and trust; promote accountability in federal tri-council policy and practice; and create a better learning system for the schools of the future.

This chapter argues that it is possible to erect the scaffolds to support respectful knowledge exchange and learning “all ways” (Ball and Pence, 2006: 83). The evidence is presented in three parts. First, it is argued that IK must be placed at the centre of discussions of epistemologies, prac-

tices and policies that enable indigenous lifelong learning. Secondly, the ethical and respectful application of IK in families must be examined. This information is shared by elders and its activation gives our children and youth the power to seek out, through observations, ceremonies and dreams, the learning spirits that reside in spirit memories tied to the land (McNab, 2007). The author supplies knowledge shared in Mi'kmaq communities concerning childrearing to illustrate her discussion of indigenous childrearing practices. Indigenous languages enable the transmission of knowledge from elders to families and to children. Therefore, without language proficiency, it is impossible for families and communities to sustain IK for the next seven generations (Henderson, 2000). Thirdly, and finally, this contribution highlights the challenges that lie ahead. Eurocentric epistemologies continue to hinder the advancement of scholastic work in the indigenous humanities and sciences. Formal schooling is still seen by immigrant or settler policymakers, teachers, other practitioners, professionals and academics as superior, objective and rational in comparison with indigenous epistemologies informed by observation, intuition and storytelling, dubbed to be of less academic value to university-level pedagogy, curriculum and training. In the university, "indigenous people can access what is available, but they cannot change the existing knowledge base" (Battiste, 2005a: 224). Therefore, the challenge for the twenty-first century involves the raising of IK to its rightful and equal place in the academy. Without IK, language maintenance and educational self-determination, educational priorities for indigenous peoples will continue to remain neocolonial and their impact will continue to be negligible.

Traditional knowledge in Canada and the United States of America (USA)

Before contact with the colonizers, the sharing of IK constituted education among indigenous nations or peoples (either the First Nations of Canada or the First Americans of the USA). A comprehensive, lifelong process of learning defined the indigenous educational process. Learning was the emphasis of IK, guided by the land and what it offered as opportunities, and by the family's, community's and elders' teachings. The stories shared by the land and elders were nourished by the extended family. These stories were both practical and mystical, blending shared knowledge into an integrated whole. It also generated multi-language competences among indigenous peoples.

Where IK survives, in its many processes and forms, it is transmitted primarily through symbols, performance and oral traditions. The oral and

symbolic were transmitted through the structure of indigenous languages and performance in ritual and ceremonies, passed on to the next generation through oral traditions in modelling, ceremonies, problem solving and animation, rather than through the written word. IK is typically embedded in the cumulative experiences and teachings of indigenous peoples rather than in a library or in journals of applied research. Because of its practical and collective nature, the diverse elements of IK can only be fully learned or understood by means of the traditional pedagogy of those who share this knowledge. And knowledge exchange and sharing is accomplished through apprenticeship, ceremonies and practice (Daes, 1994; Battiste and Henderson, 2000). These processes underscore the central role of ecology, language, cognitive abilities and livelihoods.

IK discloses how peoples live with one another, how they treat each other and how the world fits together. The lessons of IK are embedded in the structure of indigenous languages. The full range of human experience and learning processes that are critical to the survival and flourishing of any indigenous people are embodied in indigenous languages and ceremonies. These performance-based processes provide direct and powerful ways of understanding IK. They are the critical links between sacred knowledge and the skills required for survival.

Analysis of indigenous language, from an internal perspective rather than an external linguistic analysis, offers a first look at IK, revealing the deep cognitive structure of worldviews and philosophies. For example, most indigenous languages are verb-based languages that focus on the processes, cycles and interrelationships of all things and reveal how everything is connected (Battiste and Henderson, 2000). Unlike English and its related languages, which are noun-based, indigenous languages identify objects and concepts in terms of their use or their relationship to other things and do so in an active process. This is revealed by the Lakota concept of *nigila* or “that which dwells in everything” and the concept of *mitakuye oyasin* or “I am related to all that is” (Dooling and Smith, 1989: 171).

Since languages embody the lessons, knowledge and relationships that constitute the cognitive-spiritual powers of groups of people in specific places (AFN, 1992: 14), they link indigenous peoples with their ecosystems. Comprehension of ecosystems in indigenous languages is key to indigenous science. Knowing an ecosystem is not a knowing derived from the need to control, but rather a knowing motivated by the need to care for other people and the environment as well as the desire to ensure reciprocity between all beings in creation. Fundamental to IK is the awareness that beyond the immediate sensible world of perceptions, memories, imaginations and feelings lies another world from which knowledge, ability, or capacity is derived and on which indigenous peoples depend to

survive and flourish. The complementary modes of knowing and caring about the sensory and the spiritual realms inform the essence of IK. Without indigenous languages, lessons and the knowledge become difficult, but some can be relearned from the ecosystem by traditional ceremonies.

Indigenous languages speak to spiritual identity and indigenous humanities, the foundations of indigenous lifelong learning. They provide the deep cognitive bonds that affect all aspects of indigenous life. Through their shared language, indigenous people create a shared belief about what constitutes proper action. Sharing these common ideals creates the collective cognitive experience of indigenous societies, which is understood as IK.

The IK processes of cognitive transmission are intimate, oral and performance-based; they are usually not accomplished through reading or classroom lectures. IK is shared by language, oral and written traditions and ceremonies. In these three media are the lessons and knowledge that form the cognitive-spiritual power of a certain group of people in a specific place, passed on by the elders to ensure survival.

Academics trained in Eurocentric universities often ask what constitutes IK. To most scholars, IK is an alien concept. IK has to be understood as a trans-systemic source of knowledge. It is not a unicultural knowledge system (Davies, 1999). However, indigenous peoples view their knowledge as distinct and separate from European Knowledge (EK). IK comprises the complex set of languages, teachings and technologies developed and sustained by indigenous civilizations.

In IK, learning is continuous throughout life. IK emphasis in learning is on wholeness and relationships. Specifically, in its emphasis on the totality it teaches us our responsibilities to the ecosystem and obligations to our families, clans, communities, nations and confederacies. Learning about our responsibilities is inherent in the process of human development, built around complex sets of learning process developed around specific conditions of populations and communities indigenous to a particular environment area (Battiste and Henderson, 2000). Learning is built around the sharing of IK and the value of relationships.

IK is also based on kinship learning and implies a distinct form of responsibilities. Everyone has the right to give and receive, according to his or her choices. Those who give the most freely and generously enjoy the strongest claims to sharing, and these claims are directed to their relations, not to an outside community, state, or nation. Instead of an artificial state, indigenous orders recognize a web of reciprocal relationships among individuals. For most indigenous societies, a human being cannot exist without a family or a kinship regulation. For example, among Mi'kmaq there are few "strangers", since "guests" within their territory

were typically assigned to a local family or clan for education and responsibilities. Such kinship is a necessary part of indigenous peace and good order. Within the vast fabric of families, clans, nations and confederacies, every person stands in a specific, personal relationship to the other. This relationship begins well before birth.

From the time a person is conceived, there is an acceptance that the child's spirit developed in the spiritual realms, usually after many other incarnations. Mi'kmaq address the life form as *mijuaji'j* or "child". Each child is considered to have special gifts and each child will receive the protection of many significant others who will nurture the child through its growing years. Kinship relations assist children to form their consciousnesses and gifts. The extended family offers support and facilitates the transition of the child into the community and the transmission of heritage. There is no notion of a *tabula rasa*, or blank slate, from which the person will grow. Rather, IK accepts that each person has a unique spirit that comes into an embodied form. The full acceptance that babies have feelings and attitudes that are vibrant and rich towards life is evident in the verbal banter the community engages in with newborns, adults and guests. Even though the children may not have the vocabulary or the control of the language to express their attitudes and feelings, Mi'kmaq provide them with an awareness of feelings and attitudes when they talk to them. Children soon come to know all the people around them and look to them for love and guidance (Battiste, 1997).

Language acquisition is the traditional way for the transmission of knowledge. It develops in many stages and processes, usually conceived in seven-year cycles. The language-acquisition process of a Mi'kmaw child begins in a rich language environment of gregarious people. Mi'kmaw society is an extended community of relations in which dialogue and extended family are valued and respected. Children grow in an adult-centred world in which they are the objects of everyone's attention. At all gatherings and at all events of the Mi'kmaw people, one will find elders and children. They are ever-present, talking, listening and participating in their community in the context of Mi'kmaw culture. The Mi'kmaw language is rich in prefixes and suffixes that enable a verb to assume multiple meanings. Since the language is descriptive, it encourages a wide scale of perceptual observations, which are reflected in words that can be made into verbs or adjectives, seemingly to describe everything. The Mi'kmaq combine a multiplicity of perceptual details to create lively dialogues full of laughter and insight, with the descriptive nature of the language making teasing and storytelling especially vivid.

Indigenous IK reveals that learning environments are dispersed throughout daily work and roles and responsibilities. IK has the capacity to renew itself through daily practices facilitated by families and certain

teachers who act as animators, empowering or harnessing learning energy. IK is manifested in diverse ways in the concept of indigenous learning. Indigenous learning is based on the concept that the ability or competency in learning comes from learning spirit(s), gifts or visions. The process of becoming mentors or teachers is arduous, involving an encounter with the learning spirit(s), a quest for a vision and an ongoing commitment to intense personal growth through learning, ceremonies and knowledge translation and exchanges. Many have testified that engaging these learning spirit(s) and rituals often produces dramatic results in a short period of time for a person. Elders attest to the learning cycles of children who learn quickly when they are interested and can in a short time commit the knowledge to memory that will last them a lifetime.

Under the kinship system, children are given some freedom to explore the households and then the different parts of the ecosystem, and a wide array of experiences and nurtured independence help them to learn. Children's patterns of visiting reinforce relationships and bonding, and expose them to multilingual environments, which they are expected to master over a lifetime. In the Mi'kmaw transmission model, children establish who they are and what values they embrace through the core of adults, families and older siblings with whom they share face-to-face encounters. Every person is a teacher and each adult, a mentor. This reinforces and confirms relationships. A child will grow up in this adult population with laughing, teasing, sharing, enjoying, and all the while the child is learning about his or her heritage, community and language by listening, hearing and being constantly engaged in conversation. The child will be protected, looked after and given attention, hugged or simply sniffed on the head, which is a distinctive Mi'kmaw sign of affection.

In exploring and harvesting the ecosystem, some adults or older siblings are always responsible for the children and are given instructional roles. Adults and older siblings are expected to model proper behaviour. Children come to know about the complexities of their environment as well as the importance of responsibility and cooperation. Each person learns their responsibilities to other life forms and to the ecology of the whole.

As Mi'kmaw children begin to turn into adolescents, new teachings begin. The teachings focus on dignity and integrity. These discussions revolve around how to live in a good way, what Mi'kmaq consider right and wrong, and what are considered appropriate and valued community norms and behaviours. Children are constantly reminded to respect and to respond to the feelings of all of their kin. They are praised for showing sensitivity and generosity to others; they are teased for being self-

centred, rude, or acquisitive; but they are rarely punished. Childhood experiences of intense collective support and attention combine with self-discipline and responsibilities to create a personality that is cooperative and independent, self-restrained yet individualistic, attuned to the feelings of other people but non-intrusive. At the same time, the Mi'kmaq are left free to discover their gifts and talents and choose their courses of action by their personal choices and integrity. This kind of personality is compatible with the kind of social order that strives for consensus but tolerates a great deal of diversity and non-conformity (Little Bear, 2000). Mi'kmaq assume that children will have internalized these ideals well before adolescence, which is a time when their children begin to exercise personal choice. When a Mi'kmaw adolescent does something he or she should not do, the uncles, aunts and godparents intervene to clarify values with the adolescent.

In these learning processes, each person has both rights and advantages from being part of the whole, but also has obligations and responsibilities that define membership and citizenship. Further responsibilities build on relationships to oneself and to others who are embraced in the whole. The individual is responsible for recognizing and developing talents and gifts, and for cultivating and mastering these gifts in order to build a secure foundation. Thus, they attain self-realization. As one understands oneself – spiritually, mentally, physically and emotionally – one becomes centred in the whole and focused on one's learning journey, and thus becomes a vital force in enabling others to do the same. Wholeness speaks to the totality of creation in which the welfare of the group is the locus of the consciousness as opposed to the welfare of the individual. Non-interference is respect for the wholeness, totality and knowledge of others and, therefore, each person is allowed the independence to find his or her own path and purpose.

Each person has responsibilities and obligations to others. These responsibilities support the social value of sharing. They contribute to the good feelings of the group through humour and support for the sustenance and maintenance of the interconnected and interdependent whole. This whole has many concentric circles, among which are those that embrace the cycles of nature and the life that it supports. Since everything is more or less animate, everything has spirit and knowledge. The social value of sharing manifests itself in the relationships of the whole. These relationships result from interactions with the group and with the whole of creation. Since all things in nature are interrelated and interdependent, it is vital that everyone views their relationships not just with other humans but also with all of nature. Each person has an individual responsibility to sustain the renewable resources that enable the whole to survive.

From dreams, visions and different languages, IK tells how individuals establish their relations with the spiritual realm, environment, each other. It begins with how they came from a spiritual realm to the Earth lodge to dream and live out their visions and purposes. This is captured in the concept of "in the beginning was the dreaming". Dreams generate the fundamental instructions from the Life Giver, the dynamic collective mind of each indigenous nation's nation. Like embodied spirit(s), indigenous nations believe these dreams are embodied in all forms of nature and that desires live in the human mind. Dreams, intuitions and thoughts are related in every facet of learning. They have played and continue to play a central and determinative role in the formation of learning that is crucial to spiritual and scientific knowledge. Dreams, desires (internal vision) and perceivable behaviours are woven together in the implicate order of indigenous nation life.

In IK, learning occurs when one masters the transformation of dreams into existence. It is a process driven by learning spirit(s) and visions. The mystic pulse of learning is the ability to cross from the mysterious realm of dreams and embodied spirit(s) of an implicate order to improve life and well-being. It is the ability to translate, interpret or guide imagistic and affective communications into rational thoughts and pragmatic actions or behaviours. It is the mastery of human potential, however it is inspired.

Every indigenous child is conceptualized as born from and with relations of the spiritual realm and the earth dream. The heart of indigenous learning is through relationship with an animate, interactive universe. "Animate" is understood to mean alive with spirit and energy, which reveals the constant interchange with the dreams and embodied spirit(s) of an ecology.

For example, an indigenous person who has a dream or vision is not able to use its power until after they have performed this vision for the nations to see, experience and collectively understand. Thus, in the paradigm of every indigenous nation's thought and teaching, learning and knowledge belongs to the people as a collective, shared through resonance in space and time. It is our legacy and it is gathered, shared and contributed for the good of all. IK as a form of dreaming in North America is more closely related to the insights of South American biologists (Maturana and Varela, 1997). In their non-representative theory of cognition (the world as experience), they say that we do not simply observe the "world", we actively create our experience of it through the structure of our nervous system and formulate a consciousness combined with stimuli from the environment. The world participates in us, and we in the world. IK unveils that stimuli from the environment and is integral to the learning spirit.

Little distinction exists in indigenous languages between the English concepts of “unconscious” or “conscious”, the sleeping or waking, the actual and the potential. Both concepts are inseparable relations that are always present, like light and shadow that are integral in IK and its learning processes. Indigenous consciousness of IK is distinct from the conventional Canadian consciousness. Indigenous nations’ concepts of learning are outside diverse Eurocentrism (Amin, 1988; Blaut, 1993), western European knowledge systems (EK) or Eurocentric disciplines, and even outside its interdisciplinarity. The conventional and paradigmatic scientific consciousness, both human and physical, of the modern world is educated and trained in EK traditions. The configuration of the learning processes is approached, defined and delivered with a Eurocentric view of the world as the thrust. Linear time, binary thought, the primacy of the intellect, noun-based languages and partial educational philosophies combine to form a cultural lens, and it is through this lens that education is delivered and learning is defined. The shadow of the inner structure is that its paradigmatic interpretation may be, and often is, wrong. Inherent in EK, however, is a powerful and persistent awareness of the impossible, the unknown, or unfolding paradigms.

Indigenous nations and First American thinkers have long recognized the power of nature to contradict conventional beliefs. Through the understanding of spiritual and ecological covenants, embodied spirit(s) of a tricky implicate order, and a belief in transformative energies, they have generated another paradigm of science to tell, explain and elaborate. An indigenous paradigm tells conventional science not of the known but of the unknown; of things impossible; of limits and barriers that some believe cannot be crossed. The indigenous paradigm exists at the periphery to the core of the conventional science of learning, yet its teachings about learning reveal the role of impossibilities in Eurocentric science and its paradigms. It shows how awareness of the impossible may give a new perspective on reality (whatever one may think it is) that has usually escaped the core’s attention.

Alternative indigenous learning systems in mainstream learning materials and methods

Today, most indigenous children awake in a particular world, not just in the natural ecological world and among the families they inhabit, but in an artificial, cognitive realm of the institutions, practices and prejudices that hold sway around us. For better or worse, these cognitive realms, educational institutions and paradigms stand between children, the natural world and the human realm. Solutions to the major problems of our

time require a transformation in perceptions, thinking and existing conceptual frameworks about how indigenous peoples learn if we are to create the necessary indigenous renaissance.

The long, terrible, legacy of the failure of colonial and conventional education in Canada and the USA to educate indigenous peoples is intertwined with the dismissal of, avoidance of and lack of respect for, indigenous ways of learning and knowing, in short – IK. These education failures are systemic. They are based on the assumed supremacy of EK.⁴ Two dominant premises create the education failure and modern crisis. The first premise viewed educational goals as twofold: to Christianize and assimilate indigenous peoples into the colonial and, later, the Canadian body politic. The second premise assumed that coercive education could assimilate indigenous peoples into these racialized, group-based models.

The tragic legacy of residential school education began in the seventeenth century, but was coercively enforced in the nineteenth and twentieth centuries on indigenous students (RCAP, 1996; Milloy, 1999; Churchill, 2004). The cognitive imperialist educational policies that guided the church – state-operated residential school system justified the removal of children from their communities and the disruption of nations and families; a precise educational pedagogy for removing IK from indigenous children in the schools; and schemes for integrating graduates to fulfil the hegemonic ideologies of the colonization (RCAP, 1996, vol. 1, bk. II, ch. 10). This legacy reveals formal and state enforced education as a source of assimilation, ideological reproduction and a form of cognitive violence. Education was presented as universal and neutral, yet it imposed language and worldviews associated with protecting the colonizing (and racial) ideology that rationalized indigenous people as inferior, unequals and undeserving.

The literature reveals that governmental policies, institutions and bureaucrats, Christian missionaries and public school teachers created the systemic crisis in First American education, rather than the biology and culture of the peoples (USA, 1969, 1990; RCAP, 1996; Bruner, 1996; Lomawaima and McCarty, 2006). Eurocentric educational theory became the only recognized practice since indigenous learning and educational practices were ridiculed, denounced, prohibited, suppressed and invalidated. This asymmetrical collision asserts that EK is the only reliable and inevitable road to “educational” achievement and success. This road requires indigenous youth to make painful adjustments and sacrifices and adhere to some alien version of learning or educational theory or practice. These traumatic achievements and accommodations have not translated into the experience of large-scale educational success or professional advancement for indigenous peoples. The lack of achievement and the

fragile consciousnesses of educated indigenous youth are benchmarks of violence, the residue of trauma affected through the cognitive assimilationist paradigms of our education systems. In my opinion, the entire set of punishments, both subtle and violent, that has for too long accompanied learning in formal education is unjustified, even if it was to ensure students' cognitive compliance. Punishment has not created good minds for most indigenous students.

What these premises create is an education crisis, one in which the educators manufacture the false assumptions of race science: that indigenous peoples were biologically predetermined to vanish; were mentally inferior and had many socio-economic and educational deficits; and that their genes or culture caused their educational failures and explained their deleterious lifestyles. These theories generate racism, culturalism and violence against indigenous nations. This has been well documented in Canada, especially by the Royal Commission on Aboriginal Peoples (RCAP, 1996).

After three hundred years of coercive, formal education, indigenous learning and educational theory in Canada and the USA education are still caught in the legacy of race pseudo-science, assimilation, cultural deficit theories and culturalism. Additionally, these education systems have attempted to hide the systemic failures with a racial discourse of abstract individualism or individual deficit theory as "rhetorical strategy" (Bonilla-Silva, 2001, 2003; Feagin et al., 1997; Feagin, 2006).

For thirty years, indigenous scholars who have pursued graduate work in universities have documented the emerging, global educational crisis facing indigenous peoples of the former British colonies. In collaboration with their elders, knowledge keepers and leaders, they have highlighted the fatal abeyance of IK in compulsory education for indigenous peoples (Memmi, 1965; Said, 1992). Professor Leroy Little Bear (2000), a Blackfoot scholar, coined the phrase "jagged worldviews colliding" to conceptualize the educational encounter of IK with EK or Eurocentrism (Little Bear, 2000: p. 77). Assimilation strategies cultivated in governmental policy, educational systems and teacher-training institutions have had a long and devastating history around the world. Administrators and teachers representing these systems have forced Eurocentric values, beliefs and knowledge on indigenous peoples and contributed to the displacement of indigenous knowledge, languages and cultures. The results of these assimilationist strategies have created multi-generational educational failures among indigenous peoples and educational outcomes that are well below the national averages. While school records are incomplete and fragmented, outcome measures on indigenous students, whether in North America or beyond, have demonstrated that indigenous peoples have the lowest record of achievement and employment among any

other citizens in those countries once under British rule (McConaghy 2000; Battiste, 2005b).

The failings of those traumatic educational systems and practices are well known, as are the implications of these failings to indigenous peoples in the loss and erosion of their languages and knowledge systems (USA, 1969, 1990, 1992, 1998; RCAP, 1996). Compulsory English language instruction combined with the prohibition of indigenous language use created an assimilationist strategy that resulted in major, worldwide linguistic losses. Indigenous peoples who have lost languages due to cognitive assimilationist policies are presented with a great challenge. Language loss has been shown to be not purely linguistic, involving the sounds and sentence structures, but involves the socialization of language and knowledge, ways of knowing and non-verbal and verbal communication. These are the core tools of indigenous knowledge and capacity within indigenous cultures. Currently, the colonial and neocolonial epistemic models of EK continue to offer publicly funded schools and their students a fragmented, negative and distorted picture of indigenous peoples in history, textbooks and curricula. These models characterize IK as primitive, backward, or superstitious, causing indigenous peoples to be viewed as deficient and requiring remedies that renew the assimilative cycles of EK, with its English-language superiority. The only result of such cognitive imperialist policies is the destruction of indigenous peoples' learning spirit, self-esteem and self-confidence.

To correct these erroneous and destructive assumptions and premises, educational issues in indigenous nations have to be addressed from the vantage point of IK. The first generation of indigenous scholars, professionals and educators agree that high achievement in formal education and motivation depends upon the spiritual well-being of indigenous students (see Battiste and Barman, 1995; Battiste, 2000). Therefore, they assert that early attention to cognitive development, sense of identity and social/cultural maturity is necessary. Government studies have asserted that improved academic performance will not occur until the factors creating spiritual and cultural well-being are included as part of a comprehensive approach for nurturing and educating the whole indigenous child (USA, 1990, 1992, 1998; RCAP, 1996). These insights have created changes in the structure of education. In 1982, the Canadian constitution was amended to acknowledge and recognize the aboriginal and treaty rights of aboriginal peoples, which included lifelong learning and educational rights. Unfortunately, the federal government continues to see post-secondary education as social policy and not a treaty right (Stonechild, 2006). In the USA, legislation was created for language and cultural programmes in the curriculum-based education (Native American Languages Act (1990), the Bilingual Education Act of the

Elementary and Secondary Education Act (1994) (currently Title III of the Leave No Child Behind legislation) and the Executive Order on Indian Education [1998]).

Despite these legal reforms, few schools and universities have made IK a priority or mission in educating indigenous students. Few efforts have been made to teach all students about diverse knowledge systems. Instead, administrators and teachers trained in Eurocentric post-secondary institutions focus their attention on fragmented cultural practices such as indigenous art, pow-wows, and archival and museum work. These perpetuate notions of indigenous peoples as historical and local, not contemporary and global with a knowledge system that has value for all. Few teacher-training institutions have developed any insight into the diversity of knowledge foundations of indigenous peoples or to the decolonization of knowledge. These aforementioned teachers treat IK as though it were a matter of race or culture, or multicultural and cross-cultural education (Battiste et al., 2005). IK needs to be treated as a distinct knowledge system, equal to EK, rather than be ignored, invisible to Eurocentric scholarship and knowledge, to its development theories, and to its global science.

IK comprises many diverse systems of knowledge, mostly unexplored by Eurocentrism and still being unravelled by indigenous academics around the globe. Consequently, IK has not been captured and stored in a systematic way by Eurocentric educational systems and publishing companies. Indeed, in most cases there has been a concerted effort to erase it. Therefore, when Eurocentric educators encounter cultural difference, they have very little theory, scholarship, research, or tested practice to draw on to engage indigenous learning in a way that is not assimilative or racially defined. Educators tend to ignore international conventions and declarations and best practices, which have been shaped by a respect for IK and cultural diversity (Battiste et al., 2005). This absence creates unmanageable abeyances linked directly to Eurocentrism. The initial struggle for indigenous educators, then, is to sensitize the Eurocentric consciousness in general and educators in particular to the colonial and neocolonial practices that continue to marginalize and racialize indigenous students. The second struggle is to convince them to acknowledge the unique knowledge and relationships that indigenous people derive from place, from their homeland. Knowledge of these ties is central to their notions of humanity and science and passed on in their own languages, teachings and ceremonies.

IK is a growing field of enquiry, particularly for those interested in innovation and success in indigenous education. The educational successes acknowledge the distinctiveness of, and the attempts to balance, the knowledge systems. They seek a respectful way of converging Eurocen-

tric's epistemic colonialism with IK systems, including both the human and physical sciences. This is a struggle with little pedagogical or theoretical structures and an opportunity, one that has consumed most of my professional career. In the past twenty years, my educational achievement, as well as that of others in the universities and colleges, is directly related to our understanding of EK systems. In graduate studies, I discovered how EK was not the solution, but the problem. EK discriminates against IK systems and students as much as racism. Finding a satisfactory solution to the Eurocentric educational challenge is and has been the necessary first step in remedying the failures of the existing educational system. There is a need to bring about a fair and just educational system that acknowledges, respects, and builds on both IK and EK systems. Such a rethinking of education from the perspective of IK, and learning ways of being and knowing, is of crucial value to both indigenous and non-indigenous educators who seek to understand the failures, dilemmas and contradictions inherent in past and current educational policy and practice for indigenous students.

The recognition and intellectual activation of IK today is an act of remediation and renaissance by indigenous people. These struggles are a regeneration of educational integrity, where success has been found in affirming and activating the holistic systems of IK. These practices reveal the utility wealth and richness of indigenous languages, worldviews, teachings and experiences to animate educational achievement. Language is the most significant factor in the restoration, regeneration and survival of IK. Educators of indigenous students cannot stand outside of indigenous languages to understand indigenous knowledge. Where indigenous languages, heritages and communities are respected, supported, and connected to elders and holistic learning, educational successes among indigenous students can be found. Knowledge of indigenous languages both nourishes the students' learning and comprehension of the worldview and heritage of their people. Indigenous languages are irreplaceable resources in any educational reforms.

Trans-systemic knowledge in contemporary education

IK has a trans-systemic understanding of distinct and different knowledge systems. IK does not mirror classic Eurocentric orders of life or languages. It is a distinct knowledge system in its own right with its own internal consistency, diversities and ways of knowing, but it is not unicentric. These concepts are not easily visible to the Eurocentric disciplines, especially its scientific disciplines. IK is not only a remedy to the continuing failures of the education system, but also the opening to

the comprehension of distinct knowledges that twenty-first-century educators should learn to operate in. Unlike critical race theory, antiracism theory and postcolonial critique, which focuses on reforming EK, when respectfully presented, IK provides a positive approach to dealing with self-doubt and low self-esteem among indigenous populations and a balanced learning perspective of the socio-historic reality in which we all live (Battiste, 2000). Literature on the topic of IK and pedagogy is emerging, most in Eurocentric frames or disciplines, although it is limited in scope and depth, particularly in the North American context. What literature does exist attempts to clarify the nature of IK, its frameworks and its contributions to educational reform and disciplinary research, as well as to explore the ethical considerations for the use of that knowledge (Battiste and Henderson, 2000).

A global consensus, represented by the UN framework on education, recognizes and asserts that distinct differences between IK and EK knowledge systems exist (Battiste et al., 2005). The relationship between systems of IK and Eurocentric knowledge in the global consensus is generating a deep struggle in education systems that cannot be avoided. The educational struggles of indigenous students and scholars in the Eurocentric academy are multiple, diverse and complex, yet are largely intertwined with Eurocentric systems and their knowledge.

The global consensus is represented by the UN Declaration of the Rights of Indigenous Peoples (2007). The Declaration united humanity, ending the separation of indigenous peoples from other peoples in the UN human rights law. It affirmed that indigenous peoples have the right to the full enjoyment, as a collective or as individuals, of all human rights and fundamental freedoms as recognized in the Charter of the UN, the Universal Declaration of Human Rights and international human rights law (*ibid.*: art. 1). We are free and equal to all other peoples and individuals and have the right to be free from any kind of discrimination, in the exercise of our rights, in particular that based on indigenous origin or identity (*ibid.*: art. 2). We have the right to self-determination to freely pursue social and cultural development (*ibid.*: art. 3). We have the right to maintain and strengthen our distinct social and cultural institutions, while retaining our right to participate fully, if we choose, in the social and cultural life of the state (*ibid.*: art. 5). We have the right not to be subjected to forced assimilation or destruction of our culture (*ibid.*: art. 8).

The Declaration affirmed that indigenous peoples have the international right to establish and control their own educational systems and to provide education in their own languages, in a manner appropriate to their cultural methods of teaching and learning (*ibid.*: art. 14). Thus, we have a right to our IK. We have a right to revitalize, use, develop and

transmit to future generations our “histories, languages, oral traditions, philosophies, writing systems and literature” (ibid.: art. 13(1)). We have “the right to maintain, control, protect, and develop . . . [our] cultural heritage, traditional knowledge, and traditional cultural expressions, as well as the manifestation of . . . [our] science, technologies and cultures” (ibid.: art. 31). States cannot show discrimination against indigenous peoples’ cultures, traditions, histories and aspirations in education (ibid., arts. 14(2) and 15) and, in conjunction with indigenous peoples, are required to take effective measures to provide an education to indigenous students in their own culture and language (ibid.: art. 14(3)). These rights are not new international law, they constitute the “minimum standards for the survival, dignity and well-being of the indigenous peoples of the world” (ibid., art. 13). They are the standards of a decent society, but below the standards of a just society.

The Declaration merely codifies the existing global consensus on the education of indigenous students (Battiste et al., 2005). Consistent with IK, the global consensus affirmed in the Declaration directs that “[e]ducation shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms” (UDHR, 1948, art. 26(2); REIUCPEHR, 1974, art. 3; CEDAW, 1979: art. 10; CRC, 1989: art. 29). Also, consistent with IK, the word “education” implies the entire process of social life by means of which individuals and social groups learn to develop consciously within, and for the benefit of, the national and international communities, the whole of their personal capacities, attitudes, aptitudes and knowledge. This process is not limited to any specific activities (REIUCPEHR, 1974: art. 1(a)). Through intellectual and educational self-determination, indigenous academics are developing and will continue to develop new analyses, pedagogies and methodologies to decolonize themselves, their students, their communities and their institutions (Smith, 1999; McConaghy, 2000; Lomowaima and McCarty, 2006; Findlay, 2003; Battiste et al., 2005).

Finally, IK is finding allies in the convergence of ecological and social justice and in one of the largest global movements (Hawken, 2007). Because indigenous peoples’ experiential knowledge was gleaned from generations of interaction with their natural habitat, their knowledge is inherently wedded to their languages and their consciousness, and to lose indigenous peoples’ IK is to lose the wealth of knowledge of the ecosystems that can help the world survive. As Hawken (2007: 100) urges:

We cannot turn back the clock, or return to any prior state on this land, but we will never know ourselves until we know where we are on this land. There is no reason that we cannot build [an] exquisitely designed economy that matches

biology in its diversity, and integrates complexity rather than extinguishing it. In accomplishing this, there is much to be gained from those who have not forgotten the land.

The indigenous peoples, in their renaissance, are seeking to make their knowledge and the rich teachings of their elders and respected leaders central to their visions of lifelong learning. The aboriginal peoples of Canada have persistently addressed their teachings in holistic visions and models for their future (RCAP, 1996; CCL, 2007) and are committed to maintaining them for their future. However, without government and institutional support for the type of distinctive education that reflects these teachings, there is little hope for the survival of IK.

One source of support has been the Aboriginal Learning Knowledge Centre, a national centre of the Canadian Council on Learning, that brought indigenous organizations such as the First Nations Adult and Higher Education Consortium together with academic institutions like the Aboriginal Education Research Centre at the University of Saskatchewan to support aboriginal lifelong learning where indigenous knowledge is recognized, supported, enhanced and naturalized in educational systems. It is part of the indigenous renaissance and is supporting the core of indigenous knowledge where learning arises from place and from indigenous languages, and from nourishing, supportive and meaningful holistic learning. The indigenous renaissance, then, is about respect, reciprocity, responsibility and resilience. The reclamation and reactivation of IK in lifelong learning promises to restore the transmission of knowledge in families and in communities and ensure responsibility, reciprocity and relevance to all aspects of learning.

Notes

1. In addition to its many names in indigenous languages, traditional knowledge has many conceptual names in English: "folk knowledge", "local knowledge or wisdom", "non-formal knowledge", "culture", "indigenous technical knowledge", "traditional ecological knowledge", "indigenous heritage", and "indigenous knowledge".
2. Indigenous knowledge (IK) is used in this contribution to reflect the traditional, contemporary and ongoing knowledge bases of indigenous peoples. Traditional knowledge often has been used in literature but gets confused with knowledge of the past and thus does not reflect the dynamic contemporary ongoing knowledge that is learned as adaptation to and adjustment with new knowledge.
3. Initiated societies exist within a cultural group that has specific knowledge held by only those initiated into the society for specific purposes.
4. This concept has been racialized by many scholars to the concept of "white space", "white institutional space", or the "white frame". In this chapter, I will follow the indigenous approach of place rather than use the European racial framework.

REFERENCES

- AFN (Assembly of First Nations) (1992) *Rebirth of First Nations Languages*. Ottawa: AFN.
- Amin, S. (1988) *Eurocentrism*. New York: Monthly Review Press.
- Ball, J. and A. Pence (2006) *Supporting Indigenous Children's Development*. Vancouver: University of British Columbia Press.
- Battiste, M. (1997) "Mi'kmaq socialization patterns", in L. Choyce and R. Joe (eds), *Anthology of Mi'kmaq Writers*. East Lawrencetown: Pottersfield Press, pp. 145–161.
- Battiste, M. (ed.) (2000) *Reclaiming Indigenous Voice and Vision*. Vancouver: UBC Press.
- Battiste, M. (2005a) "Post-colonial remedies for protecting indigenous knowledge and heritage", in P. Tripp and L. Muzzin (eds), *Teaching as Activism: Equity Meets Environmentalism*. Kingston: McGill-Queens University Press, pp. 224–232.
- Battiste, M. (2005b) "State of aboriginal learning". Ottawa: Canadian Council on Learning. Available at <<http://www.ccl-cca.ca/NR/rdonlyres/210AC17C-A357-4E8D-ACD4-B1FF498E6067/0/StateOfAboriginalLearning.pdf>> (accessed 22 April 2010).
- Battiste, M. and J. Barman (eds) (1995) *First Nations Education in Canada: The Circle Unfolds*. Vancouver: University of British Columbia Press.
- Battiste, M., L. Bell, L. M. Findlay, I. M. Findlay and J. Y. Henderson (2005) "Thinking place: Animating the indigenous humanities in education", *Australian Journal of Indigenous Education* 34: 7–19.
- Battiste, M. and J. Y. Henderson (2000) *Protecting Indigenous Knowledge and Heritage: A Global Challenge*. Saskatoon, SK: Purich Press.
- Blaut, J. M. (1993) *The Colonizer's Model of the World: Geographical Diffusionism and Eurocentric History*. New York: Guildford Press.
- Bonilla-Silva, E. (2001) *White Supremacy and Racism in the Post-Civil Rights Era*. Boulder, CO: Lynne Rienner.
- Bonilla-Silva, E. (2003) *Racism without Racists: Color-Blind Racism and the Persistence of Racial Inequality in the United States*. Lanham, MD: Rowman and Littlefield.
- Bruner, J. (1996) *The Culture of Education*. Cambridge, MA: Harvard University Press.
- CCL (Canadian Council on Learning) (2007) "Redefining how success is measured in First Nations, Inuit and Métis learning". Ottawa: Canadian Council on Learning. Available at <<http://www.ccl-cca.ca/CCL/Reports/RedefiningSuccessinAboriginalLearning/>> (accessed 22 April 2010).
- CEDAW (1979) "UN Convention on the Elimination of All Forms of Discrimination against Women". 13 October. Available at <<http://www.un.org/womenwatch/daw/cedaw/>> (accessed 22 April 2010).
- Churchill, W. (2004) *Kill the Indian, Save the Man: The Genocidal Impact of American Indian Residential Schools*. San Francisco: City Lights Books.
- CRC (1989) "UN Convention on the Rights of the Child". 20 November. Available at <<http://www.unhchr.ch/html/menu3/b/k2crc.htm>> (accessed 22 April 2010).

- Daes, E. I. (1994) *Preliminary Report of the Special Rapporteur: Protection of the Heritage of Indigenous Peoples*. E/CN.4/Sub.2/1994/31. New York: Sub-Commission on Prevention of Discrimination and Protection of Minorities, Commission on Human Rights, United Nations Economic and Social Council.
- Davies, C. B. (1999) "Beyond unicentricity: Transcultural black presences", *Research in African Literature* 30(2): 96–109.
- Dooling, D. M. and P. Smith (eds) (1989) *I Become Part of It*. New York: Harper Collins.
- Feagin, J. R. (2006) *Systemic Racism: A Theory of Oppression*. New York: Routledge.
- Feagin, J., V. Hernan and N. Inami (1997) *The Agony of Education*. New York: Routledge.
- Findlay, I. M. (2003) "Working for postcolonial legal studies: Working with the indigenous humanities", *Law, Social Justice and Global Development Journal* 1 (Special Issue on Postcolonial Legal Studies). Available at <http://www2.warwick.ac.uk/fac/soc/law/elj/lgd/2003_1/findlay> (accessed 22 April 2010).
- Hawken, P. (2007) *Blessed Unrest: How the Largest Movement in the World Came into Being, and Why No One Saw it Coming*. New York: Viking.
- Henderson, J. Y. (2000) "Ayukpachi: Empowering aboriginal thought", in M. Battiste (ed.), *Reclaiming Indigenous Voice and Vision*. Vancouver: University of British Columbia Press, pp. 248–278.
- Little Bear, L. (2000) "Jagged worldviews colliding", in M. Battiste (ed.) *Reclaiming Indigenous Voice and Vision*. Vancouver: University of British Columbia Press, pp. 77–85.
- Lomawaima, K. T. and T. L. McCarty (2006) *To Remain an Indian: Lessons in Democracy from a Century of Native American Education*. New York: Teachers College Press, Columbia University.
- McConaghy, C. (2000) *Rethinking Indigenous Education: Culturalism, Colonialism and the Politics of Knowing*. Flaxton, AU: Post Pressed.
- McNab, D. T. (2007), "A long journey: reflections on spirit memory and Métis identities", in U. Lischke and D. T. McNab (eds), *The Long Journey of a Forgotten People: Métis Identities and Family Histories*. Aboriginal Studies Series. Waterloo, ON: Wilfrid Laurier University Press, pp. 21–37.
- Maturana, H. and F. Varela (1997) *Tree of Knowledge: The Biological Roots of Human Understanding*. Boston: Shambhala Publications.
- Memmi, A. (1965) *The Colonizer and the Colonized*. Trans. H. Greenfield. New York: Orion Press.
- Milloy, J. S. (1999) "A National Crime": *The Canadian Government and the Residential School System, 1879 to 1986*. Winnipeg, MB: University of Manitoba Press.
- RCAP (Royal Commission on Aboriginal Peoples, Canada) (1996) *Final Report*. Vols. 1–5. Ottawa: Minister of Supplies and Services Canada.
- REIUCPEHR (1974) "UNESCO Recommendation concerning Education for International Understanding, Co-operation and Peace and Education relating to Human Rights and Fundamental Freedoms". 19 November. Available

- at <http://www.unesco.org/education/nfsunesco/pdf/Peace_e.pdf> (accessed 22 April 2010).
- Said, E. (1992) *Culture and Imperialism*. Cambridge, MA: Harvard University Press.
- Smith, L. T. (1999) *Decolonizing Methodologies: Research and Indigenous Peoples*. New York: Zed Books.
- Stonechild, B. (2006) *The New Buffalo: The Struggle for Aboriginal Post-Secondary Education in Canada*. Winnipeg, MB: University of Manitoba Press.
- UDHR (1948) "Universal Declaration of Human Rights".
- USA (United States of America) (1969) "Senate Subcommittee Report, Indian Education: A national tragedy, a national challenge". Available at <<http://www.tedna.org/pubs/Kennedy/toc.ht>> (accessed 22 April 2010).
- USA (United States of America) (1990) "Native American Languages Act". Available at <<http://thomas.loc.gov/cgi-bin/query/z?c102:S.2044.ENR>> (accessed 22 April 2010).
- USA (United States of America) (1992) "White House Conference on Indian Education".
- USA (United States of America) (1998) "Executive Order on Indian Education".

3

Indigenous institutions and contemporary development in Ghana: Potentials and challenges

Stephen B. Kendie and Bernard Y. Guri

Introduction

Development has been variously defined by different actors to mean different things to different people. While western economists define development in terms of economic growth and income per capita, the politician may define the same as the provision of roads, hospitals, schools and so forth. In the context of a Ghanaian community, development is usually described in terms of the well-being of the individual and the community or opportunities for improving livelihoods. Whatever the differences may be among these definitions, the underlying fact is the need for effective leadership and organizational cohesion, be it at national or community level, to be able to initiate and sustain the processes that lead to development.

In Ghana, in spite of a modern national political organizational system, the majority of people (in the rural areas) are organized around various indigenous institutions for carrying out the activities that are important for their development and well-being. In fact, civil society in rural Ghana is embedded within these indigenous institutions and they are key to the organization of people at the rural level for their socio-economic development.

In Ghana, decentralization as the tool for creating the enabling environment for speeding up development at the local level took concrete shape in 1988 with a focus on decentralizing both political authority and the financial means to the district level. Studies, however, point to the

fact that although some successes have been achieved, so far decentralization has largely failed to meet the objective of enhancing local participation in the development process (Kendie and Mensah, 2008). One reason is that indigenous institutions around which rural people organize their lives have been largely ignored in the decentralization strategy (Kendie and Guri, 2006, 2007).

This chapter reviews indigenous institutions in northern Ghana and the implications for development in the context of Ghana's local government system. As a start, we map indigenous institutions in northern Ghana as they exist today, indicating their potentials as agents for development. Secondly, the chapter reviews and discusses the changes that have occurred to these institutions over the years and the resultant new dynamics in relation to their potential for addressing contemporary development problems. We then examine current development challenges vis-à-vis the role of these indigenous institutions and propose areas for capacity-building to release their potentials and address the challenges facing them. We then conclude with the implications for development policy, research and development action.

This chapter draws heavily on a survey that was carried out in northern Ghana by the Center for Indigenous Knowledge and Organizational Development (CIKOD) in 2004 to map the existing indigenous institutions as well as functional local organizations and assess their organizational capacities so as to identify areas for capacity-building to enable them to contribute more effectively to the development of their communities. For comparative purposes, examples are also taken from a similar exercise made for southern Ghana and described in Kendie et al. (2004).

Indigenous institutions, functional organizations and development: A conceptual overview

This chapter concerns itself primarily with indigenous institutions and local functional organizations and their potential as change agents. It is thus important to give a clear understanding of these terminologies.

The term "institution", according to the western conception, has been defined as the *rules, roles and structures* developed by people to organize their joint activities (see Kendie and Guri, 2005 for a review). Olson (1965) refers to institutions as collectively agreed social arrangements that govern interactions among members of a given group of people. Berger and Neuhaus (1984: 251) refer to these as "mediating institutions" – "those institutions standing between the individual in his private life and the large institutions of public life". Building on this, in this chapter, indigenous institutions refer to the societal norms, values, beliefs and cosmologies that guide human interaction in any particular community or

locality. Indigenous institutions also refer to the leadership structures within the community (chiefs, queen mothers, *tindanas* [traditional land-owners] elders, clan heads, etc.) and their functional roles, which ensure that the norms and values of the community are respected. It also includes practices such as the rituals and rites of the people, their funerals, dowry system, festivals and shrines or places of worship. Put together, these may be loosely described as the indigenous knowledge system or culture of the people that structure incentives in human exchange and behaviour in any particular society, be it political, social or economic. Institutions also take the form of local organizations (LOs), in which case they refer to the structures that form the units of organization in the community. Uphoff (1988) and Olson (1965) describe them as “organizations which act on behalf of and are accountable to their membership and which are involved in development activities”. Such local organizations may be formally created with official requirements such as constitutions, statutes, common laws and governmental regulations, which may be externally enforced (Pejovich, 1995). In Ghana, these are variously referred to as community-based organizations (CBOs), farmer-based organizations (FBOs), cooperative unions and so on.

In this chapter, the focus is on functional indigenous organizations (FIOs) and reference to indigenous organizations such as *nnoboa* (community self-help) groups, *asafo* (community security) groups, *susu* (community savings and loans) groups, clan networks, hunters groups and so on that are the structures through which rural families organize their social, economic and political lives. These are indigenous self-help groups established by local people based on their own criteria in response to the need for mutual support to tackle individual/community problems. They are not usually dependent on external support and will always exist even where there is no external support. The resilience of rural people in spite of the serious deprivation at the rural level may be largely attributed to these institutions and forms of organization. These indigenous organizations are self-initiated, self-help groups that are based on traditional norms of trust and reciprocity. The challenge to governments is to overcome the marginalization of these institutions and to confront the reality that, in rural areas, indigenous institutions have strong influence on the population. The greater challenge is for public policy to seek to utilize these local institutions for the realization of social and economic progress (Kendie, 1993: 321). Ironically, we observe that local political structures are often heavily relied upon by national political leaders to garner political support when it is time for national elections, and this is often to good effect.

The opportunities for sustainable local and community organization have been undermined and ignored over the years by policymakers. In

recent times, however, the relevance of indigenous knowledge and institutions for development is increasingly being recognized by both development theorists and practitioners, although the conventional development paradigm does not even recognize their existence.

Role of indigenous knowledge and institutions in endogenous development

Undisputedly, the dominance of the western knowledge system has been a major factor leading to the prevailing situation in which indigenous knowledge is ignored and neglected. It has therefore been easy to forget that, over many centuries, human beings have been producing knowledge and strategies enabling them to survive in a balanced relationship with their natural and social environment. Equally, they developed institutions to ensure the preservation of law and order and harmony within the human world and between this and the natural and spiritual worlds. This interconnectedness of the human, natural and spiritual worlds provides the philosophical basis of endogenous development movement, which is discussed in Chapter 1 of this volume. Endogenous development (ED) is defined as “development from within, based mainly, though not exclusively, on locally available resources, values, institutions and knowledge” (Kendie et al., 2004). Indigenous knowledge (IK) and indigenous institutions are recognized as essential in sustaining development initiatives. There are many failed projects in developing countries designed according to a top-down perspective to warn development practitioners against rethinking theories and their modus operandi.

The rest of this chapter is divided into three sections. The next section presents the methodology employed in this study. This is followed by an analysis of the types, functions and linkages of the different indigenous institutions (IIs) found in northern Ghana. The gender presentation of these institutions is recognized as either supporting or being a hindrance to female empowerment. We conclude the chapter with a discussion on the role of IIs in local leadership development, in local governance and in general local level development

Methodology: community institutional mapping (CIM)

CIM¹ methodology was adopted for this study. This is essentially a participatory baseline study of community-based institutions and organizations. In the first phase of the study process, community institutional mapping exercises were conducted in eight sampled communities. These communities are well spread out over northern Ghana and include

Kalbeo, Bowko, Tanchara, Kpembe, Tangsia, Nangodi/Sakote, Wulugu and Nalerigu. Drawing predominantly on a qualitative research approach, a comprehensive checklist was prepared and administered in each of the eight communities to opinion leaders and community-based groups in the form of interviews. The outcome has, therefore, been the collection of qualitative data on indigenous institutions and community-based organizations, which were further subjected to cross-validation. The second phase of the process entailed synthesis and collation of the community reports, the outcomes of which are reported here.

Indigenous institutions and organizations

As mentioned above, IIs provide important platforms for engaging communities of people for their development. However, conventional development has traditionally sought to marginalize these institutions, preferring to introduce new structures such as cooperatives, water committees and village development committees based on formal organizational rules. For this reason development practitioners are largely unaware of the types and dynamics of IIs as they operate at the community level. Externally imposed committees have often failed because they tend not to appreciate community political, social and economic organization, and lack credibility in the eyes of the people they purport to serve (Kendie and Abane, 2001). The next sections provide information on the types of IIs, their functions and linkages, in order to demonstrate the intricate web of structures that exist.

Male traditional leaders

The chieftaincy institution is the most celebrated traditional institution in northern Ghana. The chief as traditional political leader of his or her community is variously named among different ethnic groups in northern Ghana. The chief for instance is called “Naa” among the Dagaaba, “Kuoro” among the Sissala, “Naaba” among the Frafra, “Naab” among the Kusasis and Mamprusis, “Naa” among the Dagombas and “Wura” among the Gonjas.

Female traditional leaders

The chieftaincy institution is a predominantly male-dominated institution. Most chiefs are males but in rare instances there are female chiefs. The female chief, a rather rare type of office-holder in traditional circles,

may either be the chief for the community or co-exist with a male chief. Examples of female chiefs are the Sigbun Wuriche and Lepo Wuriche, both in Kpembe Traditional Area in the Northern region. In other instances, as in Tanchara, there is a female chief, "Poge Naa", who co-exists with the community chief. The "magazia" is yet another important type of indigenous women's leader in northern Ghana, particularly in communities where there is a sizeable Muslim population. The "magazia" may derive her power from the chief. For example the "magazia" in Kalbeo derives her power from the chief and constituents of women and religious leaders according to her character, deeds, resourcefulness, ability to lead and social affluence.

For a chief, power in the exercise of traditional authority is fundamentally derived from "ascription", but the community must sanction inheritance and enthronement of the skin. For instance, ascription to the skin requires that the paramount chief in collaboration with the "Tindana" (Custodian of the Land and Spiritual Leader) presides over the succession and "enthronement" processes. This is a prerequisite and basis for the legal and social approval of the chief's authority to rule in the community. Irrespective of whether a chief is male or female, they generally hold equal power and authority except in cases where a female chief co-exists in the community with a male chief. In such instances, the female chief derives her authority from the community chief who often installs and enthrones her in collaboration with other traditional office holders. In January 2007, for instance, the Loho "Naa" (male chief of Loho village) in the upper west region enthroned a "Poge Naa" (women's leader or chief) for his community. In such instances, the female chief is responsible to the community chief, who derives his authority from the people he rules over. According to Gyekye (1996), the authority of the chief usually derives, functionally, from the people so that there is often a close relationship between the ruler and the ruled in matters of the exercise of political power. Although the people do not often directly choose their rulers, many African sayings lend credence to their closeness to chiefs. The Ndebele of Zimbabwe have a popular saying that: "The king is the people; to respect the king is to respect oneself; he who despises our king despises us; he who praises our king, also praises us" (Gyekye, 1996: 110).

Social mobilization institutions

Singing and dancing groups constitute part of the cultural heritage of the people of northern Ghana. In Bowko for instance, there are two traditional singing and dancing groups. The "Jongu" dancers are mostly women (the men play the drums while the women do the dancing). The other group comprises both men and women who dance the "Simpa",

“Damba”, and “Tohowaa” dances. In Tanchara, a number of music and dancing groups exist. These include the “Doro” and “Bag-bine” groups, drumming and xylophonist groups, the latter locally known as “Gobr”; and praise singer groups. All these groups perform at various social functions such as during festivities and funerals.

Findings from this study reveal that there are youth groups and associations in the study communities that have existed for a long time. One prominent type of youth group includes area or community development associations. Membership of these types of associations is often area or community wide. In some instances, clan groups come together to form such development associations, as in the case of the Kalbeo Youth Association in Kalbeo. Eight clan groups from eight sections of the community have come together to form this association. In Tanchara, such groups include Tanchara Pole and Tanchara Youth and Development Association (TYDA).

Social control institutions

The “Tindana”, literally meaning the “custodian of the land”, is probably the oldest traditional institution in northern Ghana, predating colonialism. Just as the chief is variously called among different ethnic groups, so the custodian of the land is called different names by various ethnic groups. He or she is called the “Tindana” or “Tingansob” among the Dagaaba, and the “tortina” among the Sissala. The “Tindana” is the spiritual leader of the community, who holds the most important economic asset – land – in trust for the people. Prior to the institution of chiefs in most communities of northern Ghana by the colonial authorities, the institution of “Tindana” existed. This institution provided both spiritual and organizational leadership for most communities.

The “Tindanpogo” refers to the female “Tindana”, another rare variation in the institution of the “Tindana”. In situations where there is a female “Tindana”, she co-exists with her male counterpart and jointly holds land in trust for the people. It is reported that the “Tindanpogo” holds powers equal to those of her male counterpart but does not participate in sacrifices where the chief is part of the team. She may, however, work hand in hand with the “Tindana” on all matters relating to land and land resources, including sacrifices. It is worth noting that the concept of “Tindanpogo” in traditional institutions is limited to the East and West Mamprusi Districts of northern Ghana. This may perhaps be related to the fact that Mamprusi has a long tradition of centralized political organization in northern Ghana, most societies being acephalous until the advent of slave raiding and colonial rule, which enforced centralized organization.

Institutions for economic development

Hunter groups were identified as one category of key economic activity groups. Hunting is performed by individuals as well as groups. One group of hunters interviewed indicated that stringent traditional rules were observed in the past. Hunting in Kalbeo, for instance, was done only after the “Tindana” and the chief of Pusu-Naba had performed rituals to lift the ban on burning. Thereafter, hunters started to hunt for wildlife by tying a piece of string with cotton onto a lizard and allowing it to run into the bush. This ceremony is performed by the chief and referred to as “Akansogu”. Interviews with youth groups also revealed the waning interest in hunting. Group hunting has been a major challenge in the communities as far as bushfires are concerned, since hunting has been the main source of bushfires in northern Ghana, to the extent that traditional authorities are considering enacting additional community by-laws and enforcing existing ones to check group hunting. It should be noted that hunting was not only undertaken to procure meat, but symbolized prestige and functioned as a demonstration of bravery and manhood. The number of animal horns displayed was held to exhibit a man’s greatness. The recent creation of game reserves limits opportunities for hunting. Outside the game reserves, however, the ban on hunting is imposed only during the breeding period. The numbers of hunters are decreasing not only due to these developments, but, more importantly, because young men are going to school and seeking formal sector jobs.

Women and men groups exist in each of the study communities, with a predominance of women’s groups. In Tanchara, examples of women’s groups include Matara women’s group, Suntaa-Nuntaa Group and Kpangyangna women’s group. These women’s groups evolved from within the communities but in some instances they were supported by external facilitating agencies. These groups are usually formed for two reasons, for social protection and solidarity and for economic production.

Another category of community-based indigenous organizations are labour pooling groups for farming. Male youth usually form such groups in order to pool their labour in support of each other’s farming activities. Such groups are called “Asongtaaba groups”, literally meaning “help one another”, among the Dagaaba of north-western Ghana. These groups reportedly number about fifteen in Kalbeo, with the number of group members ranging between five and fifteen. Their activities are seasonal: the groups are functional during the farming season (usually from May to October). These are traditional self-help groups, mirroring age sets that exist in all rural communities in Ghana. They are generally called *nnoboa* in southern Ghana. In northern Ghana, each tribe has a name for such groups.

Indigenous institutions and organizations: structure and functions

Indigenous institutions and organizations evolved their own internal management structures over time and play specialized roles in community development. While the evolution of culturally related groups such as kinship, singing and dancing groups is closely linked to the preservation of culture, and reflect the inbuilt specializations among social groups, social groups such as women and youth groups are orientated towards community development in most communities of northern Ghana.

The typical structure of traditional political systems in northern Ghana is a decentralized one that embodies and stipulates a hierarchical order of office holdings and associated responsibilities. At the apex of the structure is often the paramount chief, who is supreme over all other chiefs in the area, considered a paramountcy, which in most cases coincide with what are known as traditional council areas in official circles. The second level of authority constitutes divisional chief office holders, who have under them sectional heads/sub-chiefs and household heads. Under this structure, chiefs and heads at lower levels of the hierarchy pay allegiance to chiefs at the next highest level. Drawing from the findings, for example, the sub-chiefs usually accompany their divisional chiefs to the Kpembewura's Palace (paramount chief of the Gonjas) on Mondays and Fridays to pay homage to him as a way of showing loyalty and allegiance.

Each level on the hierarchy of chiefs (paramount, divisional and sectional) is assisted by a council of elders in decision-making and governance of their respective areas of jurisdiction. The council members at the highest (paramount and divisional) levels often comprise a very important office holder, "the Tindana" (Custodian of Land), and the divisional and sectional chiefs in the case of a paramountcy, and the sectional chiefs in the case of a division. Even sectional chiefs or heads often have their council of elders who constitute the landlords of various compounds (head of all households within the compound).

Roles and functions of male-headed traditional authorities

The study findings indicate that generally the functions of the male-headed traditional authorities are:

- decision-making on matters relating to community development;
- making and enforcing rules in the community;
- providing traditional judicial services;
- conflict resolution and settlement of disputes (the chief and elders – clan heads – constitute the court of adjudication, which is open to the public. Cases are heard in public and judgment must be agreed upon

by the chief and the elders and endorsed by the people in court at each occasion);

- performance of funerals in burnt sacred groves, particularly by the “Tindana”;
- custodianship of land and land resources, particularly by the “Tindana”;
- calling community meetings to discuss development issues;
- supervising and monitoring community development initiatives;
- protecting and maintaining cultural norms and values – watchdogs on anti-social behaviour in their sections;
- overseeing the mobilization of community resources – e.g., development levies.

Roles and functions of female chief – Poge Naa and Tindanpogo

The females in various traditional authority roles undertake to:

- organize and supervise women to perform communal work;
- call meetings to discuss and advise on women’s roles in community development;
- organize women into activity groups to undertake small-scale agro-processing activities – e.g., weaving and shea-butter extraction;
- support organization of festivals in terms of food preparation as in the case of Kpembe community in the northern region of Ghana;
- offer advice to their male counterparts on traditional matters, e.g., enskinment (this refers to the official rituals and ceremonies performed before a person can officially become a chief) and settlements of disputes in the case of Kpembe.

Traditional institutions and development

Clan and kinship, singing and dancing groups and hunters are closely culturally related indigenous institutions. These institutions tend to have common internal structures. Clans tend to be a network of kinship and families that transcends community boundaries. Membership of clan and kinship groups is exclusively by birth. A person born into a particular clan group automatically belongs to the clan, which might have a special talent in a particular aspect of culture. Accordingly, certain clan groups in the evolution of culture have assumed certain responsibilities and roles – singing and dancing, drumming and xylophone playing, and hunting. It is worth noting that today, people who have an interest in participating in any of these cultural activities are often admitted into the groups, but leadership rights are often reserved for the clans that have special talents

in the particular activity in question. Clan leadership positions are life-long. It is the old who assume the leadership of clans and such positions are held for life.

In respect of roles in development, clans first and foremost become focal institutions for uniting clan members – families – and promoting a sense of belonging among people in rural communities. In order to sustain this, the common cultural attributes of clans are preserved as part of their ancestral heritage – and this is a major obligation of clan leaders. Apart from the internal dynamics of clans, clans are open institutions and relate to other clans on a social and cultural basis. For instance, there are kinship ties between different clan groupings in some parts of northern Ghana. This is very common among the Dagaaba-speaking people. As stated earlier, clans also tend to have various specializations as part of their culture and as part of their contribution to community development.

For instance, clans may specialize and provide leadership in music and hunting. For music-related clans, they exhibit outstanding skills in singing and dancing, instrument playing (e.g., as xylophonists), and thereby emerge naturally as leaders. Similarly, hunting-related clans exhibit superior skills in hunting and therefore emerge as leaders in the trade. The essence of hunting is not only game, which provides meat for nourishment, but these clans most often are the warriors who provide leadership to their communities in the event of external aggression and defence. The presence of such clans promotes a sense of security among communities. For singing, dancing and instrument playing groups, their major function is to play music, although for varied purposes. These include entertainment, education, evaluation of the year's activities, praise and criticism of achievers and wrongdoers respectively, documentation of events and facts, and performance during social functions (marriage ceremonies, festivals and funerals). Through the power of music, music and dancing groups are able to mobilize youth and act as agents of social change and control. Given this overview, it is clear that clans provide the leadership for recruitment and training in the socialization process. They preserve customs and traditions by ensuring that there is recruitment and training of new members and that they perform during social and cultural functions.

Social groups are usually established for reasons of unity and social cohesion – for community development. Depending on the nature of the social groups, they also nurture economic interests and objectives as a means to advancing social objectives. This is particularly true for women's groups and "*kotaa*" (labour pooling groups). With the exception of "*kotaa*" groups, these types of indigenous organizations are typically managed by management committees or executives that occupy democratically elected positions or, in some cases, are appointed by consensus.

However, these latter are often an option only after consideration of the benefits that can be derived from the involvement of such persons.

Some distinctions in the nature of these organizations are worth noting, however. The membership of youth associations is characteristically made up of natives residing within the community and those who have migrated to distant places for employment. The migrant members, because of their affluence and ability to raise more funds for the organization, usually drive the operations of these youth associations. At the group level, the leadership structure of women's groups is often represented by their executive management bodies – an element of modernization and adaptation that enables them to establish linkages with external development agencies. In instances where the traditional women's leader, or "magazia", is a member of a women's group, she often chairs the executive body or at least is a member of the executive body, but this usually has the tendency to draw all women into that particular women's group so that there are no competing women's groups in the community. In some instances, women's groups co-opt a man onto the executive body, for reasons ranging from the provision of secretarial services, winning the confidence of their husbands in their activities, to enhancing the maintenance of group cohesion. For women's groups, members are often community-based. For "kotaa" groups, members are usually peers and the groups may range in size from five to seven members. Seniority in age is important for assuming a leadership position. "Kotaa" groups are not as formal as youth and women's groups, so they often have a loose leadership structure but one that effectively works on the basis of social solidarity for advancing the social and economic interest of members.

The developmental roles of these indigenous organizations are numerous. Youth associations are essentially social organizations and usually pursue social development objectives – they rarely have economic objectives. The formation of these youth associations often stems from the recognition among youth to take up challenges that will bring about the development of the entire community. Reportedly, these associations generally meet to discuss development issues and plan the way forward only on festive occasions such as Christmas and New Year. These associations are involved in various developmental activities in the community. These include: the protection of natural resources in the community, that is, bodies of water, trees important to the economy (i.e. dawadawa and sheanut trees, which produce seed for spices and oil, respectively) against bushfires, anti-bushfire watchdogs, protection of crops by ensuring that all animals are quarantined during the rainy season, construction of social infrastructure (schools and health facilities) and feeder roads. Women's groups are engaged in self-help projects in the communities and also

support group by members through the granting of soft loans from group resources or by acting as a medium for the disbursement of credit from external agencies in support of individual members' varied economic activities. These economic activities generally include shea butter-processing, *pito* (traditional drink) brewing, *dawadawa* spice-processing, the weaving of mats and baskets, petty trading, livestock and poultry, crop farming and fuel wood collection. The groups also organize themselves to provide communal or group labour in farming-related activities such as sowing and harvesting on their husbands' farms, construction, rehabilitation and plastering of houses in the off-season. "Kotaa" groups assist individual members by pooling labour to assist each other to carry out farm work and construction-related works. These groups seek to benefit from the principle of synergy by pooling labour for economic production.

Institutional and organizational linkages: scope and mechanisms

The findings of this study show that a number of institutional linkages exist among the indigenous community-based institutions and organizations, and between them and non-indigenous organizations. Working relationships between the different hierarchies of traditional authorities in the study communities are generally cordial. The relationship is one of loyalty and obedience on governance and spiritual-related issues evidenced in the system of loyalty to the Kpembewura (paramount chief of Gonja) discussed earlier. It should be noted, however, that northern Ghana has its fair share of chieftaincy disputes and in such instances cordiality as described above takes a back seat. It was also observed that there are links between traditional authorities and other community-based institutions and organizations. The reason is that some traditional office holders, particularly sub-chiefs, youth leaders and women traditional leaders, are often members of community-based institutions and organizations. Although such kinds of linkages accordingly provide a window for considering the views of traditional authorities in community development initiatives, one cannot conclude that there is a working relationship between traditional authorities and community-based organizations, given the absence of any institutional arrangements.

In spite of the fact that district assembly sub-structures are supposed to function as instruments for facilitating community participation in local governance and development, it is reported that community-based organizations in Bowko, for instance, did not seem to have any working relationship with the assemblyman and unit committee at the institutional level.² Whatever the circumstances, it is only prudent that unit committees, in their effort at community development, collaborate with community-based organizations that are already playing vital roles in

community development and vice versa. From the study, it appears that the level of coordination between the IIs and formal government institutions is so low that there is duplication in terms of projects implemented in the communities. This phenomenon leads to mismanagement, duplication of projects, unhealthy competition and rivalry in community development. The problem should not be viewed in isolation but in the context of emerging problems in the implementation of decentralization policy.

The findings further show that some community-based organizations and communities have developed collaborative and cordial working relationships with non-governmental organizations and government agencies. The information from Bowko documents, that community-based organizations have developed links with external development agencies and service providers such as Banks, Social Investment Fund, Village Infrastructure Project, CARE International and PAS-L. In the Bowko report, reference is further made to CRS and the Breast Feeding Mothers Club collaboration through which, support and care is given to pregnant and lactating mothers. In the light of current participatory development approaches, the interactions between most community-based organizations and non-governmental organizations are generally informal so that there are no rigid contractual agreements governing collaborative linkages. It is noteworthy that, although this is a significant achievement, the development agencies themselves have often been instrumental in developing these links as a mechanism to utilizing a group approach to development intervention. This raises a capacity question regarding the capability of community-based organizations to negotiate and develop working links with non-indigenous and more formal organizations such as government agencies and NGOs.

Implications for local governance

This section discusses the implications of the findings for local governance and community development. The discussion centres on a number of emerging issues and themes arising from the analysis. For indigenous institutions to be able to enhance local governance, there is a need for reforms that will make their operations more effective and transparent so as to fit into the present democratic dispensation.

Democratization: broad-based participation in decision-making

Broad-based participation in decision-making must be a guiding principle in the chieftaincy institution in northern Ghana. This institution already has a decentralized structure, so that by drawing on the strengths of this structure more people can be involved in decision-making processes. This is particularly important in that the power of the chief derives from the

people. It therefore stands to reason that, while decision-making was predominantly at the level of the chief and council of elders, the new orientation should facilitate the participation of sections of the population, particularly, women and youth, who for cultural and social reasons will always take back-bencher positions in the decision-making processes in which elders are involved. However, decision-making on traditional, spiritual and defence matters must be the preserve of the councils of elders on the grounds that most northern communities are patriarchal in nature.

Inroads have already been made towards further democratization in the traditional political systems in northern Ghana; but what is now required is its institutionalization – the recognition and consolidation of the participation of women and youth in decision-making concerning community development within the framework of the traditional political system. Decision-making within community-based organizations is already broad-based in nature, often involving executives convening meetings with members of the organizations. The focus of institutional development policy should be the consolidation of this process.

Leadership development

The leadership situation among indigenous institutions and organizations points to two critical capacity concerns. These are chieftaincy succession problems and the lack of, or low, formal education levels of community-based leaders. The numerous chieftaincy succession problems emanate from the lack of a well-documented and streamlined system of succession. The policy direction for institutional development points to an urgent need to develop a reliable documentation system of succession rights for traditional political systems, which draws on a combination of hereditary rights and electoral procedures. While the issue of documentation particularly applies to the former, the latter equally requires documentation for future references. Lack of documentation on these issues has led to many cases of chieftaincy dispute in Ghana. Such conflicts have occurred and lives and property lost as a result of non-royals suddenly claiming royalty and insisting on becoming chief when vacancies occur largely because there are no documents relating to lines of succession in many communities in Ghana.

As mentioned above, one critical issue is the low educational background of leaders of community-based institutions and organizations: this suggests that training may be central for leadership capacity-building. Although formal education is not the only criterion for assessing the capacity for good leadership, there are numerous advantages and benefits that can be derived from having leaders who have attained some level of formal education. In instances where leaders of community-based organizations lack some level of education, be it formal or informal, it is plausible

to believe that there is always a social gap between such organizations and formal institutions that are purposefully established to support the former. Consequentially, this adversely affects the development of an effective working relationship, to the disadvantage of community-based institutions and organizations. This scenario therefore calls for a kind of bridge between informal education and functional literacy for leaders of community-based organizations, including traditional leaders. The subject areas for training that are critical for guiding institutional development policy include group dynamics and conflict resolution, resource mobilization, planning, information management, negotiating skills, knowledge of the development policy framework and possible sources of development support. The acquisition of these skills and knowledge can better prepare community-based institutions and organizations to link up with relevant development agencies, so that these institutions can position themselves to explore the benefits of resource support from development agencies.

Developing a reliable accountability system

The increased need for and role of traditional authorities in community development processes implies that a greater portion of community resources will have to be managed by traditional authorities. This poses a challenge to the present accountability system, which is not reliable or stable enough to enable people to have confidence in the system. The process of strengthening the accountability system can be explored on two levels. The first example is the inbuilt system within the traditional political authority structure such as in the case of the Maasu in which the structure allows for exchequer office holders to serve as checks and prevention of abuse of power by traditional leaders.

This system, however, has a very limited application in northern Ghana. In considering the success story of the “Tindana” in ensuring that traditional authorities conform with the communities’ culturally and prescribed spiritual norms in matters relating to land, it is also possible to envisage that this office, with the relevant training, could play the role of “internal auditor” to the chief and the traditional council. The experience of “Tindana” indicates that there are promising indications that such an initiative can succeed. To date, most traditional authorities in northern Ghana do not manage any substantial community-based resources comparable to the scale in southern Ghana. With any increased mobilization of resources for community development, it is plausible to believe that, given the quality of individuals considered for chieftaincy, chiefs will embrace a mechanism of transparent management and auditing of the use of community resources, since this will enable them to do away with unfounded speculations and maintain the renown of the chieftaincy.

The other policy option will be to explore the potential role of the Council of Elders. In the present traditional political system, the Council of Elders basically plays an advisory and supportive role to the chief in his exercise of traditional leadership. In the light of this, can the Council of Elders play an effective role in serving as a check in the exercise of traditional leadership, particularly in a system when council members are either sub-chiefs or elders and are supposed to pay allegiance to the chief under whom they serve? Although this remains an option, to be successful it will have to be linked to developing a regular and institutionalized community forum for relating information on resource management to communities and also to provide opportunities for people to seek clarification as a means to building a transparent system of local governance.

Leadership: appointment and replacement

Ascription to traditional leadership positions hinges to a very large extent on hereditary rights, which may in some instances be combined with electoral processes in the event that a number of prospective candidates present themselves. The policy direction here should not be to change the system of appointments, since that would be at variance with tradition and has the potential for generating conflict situations. Nonetheless, traditional systems always outline offences and the associated sanctions that go with such offences – so that this system of rules provides a window for strengthening the system of checks on traditional authority for prevention of abuse. This policy change requires that inbuilt institutional structures are strengthened to get the mechanism working; and this can benefit enormously from linking up with national or regional chieftaincy institutions such as the Regional Houses of Chiefs. What roles can the regional Houses of Chiefs, for instance, play to ensure that chiefs conduct themselves as expected? Is there any code of conduct governing the chieftaincy institution? Will the system ensure that chiefs who step out of bounds will be sanctioned and, in the worst-case scenario, be stripped of their “skins” as a deterrent for other chiefs? What role can paramount chiefs play? Paramount chiefs must be supported and strengthened to oversee good conduct of sub-chiefs. These questions point to focal points for possible interventions.

Institutional linkages and coordination

As traditional authorities and community-based organizations have an interest in promoting community development, their scope and mechanism of institutional linkages must take into consideration the existing legal, policy and institutional framework for development planning and management. The most desired institutional linkages should point to a

network scenario, involving mutually supportive and collaborative working relationships between a wide range of development authorities, institutions and agencies. The following collaborative relations between development institutions and organizations are discernible in the existing framework:

- collaboration between traditional authorities and community-based organizations;
- collaboration between district assemblies (sub-structures) on the one hand, and traditional authorities and community-based organizations on the other hand;
- collaboration between community-based organizations themselves in development efforts;
- collaboration between traditional authorities and community-based organizations on the one hand, and NGOs on the other.

Particular note is made of the Unit Committee members and assembly persons neglecting traditional authorities in some of their development activities. Just as district assembly sub-structures have a responsibility for facilitating community participation in local governance and development, the non-involvement of traditional authorities and community-based organizations can have a number of adverse implications, such as generating conflict between assembly persons and traditional authorities in a power struggle; the duplication of development efforts; development efforts failing to utilize the resource base of community-based organizations or render them inactive in the development process. Given the contribution and potentials of traditional authorities and community-based institutions and organizations, the policy direction must be to enhance increased community-based coordination between development actors. To be sustainable, such an effort should be institutionalized rather than being developed around personalities.

Resource mobilization

The findings show that community-based organizations have a low financial resource base. This is a development constraint for the sustainability of the organizations and implementation of their programmes. It is vital that any capacity-building process incorporates financial capacity-building. Such initiatives should explore the mobilization of resources from both internal and external sources. On the domestic front, cooperation with traditional authorities and the local government sub-structures should be a guiding principle. There are a number of resourceful development agencies that community-based organizations can seek support from. As already noted, community-based institutions and organizations need, first, to know which these organizations are and, secondly, how to

lobby and negotiate on terms favourable and consistent with sustainable development principles. Given the low educational orientations of community-based leaders and the consequent social gap between community-based organizations and external development agencies, the leadership development of community-based organizations will be central to the success of such a resources mobilization drive.

Conclusion

In an era when endogenous development has become an attractive development policy option among policymakers and development practitioners, community institutional development is emerging as a *sine qua non* for strengthening the capacities of communities for self-initiated mobilization and development. In northern Ghana, the chieftaincy institution, or what is also known as the traditional political authority, is pivotal as an indigenous institution for organizing local governance. Besides this, there are other indigenous institutions that can broadly be categorized into community-based self-help groups and social and cultural groups that play complementary roles in community mobilization and development. Some of these groups, particularly social and cultural groups in some instances, have specialized roles to play in the process of community development. However, these community-based institutions and organizations in general face challenges that hold back their full potential in contributing to the development process. These challenges and potentials impinge on institutional development and need to be given consideration in the formulation of institutional development policies and programmes.

Notes

1. This is a Culturally Sensitive and Participatory Approach to Community Entry and Diagnosis, developed by CIKOD and its associates.
2. Ghana's local government system hinges on the District Assembly as the lowest level political set-up for administration. There are currently 138 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana. Each MMDA is composed of elected and appointed Assembly members. The Assembly provides the platform for deliberation on local development issues and is headed by a chief executive, appointed by the head of state and approved by two-thirds of the Assembly members present and voting. Below the Assembly are Area Councils and Unit Committees, which provide avenues to discuss community development problems and source funding from the Assembly or other sources for implementation. Members of the Area Councils and Unit Committees are also elected or appointed on the same basis as the MMDA.

REFERENCES

- Berger, P. L. and H. Neuhaus (1984) "To empower people", in D. C. Korten and R. Klaus (eds), *People Centred Development: Contributions towards a Theory and Planning Frameworks*. Hartford, CT: Kumarin Press, pp. 89–112.
- Gyekye (1996) *African Cultural Values: An Introduction*. Accra: Sankofa.
- Kendie, S. B. (1993) "Making Rural Drinking Water Supply Programmes Work in Ghana and Togo: The Role of Community Participation and the Limits of the Conventional Programme Delivery Approach", Ph.D. Dissertation, Rensselaer Polytechnic Institute, Troy, New York, UMI Dissertation information Services, Ann Arbor, Michigan, 6194.
- Kendie, S. B. and A. M. Abane (2001) "User committees and sustainable development of drinking water services in rural North Ghana", in Y. Saaka (ed.), *Regionalism and Public Policy in Northern Ghana*. New York: Peter Lang, pp. 177–206.
- Kendie, S. B., N. K. T. Ghartey, and B. Y. Guri (2004) "Mapping indigenous institutions in Southern Ghana", Occasional Papers No. 1, CDS, University of Cape Coast.
- Kendie, S. B. and B. Y. Guri (2005) "Culture and development: The Asafo groups in Southern Ghana", Occasional Papers No. 2, CDS, University of Cape Coast and GTZ, Accra.
- Kendie, S. B. and B. Y. Guri (2006) "Indigenous institutions as parameters for agriculture and natural resource management", in D. Miller, S. B. Kendie and A. Apusiga (eds), *African Knowledges and Sciences: A Potential for Endogenous Development*. Leusden: ETC/COMPAS Publication, pp. 106–129.
- Kendie, S. B. and B. Y. Guri (2007) "Indigenous Institutions, Governance and Development: Community Mobilisation and Natural Resources Management in Ghana, *Proceedings of the International Conference on Bio-diversity and Endogenous Development*". Leusden: ETC/COMPAS.
- Kendie, S. B. and J. V. Mensah (2008) "Decentralised departments of state, the District Assemblies and local level development in Ghana", in S. B. Kendie and P. Martens (eds), *Governance and Sustainable Development*. Cape Coast: Marcel Hughes Publicity Group.
- Olson, Mancur (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge, MA: Harvard University Press.
- Pejovich, Svetozar (1995) *Economic Analysis of Institutions and Systems*. Boston: Kluwer Academic.
- Uphoff, N. (1988) "Assisting self-reliance: working with rather than for the poor", in J. P. Lewis (ed.) *Strengthening the Poor: What Have We Learned*. New Brunswick, NJ: Transaction Books, pp. 27–42.

4

Gender and traditional knowledge: Seeing blind spots, redressing inequities for women

Fatima Alvarez Castillo and Maria Nadja A. Castillo

Introduction

The house was circular, with a big round meeting room in the middle and a wide veranda circling it. The conversations going on in the meeting room could be heard from the veranda because the *sawali* partition is very low, topped by wide open spaces. The architecture of the house created a feeling of openness and inclusiveness. The leaders were sitting in a circle on the bamboo floor in the meeting room; other community members and the women were on the veranda.

Only two elderly women were seated with the men in the meeting room. They never talked during the meeting. The first time they spoke with me was when the meeting broke up for lunch. They talked about the urgent issue of logging in their community.

This scene took place during a meeting that was recently conducted with community leaders from a Mangyan community in the Philippines in regard to obtaining the community's free and prior informed consent for this research.¹ It depicts the traditional exclusion of women in public assemblies in this indigenous community where decision-making on matters such as whether or not to allow a research project in the community is the sole privilege of men.²

That contemporary indigenous communities are egalitarian is more imagined than real. Today, gender markers in different forms and extent exist in virtually all indigenous communities in the world (Alvarez Castillo and Lucas, 2008).

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The egalitarianism characteristic of many indigenous communities in the past is steadily being eroded by changes brought about by their interactions with societies that are hierarchical and by internal changes in their economy and social division of labour. Many of these changes have been imposed from outside and adopted by indigenous peoples to survive.

Gender-based inequalities experienced by indigenous women are also shared by non-indigenous rural women. However, the combined impact of ethnicity, gender and poverty could make the situation of indigenous women more difficult compared with non-indigenous and poor rural women. Indigenous women suffer from discrimination not only because they are poor and they are women but because of their ethnicity.

Invisibility of women as knowledge creators

Women are not only excluded from public decision-making, they are invisible as knowledge makers. Whether in mainstream science or traditional knowledge, women's contributions have been undervalued. In both the social and natural sciences, attribution of pioneering work has been mostly to men (Garry and Pearsall, 1992). Women have always been on the margins of scientific work despite their achievements (Fara, 2005). In her examination of the history of science, Fara found that much exemplary work done by women in science is not recognized. She cites the example of Rosalind Franklin, who should also have got the Nobel Prize for her work on DNA, but was excluded from the award that went to her male colleagues.

There is a similar situation for women within traditional knowledge. Very little is known and understood about women's contributions. What is generally known can be traced to two main sources: anthropological work and the work of environmentalists.

Anthropologists have studied women in traditional knowledge (Reiter, 2006; Leacock, 1983).³ They have provided rich details about women's role in knowledge production and cultural heritage in specific indigenous and traditional societies. The complexity and diversity of the subject have spawned special fields of anthropology in some universities, such as the anthropology of women and feminist anthropology. There are environmental and ecological anthropologists who focus on gender as their analytic framework.

We learned that women have specific ways of interpreting experience and creating symbols⁴ (aspects of any knowledge system), often mediated by their location in society and relations of power with men. We now know that they have a vital role in the arts and intangible heritage of their society.⁵

Women's involvement in various spheres of intangible cultural heritage is both central and vital. Such spheres include . . . language, codes of ethics, behavioural patterns, value systems and religious beliefs. In most cultures, women maintain principal roles in the upbringing of children, through which the intergenerational transmission and renewal of many of essential forms of intangible cultural heritage occurs (UNESCO, 1999: 2).

The other stream of knowledge on women's roles in traditional knowledge comes from work on environment and biodiversity. The Convention on Biological Diversity (CBD) added impetus to the work of UN agencies,⁶ environmentalists, eco-feminists and women NGOs to gather information on how the exploitation and destruction of the natural environment have negatively affected women as well as on women's roles and contributions in environmental protection, management and traditional knowledge. The UN Food and Agriculture Organization (FAO) has included a gender perspective in its interdisciplinary approach in implementing the Rio Conventions, with gender mainstreaming as one of its cross-cutting priority areas. It also established the FAO LinKS project, which aims to improve food security in the rural areas and advance sustainable management of agrobiodiversity with the use of participatory approaches in its programmes that recognize both men and women farmers' knowledge (FAO, 2005). Other institutions, such as the GTZ and International Development Research Centre (IDRC), have also advocated gender mainstreaming in biodiversity and traditional knowledge research (IDRC, 1998) but still the knowledge gap is huge; this will be taken up in the section on recommendations.

Attention among environmental practitioners to the link between women, traditional knowledge and the environment is of fairly recent origin. After the publication of the seminal work of Ester Boserup in 1970 on women's role in the traditional farming system in sub-Saharan Africa, other studies have come out on women's roles and contributions to agriculture, biodiversity and other local economic activities. A paradigm shift to properly account for women's economic contributions, Women in Development (WID), came about that informed the global policy framework. This paradigm included strategies for promoting women's economic participation and their equitable share in economic benefits (Vencatesan, 2008).

However, the key role that gender plays in marginalizing women from economic development was believed not to have been adequately integrated in WID (Razavi and Miller, 1995). This led to a further shift in policy framework, from WID to Gender and Development (GAD). This new framework emphasized the need to examine the issues from a gender perspective (Razavi and Miller, *ibid.*). It also included the idea that

women's emancipation cannot be achieved without the participation of men and that men too could be negatively affected by gendered norms and practices (e.g., the social pressure on men to typify the norm of machismo).

What is gender and why does it create problems such as these? In what ways are these problems manifested in traditional knowledge? What is the role of agents of change such as biodiversity workers, researchers and policymakers in this scheme of things? What should be done to redress gender-based injustice in the distribution of benefits from traditional knowledge?

This chapter addresses these questions by examining gender-based issues in traditional knowledge. Two cases, from Nigeria and India, are used to illustrate the barriers to gender-fairness in the distribution of benefits in the commercial use of traditional knowledge. It is argued that these barriers are rooted in household, community, national and global structures of inequality that intersect, resulting in the pervasiveness and persistence of such inequalities. The chapter ends with recommendations on policies and strategies that can bring us closer to the realization of gender justice in traditional knowledge.

Gender inequalities

Why and how does gender create inequalities between men and women? Gender refers to socially constructed identities, roles and status that influence the allocation of power, entitlements, opportunities, and prestige to men and women. The allocation of these resources is imbalanced in favour of men. Roles, responsibilities, relationships, knowledge, capabilities and practices, for example, are gendered because these are defined or assigned on the basis of individuals being men or women. These in turn, differentiate access to and control over resources between them.

Gender-based hierarchies are found in all aspects of life, at all levels: personal, private, public; household, community, the state and global political economy; the social, cultural, political, economic and ideological arenas. The reason they are pervasive and persistent is because virtually all institutions, policies and daily routines of life are embedded with gendered norms and stereotypes. Yet these are often unrecognized.

For example, when forest conservationists in Bolivia consult men and not women, not because they want to exclude women by intent but because of an assumption that women are not knowledgeable about this concern (CIFOR, 2004), they are acting out deeply internalized gender stereotypes. These stereotypes are so deeply ingrained that even women themselves unwittingly perpetuate them. In Tamil Nadu, India, for example, both female and male agricultural workers agree that it would

be humiliating for a man to receive the same pay for the same work as a woman (Rojas, accessed Jan 2009). “Women’s role in conservation since the 19th century remained ‘hidden from history’” (Vencatesan, 2008: 1120). What is objectively a discriminatory practice is subjectively thought to be simply acting in accordance with the natural order of things (men are stronger than women so it is only natural that they are the ones doing work in the forest). Much of what we consider to be natural is actually socially structured and ideologically rationalized.

Gender blindness refers to unawareness or non-recognition of the existence of gendered relations, norms, and practices that differentially impact on men’s and women’s lives. Gender blindness manifests in various ways, among which are: approaching a community as an undifferentiated entity (e.g., men and women have the same knowledge) or (habitually) thinking from the male perspective (only male knowledge is important).

Men and women are not the same even if they face similar threats and live in the same community; thus the knowledge they hold, their contributions, and their needs are different but often development workers and policy makers fail to recognize these vital differences (FAO 2005: 23).

Blindness to gender inequity is common because it tends to be obscured by or conflated with other inequities such as those brought about by class, ethnicity or religion. Thus, while we may be motivated to promote social justice to the disadvantaged poor or ethnic minorities in our projects, for example, because of gender blindness we may be actually unintentionally reinforcing injustice to women. The experience of the San in the Kalahari, which used to be egalitarian societies, illustrates this. The approach of development workers was to deal with men as the head of the household and this (further) weakened women’s economic and social status. For example, agreements were made with men; women were allotted small livestock (e.g., goats) while the men were given cattle on the assumption that they were the family heads (Sylvain, 2006).

One way of overcoming this is to explicitly integrate gender justice in policy, methods and outcome measurements in our projects. Anne Marie Goetz (2007) provides the key ideas of gender justice: ending and redress of inequalities and unfairness in the distribution of resources and opportunities between men and women.

Knowledge is gendered

Knowledge is an ideological aspect of every culture. Every knowledge system has two main interacting aspects: the ideological and the practical. The ideological consists of beliefs and assumptions about the nature of phenomena. It is infused with values, although the people who hold that

knowledge may not be aware that it is so. For example, the so-called modern, western scientific knowledge system is thought to be value free. This is not so (Oakley, 1992).

The practice (consisting of methods or ways of knowing, validating and transmitting information) of every knowledge system is influenced by its ideology. Empiricism, for example, the preferred method of modern science, has a particular mindset about the nature of phenomena (e.g., they are knowable through the use of reason and empirical evidence) and the correct scientific attitude is to be objective (meaning to be value free and not to be influenced by emotion) (Neuman, 1994).⁷ Emotion tends to clutter or distort our apprehension of phenomena. Between reason, seen as a male attribute (Reinhartz with Davidson, 1992), and emotion, a female attribute, the former is superior. Intuitive knowing, a major method for knowing in traditional knowledge (also considered by feminists as a valid method for knowing) is considered to be unscientific and therefore unreliable (Guerrero, 1995; Oakley, 1992).

Students and practitioners (e.g., development workers, conservationists) internalize the values of this knowledge system through socialization in academia and outside. Scientific publications, popular media (e.g., advertisements, news reports), the reward system in universities and professional societies are among the major purveyors of the modern (West-based) knowledge system. Colonization of the past, international development institutions (e.g., the World Bank) and agents of cultural globalization of the present are among the major actors that made this particular knowledge system the universal knowledge that societies throughout the world should adopt if they are to progress. The anti-nature character of this knowledge system will be discussed later in this chapter.

Knowledge does not drop from the sky or emerge from a vacuum; its formation is mediated by history and context. It contains elements of the ideology and values of its cultural context. The modern, scientific knowledge system came from a particular history and culture – that of eighteenth- and nineteenth-century western Europe (Wallerstein et al., 1996). It contains elements of the cultural values of that context but it is portrayed as value free and universal.⁸ Other knowledge systems, such as the traditional systems, are portrayed as inferior; in some cases, in antagonistic terms.

The policies and programmes informed by the western, modern knowledge system carry its ideological elements. If the social and historical context is gendered, the knowledge system from which it emerged is gendered. The privileging of reason over emotion reflects a socio-cultural privileging of the male over the female, reason being a male attribute, emotion female.

It should not therefore be surprising that the thinking and behaviour of experts, development workers and policymakers (as illustrated earlier) reflect a gender bias. Gender blindness is a form of gender bias exemplified (in the earlier discussion) in the view that men represent both men and women.

However, there are differences in the knowledge that men and women hold. There are differences in the impact of biodiversity loss in their lives. Gender differentiation and division of labour particularize the knowledge that women form and share. This is reflected, for example, in their knowledge of, and preferences for, plants and animals. Women may choose certain food crop seeds based on cooking time, meal quality, taste, resistance to bird damage, and ease of collection, processing, preservation and storage. Men's criteria may be based on yield, suitability for certain soil types and ease of storage (Aguilar, 1982).

It is true that because men and women in a community live through a common history and share similar contextual challenges, many aspects of knowledge that they form are also shared. But, at the same time, the differences in their lived realities, identities and roles create important differences in their perceptions, ways of knowing and valuation of phenomena. Traditional knowledge, for example, is contingent on experience, which is mediated by the gender, ethnicity, class and even geographic location of the knower (Reid, 1992).

Standpoint theorists explain that knowledge is always particular and presupposes a social location, or standpoint. Feminist standpoint epistemologists argue that recognition among scholars of the influence of women's social location on their cognition can lead to a more objective assessment and understanding of women's knowledge (Harding, 1986: 138).

Traditional knowledge

Just like other knowledge systems, traditional knowledge is infused with the values (including biases) of its historical and socio-cultural context. Traditional knowledge and indigenous knowledge are used usually interchangeably. This is because they are closely related and they often overlap, but they can be distinguished from one another.

Traditional knowledge is part of all knowledge systems in the world. It refers to knowledge that people in a community, based on experience and adaptation to a local culture and environment, have developed over time and used to sustain and enhance the community. It continually changes as people innovate, invent, discover, experiment and interact with other knowledge systems (Hansen and Van Fleet, 2003; FAO, 2005).

On the other hand, indigenous knowledge, a part of traditional knowledge, is held by communities that are indigenous. Like traditional

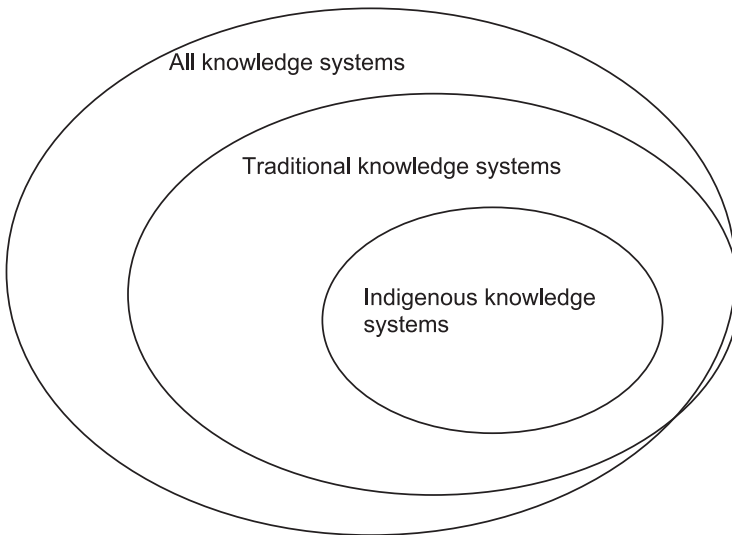


Figure 4.1 Knowledge systems in the world
Source: Modified from WIPO (2001: 23)

knowledge, it is used by indigenous communities for survival (e.g., food), for health needs, for cultural integrity (e.g., use of plants in rituals) as well as for the sustainable use of resources.

Gender and traditional knowledge

Eco-feminism

Despite the increase in available information about the roles that traditional and indigenous knowledge play in biodiversity and environmental protection, there is very little that we know about how gender is implicated in traditional knowledge. The vigorous articulation of women's role in environmental protection goes back only to the early 1970s with the emergence of eco-feminism as a philosophy and as a movement (Venkatesan, 2008).

While eco-feminism is influenced by the philosophy of the Green movement, it became a distinct school of thought because of its focus on women and how different their perceptions, ways of knowing, interacting with and valuation of nature are from those of men. A key idea is that both nature and women share a nurturing role in human existence.⁹ It critiques the anti-nature worldview that promotes the domination and exploitation of nature which eco-feminists believe is enshrined in western

industrial capitalism and mainstream science, and is an extension of male domination of women.

Women's contributions to traditional knowledge

Women as producers, custodians and consumers of traditional knowledge are recognized in major international covenants and instruments (e.g., various UN declarations and policies). Their contributions are crucial to biodiversity management, the sustenance of the family and community, and the development of new knowledge (FAO, 2005).

The contributions of women in traditional knowledge, for analytic purposes, may be grouped into three: (a) on biodiversity; (b) on cultural heritage; and (c) on family and community sustenance. These contributions overlap and are connected to their multiple roles in the family and community.

Women's knowledge on biodiversity

Women produce 80 per cent of food in Africa, 60 per cent in Asia and 40 per cent in Latin America (FAO, 2005). Because of their role of providing their families with food, water, fuel, medicines, fodder and other vital daily needs, rural women have wide and diverse knowledge about the uses of local biodiversity.

Illustrative of this are the rural women in Burkina Faso who carefully select and collect fruits, roots and seeds of native plants such as the baobab tree, red sorrel and kapok plants for inclusion in the family diet, providing more variety in nutrition and as supplement to the staple diet (FAO, 2005).

The loss of biodiversity increases the burden of women as they perform their multiple daily chores. For example, water scarcity and contamination, and deforestation make women's water and fuel-gathering tasks more taxing and time consuming (Gibb, 2007). In Sabah, the relocation of a rural community to give way to a dam project placed a greater burden on women when familiar food sources became unavailable (Ooi Lim, 2001).

Women have a stake in a healthy ecological system and they play a key role in the preservation of biodiversity. By way of example, Thai women rescued 230 species from a forest that was about to be cleared and planted these in home gardens (FAO, 2005).

Knowledge of cultural heritage

Cultural heritage has both material and ideational aspects. This is seen in women creating designs for baskets and pottery for food preparation,

keeping leaves and fruits they gather, and storage for seeds (the material aspect of culture). They make specially designed cloth for rituals. In their creative work, they express their own and their community's history, memories and views about nature (the ideational aspect of culture).

When they sing their babies to sleep, women tell stories and legends about the ancestors and the saga of their people. Groups of women share stories while they wash clothes or weave baskets with their daughters. These are the usual ways in which women pass on knowledge to their children.

Knowledge of family and community sustenance

We will use traditional medicine, a huge and vital part of traditional knowledge (Gibb, 2007), to illustrate other aspects of women's contributions. In Bangladesh, almost 80 per cent of the rural population depend on medicinal plants for their primary health care needs (Gibb, 2007). Women as healers and herbalists comprise a major part of traditional medical practice.

In many regions, women and men perform different, complementary roles in cultivating, harvesting and using medicinal plants; however, quantitative and qualitative data describing women's specific roles in collecting, growing or marketing medicinal herbs are difficult to obtain (Gibb, 2007: 8–9).

Differentiated impact of biodiversity loss on women

The demand of global markets for cheaply produced agricultural products from developing countries has intensified the expansion of commercial agriculture into the rural areas. This threatens the local ecosystems, especially biodiversity, as mono-cropping, introduction of alien species and the clearing of forests intensify. It has also resulted in a division of labour in many communities where men tend to be more involved in raising commercial crops and women in crops for consumption. Because of this, women tend to have more specialized knowledge than men on wild plants (Gibb, 2007).

However, the increased centrality of money in these rural economies has further lowered women's status – they don't earn cash, unlike the men. Women's economic contribution is further degraded.

“The commercial uses to which men generally put land, water, plants, and animals are privileged over the domestic uses to which women commonly put such resources” (Gibb, 2007: 1–2).

There are more women than men who are engaged in agriculture but this is often not accounted for in labour force statistics. Because women's

agricultural activities take place outside the market, these are considered to be less significant.

This partly explains why many projects aimed at assisting farmers deal only with the men – it is their contribution that matters. This not only excludes women from participating in the planning and decision-making regarding the project, but they are also excluded from its benefits. For example, credit and training projects involve only men (Fiagoy, 1996).

And even if women are included, when methods used do not take into account their situation, gendered practices could obstruct their participation. For example, restrictions on their mobility (e.g., due to their multiple domestic chores, cultural restrictions on their freedom of movement and political participation) would not enable them to participate in training. This exemplifies how gender-blind development work can actually reinforce gendered inequality and be unjust to women. We illustrate this in a case from the Philippines in Box 4.1 (Estandarte et al., 1999).

Gender issues in intellectual property rights

Holders of traditional knowledge are concerned about their rights of ownership, control and use of their knowledge. One reason is the huge scale of bio-prospecting, use of traditional medicine and other local biological resources for commercial purposes. One estimate of the world sales of herbal medicine is US\$30 billion (Hansen and Van Fleet, 2003). There have been reports of biopiracy, misappropriation and misuse of traditional knowledge and biological resources (Alvarez Castillo and Castillo, 2009).

International intellectual property rights (IPRs) are legal protections given to persons for their creative work or discovery. These rights give those persons exclusive right over the use of that creation or discovery for a certain period of time. They include patents, copyrights and trademarks, and are codified at the international level through a series of legally binding treaties (Hansen and Van Fleet, 2003).

Criticisms have been made of the current IPR regime, especially by human rights advocates, environmentalists and the governments of some developing countries. There are two main issues pertinent to the concerns of traditional knowledge holders: (a) practical; and (b) ideological.

Practical issues

The patent system in the current IPR regime is biased towards those who have the resources and capability to protect their property rights. Rural

Box 4.1 Violence against women a barrier to their political participation

The rural, upland farming community is remote from the city. It lives in the shadow of a military detachment deployed by Marcos in poverty-stricken communities allegedly to protect the people from communist rebels. But the people were afraid of the army, who have been abusive and living off their meagre food.

The women in the community asked an NGO to assist them in setting up a cooperative to augment their farm produce. It was timely that an international funding agency had issued a call for proposals for women and livelihood.

The NGO workers, who are women themselves, met with the community women to develop the proposal. The women were involved in crafting the proposal in all its details. When it was ready, the NGO submitted it to the funding agency on behalf of the women. Luckily, it got funded.

The project was multidimensional; it had livelihood, capacity building for women, community organizing and biodiversity protection. There was skill-building to prepare them for setting up and managing the cooperative.

It was agreed that the training would be done in a beach resort to give the women a break from their daily routine. Conscious that the women would not be able to concentrate during the training, thinking of their children and the myriad chores needing to be attended to, arrangements were made with other community women who were not participating in the training to take over the chores and mind the children.

After the training, the community organization was set up. Men and women leaders were elected as officers. A few months after the cooperative and the organization began to operate, two of the women officers asked to resign from their positions. The reason was that this had been the cause of quarrels between them and their husbands, who forbade them to attend meetings and discharge their functions. One of the women who tried to assert her right to decide on the matter was battered by her husband.

and indigenous people in poverty do not have the means, unless they are assisted from outside, to work through the technical and legalistic mechanisms of the system (WIPO, 2001).

Basically, the current patent system is practically inaccessible to indigenous peoples and communities, primarily because of their lack of funds, but also because often they have not received the education that is necessary to

manoeuvre within the extremely complex legalities of the patent system. This makes it even more inaccessible for women as they are often at a social and economic disadvantage compared to men (Gregoire and Lebner, 2000: 2–3).

The reason this poses greater difficulty for women is that they tend to be less educated than men. In addition, in many rural communities, because women do not enjoy property rights, they are not considered as legitimate actors.

Ideological issues

The IPR regime imposes the ideology of individual, private property rights and economic exploitation of knowledge on societies whose world view is anchored in collective sharing of knowledge and other resources. Traditional knowledge, especially indigenous knowledge, is communally developed and owned. There is therefore a collision of the two ideologies.

National policies to protect traditional knowledge

Many governments have passed legislation to protect their traditional knowledge from biopiracy and misappropriation. But they tend to be silent on protecting women's rights in traditional knowledge. The Philippines, for example, has a law that seeks to protect the rights of indigenous communities to access, control and be paid for their traditional knowledge, including traditional medicine, but it has no provision to ensure that indigenous women have equal access, control and share in payments from the use of traditional knowledge.

In India, the government is building a database of traditional knowledge as a protection against biopiracy. However, because women's knowledge tends not to be documented, there is concern that much of their knowledge could be excluded. A similar but bigger project, the South Asian Association for Cooperation, documents local and indigenous knowledge to safeguard intellectual property. It has no explicit protection for women's rights to intellectual property or to equitably share in the benefits from the commercial use of traditional knowledge.

Women and benefits from traditional knowledge

Discriminatory practices that unfairly impact women in the distribution of benefits from the commercialization of traditional knowledge are rooted in the gendered nature of society. We explain these in two illustrative cases: the Niprisan case in Nigeria and the Jeevani case in India.¹⁰

Box 4.2 The Nigerian Institute for Pharmaceutical Research and Development

The Nigerian Institute for Pharmaceutical Research and Development (NIPRD) learned that a US-educated traditional medical practitioner, Revd P. O. Ogunyale, has been using a recipe for the treatment of sickle cell anaemia. This recipe has been used by his family for generations.

Negotiations between the NIPRD and Revd Ogunyale for the scientific development of the drug took several years involving patent lawyers and experts. Eventually, a memorandum of agreement was signed between Revd Ogunyale and the NIPRD. In 2002, the drug Niprisan was launched in a big ceremony attended by top government officials of Nigeria.

In the negotiations, only Revd Ogunyale was involved. Before he died, he set up a foundation to receive his royalties from the benefit sharing agreement. Given that most traditional medical practitioners are women, it is reasonable to assume that women from his family and the community could have contributed to the recipe of Revd Ogunyale.

The Nigerian case

The majority of Nigeria's population are based in the rural areas. Poverty is a major problem and most of the poor are rural women. The Nigerian government has passed many laws against gender discrimination but these are not necessarily reflected in practice. For example, by law women have the right to own property just like men but daughters cannot inherit property from their father. In the management of inheritance, women are not treated equally after the death of the (male) head of the family. As in many other rural communities, most of the traditional medical practitioners in Nigeria are women. How these factors are linked to gender discrimination is shown in Box 4.2.

The lesson that this case suggests in the context of discrimination against women in regard to property rights in Nigerian society, is that women who could have played major roles in the traditional development of the recipe have been excluded from the negotiations and the ownership of benefits accruing from the commercialization of that knowledge.

The Kani case

Earlier we talked about the collision of world views between the western property system and that of indigenous communities. Through this case,

we will show that there is a need to be critical about collective ownership systems as well. There is a gender dimension in the tradition of collective ownership. The idea of the collective as homogeneous and egalitarian does not have a firm basis in reality. Even in indigenous societies, women can actually be unfairly treated in the distribution of benefits in cases where the community is able to negotiate for recognition of its property rights and a share in the benefits of commercialization. The case of the Kani women is an example.

Gendered barriers to Kani women getting fair treatment in the distribution of benefits from the commercialization of biological resources based on traditional knowledge are rooted in gendered structures in Kani society. About fifty years ago, the Kani in the forested areas of Kerala were shifting cultivators, horticulturists and food gatherers. Production was primarily for consumption. Both men and women had basically equal roles. Women had freedom to participate in decision-making as equals of men. In political affairs, women had active participation.

However, they were forced by the forest use policies of the government to adopt sedentary agriculture, supplemented by collection of forest products for exchange or sale, replacing the previous economic production for consumption. Kani egalitarianism was eroded and gender hierarchy emerged, not only due to changes in the mode of production but also due to increased interaction with mainstream Hindu society.

The passage of the law creating the Panchayat Raj (village assembly), which reserved seats for women, has not changed women's political exclusion due to socio-cultural practices. Most tribal communities in India do not allow women to take direct part in political activities. These are the domain of men. The head of the community, members of the council of elders, village Panchayat and tribal chief are all males.

The Kani women in Kerala are faced with many unmet reproductive health needs. Pregnancy-related health problems of women are due to their back-breaking work and the limited availability of the services of traditional midwives.

Traditionally as she went into labour, a woman performed all the normal household chores and social obligations. Fetching water for drinking and cooking, even from far-off springs, chopping firewood, taking care of children, cooking for the entire family, and even tending to the cattle and goats . . . Health workers and medical practitioners advise them more rest during prenatal and post natal periods, but since these women do not live in a joint family set up where they have the support of other women and as Kani men do not ordinarily share the household responsibilities, such advice is not often put into practice (Menon 1999: 216).

The relevance of these to women's fair share in the benefits from the commercialization of traditional knowledge is shown in Box 4.3.

Box 4.3 The Kani tribe and plant royalties: An example of women's involvement and benefit

In 1987 the Mottu Kani (the head of the Kani tribe) deputized three Kani guides to accompany scientists from the Tropical Botanical Gardens and Research Institute (TBGRI) on their expedition in the forest. The scientists came to learn that chewing a particular plant gave the Kani guides vitality. The scientists persuaded the Kani tribe to provide them with more information about this plant.

Progress in scientific study of the plant was encouraging. The resultant product, commercially known as Jeevani, became a popular item in European stores. Two of the guides were hired as consultants and paid fees from 1993 to 1998. Technology resulting from the study was later transferred to a major Ayurvedic company in exchange for licence and royalty fees. On its own initiative, TBGRI decided to share the fees with the Kani tribe. The Kerala Kani Community (Samudaya) Welfare (Kshema) Trust was registered in 1997 to regulate and direct the flow, management and use of the money. This function is vested in an executive committee of the Trust.

The first executive committee comprised nine members. Of the nine members, one was a woman. She participated in all activities and was a decision-maker within the committee.

When the term of the first committee expired, an election was held in May 2008 to constitute the membership of the next committee. There was no woman candidate although more than half of the community women went out to vote. Because there was no woman member, in its first meeting, the newly elected committee decided to appoint two women as members. All of the officers are men.

On the use of the money, aside from allocating for general community projects, according to a key informant, Rs. 5000 is maintained as a fixed deposit in the name of two young Kani girls whose mother was killed by a wild elephant in 2002. Financial assistance has also been given to the family of a woman who committed suicide during the year 2006. Such small benefits are being extended to the individuals/families as and when required.

There are several issues in the case described in Box 4.3:

- women's marginalization in the community decision to allow the scientists to have access to knowledge about the plant and its uses;
- male domination of the decision-making body that manages the fund;
- benefits allocated ostensibly for women were actually for their children.

While it can be argued that benefits to the community from the funds could benefit women as well, given the tendency of women everywhere to under-prioritize their own needs, unless funds are explicitly set aside for them, women could easily be marginalized from access to and use of benefits from the commercialization of a biological resource that is based on community-held traditional knowledge.

Conclusions

In the last three decades, there has been a lot of work done to address the absence of knowledge about women in traditional knowledge. The combined efforts of researchers, advocates, and programme and policymakers have resulted not only in greater awareness about women's contributions to traditional knowledge but also about gendered inequalities that disproportionately burden women in traditional societies. Still, a lot more work needs to be done, especially in drawing attention to gender blindness and biases in development and environmental work.

The contributions of men and women to traditional knowledge are different but at the same time shared and interlocking (Gregoire and Lebner, 2000). That is why traditional knowledge is collectively, not individually owned by a community.

Women, just like men, have a stake in a healthy ecosystem. However, there are important particularities in the impact of loss of biodiversity on women. Environmental degradation adds to the burden of women in the performance of their multiple domestic chores.

The rapid loss of biodiversity is partly the result of the expansion of commercial agriculture fuelled by global demand for cheap agricultural products from the rural areas in the developing world. Not only does this contribute to the domestic burden of women, it also further erodes their status in society. Cash crops, usually the domain of men, are being valued more than consumption crops, usually the domain of women. Women's economic contribution is considered to be inferior, even invisible.

The invisibility of women's contributions, specific needs and knowledge is a manifestation of gender blindness. Gender stereotyping, traditional biases, and habits of thinking and behaving are common among development workers and environmentalists. In many instances, even when they are motivated by a sense of social justice for the poor and disadvantaged, they are unconscious of the gender baggage that they carry.

Many of our assumptions and habits are actually gender-patterned; many of the things we assume to be natural are actually ideologically constructed.

As external actors, we could be party to reinforcing gender inequality. One of the reasons why we are often unconscious of gender bias and stereotypes in our work is because we have internalized the ideology embedded in our own gendered knowledge system. This is a knowledge system that emerged from western European gendered societies experiencing transformation from feudalism to industrial capitalism. Through the operations of a global political economy, academia, scientific and funding institutions and popular media, this particular gendered knowledge system has become THE universal knowledge system, often at odds with indigenous and traditional knowledge systems.

A similar situation is seen in the IPR regime. Despite differences in property systems in indigenous societies, the regime imposes the western system of individual private ownership and an ideology that considers knowledge a commodity.

There are serious criticisms about fairness and transparency raised by some developing country governments against the current IPR regime. Yet in many national policies to protect traditional knowledge, women's rights are not explicitly protected. There are serious issues with the IPR regime in regard to women's rights. These are exemplified in two cases in Nigeria and in India where the economic rights of women as holders of traditional knowledge relevant to traditional medicine, enshrined in the UN Declaration on Social, Economic and Cultural Rights, are being violated.

Why does gender create these inequalities? It is because the allocation of power, privileges and opportunities to men and women, based on their gender, is unequal. Restrictions on women's freedom, lack of access to and control of resources, including traditional knowledge and male representation of women, are manifestations of gendered inequality.

Feminist theorizing provides a framework for making sense of extensive evidence about gender (Lengermann and Niebrugg-Brantley, 2003). These theories can be grouped into three:

- Theories on difference – explain why and how women and men are different, not biologically but in their social, cultural, economic and political life.
- Theories on subordination – explain why and how women are subordinated in gendered relations, practice and policies.
- Theories on oppression – explain why and how women's freedom is curtailed or denied in gendered relations, practice and policies.

The specific contributions of women to traditional knowledge and the differentiated impact of biodiversity loss in their lives exemplify the theories on difference. The dominance of men in decision-making in both the household and community is illustrative of the theories on women's

subordination. Restrictions on their mobility and freedom to decide (as in the Philippine case) illustrate the theories on oppression.

Gender cuts across all levels and aspects of social life. Because it often operates in subtle ways and because it is deeply embedded in structures and relationships, a response is to deliberately and explicitly integrate the goal of gender justice in all our projects, methods and policies. The goal of gender justice is to ensure that women enjoy their basic human rights like other people. It is unjust to women to include them in projects simply because their participation is needed for success.

although many projects have addressed women's immediate needs as users of environmental services and managers of natural resources, few environmental efforts have addressed critical underlying questions of ownership and control. Indeed, some projects have taken an instrumentalist approach that overburdens women. Where gender has been mainstreamed, the chief reason for doing so has been to make environmental initiatives more effective and sustainable – not to promote equality. (UNDP, 2005: 2)

Recommendations

We don't have to start from zero; there are good practices and lessons to learn from the work of gender-sensitive researchers, development workers and policymakers. The database of the Equator Initiative project of the UN, for example, is a good source of information about projects that used good practices, some of which involved women's empowerment in traditional knowledge use and management for biodiversity. Still, there is a lot more that needs to be done.

Close the knowledge gap

There is little that we know about traditional knowledge and its role in biodiversity conservation. There is much less that we know about women's contributions to traditional knowledge, their use of and access to it.

The knowledge that is produced should be gender differentiated in order that women's actual role and contributions become visible. This should inform policy and guidelines for development assistance, use of traditional knowledge and sharing in the benefits from such use.

The knowledge gap includes:

- how gender blindness and biases impact women's participation in decision-making on the use of traditional knowledge;
- how gender obstructs women's access to benefits from the use of traditional knowledge;

- specific strategies and policies needed to enable women to effectively participate in decision-making regarding the protection and use of traditional knowledge;
- how to mobilize existing national and global policies in the promotion of gender justice;
- the ethical responsibilities of researchers and other agents of change for ensuring that their work does not reinforce women's subordination and oppression;
- opportunities that environmental work creates for indigenous and rural women's empowerment.

Gender-sensitive strategies

The participatory, community-based approach is an improvement on earlier approaches, where it is the external experts who monopolize the key aspects of a project, and community members, if they are ever involved, are relegated to data collectors at best. In this improved approach, emphasis is given to the importance of the community as partners in all the key aspects of the project; as stakeholders, not as passive recipients of assistance (Pulhin et al., 2005).

However, we have to be clear who it is that we want to participate and what we understand by community. We often think of community with "a warm glow" (Warburton, 1998: 14) but hidden in communities are structures of inequity. We have shown in our examples how this is so and what effects non-recognition of and inaction on these inequities could create for women.

Because women are often "invisible" in community decision-making and research, we should carefully map out our methods to ensure that women's voices are effectively heard. The use of women-sensitive methods in research has been shown to be effective not only in identifying differences in men's and women's situations but also in enabling women to be heard. Qualitative interviewing, use of folklore, storytelling and participant-observation are among the methods that could make women comfortable with the research process (Guerrero, 1995).

When planning the project, it might be necessary to have separate consultations and meetings with women. As implied in the Philippine example, this is one strategy for researchers to develop a holistic understanding of the constraints and risks that women face. This should help us to anticipate and address any possible harm that could befall them due to their participation.

These steps have to be explicitly defined in the project design. Asking the women themselves about how it is best for them to participate could avoid risks to their safety. In other words, we integrate in our methods

ways of drawing upon women's knowledge, understanding their reality and acting appropriately. This would require a reflexivity on our part about our own consciousness, biases, habits and behaviour – that could help us deal with gender blindness.

Reflexivity requires an awareness of the researcher's contribution to the construction of meanings throughout the research process, and an acknowledgment of the impossibility of remaining "outside of" one's subject matter while conducting research. Reflexivity, then, urges us to explore the ways in which a researcher's involvement with a particular study influences, acts upon, and informs such research. (Nightingale and Cromby, 1999: 228)

Promote gender justice

The specific strategies outlined above should flow from an ethical principle – gender justice could be the animating principle. This is because it encompasses issues of gender bias, subordination and oppression of women. Without this fundamental principle, any surface reform toward the improvement of women's situation could not be sustained because the structures that feed gender inequity remain in place.

This is a hugely difficult endeavour and we may not see the results in a short period of time. We will be dealing not only with deeply embedded norms, practices and relationships in society, but also with policies and institutions in national and global governance systems that are biased. Yet there are policy initiatives at both national and global levels, some of which we mentioned earlier, that we can mobilize. They provide the moral strength and legitimacy for our efforts.

Enable women

Most important are the women themselves. We have to reject the patriarchal tendency to think and decide for them, no matter what the idealism of our intentions. At the same time, we have to be aware of the tremendous odds women face in asserting their rights.

There are examples of how women's collective efforts were fruitful in advancing their rights. A classic example are the women garment workers, rag pickers, vegetable vendors and handcart pullers in India who organized the Self Employed Women's Association (SEWA) in 1972 to fight against exploitation and for the right to unionize. This organization has become a nationwide network of poor women that includes livelihood and women's rights advocacy projects (Raju and Bagchi, 1993).

In Chile, women farmers, indigenous women and contractual agricultural workers formed the Anamuri in 1988 due to pervasive violations of

their human rights and their exclusion from the male-dominated National Farmers Commission. The Anamuri has been leading campaigns for women's empowerment, food security and rescue of traditional seeds. It now has more than 6,000 members and is listened to by government and international agencies (van Gelderen, 2008).

There are opportunities in biodiversity work to enable and empower women in their communities. The challenge, however, is ensuring that their voices are influencing project planning, decision-making, methods and outcomes.

Notes

1. The research sought to understand the ethics systems of indigenous communities and their experiences, particularly in regard to prior informed consent and benefits from research. It was funded by the Commission for Higher Education and involved seven indigenous communities. The first author conducted separate consultations with the women to ensure that they have equal participation in decision-making regarding the project.
2. The equal participation of women in public assemblies was observed in only one of the seven Mangyan tribes in the island.
3. Anthropology has however been critiqued as being male-biased. See for example Slocum (1975).
4. See for example Moore (1995).
5. See for example Kritsch and Wright-Fraser (2002).
6. The CBD Declaration has been critiqued for failing to adequately address gender barriers. Except for an item in the preamble that affirms the "full participation of women at all levels of policy making and implementation for biological diversity and conservation", there is nothing else in the Declaration that follows through this intention. See Alvarez Castillo and Feinholz (2006).
7. There have been significant changes since the tradition of empiricism emerged in nineteenth-century Europe during the Age of Enlightenment. For example, many empiricists today distance themselves from the value-free paradigm. Still, the value-free paradigm continues to be influential and dominant.
8. For an excellent critique of value-free science, see Proctor (1995).
9. This idea has been critiqued by some feminist scholars as reinforcing patriarchy through the stereotyped division of labour where men work outside the household and women are the care givers. See for example Archambault (1993).
10. Discussions of the two cases are largely taken from Alvarez Castillo and Lucas (2009).

REFERENCES

- Aguilar, L. (1982) "Biodiversity: Gender makes the difference". Available at <http://www.genderandenvironment.org/admin/admin_biblioteca/documentos/Biodiversity_ing.pdf> (accessed December 2008).
- Alvarez Castillo, F. and Julie Cook Lucas (2008) "Fairness and gender in benefit sharing in genetic research: Learning from the Kani, San, Nigerian, Kenyan

- and Icelandic cases for moving forward”. Available at <<http://www.uclan.ac.uk/GenBenefit>> (accessed November 2008).
- Alvarez Castillo, F. and Rosa Cordillera Castillo (2009) “More than the law is required: Free and prior informed consent issue in mining in the Philippines of indigenous peoples’ lands with insights from the San-Hoodia case”, in Rachel Wynberg, Roger Chennells and Doris Schroeder (eds), *Indigenous Peoples, Consent and Benefit Sharing: Lessons from the San-Hoodia Case*. Dordrecht; Heidelberg: London; New York: Springer, pp. 271–282.
- Alvarez Castillo, Fatima and Dafna Feinholz (2006) “Women in developing countries and benefit sharing”, *Developing World Bioethics* 6(3): 113–121.
- Archambault, A. (1993) “The new feminist environmentalism: A critique of ecofeminism”, *Canadian Woman Studies* 13(3): 19–22. Available at <<https://pi.library.yorku.ca/ojs/index.php/cws/article/viewFile/10403/9492>> (accessed 26 May 2010).
- Boserup, Ester. (1995) *Women’s Role in Economic Development*. Earthscan. Cited in Jayshree Vencatesan (2008), “Gender and conservation – Some issues”, *Current Science* 24(9): 1120–1122.
- CIFOR (Center for International Forestry Research) (2004) “‘Men in a dress?’ Gender equity and Forests”, Jakarta. Available at <<http://www.cifor.cgiar.org/docs/-pf/publications/newsonline/35/gender.htm>> (accessed 16 May 2006).
- Estandarte, N., L. Segovia and F. Alvarez-Castillo (2000) *Sungki-sungking Daan: Lessons from NGO-Community Partnership for Women*. Manila: Philippine Health Social Science Association.
- FAO (2005) “Building on gender, agrobiodiversity and local knowledge. Training manual”. Available at <<http://www.fao.org/docrep/005/AC546E/ac546e08.htm>> (accessed 26 May 2010).
- Fara, Patricia (2005) *Scientists Anonymous: Great Stories of Women in Science*. Duxford: Wizard Books.
- Fiagoy, Geraldine (1996) “Indigenous women’s role in resource utilization and management: The Cordillera experience”, in P. Bennagen and M. L. Lucas-Fernan (eds), *Consulting with Spirits, Working with Nature, Sharing with Others*. Quezon City: Sentro ng Ganap na Pamayanan, pp. 73–82.
- Garry, Ann and M. Pearsall (eds) (1992) *Women, Knowledge and Reality: Explorations in Feminist Philosophy*. London: Routledge.
- Gibb, Heather (2007) *Gender Dimensions of Intellectual Property and Traditional Medicinal Knowledge*. Colombo: UNDP Asia-Pacific Trade and Investment Initiative.
- Goetz, Anne Marie (2007) “Gender justice, citizenship and entitlements: Core concepts, central debates and new directions for research” in Maitrayee Mukhopadhyay and Navsharan Singh (eds), *Gender Justice, Citizenship and Development*. Ottawa: IDRC; New Dehli: Zubaan. Available at <http://www.idrc.ca/en/ev-108814-201-1-DO_TOPIC.html> (accessed 26 May 2010).
- Gregoire, Helene and Ashley Lebner (2000) “Re-evaluating relevance: intellectual property rights and women’s traditional environmental knowledge”, Committee on Sustainable Development NGO Women’s Caucus Position Paper for CSD-8.
- Guerrero, S. (ed.) (1995) *Gender-Sensitive and Feminist Research Methods*. Quezon City: University of the Philippines Press.

- Hansen, Stephen and Justin Van Fleet (2003) *Traditional Knowledge and Intellectual Property: Handbook on Issues and Options for Traditional Knowledge Holders in Protecting and Maintaining Biological Diversity*. Washington DC: American Association for the Advancement of Science.
- Harding, S. (1986) *The Science Question in Feminism*. Milton Keynes, UK: Open University Press.
- IDRC (International Development Research Centre) (1998) "Guidelines for integrating gender analysis into biodiversity research: Sustainable use of biodiversity program Initiative 16 July 1998", Ottawa: IDRC. Available at <http://web.idrc.ca/uploads/users-S/10267409810gender_biodiversity.pdf#search='IDRC%20guidelines%20for%20integrating%20gender%20analysis%20in%20biodiversity%20research'> (accessed 29 July 2006).
- Kritsch, Ingrid and Karen Wright-Fraser (2002) "Guich'in in traditional Caribou skin clothing project", *InfoNorth* 55(2): 205–213.
- Leacock, E. (1983) "Interpreting the origins of gender inequality: Conceptual and historical problems", *Dialectical Anthropology*, 7(4): 263–284.
- Lengermann, P. M. and J. Niebrugg-Brantley (2003) "Contemporary feminist theory", in G. Ritzer (ed.), *Contemporary Sociological Theory and its Classical Roots: The Basics*. New York: McGraw Hill, pp. 309–358.
- Menon, V. (1999) "The politics of maternity and fertility control: The case of the forest dwelling Kani women of Kerala", in R. Indira and D. K. Behera (eds), *Gender and Society in India*, Vol. 2. New Delhi: Manak Publications, pp. 212–219.
- Moore, Henrietta (1995) *Space, Text and Gender: An Anthropological Study of the Marakwet of Kenya*. New York: Guilford Publications.
- Neuman, W. L. (1994) *Social Research Methods*. Boston, MA: Allyn and Bacon.
- Nightingale, D. J. and J. Cromby (eds) (1999) *Social Constructionist Psychology: A Critical Analysis of Theory and Practice*. Buckingham: Open University Press.
- Oakley, A. (1992) *Social Support and Motherhood: The Natural History of a Research Project*. Oxford: Blackwell.
- Ooi Lim, C. Y. (2001) Gender impact of resettlement: The case of Babagon dam in Sabah, Malaysia. *Gender, Technology and Development* 5(2): 223–244.
- Proctor, Robert (1995) *Value-free Science? Purity and Power in Modern Knowledge*. Cambridge, MA: Harvard University Press.
- Pulhin, Juan, M. Amaro and D. Bacalla (2005) *Community based Forest Management: Philippine Major Strategy for the Sustainable Development of Forest Resources and Social Justice*. Country report presented at the Community Forestry Forum, Regional Community Forestry Training Centre, Bangkok, Thailand.
- Raju, S. and D. Bagchi (1993) *Women and Work in South Asia*. London: Routledge.
- Razavi, Shahrashoub and Carol Miller (1995) "From WID to GAD: conceptual shifts in the women and development discourse". Available at <[http://www.unrisd.org/unrisd/website/document.nsf/0/d9c3fca78d3db32e80256b67005b6ab5/\\$FILE/opb1.pdf](http://www.unrisd.org/unrisd/website/document.nsf/0/d9c3fca78d3db32e80256b67005b6ab5/$FILE/opb1.pdf)> (accessed 26 May 2010).
- Reid, Elizabeth (1992) "Gender, knowledge and responsibility", in Jonathan Mann, D. Tarantola and T. Netter (eds), *AIDS in the World*. Cambridge, MA: Harvard University Press, pp. 657–667. Available at <<http://www.undp.org/hiv/publications/issues/english/issue10e.htm>> (accessed 26 May 2010).

- Reinharz, Shulamit with Lynn Davidson (1992) *Feminist Methods in Social Research*. Oxford: Oxford University Press.
- Reiter, R. (2006) [1975] "Toward an anthropology of women. New York: Monthly Review Press", in M. Courtis (ed.), *Taking Sides: Clashing Views on Controversial Issues in Physical Anthropology*. Portland: McGraw-Hill Dushkin.
- Rojas, M. (n.d.) "Agriculture: gender makes the difference". Available at <http://www.genderandenvironment.org/admin/admin_biblioteca/documentos/Agriculture.pdf> (accessed 26 May 2010).
- Slocum, S. (1975) "Woman the gatherer: Male bias in anthropology", in Rayna R. Reiter (ed.), *Toward an Anthropology of Women*. New York and London: Monthly Review Press.
- Sylvain, R. (2006) "Drinking, fighting and healing. San struggles for survival and solidarity in the Omaheke region, Namibia", in R. K. Hitchcock, K. Ikeya, M. Biesele and R. B. Lee (eds), *Updating the San: Image and Reality of an African People in the 21st Century*, Senri Ethnological Studies. Osaka: National Museum of Ethnology, pp. 131–150.
- UNDP (2005) "Biodiversity for development: the gender dimension". Available at <<http://www.undp.org/women/mainstream/BiodiversityForDevelopment.pdf>> (accessed 26 May 2010).
- UNESCO (1999) "International symposium on the role of women in the transmission of intangible cultural heritage", 27–30 September, Tehran, p. 2. Available at <<http://www.unesco.org/culture/ich/doc/src/00157-EN.pdf>> (accessed November 2008).
- van Gelderen, Michael (2008) "Fighting for women's rights in Chile: supporting women workers and promoting women's political participation". Available at <<http://www.comminit.com/en/node/297851/348>> (accessed 19 April 2010).
- Vencatesan, Jayshree (2008) "Gender and conservation: Some issues", *Current Science* 24 (9): 1120–1122.
- Warburton, D. (1998) "A passionate dialogue: Community and sustainable development", in D. Warburton (ed.), *Community and Sustainable Development: Participation in the Future*. London: Earthscan, pp. 5–17.
- Wallerstein, Immanuel et al. (1996) *Open the Social Sciences: Report of the Gulbenkian Commission on the Restructuring of the Social Sciences*. Palo Alto, CA: Stanford University Press.
- WIPO (World Intellectual Property Organization) (2001) *Intellectual Property Needs and Expectations of Traditional Knowledge Holders: WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge (1998–1999)*. Geneva: WIPO.

5

Traditional knowledge, indigenous communities and ethical values

Doris Schroeder

Introduction

Human interaction is dominated by rules, customs, practices, values and regulations. A taxi driver who can find his way around Berlin with ease is likely to be lost in the frenzy of New Delhi, not because of the different geography, but because of different practices. He would have to learn that right of way needs to be claimed by frantic hooting, that overtaking is standard on all lanes, that elephants can be dangerous to cars, that one needs to be careful around auto-rickshaws, donkey carts, overloaded motorcycles and so on. The rules and practices learned in Berlin would have to be set aside. Often, the encounter of cultures is exciting and mutual learning takes place, which is beneficial to both. However, this is not the case when benefits are reaped solely by one party, whilst the other is being exploited.

One of the reasons why the Convention on Biological Diversity (CBD) was adopted in 1992 was to stop exploitative behaviour across geographical and cultural boundaries. For instance, it is no longer legal to access traditional knowledge about useful plants, create a commercially viable product and refuse to share the benefits with the original knowledge holders (often indigenous communities in developing countries). The CBD, supported by the Bonn Guidelines and national laws such as the Biodiversity Act in South Africa,¹ has legislated against such one-sided profiteering. However, despite such legislation, access to traditional knowledge and sharing of benefits with indigenous communities is still

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problematic. The challenges include lack of enforcement mechanisms to ensure compliance with the CBD, the fact that the United States has still not ratified the Convention, a prior history of one-sided exploitation during colonialist times, as well as divergent values, customs and practices on both sides of the encounter.

This chapter is about the encounter between the values of traditional knowledge holders and the values of bioprospectors. In this area, potential clashes can be manifold. For instance, European bioprospectors might object to polygamy, whilst traditional knowledge holders might object to purposeful, intended childlessness. This chapter concentrates on potential areas of conflict that emerge directly from entering trade-related relationships. Importantly, the discussion will be preceded by a clarification of the most fundamental tension: the claim that use of traditional knowledge without benefit sharing is an instance of wrongful exploitation.

The chapter links ongoing debates about the CBD with issues of justice and cross-cultural human interaction. The level of generalization required for such a chapter is considerable. Bioprospectors could be Indian university-based scientists specializing in Ayurvedic medicines operating in their own country, and therefore sharing a history of colonialist oppression with local indigenous peoples. Or they could be European scientists, working for a multinational corporation specializing in genetically modified products, whose country was actively involved in colonialist exploitation of the communities they are now encountering again.

At the same time, traditional knowledge holders could come from communities with relatively strong political power and standing in their affluent country, such as the Maori in New Zealand. Or they could come from a community, which even in a poor, developing country represents the most marginalized group, such as the San peoples in Southern Africa. To generalize across such diversity obviously requires a broad stroke. The resulting picture will only satisfy those who are looking for essentials rather than detail. Importantly, these essentials can never substitute for in-depth getting to know each other and trust-building in real-life encounters between bioprospectors and indigenous knowledge holders. As Aboriginal teacher and UN award holder Jack Beetson has said:

To share in our knowledge you need to understand us, you need to understand how we relate to ... [each other]. You need to understand how we communicate, and the only way to do that is to develop a relationship, to grow the relationship and [then] the knowledge will be shared on the basis of ... [the relationship]. ... My biggest advice would be, please ... do ... not ... just focus on the economic gains, because for indigenous people the most important thing is the relationship. (Beetson, 2006)

The chapter is structured as follows: section two outlines the main value clash, which the CBD addresses, namely whether justice requires open access to resources, as the heritage of humankind, or whether such an approach is exploitative of the guardians of biodiversity and traditional knowledge.² Section three summarizes three instances of value or procedural clashes between bioprospectors and traditional knowledge holders, and potential ways forward to resolve them. The chapter ends with a brief conclusion.

Justice, exploitation and the CBD: The most fundamental value clash

Benefit sharing as envisaged by the CBD is a relatively new development in international law, dating from 1992. This global convention aims to achieve three objectives (CBD, 1992):

1. the conservation of biological diversity;
2. the sustainable use of its components;
3. and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

Prior to the adoption of the CBD, non-human biological resources and traditional knowledge were frequently regarded as the common heritage of humankind (Srinivas, 2008). Bioprospectors were able to take resources out of their natural habitat or make use of traditional knowledge to develop commercial products without sharing benefits with states or local communities. This was regarded as exploitative, as Vandana Shiva explains:

[T]he North has always used Third World germplasm³ as a freely available resource and treated it as valueless. The advanced capitalist nations wish to retain free access to the developing world's storehouse of genetic diversity, while the South would like to have the proprietary varieties of the North's industry declared a similarly "public" good. (Shiva, 1991)

Against such exploitation claims, bioprospectors could maintain that the resources they used became commercially valuable only because of their research and development (R&D) investment. Taking something that is not privately owned and adding ingenuity, scientific knowledge and significant investment is not exploitative. On the contrary, products thus derived contribute to scientific progress and human well-being.

A brief example: after obtaining a patent, Merck Pharmaceuticals started marketing a treatment for glaucoma derived from a bush (jabo-randi) found exclusively in the Amazon region. The plant's leaves are

Box 5.1 Exploitation

Exploitation is a failure to benefit others as some norm of fairness requires leading to wrongful gain on the one hand and undeserved loss on the other (Mayer, 2007). Three forms of exploitation can be distinguished:

In type 1 exploitation, exploiters fail to benefit other parties *at all* even though they ought to. For instance, tax evaders who use public services financed through taxation are exploiters type 1.

In type 2 exploitation, exploiters do not benefit others *sufficiently*. In this case of exploitation an exchange takes place, but it does not benefit both parties fairly. One party gains disproportionately, whilst the other loses out. For instance, a plumber might exploit a recent immigrant's ignorance of local prices by charging her twice as much as customarily quoted for a particular job.

In type 3 exploitation, exploiters do not benefit others *authentically*. Exploiters might give others what they want and at fair prices, but the exchange does not genuinely benefit them. For instance, the purchase of heroin might be what buyers want, but they would nevertheless be harmed by the exchange when judged from a neutral standpoint.

harvested by indigenous peoples in Brazil, transported to Germany, its relevant parts (alkaloids) refined and transformed into eye drops. If a Brazilian wanted to use the eye drops, she would have to buy them at German-set prices, whilst any Brazilian company wanting to produce a generic version of the treatment would have to pay royalties to Merck. "Northern biotechnology companies see this as a right to earnings on their investments. Southern nations see this as more of the all-too-familiar exploitation" (Rolston, 1995).

The above illustrates the most fundamental value conflict between bioprospectors and the guardians of biodiversity and traditional knowledge. The latter see yet another instance of wrongful exploitation in the long history of colonialism, whilst the former see the progress of science and humankind on the basis of investment and ingenuity using public assets.

How does this fundamental value tension relate to the CBD? Pragmatists might think that bioprospectors would agree to the spirit of the CBD because of ensured access to protected resources in the future. In this regard, bioprospectors would wholeheartedly support the first and the second principle of the CBD (the conservation of biological diversity and the sustainable use of its components) but only accept the third (the fair and equitable sharing of the benefits) as a means to an end (continued access). In the context of increasing criticism from developing countries

regarding the exploitation of their resources, access will be granted more easily if the exploitation critique has been addressed satisfactorily through access and benefit sharing agreements. However, bioprospectors might still regard germplasm or openly available traditional knowledge as the common heritage of humankind. Or they might still argue that scientific progress and increased human well-being for some are sufficient benefits to counter all exploitation claims.

On the other hand, the guardians of biodiversity and traditional knowledge might reluctantly accept principle two (the sustainable use of biodiversity components) in order to be rewarded for its protection through principle three (benefit sharing). However, the justice issues underlying the three CBD principles are not that simple and unobvious, even though pragmatists might prefer to see it this way. In the remainder of this section, I shall sketch a philosophically sound justification for the CBD, which should resolve the tension between the perceptions of bioprospectors on the one hand and guardians of biodiversity or traditional knowledge on the other.

Justice in exchange versus distributive justice

For our purposes, I need to distinguish two types of justice: justice in exchange and distributive justice. The principle of justice in exchange regulates the process of giving one thing and receiving an appropriate return, whilst distributive justice deals with the division of existing resources amongst a group of qualifying recipients.⁴ Justice in exchange mainly establishes the fairness of transactions. For instance, is the rent charged for a particular flat in central Cape Town appropriate, or, in other words, just?⁵ An interaction is considered just if all parties in the exchange receive an appropriate return for their contribution. Distributive justice deals with access to scarce resources – from the division of Sunday lunch to the structure of an economic order that regulates access to raw materials and the distribution of the jointly created social product.

For the sake of argument, I shall start from the premise that biodiversity and openly available traditional knowledge are the common heritage of humankind. The technical term philosophers use for this approach is “biting the bullet”, that is, accepting a principle which one might find unpalatable in order to show that even on this principle one can argue a particular point. The point I intend to make is that the CBD’s principle of giving sovereignty rights over resources to nation states can be justified on grounds of justice, even if one starts from the common heritage principle of resources.

For thousands of years, products of human ingenuity based on resources found in the natural world were not governed by norms and

regulations. Like game, seeds and forest produce in hunting and gathering times, the natural world was available to all, though often ruled by the power of the strongest. In 1992, the CBD created requirements of justice in exchange for the previous Commons. If a person accesses traditional knowledge, whether across borders or within one country, as the example of the *San-Hoodia* case shows (see Box 5.2), they need to give something back; they need to share benefits. A justice in exchange issue was *created*. Knowledge that had been available from books for decades (ibid.) suddenly became a commodity. Likewise, a handful of wild plants became a trade object. Bioprospectors who do not agree with the benefit sharing clause of the CBD and who believe that they should be able to continue taking plants from the wild would argue that this clause might work as an appeasement strategy, but not as a rebalancing act of justice. They might ask why the genetic make-up of a wild plant (its germplasm) growing in the Brazilian Amazon should belong to the Brazilian state rather than, for instance, humankind? Why should a bioprospector not simply take it and create something different from it? Is there a natural right that requires states to be assigned ownership of plant DNA?

For philosophers, natural rights can be distinguished from rights based upon laws or beliefs.⁶ A natural right is universal and applies to all human beings, irrespective of laws, traditions or culture (Brown, 1960). The right not to be killed, with certain provisos (other than in self-defence, for instance), is considered such a right (Finnis, 1980). It applies everywhere, for all human beings, whether it is enshrined in law or not (D'Entrèves, 1970). Natural rights cannot even be overruled by legislation. Even if a law states that it is acceptable to kill those belonging to a particular ethnic group, it would still be wrong to do so.

Many rights and obligations that inform human interaction are not based on natural law. They are specifically created by human beings in order to improve human flourishing. From red traffic lights to services for the disabled, rules are created to serve social utility. Returning to the earlier question, is there a natural right that gives states ownership of plant DNA or traditional knowledge? No, otherwise the rule wouldn't face such obvious and grave difficulties in its justification. For instance, why should a state own the resources of its people when a considerable number of governments today are military dictatorships for whom human flourishing of their citizens is the least pressing concern? Why should human flourishing be hampered through property rights that limit benefits for humankind? For instance, if the earth were an island with plentiful resources for its small number of egalitarian and affluent citizens, it would not make sense to restrict access to wild plants. Nobody would object to a particularly inventive chap taking a plant and extracting its active ingredients in order to create an anti-diabetes drink, even if he

charged for the end-product.⁷ However, the world is not characterized by relative egalitarianism and affluence. Hence, one could assume (leaving issues of violating sacred items or taboos aside here) that the reason traditional knowledge holders and biodiverse developing countries are claiming ownership rights over previous Commons is because of issues of distributive justice and the extreme poverty that wrecks their communities.

According to official statistics, of the world's 6.7 billion people, over 1 billion are chronically undernourished, 884 million lack access to safe water and about 2 billion lack access to essential medicines.⁸ People living with such severe deprivations are bound to be susceptible and vulnerable to infectious diseases and often unable to overcome them. Today, one third of all human deaths are from poverty-related causes: including over 9 million children under the age of five (Karwal, 2008). The majority of these deaths occur in biodiversity-rich developing countries.

Benefit sharing is not mandated by natural law, as I have briefly shown above. There is no natural right to, for instance, ownership of germplasm. Whether it belongs to individuals, on a first come first served basis, or to local communities or states or humankind as a whole is an open question; a question that must be settled with reference to social utility. Fair rules and regulations must refer to such social utility in order to pass the ethics test. A rule that helps a dictator amass more property and power is not ethical. Any attempt to *create* new social rules must make reference to context, in particular to the international economic order. And this is exactly the context in which developing country activists, such as Shiva, have raised their concerns about the misappropriation of resources. When the above shocking figures about human suffering are combined with the knowledge that rich but biodiversity-poor countries are still – even after the end of colonialism – profiting from resources found in poor but biodiversity-rich ones, the question indeed arises whether biological resources should be regarded as the common heritage of humankind.

Let me compare this situation with medical research that leads to patients and new treatments. I am a well-off academic in a tenured, professorial post. If I were asked whether a blood sample of mine could be used for research purposes, I would probably say “yes” and forget all about it. I would not ask for special benefit sharing, even though I have contributed something that might lead to benefits for others. In other words, I would have given something but would not expect anything in exchange. This apparent altruism or common spiritedness relies on the fact that any direct benefits of the research in the form of potentially therapeutic treatments and accessible new health care products and services would be available to me in the future. Whether health insurance, salary or the state paid for it, I would in principle have access to it, if needed. Within a

wider perspective, my fellow citizens and I also receive indirect benefits in the form of jobs and affluence generated by a high-tech industry.⁹ It is easy to show some altruism in this context. But what if I showed the same altruism and the results of the research never became available in my country, or, perhaps worse, I couldn't afford them if they did?

The main issue, which has thrown doubt on the fairness of the altruism model in medical research, which is similar to the common heritage model with regard to biodiversity and traditional knowledge, is the potential exploitation of research participants in developing countries (Schroeder and Lasen-Diaz, 2006; Schroeder, 2008). In developing countries, one cannot take the above-mentioned benefits for granted. On the contrary, reasonable availability of newly developed products cannot be guaranteed, neither can a match to the population's health needs (for instance, treatment for tropical diseases) nor the existence of secondary benefits (such as jobs). It is in this context that the demand for benefit sharing becomes obvious and it is here that distributive justice issues link in.

When it comes to resources, be they blood samples or plants or traditional knowledge, the ideal scenario would be that all resources can be openly accessed and used for the benefit of humankind without any inherent exploitation. The common heritage of humankind idea would be appropriate to such ideal circumstances. Whether our blood or your plant knowledge leads to medical progress does not matter as long as we all have access to the benefits of their use. To impose highly bureaucratic barriers on the use of resources (other than for reasons of achieving sustainability) and require benefit sharing through, for instance, royalty payments would be counterproductive if the international economic order and today's context resembled the previously described island of affluent citizens. Imposing the CBD on such an island would *reduce* social utility. Distributive justice issues would not exist, with everybody having access to the fruits of some people's ingenuity, and it would not make sense to impose access restrictions on resources that are better seen as the common heritage of humankind.¹⁰ The latter perspective would improve overall social utility.

However, the CBD has rightly favoured national sovereignty over the common heritage of humankind principle with regard to non-human biological resources and traditional knowledge. In fact, the CBD has *created* a justice in exchange issue for items that were not previously considered restricted property, for example germplasm. This was a contextual decision made at the end of the twentieth century, when biodiversity was being rapidly depleted and developing countries were justifiably concerned about the exploitation of their resources. Whilst the common heritage of

humankind principle would be preferable to fencing in resources with bureaucratic procedures when they could be used for the benefit of humankind, this ideal scenario cannot apply in the context of an international economic order that is unjust and leads to significant human suffering.¹¹ It is here that distributive justice issues become important.

To be ethical, bioprospectors and the guardians of biodiversity and traditional knowledge alike should subscribe to all principles of the CBD as required by demands of distributive justice in our world today, as the second-best option compared with open access in an affluent, egalitarian world. If they do, however, which additional challenges arising from different value systems need to be overcome? This will occupy us in the next section.

Encounters between traditional knowledge holders and bioprospectors: Three examples of value clashes

Decision-making: Expediency versus comprehensive community consultation¹²

By definition, benefit sharing agreements for access to and use of traditional knowledge require negotiations between at least two parties, typically traditional knowledge holders on the one hand and bioprospecting research institutes, often represented through local mediators, on the other hand. The way these two parties commonly make decisions varies significantly. Within corporate hierarchies, decision-making is usually centred around a small number of individuals, and does not involve wider consultation of stakeholders. Decisions are made on a routine basis, by highly educated personnel in positions of power who are well versed in the legal background of their situation. Decisions are made fast due to the economic expectations of shareholders who require immediacy and certainty of return.

By contrast, using the Southern African San communities as an example, decision-making in traditional indigenous communities often involves a large number of community members. Decisions develop slowly as the result of a process in which many in the community participate (Lee, 2003). Discussions are seldom limited to a single event, but rather emerge over a period of time during ordinary conversations amongst friends, relatives and neighbours. If more serious decisions have to be taken and factions emerge, the San will involve a wider audience and include those members of the community who did not take part in the initial discussions. Decisions are taken by consensus, which is reached

only when significant opposition to a decision no longer exists. As will be obvious, community decision-making practices are highly time-consuming and thus not usually welcomed by bioprospectors (see Box 5.2).

The clash over decision-making procedures and speed is often detrimental to the traditional knowledge holders, as the San case showed. When benefit sharing negotiations started between the San and the relevant bioprospecting partner (the CSIR), a legally representative group was needed to negotiate with the CSIR, but such a group only existed in its infancy, and it was not designed for fast decision-making through professionals or majority voting by representatives. Instead it relied on consensus building and the time and commitment of unpaid community leaders. To form such a body was a race against time and it seems that the decision-making abilities of the San were compromised by the need for urgent resolution on the part of the CSIR and its commercial partners. The main sub-licensee at the time, Pfizer, was clearly anxious about the negotiations and did not want any negative publicity. The San in turn were pressurized to come to an agreement and unsure as to how far they could push before jeopardizing negotiations.

There is no obvious solution to this dilemma. Investors are unlikely to allow years for community consultation processes and are more likely to drop a particular research lead than compromise their own processes. On the other hand, the imposition of rapid industry decision-making processes on traditional communities is both ethically dubious and unfeasible in practice, as it requires highly-trained professionals to lead the process. In the San case, the tensions about timeframes were further aggravated by the lack of adequate financial resources to fund meetings, to obtain additional advice and to hone negotiating skills, all vital constituents for effective decision-making under such circumstances. One could ask where the responsibility lies for securing these components. In the San case, the CSIR invested in facilitating San representation and decision-making capability. This was necessary for the San to reach the negotiation table in the first place and to achieve an agreement, which was essential for the CSIR. On the other hand, to invest considerable time and money into sustained capacity-building to enable the San representatives to become equal partners in negotiations cannot be expected on a voluntary basis from a commercial company. By investing in this way, the CSIR would have potentially closed their chances for a licensing agreement with a very attractive licensee, Pfizer, due to the loss of time. In addition, they might well have asked whether capacity-building and education is not a responsibility of national governments. A partial solution has been found in South Africa. The Biodiversity Act (10 of 2004), now locates support for consultations firmly with the South African government, to ensure benefit-sharing agreements are negotiated on an equal footing. Assuming

Box 5.2 The San-*Hoodia* benefit sharing case

The best-known benefit sharing case to date is the so-called San *Hoodia* case. The San peoples, also known as Bushmen of the Kalahari, are the oldest human inhabitants of Southern Africa. For thousands of years, they lived as the sole occupants of an area stretching from the Congo-Zambezi watershed to what is now Cape Town. After centuries of genocide and marginalization imposed by colonialists, they now number approximately 100,000 people in Botswana, Namibia, South Africa and Angola.

Their current lives are characterized by abject poverty. Yet, they still possess traditional knowledge covering the biodiversity of Southern Africa. This includes knowledge about the appetite-suppressant properties of the *Hoodia* succulent – a plant used as a substitute for food and water when hunting.

In 1963, a South African research institute, the Council for Industrial and Scientific Research (CSIR), developed an interest in the plant. But they were unable to analyse its molecular structure until the mid-1980s, when they acquired high-field nuclear magnetic resonance spectroscopy equipment. In 1995, after successfully isolating the appetite-suppressant properties, the CSIR filed for a patent. In the same year, South Africa became a Party to the Convention on Biological Diversity. This meant that those using the traditional knowledge needed to obtain consent from the holders of such knowledge and negotiate a benefit sharing agreement with them.

Yet, the CSIR never made contact with the San. Instead, they sub-licensed their discovery to firms in Europe and the United States for significant fees. A vigilant local NGO eventually informed San leaders that their traditional knowledge had been used in a patent application and that they could either challenge the patent or demand a benefit sharing agreement. They chose the latter option.

In March 2003, the San and the CSIR signed a historic agreement which will give the San 6 per cent of all CSIR royalties received from licence-holders and 8 per cent of all milestone payments. Milestone payments have already been received. However, Pfizer and Unilever, two high-profile sub-licensees, have both dropped their *Hoodia* product development, and the future of this high-profile benefit sharing agreement is uncertain in early 2010.

Source: The information in this box is drawn from Wynberg and Chennells (2009).

this support is adequate, the discrepancy between the decision-making processes of traditional knowledge holders and bioprospecting partners could be narrowed in the future.

The role of women

As we have seen, the spirit of the CBD is a spirit of justice. The Ancient Greek conception of justice has become the starting point of almost all western approaches. In essence, it requires equality, in particular equality of treatment, opportunity and rights. Human beings are considered equally worthy of respect and equal bearers of entitlements. If a member of an indigenous group and a member of a non-indigenous group undertake the same work within a company, they have the right to equal pay. Disabled and non-disabled persons have equal voting rights. Men and women should both be able to stand as representatives in a democracy and so on. Feinholz Klip and Alvarez Castillo argue:

that any process of benefit sharing that does not guarantee the representation and participation of women in the decision-making process, as well as in the distribution of benefits, contravenes a central demand of social justice ... [W]omen, particularly in developing countries, can be excluded from benefits derived from genetic research because of existing social structures that promote and maintain discrimination ... A benefit sharing arrangement that is blind to gender discrimination has the potential of reinforcing existing inequitable structures and relations that victimise women. To be genuinely equitable, benefit sharing arrangements must explicitly protect women's rights to a just share as well as their autonomy over the use of benefits. (Alvarez Castillo and Feinholz Klip, 2006)

Feinholz Klip and Alvarez Castillo make two claims. First, a prescriptive or normative claim that women *should* enjoy the same rights and access to the same benefits as men, in other words agreement with the standard approach to justice in the twenty-first century, as exemplified through the UN Convention on the Elimination of all forms of Discrimination against Women (United Nations, 1979). Second, that particularly in developing countries, this is not always the case today, a claim which can also be confirmed with the following statistics.

Women make up nearly 70 per cent of the world's 1.3 billion people living in poverty, 65 per cent of the world's refugees and two-thirds of the world's illiterate population. They constitute two-thirds of the exploited informal workforce, own just one per cent of the world's resources and earn one-tenth of the world's income (Alvarez Castillo and Cook Lucas, 2008).

Most of the women included in the above statistics live in developing countries where biodiversity and traditional knowledge are being accessed by outsiders. Notably, the accession to international human rights instruments or the promulgation of national human rights laws is no guarantee for protection of rights in practice. Many women in developing countries lack autonomy over their fertility (a standard marker for gender equality), do not participate in political decision-making and experience the division of labour undertaken across gender lines; men work in the public sphere, women in the domestic sphere (Alvarez Castillo and Cook Lucas, 2008). For the purpose of this chapter, and to outline a potential value conflict between western bioprospectors and indigenous populations, I shall focus on *indigenous* women's access to equal human rights recognition aligning with the standard western approach to justice.¹³ In her chapter in this book, Fatima Alvarez Castillo has already pointed out that within indigenous communities women are often disadvantaged on a regular basis. I shall use the example of the Chiapas bioprospecting case to illustrate this point further (see Box 5.3).

Whilst the Chiapas case (presented in Box 5.3) is suitable for the discussion of various value tensions, I shall concentrate on those that may arise when communities with divergent views on gender equality are forced to cooperate, as, for instance, in benefit sharing negotiations. Gender issues are hardly ever discussed in the benefit sharing literature. In fact, Fatima Alvarez Castillo and her colleagues are the only gender experts voicing relevant concerns in the academic literature and they have not yet focused their attention directly on the Chiapas case. However, the indicators are clear. Within Chiapas, the most marginalized of all peoples are indigenous women (Klein, 2001). As Comandanta Ester noted in a speech on International Women's Day: "We have to struggle . . . because we are triply discriminated against: as indigenous women, as women, and as poor women" (ibid.). Women do not generally participate in social and political decision-making in Chiapas due to reasons of illiteracy, inability to speak Spanish and lack of experience. As one noted during an interview, they don't participate because "we are afraid, embarrassed, [and] we feel ashamed. We feel timid and we don't speak up in the community assembly" (ibid.). In this context, it is highly unlikely that women would contribute to benefit sharing negotiations, a fact which is unjust according to the understanding of justice, which sees all human beings as bearers of equal rights. An additional gender marker can confirm the concern.

One of the standard gender markers used by Alvarez Castillo et al. (2009) is autonomy over fertility. As a *Lancet* report noted, "aggressive efforts to limit population growth . . . results in violations of reproductive

Box 5.3 The Chiapas case

The Maya civilization in southern Mexico and Central America peaked around the year 1000 before Spanish colonizers devastated the culture in 1500. The indigenous Maya had to flee into marginal territories during the invasion or were used as servants on Spanish haciendas. Since constitutional reform in 1917, the land rights of the original occupants have been officially recognized. However, today, around 900,000 people speaking four Maya languages live in the Highland Chiapas area of Mexico, a militarized, volatile area with extreme levels of poverty.

In 1998, a five-year biodiversity research project began in the Highlands, a region well-known for its richness in biodiversity. The project was funded through a consortium of United States federal agencies (the International Cooperative Biodiversity Group, ICBG). It “had the bold purpose of excelling as a model of transparent, legal and ethical plant bioprospecting in an indigenous territory in a very difficult and contentious legal, social and political climate” (Feinholz Klip et al., 2009: 316). The local indigenous Maya people were meant to be involved directly in the research as well as being envisaged as major beneficiaries of it.

The project was led by an experienced, US-based professor of anthropology who had been conducting research amongst the Maya for forty years. The local partner was the Mexican research and graduate teaching centre, El Colegio de la Frontera Sur (ECOSUR). The commercial arm of the project was a small natural products discovery company called MolecularNature Limited (MNL), based in the UK. Benefit sharing revenue was meant to flow through a fourth organization called PROMAYA (Promotion of Intellectual Property Rights of the Highland Maya of Chiapas, Mexico), “an innovative non-profit organization that will hold in trust and administer the indigenous community’s portion of any financial returns resulting from the activities of the Maya ICBG” (Berlin et al., 1999). Some 25 per cent of pharmaceutical profits were to flow back to the Maya region through this non-governmental organization (NGO).

However, revenue for PROMAYA to distribute never materialized, as three years after its start, the project was abandoned in 2001. In fact, the members of PROMAYA did not even meet, because the project faltered before its activities were required. Some of the reasons that led to the project’s abandonment were as follows:

1. “The Maya population [was . . .] not formally represented in the region by a single sociopolitical body” with whom the project team could have consulted. This led to significant difficulties later on,

Box 5.3 (cont.)

when the project was criticized for not obtaining consent comprehensively, despite considerable efforts (e.g., iterative consent, a play in native languages explaining the project, visitors taken on tours of the herbarium and the laboratories).

2. Existing domestic regulatory frameworks were inadequate. Whilst legal provisions were available for the collection of plant material for scientific purposes only, none existed for the collection of material for potential commercial exploitation.
3. International and national concerns emerged about cultural erosion and incompatibility of value systems. After consultations between local Maya NGOs and RAFI (now Action Group on Erosion, Technology and Concentration, or ETC Group, an international NGO opposing bioprospecting) the case became known worldwide. RAFI expressed international and indigenous concerns that local values were eroded when marketing, privatization and individualization of knowledge took place in a context where “communities reject both intellectual property itself as well as the process of sharing benefits through PROMAYA” (RAFI, 2000).

It has been argued that the main loss from the failure of the Maya ICBG is that it had the potential to create a truly collaborative, mutually enriching research enterprise (Feinholz Klip et al., 2009).

Note: Unless otherwise stated, the case description relies on Feinholz Klip et al. (2009).

rights” (Kirsch and Arana Cedeno, 1999) in Mexico, including such extreme violations as sterilization without consent or secret insertion of contraceptive intra-uterine devices after recent delivery. Indigenous women in Chiapas are the worst affected, as the state concentrates its effort in poor areas and because indigenous women are less likely to raise complaints due to language and cultural barriers and a general fear of the government. Such obvious human rights violations show not only utter disrespect for nationally promulgated human rights law, but also, and specifically, disrespect for women’s rights. It is in this context that value tensions are likely to occur between western bioprospectors and local populations such as those in Chiapas. Alvarez Castillo and Feinholz Klip demand of the former to contribute positively to the emancipation of the latter when they write:

[j]ustice is both a social goal and an ethics imperative. It is the obligation of the scientific and ethics communities to avoid perpetuating injustices with

their work, or as a result of it. And, if it is within their power, they ought to contribute to reducing inequalities due to race, class, ethnicity, gender and other social structures. (Alvarez Castillo and Feinholz Klip, 2006: 121).

Such efforts by the scientific community to help reduce unjust inequalities could amount to demanding, either through guidelines or within individual negotiations, that women take part in the decision-making process and are supported to include their voice in the benefit sharing process. At the same time, Article 11 of the United Nations Declaration on the Rights of Indigenous Peoples proclaims that “[i]ndigenous peoples have the right to practise and revitalize their cultural traditions and customs” (United Nations, 2007). And gender inequality can, of course, be seen as a cultural tradition and custom. To find a short-term solution to the tensions between western claims of justice as universally valid, equal respect and rights for all, and local traditions with divergent beliefs and customs is not possible as the ferociously raging debates about, for instance, female genital cutting show (Okin, 1997). Sophistically, one could argue that the United Nations Declaration on the Rights of Indigenous Peoples, so heavily fought for, is proof of the success of universalist thinking. Indigenous peoples all over the world can claim equal rights now, according to the Declaration. However, in practice such sophistry is unlikely to achieve results. Instead, Alvarez Castillo and Feinholz Klip demand that:

Benefit sharing guidelines must explicitly recognise the disadvantaged situation of women and, to redress this, they must explicitly require women’s participation in, and representation of, their interests in decision-making regarding the distribution and use of resources accruing from genetic research. (Alvarez Castillo and Feinholz Klip, 2006: 121)

The commodification of traditional knowledge¹⁴

When a shoemaker sells shoes or a teacher is paid a salary for her educational skills, one does not speak of commodification. By contrast, the term is used when items that are not normally traded are transformed into tradeable assets. Within medical ethics, examples are various, ranging from surrogate motherhood to kidneys and embryos for stem cell research. For some, the entire area of traditional knowledge belongs to the group of assets that should not be traded. The commercial use of indigenous knowledge or heritage by outsiders has therefore been called “sacrilege” or “defamation” (Greene, 2004). On the other hand, it has been pointed out that trading traditional knowledge is an appropriate means to mitigate serious poverty (Ertman and Williams, 2005). The debate

about the commodification and commercialization of traditional knowledge is highly polarized and opinions range from its categorical rejection to the perspective that it can be a liberating act (Vermeulen, 2007a).

Those who reject commodification argue that indigenous knowledge is sacred and that fair and equitable benefit sharing is impossible under “the prevailing paradigm of privatization and commodification of nature and knowledge”, as implied in the CBD (Sridhar et al., 2008). From this perspective, it is argued that CBD-style benefit sharing is dead (Sharma, 2005) even before it has begun and the “most sweeping biopiracy coup occurred in 1993, when the CBD came into force and thereby legalized ‘recognition’ of national sovereignty over genetic resources” (Ribeiro, 2005). In fact, if indigenous peoples accepted the prevailing paradigm and collaborated with the pro-patents CBD approach, “their current way of living and their culture will be destroyed in the long run” (Sridhar et al., 2008).

At the other end of the spectrum, the CBD itself, signed by 193 Parties, claims exactly the opposite, namely that it will “sustain the rich diversity of life on earth”.¹⁵ It implicitly assumes that the benefits of resources should be shared equitably amongst humankind and that the proviso of prior informed consent is sufficient to avoid the desecration of sacred knowledge, one of the strongest arguments against commodification. Above, in the first section of this chapter, I have also argued that the CBD is a just response to the valid exploitation claims of biodiversity-rich countries and communities.

It is here enlightening to gain perspectives from those directly involved. The San case has already been introduced in Box 5.2. In 2007, fieldwork was undertaken in various San communities to establish their perspectives on the commodification of their traditional knowledge. Specific reference was made to the *Hoodia* plant. The research used scenario surveys to group opinions into three categories: (1) refusal to share knowledge, (2) agreement to share knowledge in exchange for money (the typical commodification or benefit sharing scenario – traditional knowledge in return for royalties) and (3) willingness to share knowledge in exchange for legal protection, for example in exchange for patent rights (Vermeulen, 2009). The responses split mostly along gender lines. Responses from female interviewees were almost equally dispersed amongst the three categories (1: 29 per cent, 2: 38 per cent, 3: 33 per cent), with a minor overall preference for an agreement to share the knowledge in exchange for money. When asked to justify their preference for scenario 2, female respondents replied that money will help feed their children, pay for school fees and clothes. By supporting children’s education, female interviewees hoped that their children might become

teachers or civil servants and eventually shake off their parents' impoverished and stigmatized identity.

Only a small minority of male respondents opted for the agreement to share knowledge in exchange for money (1: 22 per cent, 2: 14 per cent, 3: 64 per cent). The clear majority favoured the sharing of knowledge in exchange for legal protection. When asked to justify their choice of option 3, some male respondents argued that gaining legal rights over their knowledge and other assets (such as natural resources and land) was essential to restoring their human dignity. It is noteworthy that in both groups, those who rejected commodification were in the minority overall. However, those who rejected any sharing of knowledge were strong in their beliefs, as the following two quotes from Vermeulen's research show:

When you eat *Hoodia* you can feel the supernatural powers coming from above. When you smell *Hoodia* and taste it on your tongue you will feel how it stimulates you, how it controls your hunger, how it gives you power and energy [...]. You cannot experience these powers and energies of *Hoodia* in pills; we gave the power away for money. Everything that we had here is gone because we traded the supernatural powers for money [the interviewee probably refers to the loss of wild *Hoodia* due to significant over-harvesting].

In the past when we still had rainy periods, the *Hoodia* was growing, strong, big and juicy. Now that we are experiencing droughts, succulents like the *Hoodia* have died out. The moment the *Hoodia* was shown to other [non-San] people it disappeared; we showed it to too many different people such as the white people. We did not know that our plants, our knowledge would be turned into pills. This has caused friction in the community; we blame each other for showing it to other people. (Vermeulen, 2009: 204)

As the fieldwork has shown, there was no obvious preference amongst those interviewed for or against commodification. Is there a way to resolve this question? Of course, the CBD, with its principle of enabling access to and use of resources, takes a very definite stance by including traditional knowledge in its realm. Accessing and using traditional knowledge is not rejected but encouraged. At the same time, the principle of prior informed consent bridges the gap between the categorical rejection of commodification and its uncritical embrace. According to CBD decision V/16, access to traditional knowledge is subject to formal prior informed consent requirements.

Access to traditional knowledge, innovations, and practices of indigenous and local communities should be subject to prior informed consent or prior informed approval from the holders of such knowledge, innovations, and practices. (CBD, 2000)

Hence, it is not for policymakers, academics or other outsiders to decide whether traditional knowledge can be commodified, but only for those directly concerned. The pros and cons of commodification are local choices that cannot be made universally. For some indigenous peoples, blood cannot be donated for medical research, even to benefit themselves, because it is sacred. For many other people blood is a commodity, which can be sold for economic advantage (for example, in Germany, as opposed to, for instance, the UK, blood donors are financially compensated). If those indigenous communities who are approached for informed consent recognize the potential economic value of their knowledge and are willing to share it for royalties, it is their choice to make. Likewise, if they reject granting access and use rights to their knowledge. However, this leads us back to the first short discussion. It is important that community decision-making processes are facilitated and reasonably well resourced so that communities can come to viable decisions, not only within benefit sharing negotiations, but also when assessing whether they want to commodify their knowledge or not.

Conclusion

Traditional knowledge is a highly valuable resource. The CBD regulates access to the resource and compensates its guardians for its conservation. In doing so, it regulates encounters between two very different worlds: indigenous peoples on the one hand and bioprospecting researchers or their intermediaries on the other. In an ideal scenario, encounters between the two groups can lead to relationships of mutual learning, overall benefits for humankind (such as increased medical and environmental knowledge, conservation of biodiversity), commercially viable products and new sources of income or capacity-building options for previously impoverished groups. However, one of the reasons why the CBD was adopted in the first place is that past encounters between the two groups were experienced as highly exploitative by one party, the indigenous communities.

Prior to the adoption of the CBD, traditional knowledge was regarded by bioprospectors as the common heritage of humankind, which could be used for commercial purposes without returning any benefits to local communities. In a hypothetical world where human needs were satisfied for all, the common heritage principle might achieve high social utility. Open access would enable the fast and non-bureaucratic use of resources for medical progress and thereby benefit humankind as a whole. However, in a world that still bears the marks of colonialism, with an

international economic order characterized by serious distributive injustices, reflected in the enormous and avoidable death toll in developing countries, open access is not an ethical option. What one party saw as legitimate open access was rightfully seen as exploitation by the other. By legislating for a justice in exchange system in preference to the tacit common heritage of humankind principle, the CBD has taken a small step in redressing the balance of past exploitation. It is no longer legal to use the resources of indigenous communities without obtaining their prior informed consent and without sharing benefits. Hence, the possibility for exploitation has been reduced considerably. At the same time, the attempt at regulating the encounter between the two parties has led to new challenges; the challenges of intercultural communication across boundaries of diverse practices and ethical values.

Such challenges can include benefit sharing negotiations characterized by highly diverse decision-making structures and procedures. Bioprospectors are likely to concentrate on expediency and fast decision-making by a small group of highly educated professionals. By contrast, decisions within indigenous communities are more likely to emerge over long periods of time involving consultation with and envisaged consensus by large groups. Due to the considerable financial and education imbalances between the two groups, the rapid decision-making model is often imposed on indigenous groups to their detriment. Insufficient time is left to reach consensus and the lack of adequate financial resources to fund meetings or obtain additional advice aggravates the problem further. Following the aspirational South African model, government support for consultations with indigenous groups could be a partial solution.

Other challenges of intercultural communication include the different understanding of the role or rights of women or incompatible attitudes towards the commodification of traditional knowledge. Whilst the prior informed consent clause of the CBD should enable indigenous communities to resist any enforced commodification of their knowledge, the former tension is more difficult to resolve. Bioprospectors often come from western societies where – at least in principle – the equality of men and women has been secured. As a result, men and women are expected to have equitable access to benefit sharing negotiations so that benefits are likely to be distributed without gender bias. This approach collides with different understandings of the role of women in society. In indigenous communities, women can be excluded from the participation in social decision-making or political activities. Activists and academics have therefore demanded that benefit sharing guidelines must specifically recognize the disadvantaged position of women and require their representation in negotiations so as not to cement existing inequalities. This approach can collide with the rights of indigenous peoples to practise

their cultural traditions and customs as enshrined in the recent United Nations Declaration on the Rights of Indigenous Peoples. There is no short- or even medium-term solution to the tensions between universal claims to justice (for instance, equal rights for women) and the respect for local traditions and divergent beliefs. As Jack Beetson noted at the outset of this chapter, it is essential for the two groups to communicate with each other to increase understanding and build relationships that do not focus solely on economic gain.

The three examples for tensions between value systems and practices outlined in this chapter are not exhaustive. More will be present in real-life encounters between indigenous communities and bioprospectors. As Mason Durie, Deputy Vice-Chancellor at Massey University, New Zealand, and Maori, noted, “an encounter is more likely to have a good outcome if mutual benefits are on the agenda, agreement is reached about the terms, and . . . a commitment to a long term relationship is made” (Durie, 2008).

Notes

1. Biodiversity Act of South Africa (2004). Available at <<http://www.grain.org/brl/?docid=621&lawid=1222>> (accessed 14 January 2009).
2. The CBD describes holders of traditional knowledge as “resource managers”, whilst the academic literature tends to describe them as guardians of biodiversity. I shall use the latter in this chapter. Both have been described as problematic, because “poor people may be seen as the guardians of valuable information, but not as authors of knowledge in their own right” (Jiang, 2008).
3. Germplasm is the collection of genetic resources or DNA of an organism, usually in one entity.
4. It would go beyond the scope of this chapter to explain the other two main concepts of justice, namely corrective and retributive justice. See Pogge (2006).
5. I am not using the understanding of “justice in exchange” based on Roman law, which only requires that two competent adults have voluntarily agreed a price. Instead, I am referring to the Aristotelian notion of “justice in exchange”, which requires that a price and a good are proportionate requitals, i.e., the intrinsic worth of a good is mirrored in a monetary sum. On this understanding, a plumber can overcharge a customer and thereby violate justice in exchange even if the customer agrees. See Aristotle (1934).
6. For a more technical discussion written for philosophers, see Schroeder et al. (2009).
7. Of course, people might object if he simultaneously demanded monopoly powers over his anti-diabetes drink for more than a decade.
8. See FAO (2009); WHO and UNICEF (2008); and Fogarty International Center for Advanced Study in the Health Sciences (n.d.).
9. The issue of alleged excessive profits is a different matter outside the scope of this chapter.
10. I am assuming here that the products derived from non-human biological resources would not be priced out of the range of some islanders through a system that gives monopoly powers to their inventors for a considerable interval of time.

11. It is beyond the scope of this chapter to outline why today's international economic order is unjust. For a detailed justification of this claim, please see Pogge (2008).
12. This section draws on Wynberg et al. (2009).
13. Despite this focus, I am not pretending that western societies are successful at ensuring equal rights and respect for men and women. Neither do I maintain that only indigenous communities have a concept of justice that does not see men and women as equals, nor that all of them do. For instance, the number of "missing women" in the world today (girls and women who should be alive today but are not due to selective infanticide, selective abortion, serious disadvantages in accessing health care when compared to boys and men) is gravest in the mainstream societies of China and India (see Sen, 2003). At the same time, Maori society, the indigenous society of New Zealand, is aspiring towards gender equality very forcefully (see <<http://www.mwa.govt.nz/news-and-pubs/publications/maori-women.html>> [accessed 26 May 2010]).
14. This section draws heavily on Vermeylen (2009).
15. First description of CBD aims on running banner on CBD official website: available at <<http://www.cbd.int/>> (accessed 8 February 2009).

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REFERENCES

- Alvarez Castillo, Fatima and Julie Cook Lucas (2008) "Fairness and gender in benefit sharing learning from the Kani, San, Nigerian, Kenyan and Icelandic cases for moving forward". Available at <http://www.uclan.ac.uk/health/schools/school_of_nursing/research_projects/files/health_genbenefit_gender.pdf> (accessed 26 May 2010).
- Alvarez Castillo, Fatima and Dafna Feinholz Klip (2006) "Women in developing countries and benefit sharing", *Developing World Bioethics* 6(3): 113–121.
- Alvarez Castillo, Fatima, Julie Cook Lucas and Rosa Cordillera Castillo (2009) "Gender and vulnerable populations in benefit sharing: An exploration of conceptual and contextual points", *Cambridge Quarterly of Health Care Ethics* 18: 130–137.
- Aristotle (1934) *Nicomachean Ethics*. Trans. H. Rackham. Cambridge, MA: Harvard University Press, pp. 279–282.
- Beetson, Jack (2006) "Aboriginal cosmology, traditional knowledge and ownership". Available at <<http://www.uclan.ac.uk/wellcome>> (accessed 27 December 2008).
- Berlin, B., E. A. Berlin, J. C. F. Ugalde, L. G. Barrrios, D. Puett, R. Nash, and M. Gonzalez-Espinoza (1999) "The Maya ICBG: Drug discovery, medical ethnobiology, and alternative forms of economic development in the highland Maya region of Chiapas, Mexico", *Pharmaceutical Biology* 37 (Supplement): 127–144.
- Brown, Brendan F. (ed.) (1960) *The Natural Law Reader*. New York: Oceana Publications.

- CBD (Convention on Biological Diversity) (1992) "Article 1 – Objectives". Available at <<http://www.cbd.int/convention/articles.shtml?a=cbd-01>> (accessed 27 December 2008).
- CBD (Convention on Biological Diversity) (2000) "Decision V/16", in *Decisions Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Fifth Meeting, Nairobi, 15–26 May*, UNEP/CBD/COP/5/23. Available at <<http://www.cbd.int/doc/decisions/COP-05-dec-en.pdf>> (accessed 29 December 2008).
- D'Entrèves, A. P. (1970) *Natural Law*, 2nd edn. London: Hutchinson University Library, pp. 22–36.
- Durie, Mason (2008) "Bioethics, indigeneity, and Maori experience, global forum on bioethics in research", December. Available at <<http://gfbr9.hrc.govt.nz/index.php/presentations>> (accessed 16 January 2009).
- Ertman, M. M. and J. C. Williams (eds) (2005) *Rethinking Commodification: Cases and Readings in Law and Culture*. New York: New York University Press.
- FAO (Food and Agriculture Organization of the United Nations) (2009) "1.02 Billion People Hungry", news release, 19 June. Available at <<http://www.fao.org/news/story/en/item/20568>>
- Feinholz Klip, Dafna, Luis García Barrios and Julie Cook Lucas (2009) "The limitations of good intent: problems of representation and informed consent in the Maya ICBG", in Rachel Wynberg, Doris Schroeder and Roger Chennells (eds), *Indigenous Peoples, Consent and Benefit Sharing: Lessons from the San Hoodia Case*. Berlin: Springer, pp. 315–334.
- Finnis, John (1980) *Natural Law and Natural Rights*. Oxford: Clarendon Press.
- Fogarty International Center for Advanced Study in the Health Sciences (n.d.) *Strategic Plan: Fiscal Years 2000–2003*. Bethesda, MD: National Institutes of Health. Available at <http://www.fic.nih.gov/about/plan/exec_summary.htm> (accessed 26 May 2010).
- Greene, S. (2004) "Indigenous people incorporated? Culture as politics, culture as property in pharmaceutical bioprospecting", *Current Anthropology* 45: 211–238.
- Jiang, FeiFei (2008), "The problem with patents: Traditional knowledge and international IP law", *Harvard International Review* 30(3). Available at <<http://www.harvardir.org/articles/1795/2/>> (accessed 16 January 2009).
- Karwal, Roshni (2008) "Policy advocacy and partnerships for children's rights". Available at <http://www.unicef.org/policyanalysis/index_45740.html> (accessed 21 April 2010).
- Kirsch, Jonathan D. and Marco Arana Cedeno (1999) "Informed consent for family planning for poor women in Chiapas, Mexico", *Lancet* 354: 419–420.
- Klein, Hilary (Trans) (2001) "Women and indigenous autonomy, bulletin Chiapas al Dia, No. 242", CIEPAC, Chiapas, Mexico, 30 May 2001. Available at <<http://www.fempages.org/chiapas.htm>> (accessed 8 February 2009).
- Lee, R. (2003 [1983]) *The Dobe Ju/'hoansi*. Toronto, ON: Thomson Learning.
- Mayer, Robert (2007) "What's wrong with exploitation", *Journal of Applied Philosophy* 24(2): 137–50.
- Okin, Susan Moller (1997) "Is multiculturalism bad for women?", *Boston Review*, October/November. Available at <<http://www.bostonreview.net/BR22.5/okin.html>> (accessed 21 April 2010).

- Pogge, Thomas (2006) "Justice", in Donald M. Borchert (ed.) *Encyclopedia of Philosophy*, 2nd edn, Vol. 4. Detroit: Macmillan Reference, pp. 862–70.
- RAFI (2000) "Stop biopiracy in Mexico – indigenous people's organizations from Chiapas demand immediate moratorium, Mexican government says no to bio-prospecting permits", Rural Advancement Foundation International. Available at <http://www.etcgroup.org/en/materials/publications.html?pub_id=304> (accessed 8 February 2009).
- Ribeiro, S. (2005) "The traps of 'benefit sharing'", in B. Burrows (ed.), *The Catch*. Washington: Edmonds Institute, pp. 37–80.
- Rolston, Holmes III (1995) "Environmental protection and an equitable international order: ethics after the Earth Summit", *Business Ethics Quarterly* 5(4): 735–752.
- Schroeder, Doris (2008) "Double standards and benefit sharing", *Monash Review of Bioethics* 27(4): 45–51.
- Schroeder, Doris and Carolina Lasen-Diaz (2006) "Sharing the benefit of genetic resources: from biodiversity to human genetics", *Developing World Bioethics* 6(3): 135–143.
- Schroeder, Doris and Thomas Pogge (2009) "Justice and the convention on biological diversity", *Ethics and International Affairs* 23: 265–278.
- Sen, Amartya (2003) "Missing women: revisited", *British Medical Journal* 327: 1297–1298.
- Sharma, Devinder (2005) "Selling biodiversity: benefit sharing is a dead concept", in B. Burrows (ed.), *The Catch*. Washington: Edmonds Institute, pp. 1–13.
- Shiva, Vandana (1991) *The Violence of the Green Revolution*. London: Zed Books.
- Sridhar R. and Usha S. Karsten Wolff (2008) "Commodification of nature and knowledge – the TBGRI – Kani deal in Kerala", paper presented at the National Conference on Traditional Knowledge Systems, Intellectual Property Rights and their Relevance for Sustainable Development, Delhi, 24–26 November.
- Srinivas, Krishna Ravi (2008) "Traditional knowledge and intellectual property rights: a note on some issues, some solutions and some suggestions", *Asian Journal of WTO & International Health Law and Policy* 3: 81–120.
- United Nations (1979) "Convention on the elimination of all forms of discrimination against women". Available at <<http://www.un.org/womenwatch/daw/cedaw/index.html>> (accessed 13 January 2009).
- United Nations (2007) "United Nations Declaration on the Rights of Indigenous Peoples". Available at <http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf> (accessed 30 December 2008).
- Vermeylen, Saskia (2007) "Between Law and Lore", Ph.D. thesis, Guildford: University of Surrey.
- Vermeylen, Saskia (2009) "Trading traditional knowledge: San perspectives", in Rachel Wynberg, Doris Schroeder and Roger Chennells (eds), *Indigenous Peoples, Consent and Benefit Sharing: Lessons from the San Hoodia Case*. Berlin: Springer, pp. 193–210.
- World Health Organization (WHO) and United Nations Children's Fund (UNICEF) (2008) *Progress on Drinking Water and Sanitation: Special Focus on Sanitation*. New York and Geneva: UNICEF and WHO.

Wynberg, Rachel and Roger Chennells (2009) "Green diamonds of the South: a review of the San-*Hoodia* Case", in Rachel Wynberg, Doris Schroeder, and Roger Chennells (eds), *Indigenous Peoples, Consent and Benefit Sharing: Lessons from the San Hoodia Case*. Berlin: Springer, pp. 89–126.

Wynberg, Rachel, Doris Schroeder, Samantha Williams and Saskia Vermeulen (2009) "Sharing benefits fairly: decision-making and governance", in Rachel Wynberg, Doris Schroeder and Roger Chennells (eds) *Indigenous Peoples, Consent and Benefit Sharing: Lessons from the San Hoodia Case*. Berlin: Springer, pp. 231–260.

Supplementary feature Fostering "mindfulness" in traditional knowledge research: The Code of Ethics of the International Society of Ethnobiology

Kelly Bannister, Sarah A. Laird and Maui Solomon

Traditional knowledge related to biodiversity has a vital role in ethnobiology, the study of relationships between peoples, biota and environments. Ethnobiological research draws on perspectives and methods from many different disciplines such as linguistics, anthropology, taxonomy, ecology, pharmacology, archaeology and others. Regardless of their disciplinary approach, ethnobiologists are key intermediaries between scientific and indigenous cultures. Their research facilitates access to and use of traditional knowledge and associated biological resources, leading to a diversity of positive and negative outcomes, some intentional and some unintentional.

The International Society of Ethnobiology (ISE) was founded to address the inextricable links between cultural and biological diversity, and to develop an ongoing dialogue between indigenous peoples (in this context including local and traditional communities) and those trained in western scientific traditions. Deepening understandings about the rights and responsibilities associated with ethnobiological research is an important part of this dialogue. Over the last twenty years, through ISE Congress declarations, the formation of an Ethics Committee and creation of a Code of Ethics, the ISE has made a positive start in this important process. Much of the credit for these developments lies with the late ethnobiologist Dr Darrell Posey (1947–2001), one of the founders of the ISE. Darrell Posey strongly advocated ethnobiologists basing their research on meaningful relationships with traditional knowledge holders, arguing that without this, research can facilitate the inappropriate "commodification of the sacred" and may bring a variety of harms to indigenous and local communities (Posey, 2000, 2002). He challenged

researchers to develop higher levels of awareness and commitment to respect and protect indigenous rights and cosmologies in research, as well as to base research projects on collaborations wherein community priorities and concerns are central to research design, execution and dissemination (Posey 1996, 2004; Posey and Dutfield, 1996). Darrell Posey's contributions inspired a hard-fought shift in research ethics standards for the ethnosciences over the past two decades, culminating in the Code of Ethics developed by the ISE in 2006. Today, there is fairly widespread acceptance on the part of ethnobiologists of the principles and practices promoted by Darrell Posey and colleagues, and embodied in the ISE Code of Ethics.

The lengthy and inclusive process involved in developing the ISE Code of Ethics is as important as the guidance it offers. The Code of Ethics evolved from the original sentiments expressed at the first international gathering of ethnobiologists, called the International Congress of Ethnobiology, held in 1988 in Belém, Brazil. It was here that the ISE was founded in order to create an umbrella organization for scientists, environmentalists and indigenous peoples to work together to protect the world's endangered biological and cultural diversity. Over 600 delegates from thirty-five countries, including representatives from sixteen indigenous organizations, participated in the first Congress. At the close of the Congress, founding members joined together to forge the first statement of guiding principles to represent the goals and ideals of ethnobiology in an international context – the *Declaration of Belém*.

The *Declaration of Belém* explicitly recognizes the continuing destruction of ecosystems throughout the world, and the devastating biological and human implications of these developments. Recognizing that indigenous peoples “have been stewards of 99% of the world's genetic resources”, the *Declaration of Belém* underscores the point that the knowledge underlying the resource management practices of the world's indigenous peoples is directly tied to the maintenance of the biological diversity of the planet. As a result, the loss of traditional knowledge is inextricably linked to the loss of biological diversity and vice versa (ISE 1988). The *Declaration of Belém* was the first international declaration to call for recognizing and consulting with indigenous specialists as proper authorities in all activities affecting them, their resources and their environments, including procedures to compensate indigenous peoples for use of their knowledge and their biological resources. It also calls for the recognition and guarantee of inalienable human rights including cultural and linguistic identity. The *Declaration of Belém* thus served as the basis for subsequent work by ISE members to promote ethical practices and equitable and meaningful dialogue between indigenous peoples and those trained in western scientific traditions.

In 1992, a formal Ethics Committee was established with a specific mandate to develop a Code of Conduct for the ISE. Open hearings over the course of the next four years led to development of a draft Code of Ethics and Standards of Conduct in 1996, intended to provide ethnobiologists with guiding principles developed in conjunction with indigenous peoples. In 1998, the first half of the Code of Ethics (consisting of fourteen principles) was finished during an intensive pre-congress workshop and adopted by the attending membership at the Sixth International Congress in Aotearoa/New Zealand. Completion of the second part of the Code of Ethics (research practices) was deferred to the next congress. However, the work was not undertaken in 2000 at the Seventh International Congress in Athens, Georgia (USA) due to a major controversy that emerged involving a bioprospecting project based at the host university. Instead, a special session of the Ethics Committee was organized during the Congress to debate issues of prior informed consent, intellectual property rights and benefit sharing, which were at the heart of the controversy as well as being pressing issues faced by ethnobiologists in general. Agreements were made to call together a “crucible-type group” to debate these important topics and to formulate a policy statement; however, these efforts were significantly hindered by Posey’s untimely death in 2001.

Formal discussions about the ISE Code of Ethics remained in abeyance until the Tenth Congress in Canterbury, UK in 2004, when a special session was held to discuss and renew the commitment of the membership to complete the Code of Ethics, and promote its application in practice. Internet-based discussions ensued for two years following the 2004 special session, and the final Code of Ethics was completed in 2006 after an intensive three-day pre-Congress workshop, followed by a special Congress working session, at the Tenth International Congress in Chiang Rai, Thailand. The completed ISE Code of Ethics, consisting of a Preamble, Purpose, 17 Principles and 12 Practical Guidelines, was unanimously approved by the membership attending the 2006 Congress, subject to the addition of an Executive Summary and Glossary of Terms. These two additions were adopted in 2008 at the Eleventh International Congress in Cusco, Peru, thereby concluding a long and complex journey that involved several hundred individuals (indigenous and non-indigenous, academic and non-academic), from a diversity of backgrounds and from all corners of the globe.

The resulting ISE Code of Ethics (see Box 5.4) is a negotiated tool aimed first and foremost at fostering “mindfulness” – the higher-level awareness advocated by Darrell Posey in earlier decades. Mindfulness, a vigilant willingness to evaluate one’s own understandings, actions and responsibilities to others, is central to equitable and ethical research

Box 5.4 Synopsis of the International Society of Ethnobiology Code of Ethics

The ISE Code of Ethics provides a framework for decision-making and conduct for ethnobiological research and related activities involving indigenous peoples, traditional societies and local communities. It is intended to support but *not over-ride* community-level processes and decision-making structures, and to facilitate the development of community-centered, mutually-negotiated research agreements that serve to strengthen community goals. It is comprised of an Executive Summary, Preamble, Purpose, 17 Principles and 12 Practical Guidelines, and a Glossary of Terms. The Code of Ethics is based on “mindfulness” as the fundamental value, defined as “an obligation to be fully aware of one’s knowing and unknowing, doing and undoing, action and inaction”. The ISE Code of Ethics was originally developed in English but is being translated by volunteers into other languages, to date including Chinese, Indonesian (Bahasa Indonesia), Spanish and Italian.

Summary of Principles

1. **Prior Rights and Responsibilities** – recognizes prior, proprietary rights, interests and cultural responsibilities of Indigenous peoples, traditional societies and local communities.
2. **Self-Determination** – affirms the right to self-determination will be respected.
3. **Inalienability** – recognizes inalienable rights in relation to traditional territories, natural resources and associated traditional knowledge.
4. **Traditional Guardianship** – recognizes obligations and responsibilities of Indigenous peoples, traditional societies and local communities to preserve and maintain their role as traditional guardians of ecosystems.
5. **Active Participation** – underscores the need for active participation in all phases of research activities from inception to completion, including application of results.
6. **Full Disclosure** – affirms the community’s entitlement to be fully informed about the nature, scope and ultimate purpose of the proposed activity, using understandable format and language.
7. **Educated Prior Informed Consent** – recognizes prior informed consent is based in relationship and ongoing communication throughout all phases of the project, and requires an educative process that uses bilingual and intercultural education methods and tools to ensure understanding; also recognizes the right of communities to decline participation or support.

Box 5.4 (cont.)

8. **Confidentiality** – recognizes the right to exclude from publication and/or to keep confidential any information concerning culture, identity, language, traditions, mythologies, spiritual beliefs or genomics.
9. **Respect** – refers to respect for the integrity, morality and spirituality of the culture, traditions and relationships of participating communities.
10. **Active Protection** – promotes active measures to protect and to enhance the relationships of indigenous peoples, traditional societies and local communities with their environment, and thereby promote the maintenance of cultural and biological diversity.
11. **Precaution** – promotes taking proactive, anticipatory action to identify and prevent biological or cultural harms resulting from research activities or outcomes, even if cause-and-effect relationships have not yet been scientifically proven.
12. **Reciprocity, Mutual Benefit and Equitable Sharing** – refer to the community's entitlement to share in and benefit from tangible and intangible processes, results and outcomes that accrue directly or indirectly for activities that involve Indigenous knowledge and resources.
13. **Supporting Indigenous Research** – promotes capacity-building, training exchanges and technology transfer to enable communities to undertake their own research.
14. **The Dynamic Interactive Cycle** – recognizes that projects should be conceptualized as cycles of continuous and on-going communication and interaction, thus activities should not be initiated unless there is reasonable assurance that all stages can be completed.
15. **Remedial Action** – refers to the commitment to communication and discussion with the local peoples or community concerned to decide on remedial action to redress or mitigate adverse consequences, should they occur.
16. **Acknowledgement and Due Credit** – affirms that all tangible and intangible contributions must be acknowledged in accordance with the preference of the contributor and due credit must be given in all agreed publications and other forms of dissemination, including downstream or secondary uses and applications.
17. **Diligence** – refers to an expectation that project proponents have a working understanding of the local context prior to entering into research relationships with a community, including knowledge of and willingness to comply with local governance systems, cultural laws and protocols, social customs and etiquette, as well as local language fluency (or use of translators) to the degree possible.

Box 5.4 (cont.)

Summary of Practical Guidelines

- Guidelines apply to any and all **research, collections, databases, publications, images, audio or video recordings**, or other products of research and related activities.
- Guidelines recognize that Indigenous, traditional or local peoples conducting research within their own communities, for their own uses, may need to comply with their own **cultural protocols and practices**. In the event of inconsistency between such local requirements and the ISE guidelines, all parties involved will commit to work collaboratively to develop appropriate practices.

Recommendations prior to undertaking activities:

- Understand local institution(s) with relevant authority and their interest in the activities, and knowledge of cultural protocols;
- Establish educated prior informed consent;
- Fully disclose potential benefits, reasonably foreseeable harms, relevant affiliations of the proponents (including ethics approvals), sponsors, intent to commercialize outcomes, foreseeable commercial potential for others;
- Fully communicate and consult to develop the terms of the research;
- Seek approval through the local governance system of each affected community;
- Seek permissions and approvals from government as well as other local and national authorities, as required by local, national or international law and policy;
- Reveal and reach agreement among all parties involved on objectives, conditions and mutually-agreed terms, recognizing that collaborative research may be iterative, emergent and require modifications or adaptations.

Collecting specimens and information, and compiling data or publishing information should respect norms and belief systems of the relevant communities, including:

- supporting or creating provenance mechanisms to ensure collections are clearly traceable to their origins for purposes of due credit and acknowledgement;
- establishing “prior art” in the event of future ownership claims;
- facilitating a re-consent process to develop new mutually-agreed terms for further use or applications of collections or derivatives of collections;
- where possible, registering collected information in local databases and registries and exploring use of community certificates of origin linked to databases;

Box 5.4 (cont.)

- supporting and building capacity for community-based data management systems to the extent possible;
- ensuring intellectual property ownership claims or applications do not work against the cultural integrity or livelihood of communities involved.

Mutually-agreed terms and conditions of the research shall be set out in an agreement that uses language and format clearly understandable to all parties. The agreement must:

- be documented in a mutually-acceptable form, using local language where possible;
- be made with each potentially affected community;
- address elements as related to all foreseeable uses and property ownership issues of the research outcomes including derivatives;
- specify attribution, credit, authorship, co-authorship and due acknowledgement for all contributors;
- specify how and in what forms the resulting information and outcomes shall be shared with each affected community;
- explain the understandings reached on what is potentially sacred, secret or confidential and how such will be treated and communicated, if at all, within and beyond the direct parties to the research.
- ISE members will respect and **comply with moratoriums** by communities and countries on collection of information or materials that they would otherwise intend to include in their research, unless such moratorium is lifted to allow the research.
- All educational uses of research materials shall be **consistent with a good faith respect for the cultural integrity of all affected communities**, and, as much as practical, developed in collaboration with such communities for mutual use.
- **Existing project materials** in the possession, custody or control of an ISE member or affiliated organization shall be treated in a manner consistent with the ISE Code of Ethics (e.g., right to equitable sharing, compensation, remedial action, ownership, repatriation or other entitlements).
- Prior informed consent shall *not be presumed* for **uses of biocultural information in the “public domain”** and diligence shall be used to ensure that original source(s) of the knowledge and associated resources are included and traceable in further use and publications.
- If the practices of any parties to the research are **harmful to components of an ecosystem**, such practices and the impacts will be brought to the attention of offenders and attempt will be made to

Box 5.4 (cont.)

establish a mutually agreed conflict resolution process, prior to informing the local community and/or government authorities.

- **Project proposals, planning and budgets** should be appropriate to collaborative interdisciplinary and cross-cultural research that complies with the ISE Code of Ethics (e.g., extended timeframes, development of mutually-agreed terms and ongoing communication mechanisms; additional budget categories; additional research ethics and intellectual property ownership considerations, additional reporting requirements).

ISE members shall endeavour to **raise awareness** among funding bodies, academic institutions and others about the increased time and costs that may be involved in adhering to the ISE Code of Ethics.

Source: ISE, 2006

relationships. It is also essential to guarding against misappropriation of traditional knowledge (i.e., acquisition of knowledge without the consent of knowledge holders) and ensuring that any use of traditional knowledge, including that with positive conservation, health, economic and other benefits is done in respectful and culturally appropriate ways that benefit and do not harm, the communities involved. In this way, ethnobiological research can help to support, rather than sever, the inter-relationships between biological and cultural diversity, and can promote the protection of indigenous peoples' collective biocultural heritage.

At the request of ISE members, development of a complementary "ethics toolkit" has recently been initiated to assist in the practical application of the ISE Code of Ethics. The ISE ethics toolkit is envisioned as an internet-based resource that contains supporting material for applying the ISE Code of Ethics across diverse cultural and geographical contexts. Some of the planned components include an online tutorial to promote familiarity with the ISE Code of Ethics, a collection of case studies that share lessons learned, template agreements, an online discussion forum to share experiences and ask questions, and other educational outreach, communication and training materials to help implement the ISE Code of Ethics (see ISE, 2006).

REFERENCES

- ISE (International Society of Ethnobiology) (1988) "Declaration of Belém". Available at <http://www.ethnobiology.net/global_coalition/declaration.php> (accessed 20 April 2010).

- ISE (International Society of Ethnobiology) (2006) "ISE Code of Ethics (with 2008 additions)". Available at <http://www.ethnobiology.net/_common/docs/ISE%20COE_Eng_rev_24Nov08.pdf> (accessed 27 May 2010).
- ISE (International Society of Ethnobiology) (n.d.) "History of the International Society of Ethnobiology". Available at <http://www.ethnobiology.net/about_us/history.php> (accessed 20 April 2010).
- Posey, Darrell (1996) *Traditional Resource Rights: International Instruments for Protection and Compensation for Indigenous Peoples and Local Communities*. Gland, Switzerland: IUCN.
- Posey, Darrell A. (2000) *Cultural and Spiritual Values of Biodiversity*. Nairobi: UNEP.
- Posey, Darrell A. (2002) "Commodification of the sacred through intellectual property rights", *Journal of Ethnopharmacology* 83: 3–12.
- Posey, Darrell A. (2004) *Indigenous Knowledge and Ethics: A Darrell Posey Reader*. London: Routledge.
- Posey, Darrell and Graham Dutfield (1996) *Beyond Intellectual Property: Toward Traditional Resource Rights for Indigenous Peoples and Local Communities*. Ottawa: IDRC.
- United Nations (1979) "Convention on the elimination of all forms of discrimination against women". Available at <<http://www.un.org/womenwatch/daw/cedaw/index.html>> (accessed 13 January 2009).

6

Making space for grandma: The emancipation of traditional knowledge and the dominance of western-style intellectual property rights regimes

Ikechi Mgbeoji

Overview

One of the most dramatic changes in intellectual property rights (IPRs) circles between the 1970s and 1990s was the emancipation of traditional knowledge (TK) systems from the recesses of scorn and neglect. For more than six centuries, the knowledge systems of colonized and dispossessed peoples across the world have languished as the western-styled IPRs system gained prominence, acceptance and legitimacy, regardless of cultural differences. Yet, in the past quarter of a century, TK systems have witnessed some degree of positive review, especially in policy instruments of international intellectual property organizations (WIPO, 1998–1999: 28) and in international agreements.¹

The emergence of TK from the marginal doldrums of disrepute and neglect raises the serious question of how best to manage the relationship between TK and the dominant systems or narratives of IPRs. Although there are undeniable similarities between TK (such as folklore) and IPRs (such as copyrights), the philosophical and jurisprudential divides are huge and, often, radical. Unlike IPRs, which tend to be discrete and narrowly focused on categories of intellectual property, TK systems traverse a wide gamut of life, cultural experiences, epistemologies and empiricisms. Thus TK systems are implicated in ecology, agronomy, agriculture, medicine, animal husbandry, music, storytelling, cloth-weaving and so forth, across several thousands of different cultures and peoples. Without any doubt, TK was not designed to fit with the structure and

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processes of dominant IPRs. Neither the eligibility criteria nor the judicial processes for articulation and vindication of TK rights can easily fit with dominant IPRs regimes.

As I have observed elsewhere (Mgbeoji, 2006a), given the multitudinous nature and diversity of indigenous knowledge systems, it becomes intellectually risky, if not fraudulent, for generalized claims to be made regarding the nature of indigenous knowledge systems. It would be unwise and rash to resolve the question of the relationship between IPRs and TK without first limiting the scope of the enquiry to a specific genre or type of TK. This chapter therefore limits the scope of the enquiry to the TK systems that pertain to the uses of biological products for medicinal and therapeutic needs. The task of this chapter is to examine ways in which TK related to the use of biodiversity for medicinal and therapeutic needs may be mainstreamed with dominant IPRs, in particular the patent system.

In essence, the question that this contribution seeks to tackle is whether the patent system is of any relevance or pertinence to the search for mechanisms that protect the TK of the medicinal uses of biodiversity currently held by traditional knowledge practitioners across the world. Allegations of biopiracy have been made against researchers, bioprospectors and other entities actively scouring indigenous people's communities for the next miracle drug (Mgbeoji, 2006b). The objective of this chapter will be achieved through two main approaches. The first analyses the historical and philosophical roots of the divide between the dominant regimes of IPRs and TK. As already noted, the patent system is used as the framework for the analysis. The second approach suggests ways and methodologies by which the divide may be bridged. The analysis concedes that the gaps are quite profound but nonetheless offer policymakers some leeway and flexibility to protect TK by borrowing some of the features of the patent system. The approach is anchored on a pragmatic acceptance of the fact that dominant IPRs regimes are too well established to be displaced by well-meaning but weak protagonists for purer versions of TK models.

The central argument is that, notwithstanding the palpable differences between IPRs and TK, there are feasible ways in which policymakers may deploy to legitimate the status of TK as a veritable template for the recognition of the enormous contributions of indigenous and traditional cultures over the ages. The chapter concludes with the suggestion that, although the institutionalization of global TK models may seem remote at the international level, the feasibility of such models is much more realistic if pursued by decolonized states at the regional and continental levels. As a short-term measure, however, attempts to mainstream TK could be anchored on the creative adaptation of what already exists in terms of IPRs regimes.

The contribution is divided into three parts. Part 1 traces the origins of the modern patent system. Part 2 examines the characteristics of TK. Part 3 outlines and analyses how the dominant economic and political powers have historically privileged IPRs over TK despite the enormous merits and contributions of the latter. The final section lays out a possible road-map for reconciliation between the two regimes. The chapter concludes with a suggestion that states would do well to pursue regional initiatives aimed at giving legal effect to indigenous and autochthonous models for protection. Waiting on the global community for support and guidance is neither prudent nor effective.

The controversial origins of the patent system

Contrary to popular myth, the IPRs regimes we have today are not universal verities (Drahos, 1998), but products of European political economy and history. The contemporary dominance enjoyed by modern IPRs regimes across the globe is a product of the aggressive and often violent conquest and colonization of diverse cultures and societies by European states over the past five centuries (Penrose, 1951). It is a historical fact that modern IPRs such as copyrights, trademarks and patents regimes have deep roots in European culture, worldview and imperial impulses (Lowenstein, 2002). Thus, modern IPRs, often portrayed as universal truths with global genetic makeup, are in fact originally local expressions of European thought and philosophy. The diffusion and spread of IPRs regimes from Europe to other parts of the world followed distinct patterns of violence, suppression and outright dispossession. Therefore, the pre-eminence of western-styled IPRs is a direct manifestation of the forceful imposition of European economic, political and cultural ideas on colonized parts of the globe. Very few erstwhile colonized states chose and institutionalized modern IPRs of their own volition.

As a colonial construct and implant, Eurocentric IPRs were part of the cultural, economic and legal instruments for the control and subordination of colonized peoples and economies (Sagoe, 1992; Sklan, 1978). The colonization of the Americas, Oceania, Australia, Africa, Asia and other parts of the world was premised on two main grounds, namely, European superiority over colonized peoples (Mgbeoji, 2006a) and, of course, the economic exploitation of the colonized (Lindley, 1969). Although the transplantation of Eurocentric IPRs (Abbott et al., 1999) to colonized territories has yielded mixed results in postcolonial states (Mgbeoji, 2007), in the colonial encounter, Eurocentric IPRs successfully crowded out TK in many aspects, with baleful consequences (Adewopo, 2002).

With particular reference to patents, the dissonance has been astounding. The patent system is not new to controversy. Tracing its origins to Brunelleschi's "blackmail" (Lippert, 1999) of the medieval Italian city-state of Florence, the patent system has waned and waxed to global fame. As recounted by Bruce William Bugbee, in 1421, Filippo Brunelleschi, the Italian architect and painter, announced his invention of an iron-clad vessel, the "Badalone", which he claimed could carry marble across Lake Arno for the construction of the now famous cathedral of Florence (Bugbee, 1961: 76).² Brunelleschi refused to disclose the "Badalone" to the public. In addition, he rejected the idea of putting the vessel at the service of the city unless he was granted a limited right to an exclusive commercial exploitation of the vessel. Florence yielded to his unprecedented demands and on 19 June 1421 the city issued him the first recorded patent in history. To Brunelleschi's embarrassment, the "Badalone" sank on its inaugural trip and the Florentine patent idea sank with it, at least for a long time.

It would appear that after the Florentine debacle, the concept of patents migrated to Venice where it acquired legislative imprimatur and, in addition, substantial refinement. For example, the Venetian patent law of 1474 provided for a patent duration of ten years, examination of patent applications for novelty and punishment for infringement of patent rights (White, 1967). Italian artisans and craftsmen began a process of migration to central and western Europe (Macleod, 1988). Naturally, they did not leave the concept of patents behind them in Italy but took it with them, to the Netherlands in 1817, Spain in 1820, the Vatican in 1833, Sweden in 1834 and Portugal in 1837. Thus, it is fair to say that the modern patent concept owes its original inspiration to medieval Italian city-states. From central Europe, the concept spread with European immigrants to North and South America; and by colonialism and diffusion, to the rest of the world.

Akin to the debates on the definitions of TK, certain inferences may be made from the various definitions of patents. First, in spite of several theories on patents, especially attempts to couch the arguments for and against patents in the discourse of human rights, there is no such thing as a human right to patents. Of course, an argument can be made on the fairness or otherwise of appropriating the intellectual product of another person. But the fact is that a patent is a discretionary grant, by a state, excluding unauthorized persons, for a specified number of years, from making commercial use of a clearly defined and specified invention.³

Second, the patent system is anchored on a capitalist worldview of the economy. In recognition of these features, particularly the latter, the patent system, especially in western societies, is ostensibly designed to

recompense investors by its offer of a temporary monopolization of the commercial benefits of a clearly defined invention. Third, the system of patents purports to celebrate creativity or authorship as an individual effort. This approach discounts the many societal contributions and the incremental basis of most inventions.

For TK, on the other hand, the crux of the matter is whether the patent system is inherently universal in its philosophy and, if so, whether it offers the best economic incentive for protecting and rewarding inventions in the realms of activities that are peculiarly communal and where innovations occur in an incremental nature, for example in plant genetic resources. Law, as most jurists have restated, is a mirror of societal values. In other words, does the Eurocentric patent concept reflect non-European values? In resolving these difficult questions, certain factors must be taken into consideration. Primarily, the passage of time and contemporary realities have modified the jurisprudence on property ownership, the social nature of the inventive process, notions of legal personality and so on, which underpin the patent system. The crucial task thus is to locate the areas of intractable difference.

The patent system may be malleable (Coulter, 1991; David, 1993) in some respects, but the question remains whether decolonized states have the political and economic clout to create doctrinal adaptations that best serve their own peculiar needs and aspirations. Unlike powerful industrialized countries that can at will create new international IPRs regimes from scratch,⁴ developing countries lack the economic and political machinery needed to create effective but parallel global regimes on TK. Changes to the imperial order would have to be both incremental and radical (Ewens, 2000). At this stage, the patent system has to be understood vis-à-vis TK to work out how the adaptations may be made.

The Eurocentricity of the patent system

Before examining in relative detail the main doctrinal obstacles to the full-scale adaptation of the patent system and decolonized peoples' needs for appropriate IPRs regimes, it is imperative that the social and institutional biases against TK in general be addressed. The first socio-cultural obstacle is the notion that biocultural knowledge is common knowledge possessed by all traditional and indigenous peoples. Here a working definition of TK is in order.⁵ It must be clarified at the outset that the notion of traditional knowledge as an antiquated and inferior body of knowledge is clearly rejected.

A definition of TK cannot be given (Stenson et al., 1999) outside the context of the provisions of the Convention on Biological Diversity

(CBD), Article 27 (3) of the Trade-Related Aspects of Intellectual Property Rights (TRIPs) Agreement⁶ and, perhaps, other international instruments such as the International Undertaking on Plant Genetic Resources for Food and Agriculture (FAO) of 1983 and various International Labour Organization (ILO) instruments. These instruments and many others rightly locate TK within the context of traditional and indigenous peoples' historical quest for cultural, political and economic self-determination (Kloppenborg, 1988). The debate on the proper definition of TK is thus inherently complex, recondite and cuts across issues that implicate indigenous peoples' diverse approaches to the philosophical and ethical dimensions of property and personhood.

Further, in addressing this question, two misconceptions of the "traditionality" of TK deserve attention. First, references to the innovations and knowledge of traditional societies, especially on the issue of biological resources as "traditional", are often misconstrued to imply or mean that such inventions and innovations are static, antiquated and wrapped in mythology. There is a pervasive but unfounded notion that TK is anti-intellectual and a relic of a bygone era handed down to modern successors via unreliable oral history. As the Four Directions Council points out:

[W]hat is "traditional" about traditional knowledge is not its antiquity but *the way it is acquired and used*. In other words, the *social process of learning and acquiring which is unique to each indigenous group, lies at the heart of its "traditionality."* Much of this knowledge is actually quite new, but it has a social meaning and legal character, entirely unlike the knowledge indigenous people acquire from settlers and industrialized societies. (Dutfield, 2003; cited in Brush, 1996: 3–4 [emphasis added])

The second common misconception about TK is that traditional knowledge of biological resources is mere discovery of "natural phenomena". As Gurdial Nijar (1996: 16) points out,

[T]raditional uses, although based on natural products, are not "found in nature"; as such. They are products of human knowledge. To transform a plant into a medicine, for example, one has to know the correct species, its location, the proper time of collection (some plants are poisonous in certain seasons), the part to be used, how to prepare it (fresh, dried, cut in small pieces, alcohol, the addition of salt, etc.), the way to prepare it (time and conditions to be left in the solvent). And finally the posology (route of administration and dosage).

From the foregoing, it may be posited that TK refers to that body of knowledge, practices, innovations of traditional peoples regulating the ways by which knowledge is acquired, practised, transferred and shared among a given peoples in their traditional setting. The scientific merits of

TK have been astounding (Isaac, 1970). Over the millennia, small-scale farmers and local peoples have contributed to plant diversity by breeding assorted crop varieties to suit particular local conditions (McDougall, 1995; Johnson, 1992: 2).⁷ For instance, Indian farmers grew over 30,000 different varieties of rice during the twentieth century. The native Andeans developed hundreds of species of tomatoes, potato, maize and beans. Indeed, scientists calculate that “the total genetic changes achieved by farmers over the millennia was [is] far greater than that achieved by the last hundred or two years of more systematic science-based efforts” (Shiva, 1992: 259).

Apart from developing new varieties of plants, the knowledge of biological resources for medicinal and other uses by local farmers and healers is often phenomenal and pragmatic. For example, in Sierra Leone, local farmers can differentiate between seventy different varieties of rice based on several criteria including length to maturity, ease of husking, proportion of husk to grain size and weight, susceptibility to insect attack, behaviour in different soils and moisture levels, cooking time and qualities (Nijar, 1994: 17).

TK is not merely of academic or theoretical importance; it often serves practical ends. For instance, in Rwanda, farmers have cultivated mixtures of beans that perform better in their poor soil conditions. The Aguarana Jivaro community in the Peruvian Amazon has developed sixty-one distinct cultivars of cassava, and in the Philippines 123 rice varieties have been found at just five sites. In both cases, the varieties are designed to suit certain specific requirements and needs. Thus, the abundance of multitudinous varieties and species of plant resources and the knowledge of the uses thereof among traditional societies are not merely dependent upon geographical quirks but partly a result of deliberate and cumulative intellectual efforts spanning thousands of years. In order to achieve these sophisticated results in the improvement of plant varieties or cultivars, it has been observed that those farmers:

[E]mploy taxonomic systems, encourage introgression, use selection, make efforts to see that varieties are adopted, multiply seeds, field test, record data and name varieties [and in fact] ... do what many Northern plant breeders do. (McDougall, 1995: 4)

According to a report from the World Resources Institute,

[I]ndians dwelling in the Amazon River make use of some 1300 medicinal plants, including antibiotics, abortifacients, contraceptives, anti-diarrheal agents, fungicides, anesthetics, muscle-relaxants, and many others most of which have

not been investigated by researchers. (Panjabi, 1993: 189; Scalise and Nugent, 1995; Merges, 1998)

Some 74 per cent of the pharmacologically active trees reported by an indigenous group correlated with laboratory tests, whereas in contrast only 8 per cent of random samplings showed any activity. In short, without “the aid of indigenous groups, it is estimated that for every commercially-successful drug, at least five thousand species must be tested” (Jenks, 1995: 640). Michael Ballick of the New York Botanical Gardens found that using traditional knowledge increased the efficiency of screening plants for medicinal properties by more than 400 per cent (Nijar, 1994). It is therefore no coincidence that a decisive number of drugs derived from plant resources have been produced with the help of local peoples operating outside the dominant western framework of what constitutes “scientific knowledge” (Roht-Arriaza, 1996).

Modern international law has equally come to terms with the reality of traditional input into the improvement, conservation, and diversification of biological resources.⁸ The preamble of the CBD recognizes the “close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources”.⁹ Article 10 (c) of the CBD obliges Contracting Parties to “protect and encourage customary use of biological resources in accordance with cultural practices that are compatible with conservation or sustainable use requirements”.¹⁰ Similar recognition is embodied in Article 8 (j) of the CBD, which obliges Contracting Parties to:

[R]espect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.¹¹

The salient points from the analyses above are that the links between rational human impact on and mutual interaction with plant resources are enormous and profound. Further, the notion that biological resources in the gene-rich countries are necessarily of a “wild” character devoid of human input is often generalized and exaggerated. A considerable portion of the so-called wild biological resources and ecosystems is in fact the product of centuries of human impact on the ecosystem and, particularly, plants (Young, 1990; Hochberg, 1996; Kaufman and Mallory, 1993). Of course, the mischaracterization of TK as “raw materials” denies and

seeks to delegitimize the enormous intellectual contributions made over the centuries by the so-called informal breeders, farmers and other traditional peoples.

Yet the intellectual feats of innovation by traditional and indigenous peoples wrought within the framework of traditional societies cannot be adequately protected by modern patent law and processes. Why should this be? A close examination of the doctrines of the patent system will illuminate this paradox. For the purposes of securing patent protection on biological resources, for example, it is not enough that an innovation has been wrought. The threshold for legal protection under the patent regime is whether the invention has surpassed obvious or prior art in the field of that invention (De Valoir, 1995; Seay, 1998–9). In attempting to apply patent-like protections to biological resources, the modified test is to ask when such innovations, private or collective, surpass obvious knowledge or prior art (Caillaux, 1994), and whose prior art is relevant.

It seems clear that the opposition by the “scientific and industrial” community to the scientific worth or merit of traditional biocultural knowledge has nothing to do with the innate inferiority of the latter but a reflection of a socially constructed relegated status for the epistemology and the innovations arising from the so-called traditional or informal sectors. As the environmental activist Pat Mooney has stridently posited, “the argument that intellectual property is only recognizable when performed in laboratories with white lab coats is fundamentally a racist view of scientific development” (Shiva, 1992: 18). Every biocultural innovation, regardless of the cultural framework from which it springs, deserves to be judged on its own merits and not to be peremptorily categorized as “raw material” or automatically elevated to the status of an invention merely because of the respective cultural setting from which it is made or derived.

The enduring Eurocentricity of the patent system manifests itself yet again in the fiction that inventions are invariably the result of individual spontaneous creativity and genius. A mythological but legally sanctioned concept of reward and recompense of *individual* inventiveness discounts the daily reality that most inventions are the result of incremental insights into what already exists in society. In the extremely perverse manifestation of the Eurocentric myth of inventive genius, the “inventive genius” and thus property in inventions belongs not to the actual “inventor” but to the capital investment made by a multitudinous number of corporate or public stakeholders. This pandering to modern capitalism affords juridical basis for ownership by corporate entities of thousands of inventions. For farmers and native healers in traditional and indigenous societies, the notion that inventorship is a solitary exercise is a juridical and institutional impediment.

The myth of the inventor as a lone ranger leads to the common notion that the patent concept is, *inter alia*, incompatible with the inventive process in traditional and indigenous communities. The communal/collective nature of the development and improvement of biocultural knowledge in traditional social structures and units has been posited as one of the reasons such units of legal *persona* may not secure patent protection for their intellectual contributions to biological resources (Gana, 1995). This school of thought points to the individualistic structure of western societies. The contention is that the patent system is partly predicated on the concept of the inventor as an individual, and the inventive process itself as an exercise in solitude (Petersen, 1992; Hannig, 1996). In addition to the obvious generalization inherent in this categorization of the inventive process in non-western societies, there are problems of misapprehension of the modern social structure of the inventive process in western societies.

The notion of the solitary western scientist and inventor in his isolated basement or garage has become a legal anachronism. What baffles the mind is the longevity and obduracy of this myth. Indeed, the contemporary reality is that since the legal fiction of an employer's ownership in the employee's invention,¹² and the economics-of-scale of group research, a community of scientists working away in huge laboratory complexes has driven the concept of the solitary inventor to virtual extinction. Yet modern patent law persists in sustaining the myth of the individual inventor. As Alfred Kuhn noted in a path-breaking treatise:

[T]he transformation of technology and of economic society during the last century negates completely the patent law assumption as to the nature of the inventive process . . . in the modern research laboratories, tens, hundreds of men focus, upon single, often minute problems; inventions become increasingly inevitable. (Kuhn, 1996: 35–36)

According to David Safran,

[I]n this age, most inventions result from corporate research efforts . . . a growing number of these research efforts are the result of the work of several research and development teams that are located in different countries. (Safran, 1983: 123)

Assuming that the hypothesis of a collective inventive process in traditional societies holds, the transformation of the inventive process in western societies is in several material respects similar to the inventive process in the so-called informal sector. As Stephen Brush notes, "collective invention is a common and determinant force in both local economies and the world economy" (Brush 1998: 7). Interestingly, it has not

been suggested that such collectively invented products in western societies cannot be patented because of a perceived inability to pin down the critical “flash of genius” involved in the invention to a member of the collegial team in a western laboratory. Rather, the patent law has been adjusted in western countries to create a convenient legal fiction of an employer’s ownership in the employees’ invention and the attendant consequence of reducing the individual inventor to a hired worker.

The inescapable conclusion is that like “scientists” in the laboratories of the industrialized states who exchange information, collective groups of traditional knowledge holders and practitioners also exchange ideas to resolve and find solutions to deep and complex problems relating to biological resources. As the Crucible Group has argued, “farmer’s fields and forests are laboratories. Farmers and healers are researchers. Every season is an experiment” (The Crucible Group, 2000: x–xviii). If corporate inventors are honoured with patents, *a fortiori*, their informal counterparts deserve the same privileges.

Further, just as the modern patent law created the fiction of corporate “creative or inventive” genius to serve social and economic imperatives, so non-western jurisprudence has legal personalities serving the same or similar ends. These artificial legal personae or juridical entities are usually designed for the regulation of diverse functions including land ownership, succession, inheritance and so forth. Indeed, the category of legal persons is not closed. Yet domestic laws in several decolonized states have largely maintained colonially inspired categories of legal personalities, thus further enabling the irrelevance of the patent system to local needs and realities.

Another Eurocentric aspect of the patent regime is the conception of what constitutes public domain for the purposes of evaluating novelty. The prevalent notion is that TK is a matter of common knowledge and resides in the public domain. It is argued that, when this tenet of patent law is uncritically applied to traditional and indigenous settings, it is flawed on at least three grounds. First, not all TK is in the public domain. For instance, native healers, in particular, hardly reveal the secrets of their medicinal knowledge and herbal remedies. The secrecy of their knowledge guarantees them power and influence in the local communities. Indeed, the rituals, magic and spirituality that often surround the practice of traditional healing are, in addition to their other myriad societal functions, a critical aspect of the “secrecy regimes” (WIPO, 1998–9: 34–38) imposed on such biocultural knowledge by herbalists and healers.

Second, assuming, but not conceding that all TK is in the public domain, placement of such knowledge in the public domain by overzealous researchers without the consent of native healers, does not ipso facto extinguish a right of ownership to intellectual property. This principle is the

rationale for the regime of prior informed consent (PIC) in contemporary international law on access to traditional and biocultural knowledge. Ironically, it is often the same information or knowledge construed to be in the “public domain” in so-called traditional societies, which affords the basis for some patents on biocultural resources in some other countries, particularly, Japan and the United States. Third, the concept of public domain is an occidental legal principle which should not be foisted on traditional societies without informed consent.

Beyond the problem of what constitutes public domain, another aspect of the problem of novelty is the mistaken assumption by many policy-makers that there is a universal consensus on the concept of novelty as a criterion in granting patents. A careful analysis of international patent law and practice does not support the notion of absolute global novelty in the determination of what constitutes a patentable invention. As the United Nations Conference on Trade and Development (UNCTAD) recently observed, “there is no agreed international standard of absolute novelty and, *within limits*, member countries may apply the different approaches recognized in domestic patent laws” (UNCTAD, 1996: 32).

In addition to the definitional anarchy on novelty, an international juridical bifurcation arising from US and European patent law jurisprudence on novelty and prior art has not yet been bridged. This technical and geographically relative approach to construing the concept of novelty and prior art is hardly dissimilar to the medieval and eighteenth-century patent policies of the fledgling European industrial states; yet it has legislative force by virtue of section 102 of the United States Patent Act.¹³

Given that innovations in the informal paradigm are largely conducted in traditions where the keeping of formalized data in books is the exception rather than the rule, the seeming triteness of such TK in these societies would not debar such biocultural knowledge from being construed as “novel” in another country like the United States (Oddi, 1989). The paradox is that such biocultural knowledge would be ineligible for patent protection in the home country. Hence, what is an obvious invention or prior art in India, as the controversy over neem derivatives and turmeric patents demonstrates (Jain, 1999), may be construed as a novel art in the United States of America for the purposes of obtaining a patent grant. Yet, in both cases, the TK was unjustly patented in the United States. Consequently, the blurring of the law on novelty permits, or even encourages, some biotechnology and pharmaceutical firms to privatize traditional biocultural knowledge through a cosmetic repackaging of those resources and knowledge.

Thus, it is evident that, at the doctrinal level, the ideological values and worldview encoded in the IPRs of the colonizing European powers were

often alien to indigenous and traditional people's ethos and economic traditions (Farley, 1997–8).

Charting the path of engagement

In attempting to apply patent-like protections or other forms of modern IPRs to TK, various jurisprudential hurdles have to be crossed. Some of the issues of jurisprudence pertain to misconceptions and exaggerations on IPRs vis-à-vis indigenous peoples. These include the notion that TK is a body of knowledge in the public domain. The other pertains to the notion that TK knowledge is about the “natural” workings of nature. The implication here is that practitioners of TK merely stumbled on some information without making intellectual inputs in identifying, understanding, organizing, or using the knowledge.

While the preceding pages have shown that in many respects TK is incompatible with dominant IPRs, there are equally sound arguments to be made for adapting modern IPRs, in some cases to suit the needs of traditional and indigenous peoples. For instance, the category of legal persons could be reconfigured to meet the demands and needs of traditional peoples. Such legal persons as stools, families, kindreds, clans, age-grades, the spirits of the unborn, ancestral spirits and other forms and categories of legal personality which have served traditional societies for millennia can gain juridical recognition. In Brazil, for instance, pursuant to a proposed bill, PL¹⁴ N. 2.057, of 23 October 1991, indigenous peoples have legal personality and their legal existence would not depend upon any type of registration or any act of government. Under the proposed legislation, “indigenous communities, or any of their members, have the right to apply for a patent of invention, utility model, industrial model or industrial design which has been developed utilizing their traditional collective knowledge”.¹⁵ Ultimately, the incompatibility of the patent system with TK lies in epistemic schism (Oguamanam, 2006) rather than in the purported areas of antiquity, openness and stagnation of TK.

While efforts are made to adapt some modern IPRs to accommodate the peculiarities of TK, perhaps it is high time decolonized states gave serious thought to the proposals for regional initiatives aimed at giving juridical support to autochthonous and indigenous legal regimes for the protection of TK. Regions such as Africa and Latin America should seriously consider establishing regional protocols for the protection of IPRs. Waiting on the entire global train to join before embarking on the journey could mean a perpetual wait for justice and fairness in the world of IPRs. Indigenous and traditional peoples have been made to wait for far too long.

Notes

1. See for example, Convention on Biological Diversity (held at Rio de Janeiro on 5 June 1992) (entered into force 29 December 1993), reprinted in 31 *International Legal Materials* (ILM) 818 (1992).
2. Prior to the modern era of serious inroads by the patent system into scientific discourse, open exchange of scientific discoveries and ideas was the norm. As Stephen Brush has noted, “science is the long conversation among members of . . . community . . . the glitter of science to many practitioners is its alternative to pecuniary reward”: (1996: 143, at 149).
3. *Attorney-General v. Adelaide Steamship Co.* [1913] *Appeal Cases*, 781.
4. For example, when it became obvious to the industrialized states that the existing patent regime could not protect computer chip makers, the Washington Semi-conductor treaty was quickly concluded and ratified. Meanwhile, as Peter Drahos has noted, “in contrast, the issue of protection for indigenous knowledge has largely remained just that, an issue”. See Drahos (1997: 201).
5. On indigenous peoples, see *The International Labour Organization Convention 169 Concerning Indigenous and Tribal Peoples in Independent Countries* (7 June 1989), reprinted in 28 *I.L.M.* 1382; *Commission on Human Rights, Preliminary Report on the Study of the Problem of Discrimination Against Indigenous Populations*, UN Doc.E/CN.4/sub.2/L.566 [1972]; Chapter 2 paragraph 34, *UN Declaration of the Rights of Indigenous Peoples*, UN. Doc. E/CN.4/1995/2, reprinted in 34 *I.L.M.* 541 (1995); Wolfrun (1999: 369).
6. The literature on this burgeoning school of thought is quite remarkable. See generally, Greaves (1994).
7. Traditional ecological knowledge may be defined as “a body of knowledge built by a group of people through generations living in close contact with nature. It includes a system of classification, as a set of empirical observations about the local environment, and as a system of self-management that governs resource use” (Johnson, 1992: 2).
8. Preamble, Convention on Biological Diversity, see Note 1 above.
9. *Ibid.*
10. *Ibid.*
11. Article 8 (j) of the CBD, *ibid.*
12. In virtually every patent jurisdiction in the world, an employer owns the patent right to an employee’s invention if the employer is hired to invent or the invention is made in the course of the employment using his employers’ tools. However, under some narrow circumstances, the employee may own the invention. Similarly, governments and their research institutions can own the inventions of their employees. See Vaver (1997).
13. 35 United States Code 1982. See also, Gratwick (1972: 341). Further to the WTO, the United States has amended this section but the amendment limits it only to WTO member states.
14. PL is the acronym for “projeto de Lei” or legislative bill, in English. See also, Stenson and Gray (1999).
15. Art. 19 of PL 22057/91.

REFERENCES

- Abbott, Frederick, Thomas Cottier and Francis Gurry (eds) (1999) *The Making of the International Intellectual Property System*. The Hague: Kluwer.
- Adewopo, Adebambo (2002) “The global intellectual property system and sub-Saharan Africa: a prognostic reflection”, *University of Toledo Law Review* 33: 749.

- Brush, Stephen (1996) "Is common heritage outmoded?", in Stephen Brush and Doreen Stabinsky (eds), *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Washington: Island Press, pp. 7–21.
- Bugbee, Bruce Willis (1961) "The Early American Law of Intellectual Property: The Historical Foundations of the United States Patent and Copyright Systems", unpublished thesis, University of Michigan.
- Caillaux, Jorge (1994) "Biological resources and the convention on biological resources", *Journal of Environmental Law and Policy in Latin America and the Caribbean* 1(9): 10.
- Coulter, Moureen (1991) *Property in Ideas: The Patent Question in Mid-Victorian Britain*. Missouri: The Thomas Jefferson University Press.
- David, Paul A. (1993) "Intellectual property institutions and the panda's thumb: patents, copyrights, and trade secrets in economic theory and history", in Mitchel B. Wallerstein, Mary Magee and Roberta Schoen (eds), *Global Dimensions of Intellectual Property Rights in Science and Technology*. Washington, DC: National Academy Press, pp. 19–62.
- de Valoir, Tamsen (1995) "The obviousness of cloning", *Intellectual Property Journal* 9: 323–359.
- Drahos, Peter (1997) "Indigenous knowledge and the duties of the intellectual property owners", *Intellectual Property Journal* 11: 201–230.
- Drahos, P. (1998) "The universality of intellectual property rights: origins and development, in intellectual property and human rights, at 13". Available at <<http://www.wipo.int/tk/en/hr/paneldiscussion/papers/pdf/drahos.pdf>> (accessed 15 February 2009).
- Dutfield, Graham (n.d.) "The public and private domains: intellectual property rights in traditional ecological knowledge", *Oxford Electronic Journal of Intellectual Property Rights*. Available at <<http://users.ox.ac.uk/~mast>> (accessed 21 September 1999).
- Ewens, Lara (2000) "Seeds wars: biotechnology, intellectual property and the quest for high yield seeds", *Boston College International and Comparative Law Review* 23: 285–307.
- Farley, C. (1997–8) "Protecting folklore of indigenous peoples: Is intellectual property the answer?", *Connecticut Law Review* 30: 1–58.
- Gana, Ruth L. (1995) "Has creativity died in the Third World? Some implications of the internationalization of intellectual property", *Denver Journal of International Law and Policy* 24: 109–144.
- Gratwick, Stephen (1972) "Having regard to what was known and used", *The Law Quarterly Review* 88: 341–380.
- Greaves, Tom (ed.) (1994) *Intellectual Property Rights for Indigenous Peoples: A Source Book*. Oklahoma: Society for Applied Anthropology.
- Hannig, Mark (1996) "An examination of the possibility to secure intellectual property rights for plant genetic resources developed by indigenous peoples of the NAFTA states: domestic legislation under the international convention for new plant varieties", *Arizona Journal of International and Comparative Law* 13(1): 175–252.
- Hochberg, Michael (ed.) (1996) *Aspects of the Genesis and Maintenance of Biological Diversity*. Oxford: Oxford University Press.

- Isaac, Erich (1970) *Geography of Domestication*. Englewood Cliffs, NJ: Prentice-Hall.
- Jain, Meetal (1999) "Global trade and the new millennium: defining the scope of intellectual property protection of plant genetic resources and traditional knowledge in India", *Hastings International and Comparative Law Review* 22: 815–816.
- Jenks, Daniel (1995) "The convention on biological diversity: an efficient framework for the preservation of life on earth?", *Northwestern Journal of International Law and Business* 15: 636–646.
- Johnson, Martha (1992) "Research on traditional environmental knowledge: its development and its role", in M. Johnson (ed.), *Lore: Capturing Traditional Environmental Knowledge*. Ottawa: IDRC, pp. 28–62.
- Kaufman, Les and Kenneth Mallory (eds) (1993) *The Last Extinction*. Cambridge, MA: MIT Press.
- Kloppenborg, Jack (1988) *First the Seed: The Political Economy of Plant Biotechnology, 1492–2000*. Cambridge: Cambridge University Press.
- Kuhn, Alfred (1996) *The Structure of Scientific Revolution*, 3rd edn. Chicago: The University of Chicago Press.
- Lindley, Mark (1969) *The Acquisition and Government of Backward Territory in International Law: Being a Treatise on the Law and Practice Relating to Colonial Expansion*. New York: Negro Universities Press.
- Lippert, Owen (1999) "One trip to the dentist is enough: reasons to strengthen intellectual property rights through the free trade area of the Americas now", in Owen Lippert (ed.), *Competitive Strategies for the Protection of Intellectual Properties*. Vancouver, BC: The Fraser Institute, pp. 129–140.
- Lowenstein, J. (2002) *The Author's Due: Printing and the Pre-History of Copyright*. Chicago: The University of Chicago Press.
- Macleod, Christine (1988) *Inventing the Industrial Revolution: The English Patent System, 1660–1800*. Cambridge: Cambridge University Press.
- McDougall, C. L. (1995) *Intellectual Property Rights and the Biodiversity Convention: The Impact of GATT*. Luton: Friends of the Earth.
- Merges, Robert P. (1988) "Intellectual property in higher life forms: The patent system and controversial technologies", *Maryland Law Review* 47: 1051–1075.
- Mgbeoji, Ikechi (2006a) *Global Biopiracy: Patents, Plants, and Indigenous Peoples*. Vancouver, BC: UBC Press.
- Mgbeoji, Ikechi (2006b) "Beyond patents: The cultural life of native healing and the limitations of the patent system as a protective mechanism for indigenous on the medicinal uses of plants", *Canadian Journal of Law and Technology* 5: 1–12.
- Mgbeoji, Ikechi (2007) "TRIPS and TRIPS plus impacts in Africa", in Daniel Gervais (ed.), *Strategies to Optimize Economic Development in a TRIPS Plus Era*. Oxford: Oxford University Press, pp. 120–156.
- Nijar, Gurdial Singh (1994) "Towards a legal framework for protecting biological diversity and community intellectual rights: a third world perspective", Third World Network discussion paper, Penang, Malaysia (on file with the author), p. 17.
- Nijar, Gurdial Singh (1996) *TRIPS and Biodiversity: The Threat and Responses: A Third World View*. Penang: Third World Network, p. 16.

- Oddi, Samuel A. (1989) "Beyond obviousness: invention protection in the twenty-first century", *The American University Law Review* 38: 1097–1148.
- Oguamanam, Chidi (2006) *International Law and Indigenous Knowledge: Intellectual Property, Plant Biodiversity, and Traditional Medicine*. Toronto: University of Toronto Press.
- Panjabi, Raneer Kooshie Lal (1993) "International law and the preservation of species: an analysis of the convention on biological diversity signed at the Rio Earth Summit", *Dickinson Journal of International Law* 11(2): 187–281.
- Penrose, E. (1951) *The Economics of the International Patent System*. New Haven, CT: Greenwood Press.
- Petersen, Kirstin (1992) "Recent intellectual property trends in developing countries", *Harvard International Law Journal* 33: 277–290.
- Roht-Arriaza, Naomi (1996) "Of seeds and shamans: The appropriateness of the scientific and technical knowledge of indigenous and local communities", *Michigan Journal of International Law* 17: 919–965.
- Safran, David (1983) "Protection of inventions in the multinational marketplace: problems and pitfalls in obtaining and using patents", *North Carolina Journal of International Law and Commercial Regulation* 9(1): 117–132.
- Sagoe, Ekua T. (1992) "Industrial property law in Nigeria", *The Comparative Law Yearbook of International Business* 14: 312.
- Scalise, David G. and Daniel Nugent (1995) "International intellectual protection for living matter: biotechnology, multinational conventions and the exception for agriculture", *Case Western Reserve Journal of International Law* 27: 83–118.
- Seay, Nicholas (1998–9) "Protecting the seeds of innovation: patents plants", *American Intellectual Property Law Association Quarterly* 4: 419–431.
- Shiva, Vandana (1992) *The Violence of the Green Revolution*. Delhi: Zed Books.
- Sklan, Mark (1978) "African patent statutes and technology transfer", *Case Western Reserve Journal of International Law* 10: 55–66.
- Stenson, Anthony and Tim Gray (1999) *The Politics of Genetic Resource Control*. London: Macmillan. The Crucible Group (2000) *People, Plants, and Patients: The Impact of International Property on Trade, Plant Diversity, and Rural Society*. Ottawa: IDRC.
- UNCTAD (1996) *The TRIPS Agreement and Developing Countries*. Geneva: UNCTAD.
- Vaver, David (1997) *Intellectual Property*. Concord, OT: Irwin Law, pp. 147–149.
- White, Lynn Jr. (1967) "Jacopo Acontio as an engineer", *American Historical Review* 72: 432–443.
- WIPO (World Intellectual Property Organization) (1998–9) *Draft Report, Fact-Finding Missions on Intellectual Property and Traditional Knowledge*. Geneva: WIPO.
- Wolfrun, Rudiger (1999) "The protection of indigenous peoples in international law", *Zaorv-Heidelberg Journal of International Law* 59: 369–382, at 369.
- Young, John (1990) *Sustaining the Earth*. Cambridge, MA: Harvard University Press.

7

Characteristics, current relevance and retention of traditional knowledge in agriculture

R. Rengalakshmi

Introduction

Modern technological interventions have increased food production and created both negative and positive impact, especially on natural resources and their management. They are input intensive and have inevitably altered the ecological services of agro-ecosystems. It has been reported that 60 per cent of ecosystem services are now degraded, contributing to a reversal in productivity gains (MA, 2005) that increases the vulnerability of farmers and farming systems. Studies indicate that scientific methods of intensive farming have reached only 30 per cent of resource-rich farmers, whereas the needs and priorities of nearly 70 per cent of the world's resource-poor farming communities were not adequately addressed (Nene, 2006).

There is a need for a paradigm shift in approach from higher productivity alone to integrated ecological, food and nutritional security to attain the goals of sustainability. This calls for an interdisciplinary and integrated agro-ecosystems approach to inclusive knowledge management encompassing traditional knowledge. The process of knowledge evolution and management commences with the advent of domestication of natural resources to meet subsistence goals. Traditional knowledge has been derived from the direct experience of labour process, and empirically shaped by the social and physical environment (Kloppenburger, 1991) and passed to future generations (Braumohr, 2002) orally or by shared experiences and practices (Ohmagari and Berkes, 1997). Traditional

knowledge is defined as the knowledge of a people of a particular area based on their interactions and experiences within that area, built, experimented, adapted and modified with the continuous utilitarian value which is holistic and largely transmitted orally (Boef et al., 1993).

The importance of traditional knowledge in agriculture was recognized during the nineteenth century when George Watt, a British botanist, documented traditional agricultural techniques in his book *Economic Products of India* between 1889 and 1893. Recently, at the global level there have been increasing research, dialogue and attempts to revive interest in and practice of traditional agriculture, including livestock keeping, in the context of sustainable resource use. Also, biotechnological and pharmaceutical industries are increasingly looking for traditional knowledge. Many international development agencies, universities and research institutions have started focusing on traditional knowledge and they have incorporated it in their development perspectives. Large numbers of books, research articles, journals and newsletters have emerged during the last two decades on traditional knowledge.

Scholars have studied the varied dimensions of traditional agricultural knowledge and revealed its benefits. The application of folk biological principles in agriculture began with the study of ethnology of varietal taxa among several farming cultures, such as rice varieties among the Hanuoo (Conklin, 1957), potato names among the Aymara of Bolivia (LaBarre, 1947) and nomenclatural and classification systems (Berlin et al., 1973). However, only since 1970 has the theme of ethnobiological approaches emerged in the field of agricultural biodiversity (Orlove and Brush, 1996). Scholars reported its association with the environment (Ellen, 1996), agricultural practices (Brush, 1992), in situ conservation and management of genetic resources (Hammer et al., 1991), communal resource management institutions (Berkes, 1989), and tenure arrangements and resource allocation (Brookfield, 2001).

The United Nations Development Programme has recognized the contribution of traditional knowledge in achieving the Seventh Millennium Development Goal of “ensuring environmental sustainability”. Traditional knowledge provides a basis for local level decision-making on issues of food security, human health, natural resource management (Gadgil and Berkes, 1991), livestock health, fodder sources, genetic improvement, range/grazing land management (ITDG, 1998), environmental assessment and developmental planning (Warren et al., 1993). MOST and CIRAN (1999) and Kuramoto and Sagasti (2002) reported that traditional knowledge is crucial for survival and often contributes to improving the quality of life among poor populations. Agro-ecologists visualize traditional systems as unique opportunities to study the perspectives of stability and sustainability and to get ideas for agro-ecosystem management (Altieri and Merrick, 1987). In Nigeria indigenous soil taxonomy

provides the base for agricultural decision-making (Warren and Rajasekaran, 1993) and folk biological taxonomy in plant genetic resource conservation, and in Guatemala and Peru forest conservation activities incorporate traditional sustainable harvesting methods (Nations, 1992; Salick, 1992). Similarly, in Namibia the WWF has demonstrated the use of traditional knowledge in community-based resource management, creating a win-win situation between economy and environment (AFROL, 2004).

Over the last two centuries, science- and technology-led development approaches have been used to enhance agricultural production. Such programmes provided purely technological solutions to economic, environmental, cultural and social constraints. They followed the “transfer of technology” (“TOT”) model or “trickle down approach”, where traditional knowledge was ignored and rated as inefficient and inferior, and knowledge flow was unidirectional from researcher to farmer. Finally this approach led to disparity of development objectives, priorities, needs and potentials of local communities (Altieri, 1990).

This chapter explores the manner in which traditional knowledge in agriculture is manifested, constructed and managed within a socio-cultural context, its contemporary relevance for retention and integration with scientific knowledge systems, enabling policies and transformational forms, and provides a way forward.

Social stratification of traditional knowledge

Variations in traditional knowledge in complex societies have not been adequately focused on. Most studies on such societies have looked at communities as a homogenous group; hence, the cognitive variations in classifying resources and knowledge generation have not received adequate attention; this is reflected in developmental interventions. Social stratification assumes importance in the social construction of knowledge since different groups may have different interpretive frameworks of experiences. Socialization and social heredity (the process of learning) take place within a particular socio-cultural realm, determined by class, gender and caste. The socially and culturally constructed differential tasks of men and women and disparity in power consequently lead to differential knowledge and skill in the community over time. Knowledge and information varies with socio-economic variables such as caste, class, gender and age that determine skills (Krishna, 1998; Vedavalli and Anilkumar, 1998; Banu and Thamizoli, 1998; Kelkar, 2007), knowledge networks (Ramdas et al., 2001; Howard, 2003), social relations of power (Agarwal, 1995), access to resources, education, employment, wages, household and community-level decision-making, and occupations. Access to resources,

Box 7.1 Social construction of traditional knowledge on soil fertility management in an agricultural community, Tamil Nadu

A study was carried out to understand the social stratification of traditional knowledge on soil fertility management among women and men small farmers and agricultural labourers of Kannivadi village, Dindigul district, Tamil Nadu. It analysed the differential knowledge pattern between farmers and agricultural labourers, between men and women, and between higher caste and Dalit communities in south India. The findings show that though the indigenous knowledge of soil fertility management plays a crucial role in input investment, cropping patterns and defining the value of the land, the differences in traditional knowledge are visible in terms of gender, class and age. The women and the landless labourers seem to have more limited traditional knowledge of soil properties and management practices than farmers. Among farming households men possess deeper understanding and more knowledge of the soil properties than women. Of the men, the farmers who are forty years old and above have in-depth knowledge of soil properties and soil fertility management techniques. This is mainly due to the division of labour in which soil management is the sole activity and responsibility of men. Hence social norms define the experiences of individuals and groups, and develop a framework for interpreting experiences. With regard to age, the introduction of modern technologies, access to external inputs and government policies play an inevitable role in practising traditional knowledge. The study concluded that social stratification, the cultural norms and access to resources influenced by production relations create conditions to exclude women and socially disadvantaged sections of the people in a village from sharing the traditional knowledge.

socialization and processes of social heredity define knowledge acquirement within a given society.

Differentials in access influence the process of socialization and social heredity among different groups. Ludden (1996) put forth the idea that productive power relations and agro-ecological conditions in south India influence agricultural knowledge. Berlin (1992) has also described the cognitive variations in ethnobiological knowledge on the basis of sex, age or social status. In his study of Aguaruna's ethnobiology, he found that males have greater knowledge of rarely seen birds compared with females. Berlin attributes the social roles of males as hunters as a reason for the differences in knowledge. Similarly in India, men have specialized knowledge in the livestock sector, because women were historically denied access to animal healing due to the taboo associated with women (Ramdas

et al., 2001), and the prevailing cultural norm where knowledge is transmitted from father to son. Berlin also highlights how knowledge networks are gendered, which influences the process of knowledge acquisition, processing and sharing. Age also plays an important role in knowledge construction. Among the farmers in the semi-arid agro-ecosystem in Tamil Nadu, India, older people use more weather and seasonal climate-predicting indicators with greater understanding of their reliability. The study shows that older men and women used more than twelve indicators for weather forecasting, whereas the middle-aged people (aged twenty-five to thirty-five) used only three to four indicators (Rengalakshmi, 2004). The case study in Box 7.1 clearly indicates how caste, class and gender form an important stratification system leading to differential knowledge and skills among farming and agricultural labour communities in a village in India. In addition to the social variables presented in Box 7.1, Ellen (1979) has added kinship affiliation, ideology and literacy as additional variables influencing traditional knowledge in simple societies.

Gender relations and traditional knowledge

Experiential knowledge arises out of the experiences and routines of daily life, hence gendered knowledge also arises from gendered roles and responsibilities of men and women. In many parts of the world, women farmers are most knowledgeable about natural resources because of their constant close interaction with them (Berlin, 1992; Samal and Dhyani, 2006). Women farmers in resource-poor marginal farming systems have deep knowledge that includes ecological, agronomic and consumption characteristics about local landraces, crop improvement, agricultural practices, and the entire value chain and environment. It is argued that in traditional agricultural communities, this experiential knowledge gave women an important role in decision-making both at the family and community levels, consequently contributing to equitable power relations between genders (Rengalakshmi et al., 2006). The activity profile of millet cultivation requires women to stay for a long time in the fields, providing them with opportunities for closer observation that enables them to gain deep knowledge about the process of millet farming systems (see Box 7.2). The case study on the role of women in millet cultivation in the Kolli Hills among Malayali tribes brings out the manner in which knowledge becomes gendered and women become major decision-makers.

Changes in the agricultural production systems across different agro-ecosystems have led to consequent changes in gender roles, responsibilities and knowledge. The loss of traditional production systems has displaced women's knowledge and expertise. It has affected women's access, control and decision-making in resource management. The shift to

Box 7.2 Specialized knowledge of women in small millet cultivation and utilization

Knowledge of soil: Despite the complementary roles of men and women in small millet cultivation, women contribute up to 80 per cent of the labour in cultivation and perform specialized tasks in production, processing and utilization. Close interaction and responsibility help them to gain a deeper understanding of the growing environment, particularly soil and its interaction with rainfall. Women have greater knowledge than men about soil texture, fertility status and suitability for millet cultivation, though men do the ploughing. A quote from one of the Focus Group Discussions (FGD) with men and women farmers “Often men plough but it is women who touch, feel and work in the soil” further supports this fact. Women’s intimate relationship with the soil is reflected through their statements made in FGDs. Local category *pallakadu* (black clay soil) retains moisture for seven to ten days after the first rain, but the *sudumannkadu* (red gravelly soil) absolutely lacks any moisture holding capacity after the first rain. The third category of soil, *kassanku kadu* (red laterite soil), becomes hard and crust forms on the surface after the first rain. Irrespective of soil type, women ensure the soil moisture is, as they say, *thavittu irram*, which means the right state of moisture in the soil for ploughing and sowing. This knowledge helps them to take a lead in decision-making for ploughing, sowing or weeding on the basis of rainfall received and soil types. It indicates a deeper understanding of soil profile characteristics and ability to correlate quantum of rainfall and field conditions.

Knowledge of crops and different landraces: Women not only differ in expertise, but also in opinions from their counterparts with regard to value of landraces. The crop selection criteria of women, compared to men, consist of multiple interests or concerns. Stability and productivity are the major concerns in landrace selection for men, whereas women consider meal quality, resource availability, ease in processing and multiple uses of the crop. Men prefer early maturing landrace *Malliasamai*, while the women choose *Vellaperumsamai/Perumsamai* because of their meal quality. Women, being responsible for cooking, explain that they value *Vellaperumsamai/Perumsamai* because of its taste and consistency. Women say that, among all the little millet landraces, *Kottapattisamai* is the most beautiful, as stated in a local language (Tamil: *samaikku azhaku kottapattisamai*), and prefer this landrace due to ease in processing, productivity, meal quality and adaptation to diverse agro-ecosystems. Women rate the landraces according to meal quality and taste. In Italian millet the meal quality is in the

Box 7.2 (cont.)

order of *Perumthinai* followed by *Palanthiani*, *Senthinai*, *Mukkanthinai*, *Koranthinai*. Also, women classify little millet landraces based on bran to edible portion ratio and prefer landraces that are lower in bran proportion. Based on pounding intensity, they assess bran ratio and prioritize landraces for cultivation. Women rate landraces based on pounding intensity as *Vellaperumsamai* > *Kattavettisamai* > *Karumperumsamai* > *Kottapattisamai*. The responsibility and involvement in the pounding process help them to gain knowledge about the grain characteristics in milling, although sometimes men also pound the grain.

Source: Rengalakshmi, 2004: 98

modern agriculture has restricted women's role as providers of labour and denied access to information, knowledge and skill regarding new technology.

Today, the fate of global food security is linked to the performance of less than ten crops out of nearly 7,000 edible species (MSSRF, 1999). The disappearance of agro-biodiversity results in loss of local knowledge on the management and conservation of local resources (Knabe and Nkoyok, 2006). Most importantly, gender issues of roles, access, control and decision-making, and related local knowledge systems, have undergone changes, and marginalized women's knowledge and status (Zwiefel, 1996) and decision-making power (Ramdas et al., 2004). Ramdas et al. (2001) reported that changes in the cropping pattern from food crops to cash crops changed women's participation and decision-making in cultural practices of local food crops. The value of women's specialized knowledge, based on use and demand for such knowledge, would clearly be linked to the rise or fall of production of the particular crop. If small millets continue to fade away, or vanish, in the Kolli Hills, knowledge about them would no longer be valuable or needed by the community, and that would affect women's status adversely (Rengalakshmi et al., 2006).

Culture and traditional knowledge and their contemporary relevance

Traditional knowledge is based on interaction with the environment to cope with agro-ecological and socio-economic environments. Knowledge is structured by a system of classification, sets of empirical observations

about the local ecosystems and systems of self-management to guide the resource use. Hyndman (1994) demonstrated a strong interdependent cultural and biological diversity through self-determination among indigenous peoples in Central America. It is important to focus on the cultural aspects of traditional natural resource management in order to understand the manner in which culture influences use and management of natural resources by men and women. Johnson (1974: 86) observed: "Analyses of the shared cognitive aspects of human ecological systems must increasingly take into account behaviour which connects a people's idea to the external environment in which they attempt to survive." Such knowledge and practices are preserved and transmitted to the subsequent generations either orally (folk songs/folk tales) or through shared experiences (rituals and religious ceremonies). Nietschmann (1992: 3) reported that "where there are indigenous peoples with a homeland there are still biologically-rich environments".

The nature of "coexistence of indigenous people and the natural environment" was demonstrated in Central America, where six million indigenous peoples are geographically coterminous with the region's surviving biodiversity (Chapin, 1992). Tengo and Hammer (2003) emphasize that knowledge is "stored" and manifested in management practices and institutions for resource use. The examples cited in Boxes 7.3 and 7.4 highlight the knowledge of plant genetic resource management encoded in rituals and cultural practices and how it was institutionalized among the Malayali tribal communities in the Kolli Hills, south India. Practices like these effectively manage the socio-ecological context through promoting and managing cultivation of small millets and maintain wide inter- and intra-crop diversity. Some of these customary practices manage small millet resources and natural resources effectively at the field level and ensure their utilization at the household level.

Once the conceptual and empirical basis of people's interactions with their environment is understood, a connection is made between culture and behaviour, structure and event, by formulating rules to cope with local environmental variables. In the Kolli Hills small millet landraces are cultivated under a rainfed system and adapted to local climatic and edaphic conditions. Malayali farmers understood the environment and crop genetic resources and evolved a local system to ensure its availability.

The dependence on traditional knowledge and cultural aspects was ignored when the productive capacity of the land was thought to be infinite (Hyndman, 1992). Also, it was increasingly believed that intensifying capitalist relations of production is possible with the support of modern science and technology. Under the changing social, economic and political systems the degree of interdependence between knowledge and culture

Box 7.3 Rituals and cultural practices associated with small millet diversity management in Kolli Hills among Malayali tribals

Small millets with considerable intra-specific diversity have been cultivated in Kolli Hills, where sowing customarily commences when the village leader defines the time of sowing and pattern of cropping through a festival called “erecting the golden yoke” (*Poonerukatuthal*). He consults the elders on the onset of rainfall and defines the sowing date, which mostly coincides with the first week of June. Through this ritual the message of the onset of rain is communicated to the entire community. The elders use the same occasion to informally educate the younger generation about the traditional rain classification and appropriate cropping practices. The practice also shows deep environmental and crop improvement knowledge. As the breeding system of the species used is autogamy, in order to reduce inbreeding depression and loss of genetic erosion the Malayalis have been ensuring uniform sowing dates. By this practice farmers indirectly make adjustments in the flowering dates, which is most relevant for geneflow between different landraces in the neighbouring plots. In addition, seed flow is facilitated through informal horizontal seed exchange networks, gifts to a daughter’s family at the time of marriage, or to relatives, and sometimes in exchange for labour. These processes indirectly promote and maintain varietal diffusion, diversity management and widening the genetic basis by conserving different types of alleles.

Another tradition among Malayalis is to offer more diversified grains to the goddess during the annual festival, which necessarily includes all small millets cultivated in the hills. The social status of the household increases when it manages to offer diversified grains. Thus most of the households used to cultivate and manage most small millet species in their respective fields. Also, during marriages it was customary to give five measures of little millet as a part of *parisam* (bride price). These practices ensured the continuous cultivation of small millets in the marginal hilly environment and maintain the locally adapted seed resources.

Source: Rengalakshmi, 2004: 149, 152

has been altered and its relevance is diminishing among agrarian societies.

Around the globe preservation of traditional agricultural practices is challenged under the changing socio-political systems. Subsistence

Box 7.4 Institutionalization of traditional knowledge and practices about seeds

In addition to farmers' own source of seeds, the community has evolved an informal seed network for local seed exchange that ensures availability of small millet seeds. Horizontal seed networking among farmers is a traditional practice that is primarily based on kinship and neighborhood evolved to facilitate and ensure the availability of seed to farmers. It operates through an informal network governed by local ethics and norms. Exchange takes place without cash transaction. Some of the norms evolved and practised by the Malayali community include:

- The borrower is required to return one-and-a-half or two times the quantity of seed borrowed.
- The transaction is exchange of seeds and never in cash.
- Seeds have to be returned; otherwise, support in future is not ensured.
- Delay in returning seed after a crop harvest has the penalty of double the quantity borrowed.
- If the quantity is not returned, the village *panchayat* meetings are used to resolve the matter.
- The lender ensures seed quality and "neighborhood certification". If the quality is poor, with inert dust particles and chaff, the lender cleans it before transaction.
- Materials are exchanged for products having equal value. For example, little millet and Italian millet are exchanged, but not for paddy because paddy gives only just under 60 per cent of the edible part after threshing. Little millet and Italian millet give around 75 per cent of the edible portion, leaving the husk.

Source: Rengalakshmi, 2004: 129

arrangements can no longer regulate the major articulation between the human population and the ecosystem (Ellen, 1983). The loss of self-sufficiency therefore leads to loss of the possibility of regulatory autonomy. Knobl et al. (1999) observed the changes among Alpine communities where the practice of managing agro-ecosystems through social structures is weakened today, and values are eroding with a threat to social cohesion and whole farming systems.

The shift from subsistence and semi-commercial systems to commercial systems led to erosion of crop genetic resources across the globe. The spread of new global culture threatens traditional agriculture. Another

significant factor threatening diversity of agriculture crops is growing globalization of food market systems and tastes (FAO, 1998). The change in the food system globally has resulted in marginalizing the small-scale food production system that conserves farmers' varieties of crops (FAO, 1998). Most importantly, the advances in enhancing the productivity of major crops like wheat, rice and maize, introduction of new crop species and government policies have resulted in the replacement of numerous minor cereals and millets, legumes, tubers, oilseeds and vegetables. Examples are the disappearance of several small millet landraces in the Kolli Hills and the consequent reduction in the area under millets: from 1799 ha during 1970–71 to 766 ha during 2003–04 (Rengalakshmi, 2004); traditional paddy landraces from Jeypore tract of Orissa from 1745 landraces during 1955–60 to 256 during 1995–96 (Smita et al., 2005). Over time the loss is also associated with changes in the local culture and dietary habits.

Also, it is important to mention the negative implications of genetic erosion for knowledge systems and traditional practices. Synneveg et al. (1999) reported that threats to locally available food and seed supply systems affect the associated practices, knowledge and social relations which are used in promoting in situ conservation activities. For example, in the Philippines the commoditization of rice production eroded the cultural dance pattern and labour sharing practice which helped the cultivation of long duration *wagwag* rice landraces. The Hopi Indians of the US lost traditional blue corn varieties mainly due to lack of skills in seed saving (Anonymous, 1993). Similarly in the livestock sector, Raika communities in western India acquired innovative and specialized knowledge on sheep rearing and followed internal control practices on sustainable resource utilization. But changes in the ecological and institutional landscapes in Rajasthan marginalized the availability of grazing land, which largely affected their pastoral lifestyle and forced them to sell animals and take up low-paid labour in towns. Hence their knowledge is irrelevant and thus the changes in their livelihood led to the disappearance of valuable breeds and associated knowledge (Practical Action, 2009).

Promoting a strategy of linking biodiversity with human cultural, ethical and utilitarian requirements is needed (Reid, 2002). For example, farmers in semi-arid parts of south Tamil Nadu use ploughs made of neem tree timber (*Azadracta indica*) as one of the integrated methods to control *Cyperus*, a notorious weed in cropped fields. Currently, ploughing is carried out using tractors and thus the traditional knowledge of using neem ploughs has become obsolete and its relevance is limited under the changing production practices.

An associated loss is the institutional mechanisms developed such as seed networks, local resource sharing and control mechanisms. In the

Kolli Hills the reduction in small millet diversity reduced informal seed network and community labour-sharing measures for farming, social and cultural activities (Range, 2001). The cultural value placed on crop diversity and local selection techniques is also declining in many areas and the skills that contributed to evolution of landraces are slowly disappearing, as in the case of specific culture in the Philippines mentioned earlier. Changing socio-cultural practices make the knowledge irrelevant and reduce sharing and communication at the community level and into the next generation. Dying traditional wisdom and loss of traditional knowledge have received attention from the academic institutions, which have made efforts to document some of them. For example, in India the National Agriculture Innovation Programme launched nationwide documentation on Indigenous Traditional Knowledge across different sectors.

Retention and integration of traditional knowledge

In the changing context of commercial agriculture and national and international trade, neither the traditional nor the scientific knowledge systems can work in isolation to promote sustainable farming strategies and livelihoods. The importance of the integration of traditional and scientific knowledge systems as prerequisites to achieve sustainable development has been highlighted by Icamina (1993), Warren et al. (1995) and MA (2003). International organizations like the International Union for Conservation of Nature (IUCN) and the World Commission on Environment and Development (WCDE) (WCDE, 1987; Johnson, 1992) also accentuated that ecological security could only be achieved by creating a technological base that includes both traditional and modern approaches to problem solving. In such a situation, the challenge is in bringing together traditional knowledge and modern science without substituting one for the other, but respecting these two sets of values, and building on their respective strengths to address the contemporary developmental challenges. Altieri (2002) stated that hyperbolic growth of agricultural production due to modern science and technologies is built on foundations nurtured by the farmers over a long period through traditional knowledge. However, the dichotomy between traditional knowledge and scientific knowledge is reported as a cause for underdevelopment. Participatory research and farmer-back-to-farmer models of technology transfer (Amanor et al., 1993) are examples of the attempts towards establishing such a bridge. Similarly, disciplines such as ethnobiology have sought to build bridges between indigenous knowledge and modern science.

Linking the different knowledge systems provides scope to increase the amount and quality of the information available about a particular

Box 7.5 Harmonizing traditional and scientific knowledge systems in rainfall prediction and utilization: The experience of a farming community, Tamil Nadu

The amount of rainfall and the period of onset are the most significant variables for the farmers to make decisions in agricultural activities. An attempt has been made to link traditional forecasting knowledge and skill with scientific methods through appropriating the scale with the technical support of the National Centre for Medium Range Forecasting, New Delhi and Tamil Nadu Agricultural University, Coimbatore, India through Village Knowledge Centres at the village level. The scientific forecast provides a probability distribution for the quantity of seasonal rainfall (three to six months in advance) and does not provide information on the likely onset and its distribution. On the other hand, traditional knowledge is able to help the farmers in terms of the possible onset of rainfall using indicators such as direction and intensity of the wind during the summer season, position of the moon on the third day and traditional calendars (including other supportive indicators). An attempt was made to establish a continuum between scientific and traditional forecasts, which combines the scale and period of onset of rainfall. The result of combining these two knowledge systems indicated that although the reliability of the traditional indicators varies, they do help the farmer to prepare for the timing and distribution of rain, while a scientific forecast might help them to prepare for the amount.

Source: Rengalakshmi, 2006: 225

environmental or agricultural developmental problem. Of late, there is a shift in direction in agricultural technology development and there is an increasing appreciation of farmers' knowledge and experiences. Experiences show that an intensive dialogue between scientific knowledge providers and user groups helps to define strategies for bridging these two knowledge systems in developing reliable weather and seasonal forecast systems in south India. The different strengths of the two systems, when combined, provide farmers with more valuable information than either system provides in isolation (see Box 7.5).

As a strategy, participatory research and dialogue has been effective in building bridges between two different knowledge systems. Participatory research in the context of crop improvement is a familiar example that essentially means exchange of knowledge of farmers on local crop improvement and the scientific approaches of researchers. Participatory Plant Breeding (PPB) bridges farmers' traditional knowledge and skills

Box 7.6 Participatory plant breeding in traditional paddy landraces, Orissa, India

The Jeypore tract of Orissa in India is a secondary centre of origin of rice and used to be endowed with more than 1745 landraces of rice. Low productivity due to the suboptimal agronomic practices, erosion of varietal heterogeneity and the genetic purity of landraces are the major constraints. Hence efforts have been made since 1998 to conserve and enhance productivity through improved agronomic practices and participatory purification of selected landraces. Participatory field trials were carried out using twenty-six landraces across upland, medium land and lowland agro-ecosystems. Effort has been focused on improving farmers' own natural resources by bringing genetic purity and selecting for a number of traits desired by the farmers. These combined methods helped to enhance the productivity of landraces by up to 4.5 tonnes per hectare and improved the skill and capacity of farmers on the process of purification. For example, the rice landrace *Kalajeera* was genetically purified and further developed by local farmers to commercial scale and named *Kalinga Kalajeera*.

on crop improvement using modern breeding concepts based on the laws of inheritance. The case study of paddy landraces improvement through PPB by Arunachalam et al. (2008), illustrates its potential (see Box 7.6).

Bridging knowledge systems empowers the user communities by involving them in the process of assessment, integration, testing and evaluation (Ammann, 2007). Such a process takes time, typically of the order of ten years (Berkes, 2002), to build mutual trust and respect, which are slow to build and are preconditions for linking knowledge systems (Preetly and Ward, 2001). Cash and Moser (2000) and Rengalakshmi (2006) reported the need for the boundary organizations to mediate the relationship of science to traditional knowledge and stimulate integration (refer case 4, Village knowledge centre as a boundary organization at the village level). Berkes et al. (2006) point out that bridging needs a combination of communication modes such as scenarios and graphics and group deliberations.

Though integration of knowledge systems is necessary, indeed vital, one needs to acknowledge the barriers to bridging, such as power dynamics. Nadasdy (1999) states that bridging takes traditional knowledge out of its cultural context, aggravates power imbalances and disempowers local communities. Other barriers are scientists' common lack of respect for local and traditional knowledge (Berkes et al., 2006), lack of common "language" and means of verifying the veracity of knowledge (Eriksen

et al., 2005). Finally, a most important trend observed during field visits and observation is the lack of interest and appreciation for traditional knowledge among younger generations, which results in their not inheriting the knowledge from elders.

New trends: Organic farming, LEISA and ecoagriculture

Studies indicate that traditional systems and their underlying agro-ecological principles are highly productive and sustainable (Gliessman et al., 1981). The recently promoted farming system approach of Low External Input Sustainable Agriculture (LEISA) and organic farming are built on agro-ecological principles of traditional systems. The cardinal principles of traditional systems such as diversity, integration and recycling are widely promoted to improve agro-ecological services.

The International Federation of Organic Agriculture Movements (IFOAM) defines organic agriculture as a production system that sustains soils, ecosystem services and people and combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. It promotes the use of agro-ecosystem principles like diversification, integration and recycling, and improves ecosystem services. Organic farming pursues a way to encourage the powers of self-regulation and resistance, which plants and animals possess naturally (Lindenthal et al., 1995). Organic agriculture promotes the use of local resources, thus scope and opportunity is gaining momentum on traditional knowledge since it is holistic, contextual and adaptive (Blaikie et al., 1997). Recent studies substantiate the view that indigenous/traditional knowledge and experiences of farmers were the base for sustainable and organic agriculture (Vogl et al., 2005). Currently, millions of small farmers across the globe practise organic farming without this being certified as traditional farming or agro-ecological movements (Altieri, 2000), and 31 million ha were under certified organic farming during 2008. The principles and practices (crop rotation, organic fertilization, mixed cropping, use of legumes in cropping systems and so on) followed in traditional agriculture have been promoted in contemporary organic agriculture and included in its standards (Vogl et al., 2005).

Certified organic farming gained importance in the context of the shift from subsistence to market-oriented agricultural systems by integrating traditional agro-ecological principles and scientific knowledge systems. In other words, organic farming practices that have strong roots in traditional agricultural knowledge provide scope to bridge with scientific knowledge systems (see Box 7.7).

Box 7.7 Integrating scientific and traditional knowledge in coffee berry borer management under an organic farming system in Tamil Nadu

Coffee has been cultivated in the Lower Palani Hills of south India under a traditional system without external inputs. The major weakness in such systems is productivity and product quality, which could be addressed through harmonizing scientific and traditional knowledge systems. Due to considerations of market advantage, it was decided to certify organic products, and the process was initiated with the support of IMO Control Private Limited in 2003. In 2004, when it reached the market as an “under conversion” product, it was rejected due to high incidence of the coffee berry borer pest. A Focus Group Discussion was carried out with knowledgeable men and women farmers, with field visits to identify traditional control measures. Later the matter was discussed with experts from the Coffee Board on the scientific methods of management along with local farmers. These participatory discussions helped to evolve complementary strategies to harmonize traditional as well as scientific knowledge systems. Steps have been taken to control the pest incidence using the traditional method of pruning to arrest the excess vegetation, as well as the scientific method of using biological predators (Mexican beetle: *Hypothenemus hampei*) along with simple traps using ethanol and methanol mixtures as attractants. This practice has been continued at the community level for two years. During 2006–7 when the coffee bean was tested, damage was reduced by 80 per cent and presently the product is reaching the market with an organic label.

At the same time, the standards promoted under the certified organic farming approach may lead to the risk of homogenization of practices, which affect farmers’ initiatives and innovation to adapt to local conditions. The prescribed standards become mandatory and the inspection and certification regime does not match with the local socio-economic and cultural context of farmers. The standards are being set by the promoting organizations and government agencies, which almost leads to a situation where organic farmers have little or no power over them (Vogl et al., 2005). In this context, these authors suggest that regulations and all activities to monitor must respect cultural diversity and promote regional definitions, local identification and innovations.

Thus the organic farming approach needs to be improved further to address the key challenges for the future: maintaining the power of innovation, empowering small and marginal landholding women and men farmers, enhancing food security and safety, ensuring ecological services

and farm resilience, facilitating and supporting traditional knowledge through use, and bridging with scientific knowledge systems.

LEISA is seen as a viable alternative to conventional external input-based farming. The main objective of LEISA is to enhance farm productivity, ecological sustainability, and social justice and humaneness (Reijntjes et al., 1992). The study by Graves et al. (2004) states that compatible socio-economic conditions of the farmer are the most crucial requirement for the practice of LEISA. Strengthening and promoting such a low input-based farming approach requires incorporating the element of “farmer participation” as a central theme. In the process, development workers stimulate and facilitate the participatory learning and development to strengthen farmers’ knowledge, skill and decision-making capacities. The approach helps to value their traditional knowledge and build horizontal networks for knowledge and resource sharing. The studies indicate that complementary investments are needed to promote farmer-to-farmer diffusion, innovation and networking in order to promote LEISA among small and marginal farmers (Tripp, 2006). Farmer Field School, Participatory Technology Development, Participatory Plant Breeding and others are such initiatives acknowledging and integrating traditional knowledge. In order to promote the LEISA practices, networking has been done through the Centre for Information on Low External Input and Sustainable Agriculture, which promotes documentation and exchange of information for small-scale farmers in the south.

Apart from this, ecoagriculture, which is a blend of conservation and rural development strategy promoted by Ecoagriculture Partners, has been promoted as an alternative to conventional agriculture; the underlying principle is “farming with nature”, meaning farming in a way that builds on natural processes, maintains a healthy environment and supports livelihoods at the local level (McNeely and Scherr, 2003). Ecoagricultural concepts aim to interlink enhancing production, improving biodiversity and promoting viable local livelihoods as key themes. It recognizes the traditional knowledge of the producers and integrates and promotes the utilization of the same in isolation or in integration with scientific knowledge.

Retention of traditional knowledge: The role of state policies

Globalization and intellectual property rights are issues threatening traditional knowledge systems. The limitations of intellectual property rights in recognizing traditional knowledge have led to strong reactions, such as “The perception that intellectual property is only recognizable when

produced in laboratories by men in lab coats is fundamentally a racist view of scientific development” (Mooney, 1988: 61). WIPO has established a system to study traditional knowledge and the possibilities of including it in a digital, searchable database. The Doha Agenda Ministerial Declaration explicitly endorsed the issue of traditional knowledge as a subject for negotiation (WTO, 2001). A study by Ammann (2007) stated that policymakers recognize that traditional knowledge affects the legitimacy of the multilateral trading system as well as modern agricultural and environmental policies. The Convention of Biological Diversity provided space to recognize traditional knowledge under Article 8 (j). Indian national laws, like the Plant Variety Protection and Farmers Rights Act 2001 (PVPFR) and the Biodiversity Act 2002, incorporated the same. The PVPFR Act recognizes farmers’ planting materials and knowledge, and promotes management of traditional varieties and landraces. The Act recently recognized communities and conferred a “genome saviour award” for their role in conservation and enhancement of traditional paddy landraces in the Jeypore tract of Orissa, India, which is the secondary centre of origin of paddy (MSSRF 2008). The Biodiversity Act promotes the documentation of traditional knowledge and practices through People’s Biodiversity Registers at the village level.

Concluding remarks

In the context of climate change, it is increasingly felt necessary to enhance the resilience of farming systems (including livestock), for which traditional knowledge and learning are fundamental elements. Carpenter and others (2001: 770) defined resilience as the “capacity to buffer change, to reorganize and to adapt”. The capacity for adaptation and learning is the characteristic of the traditional knowledge-based farming which is gaining attention at the global level.

The changing social, economic and political systems in the agricultural domain influence the relevance of traditional knowledge, widen the gap between culture and traditional knowledge, and make the knowledge less relevant to the context. Loss of traditional knowledge has implications for gender relations; women’s contribution to resource management has not been widely utilized and the lack of documentation on such knowledge systems has denied access to such knowledge, which altered the gender relations in many societies. At the same time, it is mandatory to acknowledge and recognize the differential knowledge in the community while reviving interest in traditional knowledge. The vertical and horizontal stratification operating in a given society defines the access to various resources including cultural and natural resources. The social stratifica-

tion, the cultural norms and access to resources influenced by the production relations, create conditions to exclude certain sections of the community from sharing the indigenous knowledge.

Increasing recognition of bridging knowledge systems provides scope to harness the benefits of the respective systems through innovative participatory delivery strategy and communication modes. The approaches of organic farming and LEISA are potential alternative systems and more environment-friendly forms of agriculture, which provides scope to create links between traditional and scientific knowledge systems. The promotion of organic farming and its standards needs to respect the traditional ecosystems and knowledge of the farmers. It is important to assimilate strategies that combine traditional knowledge and modern science-based practices to achieve sustainable and equitable use and development. Such changes would require a shift in research and development approaches towards farmer/user-led participatory development, which is right now being practised among developmental agencies. Also need-based exchange, dialogue and consultations need to be promoted and institutionalized among local communities, researchers/scientists, policymakers, officials and others to facilitate the integration between the two knowledge systems.

Finally, the international and national policies should recognize the need and promote the documentation, integration and upscaling of the traditional knowledge links in promoting sustainable development. Currently, the interaction between traditional and scientific knowledge provides scope to facilitate the development of more appropriate agrarian strategies, which are more sensitive to the complexity of agro-ecological processes. Such strategies promote an agro-ecosystem-based approach, which is more in tune with nature, and thus minimize the environmental problems associated with conventional, industrial agriculture. Towards this, it is essential to promote policies among developmental and academic institutions for aggressive international and national donor support to carry out micro-level model building efforts with multi-stakeholder partnerships. In order to promote such an approach, mapping of the successful case studies and lessons learned are to be documented to translate the knowledge and facilitate cross-learning.

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REFERENCES

- AFROL (2003) "Resource management based on traditional knowledge wins in Namibia". Available at <http://www.afrol.com/Categories/Environment/env040_nam_management.htm> (accessed 5 August 2003).
- Agarwal, A. (1995) "Dismantling the divide between indigenous and scientific knowledge", *Development and Change* 26(3): 413–439.
- Altieri, M. A. and L. C. Merrick (1987) "In situ conservation of crop genetic resources through maintenance of traditional farming systems", *Economic Botany* 4: 86–96.
- Altieri, M. A. (1990) "Why study traditional agriculture?", in R. Carroll, J. H. Van der Meer and P. M. Rossett (eds), *Agro-ecology*. New York: McGraw-Hill, pp. 551–564.
- Altieri, M. A. (2000) "Enhancing the productivity and multi-functionalality of traditional farming in Latin America", *International Journal of Sustainable Development & World Ecology* 7: 1–12.
- Altieri, M. A. (2002) "Agro-ecology: The science of natural resource management for poor farmers in marginal environments", *Agriculture Ecosystems and Environment* 93: 1–24.
- Amanor, K., K. Wellard, Walter de Boef and Anthony Bebbington (1993) "Introduction", in Walter de Boef, Kojo Amanor, Kate Wellard and Anthony Bebbington (ed.), *Cultivating Knowledge: Genetic Diversity, Farmers Experimentation and Crop Research*. London: Intermediate Technology Publications.
- Amman, K. (2007) "Reconciling traditional knowledge with modern agriculture: A guide for building bridges", in A. Krattiger, R. T. Mahoney and L. Neisen (eds) *Intellectual Property Management in Health and Agricultural Innovation: A Handbook of Best Practices*. Oxford: MIHR; Davis, CA: Public Intellectual Property Resource for Agriculture, pp. 1539–1546.
- Anon. (1993) "Conserving native seeds and culture", *International Ag-Sieve* 5(4): 2–3.
- Arunachalam, V., Susanta Sekhar Chaudhury, Sukanta Kumar Sarangi, Trilochan Ray, Bibhu Prasad Mohanty, V. Arivudai Nambi and Smita Mishra (2008) *Rising on Rice: The Story of Jeypore*, MSSRF/MA/06/31. Chennai, India: M. S. Swaminathan Research Foundation.
- Banu, Zubeeda and P. Thamizoli (1998) "Indigenous women, seed preservation and sustainable farming", *Journal of Human Ecology* 9(2): 181–185.
- Berkes, R. (1989) *Common Property Resources: Ecology and Community Based Sustainable Development*. London: Belhaven Press.
- Berkes, F. (2002) "Cross scale institutional linkages for commons management: perspectives from the bottom up", in E. Ostrom, T. Dietz, N. Dolsak, P. C. Stern,

- S. Stonich and E. U. Weber (eds), *The Drama of the Commons*. Washington, DC: National Academy Press, pp. 293–321.
- Berkes, F., Walter V. Reid, Thomas J. Wilbanks and Doris Capistrano (2006) “Conclusions: bridging scales and knowledge systems”, in Walter V. Reid, Fikret Berkes, Thomas J. Wilbanks and Doris Capistrano (eds), *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment*. Washington, DC: Island Press, pp. 315–332.
- Berlin, B. (1992) *Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies*. Princeton: Princeton University Press.
- Berlin, B., D. E. Breedlove and P. H. Raven (1973) “General principles of classification and nomenclature in folk biology”, *American Anthropologist* 75: 214–242.
- Blaikie, P., K. Brown, M. Stocking, L. Tang, P. Dixon and P. Sillitoe (1997) “Knowledge in action: local knowledge as a development resource and barriers to its incorporation in natural resource research and development”, *Agricultural Systems* 55: 217–37.
- Boef, Walter de, Kojo Amanor, Kate Wellard and Anthony Bebbington (1993) *Cultivating Knowledge: Genetic Diversity, Farmer Experimentation and Crop Research*. London: Intermediate Technology Publications.
- Braimoh, A. K. (2002) “Integrating indigenous knowledge and soil science to develop a national soil classification system for Nigeria”, *Agriculture and Human Values* 19: 75–80.
- Brookfield, H. (2001) *Exploring Agro Biodiversity*. New York: Columbia University Press.
- Brush, S. B. (1992) “Ethno-ecology, biodiversity and modernization in Andean potato agriculture”, *Journal of Ethnobiology* 12: 161–185.
- Carpenter, S., B. Walker, J. M. Anderies and N. Abel (2001) “From metaphor to measurement: resilience of what to what?”, *Ecosystems* 4: 765–81.
- Cash, D. W. and S. C. Moser (2000) “Linking global and local scales: designing dynamic assessment and management processes”, *Global Environmental Change* 10: 109–20.
- Chapin, M. (1992) “The indigenous peoples and the environment in Central America”, *National Geographic Research and Exploration* 8: 232–234.
- Conklin, H. C. (1957) *Hanunoo Agriculture: A Report on an Integral Swidden System of Shifting Cultivation*. FAO Forestry Development Paper No.12. Rome: FAO.
- Ellen, Roy (1979) “Omniscience and ignorance: variations in Nuauulu knowledge, identification and classification of animals”, *Language in Society* 8: 337–364.
- Ellen, Roy (1983) *Environment, Subsistence and System*. Cambridge: Cambridge University Press.
- Ellen, Roy (1996) “Anthropological approaches to understanding the ethnobotanical knowledge of rainforest populations”, in D. S. Edwards, W. E. Booth and S. C. Choy (eds), *Tropical Rainforest Research: Current Issues*. Dordrecht: Kluwer, pp. 457–465.
- Ericksen, P., E. Woodley, G. Cundill, W. Reid, L. Vicente, C. Raudsepp-Hearne, J. Mogina and P. Olsson (2005) “Using multiple knowledge systems in sub-global assessments: benefits and challenges”, in Doris Capistrano et al. (eds),

- Ecosystems and Human Well-being: Multiscale Assessments: Findings of the Sub-global Assessments Working Group of the Millennium Ecosystem Assessment*. Washington, DC; London: Island Press, pp. 87–115.
- FAO (1998) “Biodiversity for food and agriculture, crop genetic resources”. Available at <<http://www.fao.org/sd/EPdirect/EPPre0040.htm>> (accessed 27 May 2010).
- Gadgil, M. and F. Berkes (1991) “Traditional resource management systems”, *Resource Management and Optimization* 18: 127–141.
- Gliessman, S. A., E. Garcia and A. Amador (1981) “The ecological basis for the application of traditional agricultural technology in the management of tropical agro-ecosystems”, *Agro-Ecosystems* 7: 173–185.
- Graves, A., R. Matthews and K. Waldie (2004) “Low external input technologies for livelihood improvement in subsistence agriculture”, *Advances in Agronomy* 82: 473–555.
- Hammer, K., G. Laghetti, S. Cifarelli and P. Perrino (1991) “Collecting in northern Italy using the indicator-crop method”, *FAO/IBPGR Plant Genetic Resources Newsletter* 86: 39–40.
- Howard, P. L. (2003) “Women and the plant world: an exploration”, in P. L. Howard (ed.), *Women and Plants: Gender Relations in Biodiversity Management and Conservation*. London and New York: Zed Books, pp. 1–48.
- Hyndman, D. (1994) “Commentary: Conservation through self-determination: promoting the interdependence of cultural and biological diversity”, *Human Organization* 53(3): 296–302.
- Icamina, P. (1993) “Threads of common knowledge”, *IDRC Reports* 21(1): 14–16.
- ITDG (1996) *Dynamic Diversity: Livestock Keepers Safeguarding Domestic Animal Diversity through their Animal Husbandry*. Rugby: Intermediate Technology Development Group.
- Johnson, A. W. (1974) “Ethnoecology and planting practices in a swidden agricultural system”, *American Ethnologist* 1: 87–101.
- Johnson, M. (1992) *Lore: Capturing Traditional Environmental Knowledge*. Hay River, NWT: Dene Cultural Institute and International Development Research Centre.
- Kelkar, Meghana (2007) “Local knowledge and natural resource management: a gender perspective”, *Indian Journal of Gender Studies* 14(2): 295–306.
- Kloppenborg, J. Jr. (1991) “No hunting! Biodiversity, indigenous rights, and scientific poaching”, *Cultural Survival Quarterly* 15(2): 14–18.
- Knabe, F. and J. Nkoyok (2006) “Overcoming barriers: promoting women’s knowledge”, *Knowledge Management for Development Journal* 2(1): 8–23.
- Knobl, I., M. Kogler and G. Wiesinger (1999) *Landwirtschaft zwischen Tradition und Moderne: Über den Struktur- und Wertewandel in der österreichischen Landwirtschaft*, Forschungsbericht No. 42. Vienna, Austria: Bundesanstalt für Bergbauernfragen.
- Krishna, S. (1998) “Arunachal Pradesh”, in M. S. Swaminathan (ed.), *Gender Dimensions in Biodiversity Management*. New Delhi: Konark Publishers, pp. 148–181.
- Kuramoto, Juana and Francisco Sagasti (2002) “Integrating local and global knowledge, technology and production systems: challenges for technical cooperation”, *Science, Technology and Society* 7(2): 215–247.

- LaBarre, W. (1947) "Potato taxonomy among the *Aymara* Indians of Bolivia", *Acta Americana* 5: 83–103.
- Lindenthal, T., C. R. Vogl and J. Hess (1995) *Forschung im Ökologischen Landbau- Integrale Schwerpunktthemen und Methodikkriterien*, Forschungsendbericht, Der Forderungsdienst No. 2c.
- Ludden, David (1996) "Archaic formation of agricultural knowledge in South India", in Peter Robb (ed.), *Meanings of Agriculture in South Asian History and Economics*. Cambridge: Cambridge University Press, pp. 35–70.
- McNeely, J. and S. Scherr (2003) *Ecoagriculture: Strategies to Feed the World and Save Wild Biodiversity*. London: Island Press.
- MA (Millennium Ecosystem Assessment) (2003) *Ecosystem and Human Well Being: A Framework for Assessment*. Washington, DC and London: Island Press.
- MA (Millennium Ecosystem Assessment) (2005) *Millennium Ecosystem Assessment Synthesis*. Washington, DC and London: Island Press.
- Mooney, P. (1988) "From cabbages to kings", *Development Dialogue* 1, pp. 237–255.
- MOST and CIRAN (1999) *Best Practices on Indigenous Knowledge*. Paris and The Hague: Management of Social Transformations Programme (MOST) and Centre for International Research and Advisory networks (CIRAN). Available at <<http://www.unesco.org/most/bpikreg.htm>> (accessed 6 July 2003).
- MSSRF (1999) "Enlarging the basis of food security: role of underutilized species", in M. S. Swaminathan Research Foundation (MSSRF), *Proceedings of the Consultative Workshop on Enlarging the Basis of Food Security: Role of Underutilized Species*, No: 29, February. Chennai, India: MSSRF, pp. 1–24.
- MSSRF (2008) *Annual Report*. M.S.Swaminathan Research Foundation: Chennai, India.
- Nadasdy, P. (1999) "The politics of TEK: power and the 'integration' of knowledge", *Arctic Anthropology* 36: 1–18.
- Nations, J. (1992) "Xateros, chicleros and pimenteros: Harvesting renewable tropical forest resources in the Guatemalan", in K. Redford and C. Padoch (eds), *Conservation of Neotropical Forest: Working from Traditional Resource Use*. New York: Columbia University Press, pp. 208–219.
- Nietschmann, B. (1992) *The Interdependence of Biological and Cultural Diversity*. Kenmore, WA: Centre for World Indigenous Studies.
- Nene, Y. L. (2006) "Utilizing traditional knowledge in agriculture", Paper presented at COMPAS Asian Regional Workshop on Traditional Knowledge Systems and their Current Relevance and Application, 3–5 July.
- Ohmagari, K. and Berkes, F. (1997) "Transmission of indigenous knowledge and bush skills among the western James Bay Cree women of Subarctic Canada", *Human Ecology* 25(2): 197–222.
- Orlove, Benjamin S. and S. B. Brush (1996) "Anthropology and the conservation of biodiversity", *Annual Review of Anthropology* 25: 329–52.
- Practical Action (2009) "Traditional communities' indigenous knowledge about animal breeding". Available at <http://practicalaction.org/technology-in-society/case_indigenous_knowledge> (accessed 15 January 2010).
- Pretty, J. and H. Ward (2001) "Social capital and the environment", *World Development* 29: 209–27.

- Ramdas, R. Sagari, Yakshi, Girijana Deepika and ANTHRA Team (2001) "Changing livelihoods, livestock and local knowledge systems: women stake their claim in Andhra Pradesh and Maharashtra", *Indian Journal of Gender Studies* 8(2): 175–194.
- Ramdas, R., Sagari, Nitya S. Ghotge, Ashalatha Nandini Mahur, M. L. Sanyasi Rao, N. Madhusudhan, S. Seethalakshmi, N. Pandu Dora, N. Kantham, E. Venkatesh and J. Savithri (2004) "Overcoming gender barriers: local knowledge systems and animal health healing in Andhra Pradesh and Maharashtra", in S. Krishna (ed.), *Livelihood and Gender: Equity in Community Resource Management*. New Delhi: Sage Publications, pp. 67–91.
- Range, Shubh Kumar (2001) *Like Paddy in Rock: Local Institutions and Gender Roles in Kolli Hills*, M.S. Swaminathan Research Foundation Report No. MSSRF/MG/01/13. Chennai, India: MSSRF.
- Reid, Walter V. (2002) "Epilogue", in Tim O' Riordan and Susanne Stoll-Kleemann (eds), *Biodiversity, Sustainability and Human communities*. Cambridge: Cambridge University Press, pp. 311–314.
- Reijntjes, C., B. Haverkort, and A. Waters-Bayer (1992) *Farming for the Future: An Introduction to Low-external-input and Sustainable Agriculture*. London: Macmillan.
- Rengalakshmi, R. (2004) "Conservation Biology of Little Millet (*Panicum sumatrense* Rothex Roem. A Schultz) landraces of Kolli Hills, South India". Ph.D. thesis (unpublished), University of Madras, Chennai.
- Rengalakshmi, R. (2006) "Harmonizing traditional and scientific knowledge systems in rainfall prediction and utilization", in Walter V. Reid, Fikret Berkes, Thomas J. Wilbanks and Doris Capistrano (eds), *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment*. Washington, DC: Island Press, pp. 130–148.
- Rengalakshmi, R., Smita Mishra, S. Sushant, E. D. Chaudhury, Israel Oliver King and Ray Trilochan (2006) "When is knowledge power? Gendered knowledge and women's changing status in two agro-biodiversity locations", paper presented at International Conference on Participatory Plant Breeding and Knowledge Management for Strengthening Rural Livelihoods, 17–19 August.
- Salick, J. (1992) "Amuesha forest use and management: an integration of indigenous use and natural forest management", in K. Redford and C. Padoch (eds), *Conservation of Neotropical Forests: Working from Traditional Resource Use*. New York: Columbia University Press, pp. 305–332.
- Samal, P. K. and P. P. Dhyani (2006) "Gender in the management of indigenous knowledge: reflections from Indian Central Himalaya", *Current Science* 91(1): 104–108.
- Smita, Tripathy, P. Gurung and S. D. Sharma (2005) "Intellectual property contribution with regard to rice genetic resources by tribes of south Orissa, India", *Plant Genetic Resources Newsletter* 141: 70–73.
- Synnevag, G. (1997) "Gender differentiated management of local crop genetic resources in Bafoulabe cercle, Kayes Region of Mali – a case study", in *Actes du Collouque, Gestion des Ressources Genetiques de plantes en afrique des Savanes*, Bamako, Mali, 24–28 February. Montpellier, France: Institut d'Economie Rurale, Bureau des Ressources Genetiques, Solidarites agrocoles et Alimentaires, pp. 85–92.

- Tengo, M. and T. Hammer (2003) "Management practices for building adaptive capacity: a case from northern Tanzania", in F. Berkes, J. Colding and C. Folke (eds), *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge: Cambridge University Press, pp. 132–162.
- Tripp, Robert (2006) "Is low external input technology contributing to sustainable agriculture development?" Natural Resources Perspectives policy paper 102, Overseas Development Institute, United Kingdom.
- Vedavalli, L. and N. Anilkumar (1998) "Wayanad, Kerala", in M. S. Swaminathan (ed.), *Gender Dimensions in Biodiversity Management*. New Delhi: Konark, pp. 148–181.
- Vogl, C. R., L. Kilcher and H. Schmidt (2005) "Are standards and regulations of organic farming moving away from small farmers' knowledge?", *Journal of Sustainable Agriculture* 26(1): 1–26.
- Warren, D. M., D. Brokensha and L. J. Slikkerveer (ed.) (1993) *Indigenous Knowledge Systems: The Cultural Dimension of Development*. London: Kegan Paul International.
- Warren, D. M. and B. Rajasekaran (1993) "Putting local knowledge to good use", *International Agricultural Development* 13(4): 8.
- Warren, D. M., L. J. Slikkerveer and D. Brokensha (eds) (1995) *The Cultural Dimension of Development: Indigenous Knowledge Systems*. London: Intermediate Technology Publications.
- WCED (World Commission on Environment and Development) (1987) *From One Earth to One World: An Overview, World Commission on Environment and Development*. Oxford: Oxford University Press.
- WTO (World Trade Organization) (2001) "Doha Ministerial Declaration", WT/MIN(01)/DEC/1, 20 November.
- Zwifel, H. (1996) "Biodiversity and appropriation of women's knowledge", *Indigenous Knowledge and Development Monitor* 5(1): 9–12.

Supplementary feature

Traditional land management techniques for climate change mitigation

Oladimeji Idowu Oladele and Ademola K. Braimoh

Introduction

Over the millennia, indigenous peoples have developed a close and unique connection with the lands and environments in which they live. They have established distinct systems of knowledge, innovation and practices relating to the uses and management of biological diversity on these lands and environments. Much of this knowledge forms an important contribution to research and development. The increasing attention indigenous knowledge is receiving from academia and the development institutions has not yet led to a unanimous perception of the concept of indigenous knowledge. None of the definitions is essentially

contradictory; they overlap in many aspects. Indigenous knowledge (IK) is the local knowledge that is unique to a given culture or society (Warren, 1987). IK contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision-making in agriculture, natural-resource management and a host of other activities in rural communities (Warren, 1991). According to Rajasekaran (1993), IK is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture. To Haverkort and de Zeeuw (1992), IK is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies.

It is also described as a non-conventional body of knowledge that deals with some aspects of the theory, but more of the beliefs, practices and technologies developed without direct inputs from the modern, formal, scientific establishment; in this case, towards the management of farms (Chambers et al., 1989; Gilbert et al., 1980). IK has, therefore, evolved through “unintended experimentation”, fortuitous mistakes and natural selection by farmers, and arises from the practical judgement and skill needed to survive in a fragile system (Aina, 1998; Moss, 1968) and face environmental challenges (Adedipe, 1983, 1984). What is clear from all of these perspectives is that, over centuries, farmers are knowledgeable about their resources and the environment in so far as these govern their farming practices.

Indigenous knowledge refers to institutionalized knowledge that has been built upon and passed from one generation to another. Communities are continuously transforming information into strategies and practices they can use for their development. In particular, indigenous knowledge provides local farmers with the basis for agricultural decision-making (Warren, 1991; White et al, 2000). In this study, the terms traditional knowledge, indigenous technical knowledge, rural knowledge have been used interchangeably.

Sandor and Furbee (1996) opine that indigenous soil knowledge and traditional agriculture provide a more environmentally sound and culturally acceptable basis for adoption of agricultural innovation. Tabor (1990), Chokor and Odemerho (1994) and Winklerprins (1999) have shared a similar view. Local farmers have profound knowledge of their soils and they develop local taxonomical systems that are usually use-oriented (Kundiri et al., 1997). They commonly adopt identifiable parameters such as colour, texture, depth changes in soil behaviour under different conditions, drainage and parent materials in classifying soils for their own need. Traditional knowledge about how local populations have coped with previous climatic variations has the potential to provide an important guide for addressing current and future climatic events.

Land resources such as soil water and biodiversity build the basis for agricultural outputs and services. The livelihoods of the vast majority of the world's land users and particularly the small-scale farmers depend directly on these resources and the quality of their services, which in turn determine the user's quality of life. Land management is handled in reactive ways by small-scale farmers in response to signs of degradation; it is when these become threatening that land management practices set in. Soil is a basic resource for land use and serves as a major link between climate and biogeochemical systems (Yaalon, 2000), supports biodiversity, and plays an important role in the ability of ecosystems to provide diverse services necessary for human well-being (Young and Crawford, 2004). Soil and water conservation is defined as activities at the local level that maintain or enhance the productive capacity of the land in areas affected by, or prone to, degradation. Soil and water conservation technologies are agronomic, vegetative, and structural and management measures that control land degradation and enhance soil productivity in the field. Agronomy measures are mixed cropping, contour cultivation, mulching; vegetative measures are grass strips, hedge barriers and wind breaks; while structural measures are terraces, banks, bunds, constructions and palisades. Management measures such as area closure and rotational grazing involve a fundamental change in land use. They involve no agronomic and structural measures, which often result in improved vegetative cover and often reduce the intensity of use.

Land management techniques

Building on the indigenous knowledge systems offers great prospects for effective integration of strategies that will be attractive enough to the vast majority of small-scale local farmers: use of zero tilling practices in cultivation and mulching, as well as other soil management techniques (Schafer, 1989; Osunade, 1994). The practice of organic farming also helps farmers manage their land. Local farmers are known to have practised a fallow system of cultivation, which encouraged the development of forests.

Farmers, through their familiarity with and use of local knowledge, can determine when the soil is exhausted by examining the water retention level, which reduces substantially (becomes too porous), the plants/crops or weeds are stunted and yellowish, and the crop yields decline at an increasing rate. Decline in soil fertility is also determined by evident loss of crumb structure. It also becomes very light, dusty or sandy in texture. The soil colour changes from dark or brown to reddish with increased number of stones. When soils are exhausted, this allows the growth of certain weeds.

Agroforestry is another rational land-use planning system that tries to find some balance in the raising of food crops and forests (Adesina et al.,

1999; Floyd, 1969). A practice similar to this has been described in a part of south-western Nigeria to raise shade-tolerant crops such as *Dioscorea* spp and cocoyam in, essentially, a permanent forest setting (Adesina, 1988). In addition to the fact that agroforestry techniques can be perfected to cope with the new conditions that are anticipated in a drier climate and with a higher population density, they lead to an increase in the amount of organic matter in the soil, thereby improving agricultural productivity and reducing the pressure exerted on forests. Local farmers certainly know other trees, such as the baobab (*Adansonia digitata*) and acacia (*Acacia*), that perform well under different ecological conditions, especially during the hot and dry parts of the year.

Mixed cropping is a common land management technique among farmers based on the indigenous knowledge of crops to be mixed, intensity and pattern of the mixture. Previous studies show that mixed cropping is practised to reduce pest infestation, and serve as insurance against crop failure and improvement of soil fertility. The determination of different mixtures used on different soil types is based on indigenous knowledge. Basin construction is also practised by farmers to direct flood water and to enhance good drainage on inland valley and flood plain fields. Stones and fertilizer bags filled with sands are often used as bunds by farmers, to reduce soil erosion due to run-off, and this practice often enhances silt deposition (Omotayo and Musa, 1999).

The evolution of crop – livestock integration in a farming system is not an unsalutary development as it is generally believed to have numerous advantages. These include the assurance of complementary interaction between crops and livestock, such that slack resources from crops could be used as feed for livestock, while livestock would provide draft power and manure to replenish the soil. Farmers use *Cicata/Jijjiirra*, an indigenous method of soil conservation, in Ethiopia to maintain soil fertility through the process of kraaling cattle at night, and rotating the position of the barn regularly in order to uniformly distribute manure to crop fields. In this case not only manure, but also urine, which has a high nitrogen content, is distributed. In this region cattle spend the nights in the barn and they drop their manure with their urine in the barn, which rotates to new plots after three to seven days depending on the season, crops to be planted and density of the herd. Longer kraaling is exercised and required during the dry seasons and for heavy feeder crops such as maize, sorghum and potato. Shorter kraaling is often exercised during the rainy season for other small cereals (Erkossa and Gezahegn, 2003).

Some examples of indigenous soil fertility management in the mid-hills of Nepal are terracing, slicing the walls of terrace risers, allowing flood water into fields, in situ manuring and inclusion of various legumes in crop rotations (Pandey et al., 1995). According to Pratap and Watson

(1994), terrace improvement is one of the oldest indigenous conservation practices in the Hindu Kush Himalayan region. It is a package programme that comprises several activities, including construction and levelling of terraces, riser trimming, construction of drainage, contour strip and grass plantation, and pond construction.

In many parts of the humid tropics, indigenous systems of forest gardening (silvihorticulture) have been developed. They represent permanent types of land use which provide a wide range of products with high food value (fruits, vegetables) and non-food products (firewood, timber and herbal medicines). Similar methods of conservation and biodiversity protection have been widely reported for India (Sinha, 1994; Sinha, 1998), Latin America (Periera, 1991) and a host of African nations (Baidu-Forson, 1999) including Nigeria (Fagbemi, 1998; Adebisi and Bada, 2001). In these systems, natural processes of cycling water, organic matter and nutrients are maintained and are sufficient to maintain soil fertility without the use of chemical fertilizers.

Indigenous farmers have developed various techniques to improve or maintain soil fertility. For example, farmers in southern Sudan and in Zaire noticed that the sites of termite mounds are particularly good for growing sorghum and cowpea. In Senegal, the indigenous agrosilvopastoral system takes advantage of the multiple benefits provided by *Faidherbia* (formerly *Acacia*) *albida*. The tree sheds its leaves at the onset of the wet season, permitting enough light to penetrate for the growth of sorghum and millet, yet still providing enough shade to reduce the effects of intense heat. The tree also fixes nitrogen for improving crop yield. This represents a good IK of the plant physiological principles of canopy structure, light penetration and nitrogen fixation in moderating photosynthesis and crop productivity (Adedipe, 1984). In Burkina Faso the *zai* is a traditional technique for restoring degraded soils by creating a micro-environment favourable for crops by digging and sowing in holes in which manure or compost has already been deposited. In the stone strips, stones are arranged perpendicular to the slope of the land in order to slow down water flow, encourage water infiltration and increase the sedimentation of the materials reconstituting soil (Sidibé, 2007). The adoption of these technologies by farmers was influenced by their level of education and perception of soil degradation. In the parish of St Elizabeth, in Jamaica, dryland farming technology has been developed and perfected over the years based on water conservation, which is achieved principally through grass mulching. In St Elizabeth, Guinea grass (*Panicum maximum*) is a sacred crop which is cultivated as a cash crop for mulching purposes (Francis, 2004).

In Ethiopia, several indigenous technologies developed to control soil erosion and conserve soil water include cut-off drains locally called

Boraatii and drainage furrows called *Bo'oo* or *yaa'a*. Depending on the runoff expected, which depends on the slope length and gradient, intensity of rainfall and the type of crop planted upstream of the field, reinforcement may be necessary. If crops are planted upstream, the cut-off drain (*Boraatii*), which is constructed at the uppermost end of the field to divert all the run-off before it enters into the field, are reinforced by stones, wood, blocks of soils with grass, especially across depressions. The type of crop planted is also an important factor determining the type and intensity of the structures. Thus to prevent soil loss due to run-off, semi-parallel drainage furrows known as *Bo'oo* or *yaa'a* are constructed at relatively closer intervals depending on the slope. The spacing and gradient of *Bo'oo* depends on several factors such as slope gradient and length, and land use or crop type of the upstream area. When the slope is steep and long, or when the upstream field is cultivated and the crops to be planted in the field are to be protected also, the furrow spacing should be narrow and sometimes needs to be intercepted by perpendicular furrows such that a net of furrows is formed (Erkossa and Ayele, 2003).

Link between land management and climate change

Worldwide, the net effect of climate change will be to decrease stocks of organic carbon (C) in soils, thus releasing additional carbon dioxide (CO₂) into the atmosphere and acting as a positive feedback, further accelerating climate change. Indigenous knowledge in land management has been applied for emission reduction, C sequestration and carbon substitution, weather forecasting, vulnerability assessment and implementation of adaptation strategies. Some changes in the management of land can help in cutting overall emissions of greenhouse gases. This is mainly by causing some C, from CO₂ in the atmosphere, to be locked up (“sequestered”) in soil or vegetation. Soils that have been in arable cropping for a long period usually have a low content of organic C, so they offer scope for additional sequestration. With soils already high in C, such as those under old grassland or woodland and peat soils, there is little extra capacity for additional C storage. Traditional land management techniques such as the use of zero tilling practices in cultivation, mulching and other soil management techniques conserve C in soils (Schafer, 1989; Osunade, 1994), as natural mulches moderate soil temperatures and extremes, suppress diseases and harmful pests, and conserve soil moisture. The practice of organic farming by local farmers is also capable of reducing greenhouse gas (GHG) emissions. It is widely recognized that forests play an important role in the global carbon cycle by sequestering and

storing C (Karjalainen et al., 1994; Stainback and Alavalapati, 2002). This is ensured through fallow practices by farmers which encouraged the development of forests; as forests provided food and timber resources to the community, they also served as C sinks.

The development and use of indigenous early warning systems for the prediction or forecast of events (Ajibade and Shokemi, 2003) is based on a wealth of local knowledge in predicting weather and climate. These farmers have developed intricate systems of gathering, prediction, interpretation and decision-making in relation to weather. To a very great extent, these systems of climate forecasts have been very helpful to the farmers in managing their vulnerability. Farmers are known to make decisions on cropping patterns based on local predictions of climate and decisions on planting dates based on complex cultural models of weather. Agroforestry practices, agro-silvopastoral systems and indigenous systems of forest gardening have been able to reduce higher temperatures and evapotranspiration, thus making the conditions for drought more likely.

The indigenous methods of maintaining soil fertility, prevention and control of soil erosion have been able to protect the soil structure, which is often affected by variation in temperature and rainfall. In particular, during hotter, drier summers there is an increased tendency for subsoil to become “strong”, making it more difficult for roots to penetrate. Some soils are likely to form impenetrable caps, increasing the risk of run-off and subsequent pollution events and flooding. Others may form cracks through which any rainfall will pass, reducing the trapping effect of the surface layers, further increasing risk of drought in the following year and also reducing the filtering effect of soil and increasing pollution risk (Zurayk et al., 2001).

Conclusion

It is clearly evident that based on the indigenous knowledge of a given area, over time and space, land management techniques have been applied to mitigate the effect of climatic changes. Global economic activity may well have contributed significantly to the recent environmental changes which have been associated with widespread human suffering and societal disruption. Indigenous land-use practices have been employed successfully for millennia, such that arguments that traditional methods of land management are no longer appropriate because of population pressure and climatic fluctuations are tenuous. There is therefore a need to integrate this local knowledge into formal mitigation and adaptation policies.

REFERENCES

- Adebisi, I. A. and S. O. Bada (2001) "Biodiversity case study: Osun Osogbo Grove", in A. O. Adeola, J. Okojie and L. O. Ojo (eds), *Biodiversity of the Rain-forest Ecosystem in Nigeria. Proceedings of a Colloquium at the FEPA/UNAAB Linkage Centre for Forests, Conservation and Biodiversity*. Abeokuta, Nigeria: University of Agriculture, pp. 86–100.
- Adedipe, N. O. (1983) "Strategies for increasing food production in Nigeria", in T. Atinmo and L. Akinyele (eds), *Nutrition and Food Policy in Nigeria*. Jos: National Institute for Policy and Strategic Studies, pp. 109–116.
- Adedipe, N. O. (1984) "Environmental considerations of shifting cultivation in Africa and the task of universities", in A. H. Bunting and E. Bunting (eds), *Proceedings of the International Workshop on Shifting Cultivation: Teaching and Research at the University Level*, 4–9 July 1982, University of Ibadan, Nigeria. Rome: Food and Agricultural Organization, p. 192.
- Adesina, F. A. (1988) "Developing stable agroforestry systems in the tropics: an example of local agroforestry techniques from south western Nigeria", *Discussion Papers in Geography* 37: 27, Department of Geography, University of Salford, United Kingdom.
- Adesina, F. O., W. O. Siyambola, F. O. Oketola, D. A. Pelemo, L. O. Ojo and A. O. Adegbugbe (1999) "Potentials of agroforestry for climate change mitigation in Nigeria: some preliminary estimates", *Global Ecology and Biogeography* 8: 163–173.
- Aina, P. O. (1998) "Soil and water resources: their conservation, management and constraints to their utilization for sustainable development in south-western Nigeria", in J. Baidu-Forson (ed.), *Africa's Natural Resources Conservation and Management Surveys*. Accra, Ghana: United Nations University Institute for Natural Resources in Africa, pp. 79–83.
- Ajibade, L. T. and O. O. Shokemi (2003) "Indigenous approaches to weather forecasting in Asa L.G.A., Kwara State, Nigeria", *Indilinga: African Journal of Indigenous Knowledge Systems* 2(1): 37–44.
- Baidu-Forson, J. J. I. (ed.) (1998) *Africa's Natural Resources Conservation and Management Surveys*. Accra, Ghana: United Nations University Institute for Natural Resources in Africa, p. 141.
- Chambers, R., A. Pacey and L. A. Thrupp (eds) (1989) *Farmers First: Farmer Innovation and Agricultural Research*. London: Intermediate Technology Publications, p. 218.
- Chokor, B. A. and F. O. Odemerho (1994) "Land degradation assessment by small-scale traditional African farmers and implications for sustainable conservation management", *Geoforum* 25(2): 145–154.
- Erkossa, Teklu and Ayele Gezahegn (2003) "Indigenous knowledge and practices for soil and water management in East Wollega, Ethiopia", Conference on International Agricultural Research for Development, Deutscher Tropentag Göttingen, 8–10 October. Available at <<http://www.tropentag.de/2003/abstracts/full/364.pdf>> (accessed 21 April 2009).
- Fagbemi, T. (1998) "Agroforestry for sustaining agricultural production in the tropics", in M. A. Badejo and A. O. Togun (eds), *Strategies and Tactics of Sustainable Agriculture in the Tropics*, vol. 1. Ibadan, Nigeria: College Press, p. 249.

- Floyd, B. (1969) *Eastern Nigeria: a Geographical Review*. New York: Frederick A. Praeger.
- Francis, J. A. (2003) "Farmers as innovators in building indigenous knowledge systems: proposal for CTA's science and technology strategies programme", paper presented at the 2nd Meeting of ACP Informal Working Group on Science & Technology, Ede, The Netherlands, 28 November–3 December.
- Gilbert, E. H., D. W. Norman and F. E. Winch (1980) "Farming systems research: A critical appraisal", MSU Rural Development Paper No. 6 Michigan State University, East Lansing; Department of Agricultural Economics.
- Haverkort, B. and H. de Zeeuw (1992) "Development of technologies towards sustainable agriculture: institutional implications", in W. M. Rivera and D. J. Gustafson (eds), *Agricultural Extension: Worldwide Institutional Evolution and Forces of Change*. New York: Elsevier Science Publishing Company; New York: Kegan Paul International, pp. 231–242.
- Karjalainen, T. S. Kellomäki and A. Pussinen (1994) "Role of wood-based products in absorbing carbon", *Silva Fennica* 28(2): 67–80.
- Kundiri, A. M., M. G. Jarvis and P. Bullock (1997) "Traditional soil and land appraisal on fadama lands in northeast Nigeria", *Soil Use and Management* 13: 205–208.
- Moss, R. P. (ed.) (1968) *The Soil Resources of Tropical Africa*. Cambridge: Cambridge University Press.
- Omotayo, Akin and M. W. Musa (1999) "The role of indigenous land classification and management practices in sustaining land use system in the semi-arid zone of Nigeria", *Journal of Sustainable Agriculture* 14(1): 49–58.
- Osunade, M. A. (1994) "Indigenous climate knowledge and agricultural practices in Southwestern Nigeria", *Malaysian Journal of Tropical Geography* 1: 21–28.
- Pandey, S. P., D. B. Tamang and S. N. Baidya (1995) "Soil fertility management and agricultural production issues with reference to the middle mountain regions of Nepal", in H. Schreier, P. B. Shah and S. Brown (eds), *Challenges in Mountain Resource Management in Nepal: Processes, Trends and Dynamics in Middle Mountain Watersheds*, proceedings of a workshop held in Kathmandu, 10–12 April. Kathmandu: International Centre for Integrated Mountain Development; International Development Research Centre; University of British Columbia, pp. 41–49.
- Periera, W. (1991) "Traditional rice growing in India", *The Ecologist* 21: 97–100.
- Pratap, T. and H. R. Watson (1994) "Sloping agricultural land technology (SALT)", occasional paper no. 23: 140. Kathmandu: International Centre for Integrated Mountain Development.
- Rajasekaran, B. (1993) "A Framework for Incorporating Indigenous Knowledge System into Agricultural Research and Extension Organizations for Sustainable Agricultural Development in India", Ph.D. dissertation, Iowa State University, Ames.
- Sandor, J. A. and L. Furbee (1996) "Indigenous knowledge and classification of soils in the Andes of Southern Peru", *Soil Science Society of America* 60: 1502–1512.
- Schafer, J. (1989) "Utilizing indigenous agricultural knowledge in the planning of agricultural research projects designed to aid small-scale farmers", in D. M.

- Warren, L. J. Slikkerveer and S. O. Titilola (eds), *Indigenous Knowledge Systems: Implications for Agriculture and International Development*. Studies in Technology and Social Change No. 11. Ames: Technology and Social Change Program, Iowa State University, pp. 116–120.
- Sidibé, Amadou (2005) “Farm-level adoption of soil and water conservation techniques in northern Burkina Faso”, *Agricultural Water Management* 71(3): 211–224.
- Sinha, R. K. (1994) “Eco-farming for sustainable agriculture”, in Rajiv K. Sinha (ed.), *Development Without Destruction: The Challenge to Survival*. Jaipur: Environmentalist Publishers, p. 235.
- Sinha, R. K. (1998) “Biodiversity for sustainable agriculture in the tropics: experience from India and Latin America”, in M. A. Badejo and A. O. Togun (eds), *Strategies and Tactics of Sustainable Agriculture in the Tropics*, Vol. I. Ibadan: College Press Ltd, pp. 211–221.
- Stainback, G. A. and J. Alavalapati (2002) “Economic analysis of slash pine forest carbon sequestration in the southern US”, *Journal of Forest Economics* 8: 105–117.
- Tabor, J. (1990) “Ethnopedology: using indigenous knowledge to classify soil”, *Arid Land Newsletter* 30: 28–90.
- Warren, D. M. (1987) “Linking scientific and indigenous agricultural systems”, in J. L. Compton (ed.), *The Transformation of International Agricultural Research and Development*. Boulder, CO: Lynne Rienner Publishers, pp. 153–170.
- Warren, D. M. (1991) “Using indigenous knowledge in agricultural development”, World Bank Discussion Papers 127: 46. Washington, DC: The World Bank.
- WCED (World Commission on Environment and Development) (1987) *Our Common Future: World Commission on Environment and Development*. Oxford: Oxford University Press.
- White, P., A. Dobermann, T. Oberthur and C. Ros (2000) “The rice soils of Cambodia. I. Soil classification for agronomists using the Cambodian agronomic soil classification system”, *Soil Use and Management* 16: 12–19.
- WinklerPrins, A. M. G. A. (1999) “Insights and applications of local soil knowledge: A tool for sustainable land management”, *Society and Natural Resources* 12(2): 151–161.
- Yaalon, D. H. (2000) “Down to earth: Why soil and soil science matters”, *Nature* 407: 301.
- Young, I. M. and J. W. Crawford (2004) “Interactions and self organization in the soil-microbe complex”, *Science* 304 (5677): 1634–1637.
- Zurayk, R., F. El-Awar, S. Hamadeh, S. Talhouk, C. Sayegh, A. G. Chehab and K. Al Shab (2001) “Using indigenous knowledge in land-use investigations: A participatory study in a semi-arid mountainous region in Lebanon”, *Agric. Ecosyst. Environ* 86: 247–262.

8

Traditional knowledge and health

Gerard Bodeker

The World Health Organization (WHO) estimates that the majority of the population of most non-industrial countries still relies on traditional forms of medicine for their everyday health care. In many countries, up to 80–90 per cent of the population is in this category.

Traditions vary from region to region and even within a single country. Attempts to classify these traditions into meaningful systems and sets of practices have generally adopted a twofold classification.

In Asia, traditional medical knowledge has often been classified into two broad groupings: codified and folk traditions (Shankar, 2000). *The codified traditions* of Asia typically have a written materia medica and clinical texts, a systematic theory of pathogenesis and treatments based on a formal diagnostic system, and a pharmacological tradition with precise standards of dosage and an awareness of toxicity and its management. These traditions include the Ayurvedic medical system of India and South Asia, traditional Chinese medicine and its related systems in Vietnam and Korea, and Unani medicine, the Graeco-Arabic tradition found in Pakistan, India and many other countries with Islamic traditions. *Folk traditions* are generally seen as the collection of community knowledge about the use of plants in the management of common illness, non-pharmacological interventions such as massage, meditation, the use of steam and other physical means of effecting cure.

In studying the Mayan medicine of Mexico, Brent Berlin and Elios Ann Berlin have adopted Foster's (1976) dual division of medical systems into naturalistic and personalistic frameworks. In the naturalistic system, a health condition is empirically determined. Diagnosis is based

primarily on immediately apparent signs and symptoms. For a condition such as bloody diarrhoea, it is the norm for people to treat themselves with medicinal plants or to seek local expert advice in the use of plants as treatment. However, diagnosis of a personalistic condition is based on a retrospective analysis of possible causative factors, such as an encounter with ancestral spirits.

Berlin and Berlin (2000: 273–274) have noted in their study of Mayan traditional medicine that: “such cases are first treated with plant medicinals, and later classed as personalistic in cases that are unresponsive to herbal remedies or that are either prolonged or progressively worsen. These patterns of diagnosis have been extensively described by virtually everyone who has studied the subject.” Diagnosis and treatment frequently involve the intervention of healers with special powers, such as a pulser or diviner. While personalistic conditions may at times also be treated with herbal medications, Maya curers normally employ remedies that require ceremonial healing rituals and special prayers.

In the context of biomedical views, what may appear to the allopathic clinician as the practice of herbal medicine, with varying degrees of competence, is often grounded in theoretical assumptions, beliefs about disease and its origins, and what constitutes a real cure as opposed to simply the management of symptoms. An understanding of these perspectives is necessary to understand the beliefs and health practices of patients, many of whom will use both conventional and traditional medicine in the management of a condition.

Theoretical framework

Historically, the paradigms of traditional knowledge systems have been considered “primitive” by modern or western science. However, recent advances in environmental sciences, immunology, medical botany and pharmacognosy have led to a new appreciation for the precise descriptive nature and efficacy of many traditional taxonomies, as well as for the efficacy of the treatments employed. There is an emerging awareness that any meaningful appraisal of a traditional health system and its contribution to health care must take into account the paradigm or cosmology that underlies diagnosis and treatment.

An essential feature of traditional health systems is that they are based on theories or cosmologies that take into account mental, social, spiritual, physical and ecological dimensions of health and well-being. A fundamental concept found in many systems is that of balance – the balance between mind and body, between different dimensions of individual bodily functioning and need, between individual and community, individual/community and environment, and individual and the universe. The break-

ing of this interconnectedness of life is a fundamental source of disease, which can progress to stages of illness and epidemic. Treatments, therefore, are designed not only to address the locus of the disease but also to restore a state of systemic balance to the individual and his or her inner and outer environment.

The WHO has referred to the world's traditional health systems as holistic, "that of viewing man in his totality within a wide ecological spectrum, and of emphasizing the view that ill health or disease is brought about by an imbalance, or disequilibrium, of man in his total ecological system and not only by the causative agent and pathogenic evolution" (WHO/UNICEF, 1978).

Arthur Kleinman, of Harvard University's Center for Culture and Medicine, has noted that

for members of non-Western societies, the body is an open system linking social relations, the self, a vital balance between interrelated elements in a holistic cosmos.

Emotion and cognition are integrated into bodily processes. The body-self is not a secularized private domain of the individual person, but an organic part of a sacred, sociocentric world, a communication system involving exchanges with others (including the divine). (Kleinman, 1988)

In Ayurvedic medicine, the classical health care system of India, consciousness is of primary significance and matter is deemed secondary. Accordingly, Ayurvedic medical treatment, when practised according to the high traditions of Ayurveda, will first address the spiritual and mental state of the individual – through meditation, intellectual understanding of the problem, behavioural and lifestyle advice, and so on, and then address the physical problem by means of diet, medicine and other therapeutic modalities (Sharma and Clarke, 1998).

In the shamanic traditions of the Americas, spiritual healing is fundamental to the recovery process.

Traditional health practices are part of a cultural identity that goes from the particular to the collective and vice versa. The forces which allow traditional health practices to function are based on spirituality, the wholeness of the person, the maintenance of balance and harmony with habitat and Nature. The practice strengthens and reinforces family and community connections. Therefore the traditional doctor reestablishes the patient's lost harmony. (Alderete and Guevara, 1996: 398–401)

National policy

Considerable progress has been made in the development of national policies. At the launch of WHO's Traditional Medicine Strategy in 2002,

only 25 of WHO's 191 member states had a national policy on Traditional, Complementary and Alternative Medicine (TCAM) (WHO, 2002), but the more recent WHO *Global Atlas on Traditional, Complementary and Alternative Medicine* shows that there are now at least 66 out of a total of 213 member states with TCAM policies (Bodeker et al., 2005). A further forty-three member states have at least some specific legislation relating to TCAM, even in the absence of an official national policy, while twenty member states are currently in the process of developing policies and/or legislation.

Utilization

What has become clear since the publication of the *World Health Organization Global Atlas on Traditional Complementary and Alternative Medicine* is that traditional medicine is widespread and is increasingly being given a place in formal health care in tropical and other countries. Earlier calls for traditional medicine to be replaced by modern medical services have now given way to recognition that some degree of formalization of these health services might offer the public increased standards of quality and safety. In many countries, life begins with the support of traditional medicine. An estimated 60–70 per cent of births in developing countries still take place with the sole help of traditional birth attendants (Stephens, 1992).

Africa

There have been many general estimates of the extent of use of traditional medicine in Africa. The African regional report in the WHO *Global Atlas on Traditional, Complementary and Alternative Medicine* reaffirms a long-standing view that at least 80 per cent of the population of Africa regularly use traditional medicine (Bodeker et al., 2005).

However, some estimates of use are strikingly low. In a survey of perceived morbidity in a rural community in south-western Ethiopia, 55.4 per cent of those reporting illness took no action at all; 30.3 per cent applied to health institutions; 9.2 per cent reported self-care and only 5.2 per cent visited a traditional healer. By contrast, research done at Mogo-pane Hospital in north-eastern Transvaal, South Africa, showed that nine out of ten patients who come to the outpatients department first consult traditional healers (Oskowitz, 1991). Clearly, studies of community groups and of hospital populations address the needs and choices of different populations with different health profiles. In planning services, such differences need to be accounted for. Age and gender are factors in utiliza-

tion of traditional health care services. A study of visitors to traditional healers in central Sudan indicated that children under ten years did not take part in visits. Most visitors were between twenty-one and forty years (61 per cent) and were women (62 per cent). They were less educated compared with the general population in the area. The main reasons given for attending traditional healers were treatment (60 per cent) and blessing (26 per cent) (Ahmed et al., 1999).

In Mali, men are more likely to prefer traditional treatments for malaria than women (Traore et al., 1993), and more boys than girls believed in herbal medicine in a survey in the Sudan (Elzubier et al., 1997). It has been suggested that women are less likely to be treated at modern facilities, and are more likely to resort to traditional medicines (Tanner and Vlassoff, 1998). Travel time can be a factor in the choice of traditional over modern medical services. In Mali, 87 per cent of patients with uncomplicated malaria use self-medication as the first line of treatment and 59 per cent use traditional medicines (mainly plant-based), either alone or in combination with modern medicines (Diallo et al., 2006).

Among comments made by traditional midwives in a study in South Africa was that “the nearest hospital is 20 kilometres far”. By contrast, traditional health care services are readily available. Every village has a number of traditional healers and birth attendants, each with their own specializations (Mbindyo, 2007).

There are usually differences between urban and rural populations in their use of traditional and modern medicine. While 95 per cent of urban women who attended modern medical clinics in South Africa strongly advocated mixing traditional and western antenatal care, only 63 per cent of rural clinic attenders found this practice acceptable. All groups favoured western over traditional care in cases of serious pregnancy complications (Varga and Veale, 1997).

Asia

Asia has seen the most progress in incorporating traditional health systems into national health policy. In China, this began in 1951 with the establishment of a Traditional Chinese Medicine Division within the Ministry of Public Health, upgraded to a department in 1954. In 1988, the State Council established the State Administration of Traditional Chinese Medicine as an independent administrative body in its own right, with eight major departments. The government’s commitment to “develop modern medicine and Traditional Chinese Medicine” has been written into the national constitution and the two are regarded as equally important.

In India, formal recognition for Indian systems of medicine came with the Indian Medicine Central Council Act of 1970. In 2002, India developed a specific national policy to facilitate the integration of these health care systems into national health programmes. The policy emphasizes affordability, safety, efficacy and the sustainable use of raw materials.

In terms of the local level of use of traditional medicine, it has been found that the influence of family structure is significant. In India, the presence of the mother-in-law is associated with a greater use of traditional healers (Vissandjee et al., 1997).

In a study of health service utilization in four villages in India, the most common complaint by a majority of those surveyed was that “medicines are never available” at the Primary Health Centre, followed by discourteous behaviour of the staff and health personnel, “doctors never available”, “doctors demand money for better treatment” and so on. Almost one-quarter of the women initially tried homeopathic treatment, followed by 9 per cent who administered western medicine at home, while 2 per cent opted for traditional home remedies for cure and treatment, before visiting and consulting a trained medical practitioner. Medical pluralism was found to be flourishing as people switched from one medical system to another depending on affordability and time (Bandyopadhyay and MacPherson, 1998).

As has been observed in Africa, rural women in Gujarat in India were found to be more likely to use services which were closer to home, other things being equal. The “travel” variable (including time and travel costs) is a more important factor determining use of modern and traditional services among women in the study area than the actual direct costs of the service (Vissandjee et al., 1997).

Important new initiatives are under way in India focusing on the public health applications of Indian Systems of Medicine. A home herbal garden programme of the Bangalore-based Foundation for Revitalization of Local Health Traditions (www.frlht.org) covered 6,000 rural villages and provided twenty or so medicinal plant seedlings for 150,000 herbal home gardens (HHGs) (Hariramamurthi et al., 2007: 167–168). Facilitated by local Women Self-Help Groups, the HHG programme was adopted by the poorest of the poor. These were: landless (33 per cent), marginal landholding (37 per cent) and small landholding (21 per cent) farmers.

Herbal home garden families spent, on average, ninety-two rupees in three months towards their family’s primary health care and reported significant family health benefits. Within a three-month period, the health expenditure of families who did not take up the HHG programme was approximately five times greater than that of HHG families. In India, where more than 80 per cent of the need for health care is in rural areas and only 25 per cent of existing services are rural, HHGs can serve as an

important means to alleviate poverty through reductions in health expenditure and the associated indebtedness of the rural poor.

In Sri Lanka, two patterns of health care seeking which cut across modern and traditional medical systems have been identified. The first involved patients who searched for a medicine which could cure. The second pattern involved the search for a practitioner who had the power of the hand to cure one's illness (Nichter, 1991). Ethnic minorities in industrialized countries often continue to use the traditional medicine from their culture alongside, or even in place of, conventional medicine. This can apply even in settings where conventional health care is provided free of charge, but traditional health care services must be paid for out of pocket, as in the case of Chinese communities in the UK.

As in developing countries, the affordability, availability and cultural familiarity of traditional medicine, together with family influence, contribute to the continued use of traditional medical providers and medicines in "ethnic enclaves".

Medical pluralism is common worldwide and consumers practise integrated health care irrespective of whether or not it is present at the formal level. In Taiwan, 60 per cent of the public have been found to be users of multiple healing systems, including modern western medicine, Chinese medicine and religious healing (Chi, 1994).

Indigenous communities

The lives of the majority of the world's 300 million indigenous peoples are characterized by extreme conditions of social and environmental risk, and historical injustice (Bodeker, 2008a). Native American communities incorporate traditional forms of treatment into the US Indian Health Service (IHS) alcohol rehabilitation programmes. In a study of 190 IHS contract programmes, it was found that 50 per cent of these offered a traditional sweat lodge or encouraged its use. Treatment outcomes were found to be better for alcoholic patients when a sweat lodge was available. In addition, the presence of medicine men or healers, when used in combination with the sweat lodge, greatly improved the outcome (Hall, 1986).

In the tropical regions of Australia, traditional Aboriginal medicine is widely practised. In most regions of the Northern Territory, more than 22 per cent of indigenous people had used bush medicine in the previous six months when surveyed. A decrease in use of traditional medicine seems to be because western medicine is easier to access, not because of a lack of faith in its efficacy. Indigenous Australian medicine includes herbal preparations, diet, rest, massage, restricted diet, and external remedies such as ochre, smoke, steam and heat (Maher, 1999).

New Zealand has registered more than 600 Maori traditional healers who provide services within the wider health care system. While the government reimburses their services under health insurance, criteria for registration and oversight of professional practice are the responsibility of Maori traditional health practitioner associations (Scrimgeor, 1996).

Policy

Professionalization and partnership with modern medicine in Africa

While Asia now has formal policy orientation of traditional medicine into national health care, this is very much an emerging situation in Africa. There has been a long-reported willingness on the part of traditional healers in Africa to collaborate with the formal sector and to establish joint training. Burnett et al. (1999) note that thirty-seven of the thirty-nine traditional healers (94 per cent) and fourteen of the twenty-seven formal health workers (52 per cent) interviewed in a Zambian study were keen to collaborate in training and patient care relating to HIV/AIDS.

However, this is not generally a reciprocal view. Although 1 per cent of nurses in South Africa are reported to be traditional healers, rural nurses in Swaziland perceived themselves as being teachers to healers, but not learning from healers. They saw themselves as a source of referral for healers, but not the reverse (Upvall, 1992, 1993). One view is that it may be more appropriate to work towards a system of cooperation between two independent systems, with each recognizing and respecting the character of the other (Last and Chavanduka, 1986). This is Botswana's policy, where parallel development has been encouraged, since it is felt that one or other of the systems might suffer in the process of integration (Burnett et al., 1999).

In South Africa, many traditional healers are members of well-organized national organizations that are seeking formal recognition from the government. In one instance of WHO-sponsored collaboration, it has been recognized that the rapid increase in tuberculosis (TB) caseload, especially in African countries heavily affected by the HIV epidemic, requires a search for effective ways to treat patients outside hospital. As a component of the WHO's Community Care for Tuberculosis in Africa Project, Wilkinson et al. studied the potential role for collaboration between the health service and traditional healers, especially as tuberculosis treatment supervisors, and examined what precedent and potential exist for traditional healers to act in this role.

Before commencing collaborative effort in health care between modern and traditional sectors, a careful assessment of potential benefits and obstacles should be made. The medical services utilization patterns of the communities need to be ascertained and the specific role of traditional health practitioners considered. In such efforts the ideas of healers themselves about possible collaboration are crucial (Mbindyo, 2007). Ghana passed the Traditional Medicine Practice Act 2000, Act 595, to establish a council to regulate and control the practice of traditional medicine. The primary draft of this Act originated from the traditional healers themselves. The Act defines traditional medicine as “practice based on beliefs and ideas recognized by the community to provide health care by using herbs and other naturally occurring substances”, and herbal medicine as “any finished labelled medicinal products that contain as active ingredients aerial or underground parts of plants or other plant materials or the combination of them whether in crude state or plant preparation”. It is arranged into four sections, namely the establishment and functions of a Traditional Medicine Practice Council; registration of practitioners; licensing of practices; and miscellaneous provisions.

Ghana’s Ministry of Health has incorporated a Traditional Medicine Unit since 1991, and in 1999 this was upgraded to the status of a Directorate. The Ministry, in collaboration with the Ghana Federation of Traditional Medicine Practitioners Associations and other stakeholders, has now developed a strategic plan for traditional medicine which proposes, among other aspects, the need to develop comprehensive training in traditional medicine from basic and secondary to tertiary levels. A “Ghana Herbal Pharmacopoeia”, containing scientific information on common medicinal plants, has been published. Efforts are being made to integrate traditional medicine into the official public health system, including dispensing certified and efficacious herbal medicines in hospitals and pharmacies.

In Nigeria, the National Agency for Food and Drug Administration and Control (NAFDAC) has taken steps to regulate and control traditional medicine products with a view to ensuring their safety, efficacy and quality. In consultation with traditional healers and researchers NAFDAC has developed guidelines on regulating herbal medicines. Recently, the government of Nigeria approved a national policy on a Traditional Medicine Code of Ethics. There is also legislation for national and state Traditional Medicine Boards to enhance the regulation of traditional medicine practice and promote cooperation and research in traditional medicine (Osuide, 1999).

Mali has a policy of officially approved standardized phytomedicines (*Medicaments Traditionnels Améliorés* or MTAs), which are included in the Malian National Formulary (Ministère de la Santé, 1998). Seven

approved MTAs are included in the formulary. These are for treatment of malaria, cough, dysentery, indigestion, gastritis, constipation and eczema.

Intellectual property rights

Exploitation of traditional medical knowledge for drug development without the consent of customary knowledge holders is prohibited under the UN Convention on Biological Diversity. Researchers evaluating traditional medicines are required to recognize that under international law, the customary owner – and often the country of origin – holds rights over the knowledge being evaluated. This has implications for patenting. If a patent is sought by a non-indigenous group, prior informed consent and just benefit sharing with customary owners must be established (Bodeker, 2007).

Medicinal plant biodiversity conservation

National economic development may be linked to the cultivation and use of traditional medicines. Wild harvesting of medicinal plants can provide an additional source of family income and also saves expenditure on other forms of medicine. However, overharvesting constitutes a serious threat to biodiversity. Overharvesting of medicinal plants occurs in China and India, where approximately 80 per cent and 90 per cent respectively of the raw materials for traditional medicines come from wild sources, raising the need for new policies to integrate health, environmental and economic perspectives. Investments are needed to develop appropriate cultivation and harvesting strategies to meet the demand for inexpensive and accessible medicines while ensuring the conservation of diverse biologic resources (Bodeker and Burford, 2007).

Future trends and needs

Traditional medicine continues to exist in the developing world as a major source of health care for the majority of the population. National and international policies are calling for partnerships between conventional and traditional health practitioners in order to provide adequate health care coverage in the face of limited resources.

At the other end of the affluence spectrum, it is important to note the role that traditional therapies are playing in the global wellness industry. In the evolving global spa industry, for example, indigenous themes have emerged as a significant trend, especially in so-called “destination spas” in rural and regional settings where traditions are strong and local health knowledge is lively. Globally, the spa industry draws on the healing tradi-

tions of Asia. Reflecting the globalization of Asian health cultures, Ayurvedic therapies have been developed into spa treatments, Chinese massage and acupuncture are incorporated along with Tai Chi and Qi Gong into Asian-themed spa regimens; Japanese Onsen, or communal thermal baths, are found in spa settings around the world; and in South-East Asia, Thai, Indonesian and Malay health and beauty traditions are undergoing a resurgence of interest (Bodeker et al., 2009).

These trends must be viewed as significant in view of the size of the international spa and wellness economies. The Stanford Research Institute (SRI) International studied the global economy of the spa industry and estimated the global wellness industries at a total value in 2007 of US\$1.2 trillion, within which the global spa economy was assessed at US\$255 billion (SRI International, 2008).

If the spa industry is profiting from indigenous traditions, it is reasonable to ask what the industry is returning to these cultures. Corporate social responsibility programmes can support the revival of local traditions, development of micro-enterprises related to traditional knowledge, and fair trade practices for the purchase and export of traditional health products and ingredients (Bodeker, 2008b).

It is also valid to ask whether the rapid and often superficial spread of these therapies contributes to strengthening or weakening the tradition itself, through propagation of a piece of the tradition rather than of the whole philosophy and the formal process of training historically required of practitioners. The effects of globalization and the trend for blending of traditional practices and philosophies with those from other regions – known as “syncretism” – need to be analysed and addressed within the spa industry.

At the same time, there is a need for a core set of issues to be addressed in order to preserve the integrity of traditional health knowledge as its role modifies under new societal and policy conditions. Some of these core issues are:

- documenting “best practice” in traditional therapies;
- identifying representatives of tradition who can guarantee this;
- the conservation of indigenous traditions;
- the role of innovation within tradition;
- the sharing of benefits between those commercializing traditional knowledge and the custodians of these traditions;
- scientific evidence in support of the efficacy of traditional therapies;
- regulation based on appropriate standards of training for traditional practice;
- *syncretism* – attention to the current trend of blending of local or traditional practices and philosophies with those from other regions or traditions.

Finally, the public health dimensions of the trend towards greater use of traditional medicine are clear. The global public are using health care approaches that are typically outside the purview of mainstream medicine. Why? To what benefit or detriment – medically, financially, socially? And what does this portend for health care in the future. These are all public health questions that warrant a comprehensive research and policy response from public health professionals and academics (Bodeker et al., 2008). Indeed, while overdue, this is now expected by the public and health care providers.

REFERENCES

- Ahmed, I. M., J. J. Bremer, M. M. Magzoub and A. M. Nouri (1999) “Characteristics of visitors to traditional healers in central Sudan”, *Eastern Mediterranean Health Journal* 5(1): 79–85.
- Alderete, W. and G. Guevara (1996) “Recommendations from the South and Central America regional workshop on traditional health systems: GIFTS of health”, *The Journal of Alternative and Complementary Medicine* 2(3): 397–401.
- Bandyopadhyay, M. and S. MacPherson (1998) *Women and Health: Tradition and Culture in Rural India*. Brookfield: Ashgate.
- Berlin, E. and B. Berlin (2000) “General overview of Maya ethnomedicine”, in D. Posey (ed.), *Cultural and Spiritual Values in Biodiversity*. Nairobi: UN Environment Program, pp. 273–275.
- Bodeker, G. (2007) “Intellectual property rights and traditional medical knowledge”, in G. Bodeker and G. Burford (eds), *Public Health and Policy Perspectives on Traditional, Complementary and Alternative Medicine*. London: Imperial College Press, pp. 419–431.
- Bodeker, G. (2008a) “The health care of indigenous peoples/nations”, in Kris Heggenhougen and Stella Quah (eds), *International Encyclopedia of Public Health*, Vol. 3. San Diego: Academic Press, pp. 175–180.
- Bodeker, G. (2008b) “Ethics and values”, in M. Cohen and G. Bodeker (eds) *Understanding the Global Spa Industry*. Oxford: Elsevier, pp. 432–445.
- Bodeker, G. (ed.) (2009) *Health & Beauty from the Rainforest: Malaysian Traditions of Ramuan*. Didier Millet Pte Editions: Singapore.
- Bodeker, G. and G. Burford (2007) “Conservation of medicinal plant biodiversity”, in G. Bodeker and G. Burford (eds), *Public Health and Policy Perspectives on Traditional, Complementary and Alternative Medicine*. London: Imperial College Press, pp. 145–164.
- Bodeker, G. and G. Burford (2008) “Traditional knowledge and spas”, in M. Cohen and G. Bodeker (eds), *Understanding the Global Spa Industry*. Oxford: Elsevier, pp. 413–431.
- Bodeker, G., F. Kronenberg and G. Burford (2008) “Holistic, alternative and complementary medicine”, in Kris Heggenhougen and Stella Quah (eds), *International Encyclopedia of Public Health*, Vol 3. San Diego: Academic Press, pp. 449–455.

- Bodeker, G., C.-K. Ong, Grundy C. Burford and K. Shein (eds) (2005) *World Health Organization Global Atlas on Traditional and Complementary Medicine*. Geneva: World Health Organization.
- Burnett, A., R. Baggaley, M. Ndovi-MacMillan, J. Sulwe, B. Hang'omba and J. Bennett (1999) "Caring for people with HIV in Zambia: are traditional healers and formal health workers willing to work together?", *AIDS Care* 11(4): 481–491.
- Chi, C. (1994) "Integrating traditional medicine into modern health care systems: examining the role of Chinese medicine in Taiwan", *Social Science and Medicine* 39(3): pp. 307–321.
- Diallo, D., B. Graz, J. Falquet, A. K. Traoré, S. Giani, P. P. Mounkoro, A. Berthé, M. Sacko and C. Diakité (2006) "Malaria treatment in remote areas of Mali: Use of modern and traditional medicines, patient outcome", *Transactions of the Royal Society of Tropical Medicine and Hygiene* 100(6): 515–520.
- Elzubier, A. G., E. H. H. Ansari, M. H. El Nour and H. Bella (1997) "Knowledge and misconceptions about malaria among secondary school students and teachers in Kassala, Eastern Sudan", *The Journal of the Royal Society for the Promotion of Health* 117(6): 381–385.
- Foster, G. (1976) "Disease etiologies in non-western medical systems", *American Anthropologist* 78: 773–782.
- Hall, R. L. (1986) "Alcohol treatment in American Indian populations: an indigenous treatment modality compared with traditional approaches", *Annals of the New York Academy of Science* 472: 168–178.
- Hariramamurthi, G., P. Venkatasubramanian, P. M. Unnikrishnan and D. Shankar (2007) "Herbal home gardens: biodiversity conservation and health care at the local level", in G. Bodeker and G. Burford (eds), *Public Health and Policy Perspectives on Traditional, Complementary and Alternative Medicine*. London: Imperial College Press, pp. 167–183.
- Kleinman, A. (1988) *The Illness Narratives*. New York: Basic Books.
- Last, M. and G. L. Chavanduka (1986) *The Professionalisation of African Medicine*. Manchester: Manchester University Press.
- Maher, P. (1999) "A review of "traditional" aboriginal health beliefs" *Australian Journal of Rural Health* 7(4): 229–236.
- Mbindyo, P. (2007) "Public-private partnerships: A case study from East Africa", in G. Bodeker and G. Burford (eds), *Public Health and Policy Perspectives on Traditional, Complementary and Alternative Medicine*. London: Imperial College Press, pp. 205–236.
- Agusan del Sur, the Philippines", *Social Science and Medicine* 48: 607–618.
- Ministère de la Santé, des Personnes Agées et de la Solidarité (1998) *Formulaire Thérapeutique National*. Bamako: Mali Edition.
- Nichter, M. (1991) "Ethnomedicine: diverse trends, common linkages. Commentary", *Medical Anthropology* 13: 137–171.
- Oskowitz, B. (1991) "Bridging the communication gap between traditional healers and nurses", *Nursing: Republic of South Africa* 6(7): 20–22.
- Osuide, G. E. (1999) "Regulation of herbal medicines in Nigeria: the role of the National Agency for Food and Drug Administration and Control (NAFDAC)", paper presented at the International Conference on Ethnomedicine and Drug Discovery, Silver Spring, MD, 3–5 November.

- Scrimgeour, D. (1996) "Funding for community control of indigenous health services", *Australian and New Zealand Journal of Public Health* 20: 17–18.
- Shankar, D. (2000) "The spiritual dimensions of medicinal plants in the Vedic tradition of India", in D. Posey (ed.), *Cultural and Spiritual Values in Biodiversity*. Nairobi: United Nations Environment Programme, pp. 267–270.
- Sharma, H. and C. Clarke (1998) *Contemporary Ayurveda*. London: Churchill-Livingstone.
- SRI International (2008) *The Global Spa Economy, 2007*. New York: Global Spa Summit.
- Stephens, C. (1992) "Training urban traditional birth attendants: balancing international policy and local reality. Preliminary evidence from the slums of India on the attitudes and practice of clients and practitioners", *Social Science Medicine* 35(6): 811–817.
- Tanner, M. and C. Vlassoff (1998) "Treatment-seeking behaviour for malaria: a typology based on endemicity and gender", *Social Science and Medicine* 46(4–5): 523–532.
- Presentation 72, *Clone, Cure and Control: Tropical Health for the 21st Century*.
- Traore, S., S. O. Coulibaly and M. Sidibe (1993) *Comportements et coûts liés au Paludisme chez les femmes des campements de pêcheurs dans la zone de Sélingué au Mali*. Bamako, Mali: Institut National de Recherche en Santé Publique; TDR/SER/PRS/12.
- Upvall, M. J. (1992) "Nursing perceptions of collaboration with indigenous healers in Swaziland", *International Journal of Nursing Studies* 29(1): 27–36.
- Upvall, M. J. (1993) "Therapeutic syncretism: A conceptual framework of persistence and change for international nursing", *Journal of Professional Nursing* 9(1): 56–62.
- Varga, C. A. and D. J. Veale (1997) "Isihlambezo: utilization patterns and potential health effects of pregnancy-related traditional herbal medicine", *Social Science and Medicine* 44(7): 911–924.
- Vissandjee, B., R. Barlow and D. W. Fraser (1997) "Utilization of health services among rural women in Gujarat, India", *Public Health* 111(3): 135–148.
- WHO (World Health Organization) (2002) "Traditional medicine strategy 2002–2005", May 2002. Available at <<http://www.who.int/medicines/organization/trm/orgtrmmain.shtml>> (accessed 17 July 2010).
- WHO/UNICEF (1978) *Primary Healthcare: A Joint Report*. Geneva: WHO.

Supplementary feature

Knowledge and practitioners: Is there a promotional bias?

Unnikrishnan Payyappalli

Introduction

While there are extensive discussions on traditional knowledge (TK), TK practitioners in various sectors receive insufficient attention and are lim-

ited to certain indigenous rights forums. The health sector is no exception. Traditional medicine practitioners (TMPs), local, indigenous or traditional healers as they are called, have almost faded out from the development discourse of various regions in recent times, except for a few limited regions in the world¹. Since a large proportion of traditional medical knowledge is orally transmitted and experience driven, and since it is still an integral part of health care, reflection on its carriers assumes importance. The article draws attention to the wide and continuing presence, lack of sufficient recognition and issues related to integration of such practitioners in the health system.

In the 1970s there were many efforts to integrate traditional medical practitioners into primary health care. The World Health Assembly of 1977 and the 1978 Alma Ata international conference on primary health care recommended integration and utilization of TMPs including birth attendants in national health systems. Prior to this, stories on local healers were largely limited to anthropological or sociological ethnographical accounts. For the succeeding two decades one would frequently encounter informative articles such as “the role for traditional practitioners in the primary health system”, “traditional birth attendants’ role in reducing mortality”, and “involving communities and healers in health planning” from various developing countries, multilateral organizations and donor agencies. While by the 1990s such formal discourses had been almost completely given up in other continents, in the African context some sparse, yet serious attempts continue to be made, limited to areas such as HIV, or mental health. Does this mean that elsewhere the role of these traditional healers has become totally obsolete? Or does it mean that the “integration efforts” and “developmental approaches” have been successful in wishing away or neglecting their relevance in some continents, while this is only a matter of time in others?

Presence and outreach

Estimates suggest that a vast section of the population continue to seek health care from informal practitioners like local healers, though there is insufficient data on the number of such practitioners in any part of the globe (WHO, 2002; Bodeker and Burford, 2007: 14). Herbal healers, traditional orthopaedic practitioners, birth attendants, poison healers, spiritual therapists, mental health providers, healers specializing in eye conditions, paediatric conditions, skin diseases, gastrointestinal or respiratory conditions, veterinary conditions and so on are some of the prominent specialties of such practitioners. According to the National Family Health Survey of India, in a fast-growing economy and populous (the world’s second largest) country like India, 36.6 per cent of child deliveries are

managed by traditional birth attendants against 35.2 per cent managed by doctors, 10.3 per cent by auxiliary nurse midwives (ANM) or nurse-midwives, 16.2 per cent by relatives, 0.5 per cent by no one (self-delivered) and 1.3 per cent by other/unknown (Sadgopal, 2009). Studies elsewhere have indicated that around 60–70 per cent of deliveries are carried out solely by untrained birth attendants (Bodeker, this volume; Kruske and Barclay, 2004). In the southern states of India, which have a relatively more developed health system, a recent survey indicated that traditional bonesetters continue to take a good percentage of the orthopaedic load, especially in rural areas. Through interviews conducted among 550 orthopaedic practitioners, the study reveals that some of these healer families (of three to four practitioners collectively) even manage up to 200 patients per day and there are healers who can trace back their lineage even back to the thirteenth generation, while there are also healers who are new entrants (Unnikrishnan et al., in press). In other less developed countries the percentage of any form of traditional healing may be higher, which reaffirms the presence, contribution and long cultural continuity of such knowledge carriers. However, there is high heterogeneity in the socio-economic status, skill levels, experience and quality of care among these healers. Most often their knowledge is community and local ecosystem specific and thus very diverse. In most regions of the world they have continued to be community supported and traditionally legitimized, and their services receive scant attention in official public health spheres, as is the case with many other specialities of traditional knowledge (Shankar and Unnikrishnan, 2004). The extent of practitioners, their socio-economic conditions, methods of training and practice, lineage, outreach, public support and social legitimacy, quality of care, efficacy, complications, irrational practices, organizational support, interactions with the mainstream and the future prospects of the profession are other aspects which are poorly explored.

Public health role

For most healers, healing is a part-time vocation and not a livelihood activity. In rural communities healers carry on to fill health sector roles such as those of caregivers, health educators, family counsellors or community therapists, and often carry out wider community functions as priests, ritual specialists, diviners, teachers, moral and ethical guides, and community leaders. Unlike private practitioners of modern medicine, many healers also cater to preventive as well as promotive health care aspects in the community and thus retain a significant, yet unacknowledged, public health character.

Dynamic character

Owing to the dynamic nature of tradition, their knowledge is not static in time and a lot of practitioners have adapted to contemporary times by integrating modern knowledge and technologies in their practice (McMillen, 2004). Most have also been proficient with newly emerging conditions and have acclimatized to rapid changes such as urbanization and globalization. There is also a tendency for healers to migrate from communities to nearby townships, suburbs and cities. In a number of cases they have been successful in amassing wealth and thus are objects of envy of local conventional medical professionals. Such changes also indicate an alienation of such healers and their changing roles from the community health focus and community supported position, to more individualized and commoditized practices. In countries like India, studies suggest that the number of young entrants to the vocation is low, indicating rapid erosion of the tradition.

Reasons for wide presence

A World Health Organization (WHO) report (2002) cites studies of Uganda, Tanzania and Zambia, where the ratio between healer and population is 1:200 to 1:400, while the ratio of allopathic practitioners to population is 1:20000. In India, according to official sources, traditional medicine is the only available source of health care for 65 per cent of its population (WHO, 2002: 13). Data from the Department of Indian Systems of Medicine, Government of India (2001) indicate that there are around 200,000 non-institutionally qualified, registered practitioners in the country, while a substantial number of healers are still unregistered. Even with the existing data and conservative estimates, this means that for every 1500 of population there is a healer (Abraham, 2005). Thus high per capita distribution of local healers in developing countries is an important reason for their widespread use. Easy access, cost efficacy, cultural familiarity and better cultural cognition by healers, flexible fee payment systems (outcome payment) and efficacy are a few other reasons for continued use of local healers.

Challenges

In the development discourse, healers have been diversely described: often negatively, as stumbling blocks, quacks and witchcraft practitioners; and on a positive note as gatekeepers, counsellors, local development leaders, carriers of cultural identities and so on. Integration perspectives

also vary from romantic (all practitioners are knowledgeable and rational) to utilitarian (can be selectively utilized for diseases or finding new drugs) to complementary (can play a complementary role) views. Although there was a feeling that healers would disappear as the countries achieve economic progress and modern medical facilities improve in various regions, the number of local healers has continued to rise in many developing countries (Green, 1996: 20). There have been numerous initiatives both by colonial or post-independence states to outlaw such practices (Tabuti et al., 2003: 120) but it is being realized that traditional healers cannot be wished away from the health sector. Despite the fact that many countries have formulated policies for integration of traditional healers in the implementation of national health programmes, they have continuously failed for a variety of reasons discussed in the following section.

Recognition and regulation

Issues related to local healers include, among others, lack of recognition and regulations, inadequate government support as well as reduced community support, erosion of knowledge due to lack of successors, conflicts with mainstream medical professions and negative propaganda, insufficient research support, quackery and irrational practices in the name of professions, restrictive regulation of resource access (such as collection of medicinal plants) and insufficient efforts for conservation of rare plants, inadequate intellectual property protection and incompatibility of local ownership values with contemporary regulations.

Recognition or regulation of healers across regions represents a mixed bag. Most countries are apprehensive that mainstreaming healers would promote quackery and subsequently lead to a chaotic situation. While some countries have completely banned traditional healers from practising, or have exerted too much control (Green, 1996: 20; Stangeland et al., 2008: 290), others have either been negligent or tried to selectively integrate them in specific health concerns such as AIDS or tuberculosis, thus recognizing and restricting them to certain specific roles such as community health workers. Redefining such roles often also results in a loss of traditional community status of healers. Though in many countries registration of such practitioners is mandatory, most healers continue their practice without any such registration. Even in places where there is registration, uncertainty exists in protection of rights of both patients and healers as the definition of traditional healers is often ambiguous.² Often it also leads to highly unregulated as well as irrational practices among such practitioners, resulting in the tagging of all practitioners as quacks

by the conventional system. Efforts for wage compensation for healers or birth attendants in the role of community health workers in the past have also failed due to an array of reasons, such as increase in fiscal burden for the health sector, inadequate compensation, healers having better income through private practice and weakening of their community roles while undertaking such a position.

Healers continue to be unorganized, although in many countries there are local or national networks, councils and accreditation systems for healers. After many governments have promoted self-regulation as a key instrument of regulating local healers, the practice is becoming a widespread trend in promoting traditional practitioners in many regions. Such councils have been introduced for training, professional development, accreditation and so forth. However, there are insufficient studies on the functioning, public accountability and effectiveness of such efforts.

Irrational practices

This is a major concern. Medical literature, especially from Africa, on orthopaedic traditions is filled with stories of irrational practices and complication arising from the management by local healers. Similar instances have been noted in Indian studies too. This is mainly due to young entrants who have no experience or family tradition. Identifying such inexperienced practitioners and unethical practices is a major challenge. A further cause for concern is the use of modern medicines and technologies without adequate knowledge by the healers. While such usage is permitted in some regions among healers in the name of technology transfer for promoting access in serious conditions, it is often criticized as creating high expectations from healers and leading to uncontrolled situations (Green, 1996).

Insufficient awareness of intellectual property rights aspects

In most societies, healers' knowledge is secretive and is not in the public domain. However, in many countries, following the introduction of biodiversity regulations, knowledge associated with biological resources is attempted to be protected through a process of documentation with inadequate protection of individual rights. This points to a fair degree of thoughtlessness by governments who, while not recognizing healers as legitimate practitioners, strive to retain a right to the knowledge related to their practices.

Communication gap with modern health practitioners and the public health system

Often ambiguities in regulations strain referrals and relationships between conventional practitioners and local healers. Non-disclosure of complementary therapies used along with conventional medicines by patients during allopathic consultation is as high as 77 per cent, which makes it difficult to make an efficacy assessment of therapies (Bodeker and Burford, 2007: 14). In countries like India where there is already a formalized traditional medicine education, local healers also face contempt from institutionally trained traditional physicians.

Institutionalization and experiential aspects

Traditional medical knowledge is highly subjective and experience based. There are many finer elements practised by healers such as pulse reading, *marma* (vital points) and urine diagnosis, which cannot be taught or learned in an institutional context. Several such subtle aspects have disappeared from the Ayurveda institutional way of learning today in India. Healers with substantial practical knowledge of *marma* have become rare, indicating a national loss to the country.

Documentation is considered by many governments and civil society groups as a way to protect and prevent loss of community knowledge. Many of the above-mentioned experiential aspects cannot be captured in such codification. Though documentation has advantages in terms of discouraging unethical commercial use, mere documentation cannot contribute to revitalization of such knowledge. Revitalization involves a sensitive approach of reviving the social processes of such traditions, identifying their contemporary relevance and promoting them (Shankar and Unnikrishnan, 2004). Hence a comprehensive strategy to identify and recognize such oral and experiential aspects as cultural heritage and to document, preserve and promote them is an immediate requirement.

Presence in multilateral policies on traditional medicine

There are several multilateral policy instruments on traditional medicine apart from an array of WHO policies and guidelines. Some of the important instruments include The United Nations Environment Program (UNEP) conceptual framework on poverty and ecosystem³ (ability to use traditional medicine is one of the ten resources of well-being); the UN Conference on Trade and Development (UNCTAD) (on protection of traditional knowledge and also promoting trade and development opportunities for developing countries through traditional medicine)⁴; the

United Nations Declaration on the Rights of Indigenous Peoples 2007⁵ (on the right to use traditional medicines); Indigenous and Tribal Peoples Convention (ILO) 1989;⁶ the World Intellectual Property Organization (WIPO)⁷ initiatives on protection of traditional medical knowledge; and the United Nations Committee on Economic, Social and Cultural Rights resolution 2000⁸ that places an obligation on parties to ensure the right to the highest attainable standard of health, “to refrain from prohibiting or impeding traditional preventive care, healing practices and medicines”. Other international organizations such as the Commonwealth Secretariat, European Union, World Bank and World Trade Organization, Ford Foundation and World Wide Fund for Nature (WWF) also have various policy documents on traditional medicine. Though these uphold traditional medicine, cultural knowledge, community rights and the like, healers’ issues do not find a significant place in any of these policy instruments, as is the case even in the various traditional knowledge and biodiversity related multilateral conventions. Insufficient guidance from international policies certainly hampers implementation at the national levels.

Integration efforts

Integration is often criticized as a one-way flow of knowledge through targeted training, exploitation of healers, under-utilization, non-critical assessment of their value, biomedicalization of traditional knowledge and so on. Since the early 1920s, isolated episodes of traditional birth attendant training were undertaken by colonial powers and missionaries in the non-western world (Kruske and Barclay, 2004: 306). What started as organized TBA training to lower the high maternal and infant mortality and morbidity rates in the 1970s, and continued for two decades, was abandoned on the introduction of the concept of “skilled attendants” to which category these local women did not belong. The definition of skilled attendants excluded TBAs and resulted in the subsequent withdrawal of funding for TBA training globally. It was also owing to this fact that despite the growth of TBA training programmes, maternal mortality did not decrease (Kruske and Barclay, 2004). Cultural insensitivity, non-objective assessment of reasons for mortality, non-inclusion of local knowledge into the curricula, a hierarchical work culture, healer subordination and a one-way flow of knowledge are identified as some major gaps in such training programmes (Pigg, 1995; Sadgopal, 2009). While the early recommendations for inclusion of healers in health programmes were to fill the gap of human resources, the recent ones are based on the requirement of filling a cultural gap in development efforts and local contextual realities in which healers are identified as the gatekeepers (Van der Geest, 1997). The current interest in healers’ knowledge is also for

drug development, though this has been dwindling due to changing pharmaceutical priorities and commercial interests.

WHO continues to state that:

Traditional health practitioners (THPs) are a valuable resource that already exists in most communities. The training and utilization of these practitioners in primary healthcare, working in close collaboration with conventional health staff, can be expected to contribute, in many countries substantially, to obtaining more practical, effective, and culturally acceptable health systems for communities. (WHO, 1995)

It further says that:

Collaboration with health workers, other THPs, and community leaders is one way to improve health care in the community. Collaboration means pooling resources (health staff and health services) where both modern health staff and THPs work together toward a common goal. Each can refer patients to the care-giver who is best qualified to provide specific health service.⁹

This was again reiterated at the 2008 World Congress on Traditional Medicine held in China, that “Governments should establish systems for the qualification, accreditation or licensing of traditional medicine practitioners. Traditional medicine practitioners should upgrade their knowledge and skills based on national requirements.”

There have been several attempts to strengthen local healers supported by civil society groups and non-governmental organizations. According to WHO there were twenty-three countries in Africa alone that had healer organizations in 1985, and several more countries have formed local, regional or national associations subsequently (Green 1996: 27; WHO 2002: 17). However, such networks at national level have been short-lived. Some of the recent initiatives have been specific to tackling issues such as AIDS. Liaising with communities plays a major role in such efforts, apart from psychological counselling and treating opportunistic infections.

It is often hard for a national government to respond to the demands of healer associations. In a decentralized political environment, local governments can play a central role in incorporating them. This will enhance public accountability and responsiveness among healer networks as well as governments. Similarly, NGOs and civil society groups also can play a central role. However, over a period the enthusiasm dies out among such organizations, leading to dilemmas for both NGOs and healer networks. Mostly this is owing to lack of clarity of vision, leadership issues, external fund-based programmes, changing policy environments and so on.

An inclusive development approach

With multilateral bodies such as WHO continuing to voice the relevance of local healers for the last four decades, currently there is insufficient data of successful models of integration and appropriate regulation. Why is it that there are no sufficient models of constructive engagement with such healers? Who should be engaging more with the healers – local governments, civil society groups or others? Why is it that such attempts are short-lived and both the promoters as well as healers end up in a dilemma? Another pertinent question is if and how certain aspects of health knowledge production can continue to remain in the informal domain and benefit development programmes. Would it be possible for a learning system to be created where there is place for such individuals to share their experiences in formal education?

Most governments have supported healers' programmes only as an interim measure until modern medical facilities became available to the entire population. However, universal health remains a far-fetched dream as reflected in various multinational campaigns such as "Health for all by 2000", "Millennium Development Goals" and so on. Sustainable development advocates have reiterated the necessity of an inclusive, endogenous development approach. A point emphasized time and again is that in such an approach, self-reliance becomes a key characteristic as opposed to the current institutionalized health delivery system. Recognizing the value of local resources, integrating them and sensitively filling their lacunae are essential. Denmark offers some direction for a solution to this dilemma in the health sector. In the Danish Practice of Medicine Act, entitlement to provide therapy belongs to everyone. It says "anyone may care for the ill" regardless of education, within certain limitations (Hog, 2005). While it will be a daunting challenge in developing countries to maintain a balance between irrational and best practices, it is necessary to strengthen perspectives which empower communities such as "health in own hands" and "endogenous development" so as not to endlessly chase such universal dreams.

From a pragmatic view, for a responsive development of local health knowledge the first task would be to recognize the contributions by such practitioners. It is also important to carry out skill assessment and introduce appropriate orientation for local healers through such networks and councils. Local healer traditions are still not a livelihood dependent profession. So, for survival of such practices, an interaction between the formal and informal education is a necessity. Unlike institutionalized medicine, traditional medical practice is primarily healer or physician centred. Preventing loss of subtle skills and experiential knowledge and

Box 8.1 Revitalizing Local Healing Traditions in India

Foundation for Revitalization of Local Healing Traditions (FRLHT), a southern India based NGO, has been promoting local healer activities in various states across the country for the last two decades. Traditional healer networks have been formed at state and district levels which conduct regular meetings and exchanges among healers. Self-regulatory guidelines have evolved through a participatory process based on the contextual realities of each state. An excellence award is given every year to a chosen male and female healer in selected states at the state level annual convention. Healer networks, along with local level NGOs and government forest departments, have been actively engaged in supporting medicinal plant conservation programmes in various states and several herbal gardens have been initiated by these networks. Healers are also involved in documentation and participatory assessment of community knowledge for supporting primary health care programmes and action research interventions in key health issues such as malaria and anaemia initiated by the conservation network. Many regional exchange visits of healers have been conducted within the country as well as with healers of other countries of South Asia. An international healers' exchange programme involving healers from Africa, Latin America and other Asian countries has also been planned in 2009. After nearly a decade of creative engagement with the healers and community health sector, the Indian government's traditional medicine policy in 2002 recognized the role of local health traditions for the first time in the post-independence state. In 2007, a national consultative group on local health traditions was called by the health section of the Planning Commission and, following this, public financing has been initiated to support local healers' activities by the central government. Several similar efforts for supporting healers have been initiated in various states and speciality areas in the country by NGOs such as Chetna, Matrika, BAIF, Sambandh, Jan Jagran Vikas Samiti and Ladakh Society for Traditional Medicine, and government organizations such as KIRTARDS in Kerala state and the newly established North Eastern Institute of Folk Medicine in Arunachal Pradesh. Though these have had considerable impact on the local healers of the country, there is a long way to go before their efforts become successful public health models for other regions to learn from.

their epistemology is central. It is also necessary to encourage sharing of these experiences through appropriate forums with respect to knowledge preservation, transmission and enhancement according to the highest contextual standards of the tradition. It is noteworthy that most of the institutionalized part of traditional medicine has been generated through the hard work of such healers. Through the erosion of local healers and community elders, the local value systems are also changing at a rapid pace. It is important to prevent this through introduction of their concepts in formal educational curricula and informal learning and community learning through participation of such healers. Clearly, there is a need for more academic research support from both social and natural sciences for the sector.

Conclusion

An undeniable fact is that traditional healers continue to carry out a significant function in our health sector. Similarly, community elders have a central role to play in endogenous development, and their recognition and constructive involvement are central, moving beyond merely celebrating “respect for elders” days. In primary health care as well as care for major disease conditions like HIV/AIDS, malaria and other parasitic conditions, diarrhoea, and several chronic and lifestyle diseases, traditional healers, their knowledge and their accessibility have a key role and this should be recognized and promoted. Various pilot models for promotion of traditional medical practices suggest that it is time for massive public investment and promotion of such successful models for suitably integrating them into each country’s health care programmes. Epistemological and cultural sensitivity is central for promotion of such practitioners and appropriate methodologies need to be evolved, for continuously evaluating such contributions.

Notes

1. Here the terms traditional medical practitioners, local, indigenous or traditional healers are used to indicate practitioners in communities who have no formal university-level training or are non-institutionally trained through apprenticeship under another practitioner or through self-learning. This excludes practitioners who have undergone formal training in systems such as Chinese medicine, Ayurveda or similar medical systems through university-level degree programmes in such systems and are part of a formalized health system. This also excludes the new, complementary and alternative medicine practitioners who are not traditionally linked to a community.
2. There have been numerous efforts to classify and define healers, yet it has just ended in an exercise of academic taxonomy and semantics (Green, 1996). See also Pigg (1995).

3. Available at <<http://www.unep.org/GC/GC22/Document/k0360114.pdf>> (accessed 20 January 2010).
4. Available at <<http://www.unctad.org/en/docs/c1d38.en.pdf>> (accessed 20 January 2010) and <<http://www.unctad.org/en/docs/c1em13d2.en.pdf>> (accessed 20 January 2010).
5. Available at <http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf> (accessed 20 January 2010).
6. Available at <<http://www.ilo.org/ilolex/cgi-lex/convde.pl?C169>> (accessed 20 January 2010).
7. Available at <http://www.wipo.int/freepublications/en/tk/920/wipo_pub_920.pdf> (accessed 20 January 2010).
8. Available at <<http://www.unhcr.ch/tbs/doc.nsf/%28symbol%29/E.C.12.2000.4.En>> (accessed 20 January 2010).
9. Available at <<http://apps.who.int/medicinedocs/pdf/h2940e/h2940e.pdf>> (accessed 20 January 2010).

REFERENCES

- Abraham, L. (2005) "Indian systems of medicine (ISM) and public health care in India", in L. V. Gangolli, R. Duggal and A. Shukla (eds), *Review of Healthcare in India*. Mumbai: Centre for Enquiry Into Health and Allied Themes, pp. 187–223.
- Bodeker, G. and G. Burford (2007) *Traditional, Complementary and Alternative Medicine Policy and Public Health Perspectives*. London: Imperial College Press.
- Government of India (2001) *Indian Systems of Medicine and Homeopathy in India*, 2001. Planning and Evaluation Cell, Ministry of Health and Family Welfare.
- Green, Edward C. (1999) *Indigenous Healers and the African State: Policy Issues Concerning African Indigenous Healers in Mozambique and Southern Africa*. New York: Pact Publications.
- Hog, Erling (2005) "Regional overview: European region – Kingdom of Denmark", in G. Bodeker, C. K. Ong, C. Grundy, G. Burford and K. Shein (eds), *WHO Global Atlas on Traditional, Complementary and Alternative Medicine*. Kobe, Japan: WHO Centre for Health and Development, pp. 109–116.
- Kruske, S. and Lesley Barclay (2004) "Effect of shifting policies on traditional birth attendant training", *Journal of Midwifery and Women's Health* 49(4): 306–311.
- McMillen, H. (2004) "The adapting healer: pioneering through shifting epidemiological and sociocultural landscapes", *Social Science and Medicine* 59: 889–902.
- Pigg, S. L. (1995) "Acronyms of effacement: traditional medical practitioners (TMP) in international health development", *Social Science and Medicine* 41(1): 47–68.
- Sadgopal, M. (2009) "Can maternity services open up to the indigenous traditions of midwifery?", *Economic and Political Weekly* 44(16): 52–59.
- Shankar, D. and P. M. Unnikrishnan (eds) (2004) *Challenging the Indian Medical Heritage*. New Delhi: Foundation Books.

- Stangeland, T., S. S. Dhillion and H. Reksten (2008) "Recognition and development of traditional medicine in Tanzania", *Journal of Ethnopharmacology* 117: 290–299.
- Tabuti, J. R. S., S. S. Dhillion and K. A. Lye (2003) "Traditional medicine in Bulamogi County, Uganda: its practitioners, users and viability", *Journal of Ethnopharmacology* 85: 119–129.
- Unnikrishnan, P. M., L. Kumar and D. Shankar (forthcoming) "Traditional orthopaedic practitioners' place in contemporary health", in K. Sheikh and A. George (eds), *Health Providers in India: On the Frontlines of Change*. New Delhi: Routledge.
- Van der Geest, S. (1997) "Is there a role for traditional medicine in basic health services in Africa? A plea for a community perspective", *Tropical Medicine and International Health* 2(9): 903–911.
- WHO (World Health Organization) (1995) *Guidelines for Training Traditional Health Practitioners in Primary Health Care*. Geneva: WHO.
- WHO (World Health Organization) (2002) *WHO Traditional Medicine Strategy 2002–2005*. Geneva: WHO.

9

Traditional knowledge: From environmental management to territorial development

Guillen Calvo Valderrama and Salvatore Arico

Introduction

Since the advent of the global economy, local forms of knowledge and practices related to the utilization of natural resources have tended towards an increased homogenization, which in turn has determined a reduction of both the biological and cultural diversity associated with that knowledge and those practices. There is a growing recognition that, on one side, the full body of knowledge embedded in traditional practices associated with natural resource management constitutes a vital heritage that should be preserved and enhanced; and, on the other side, that reduced diversity (biological and cultural) makes the world and its inhabitants increasingly vulnerable to natural and human-induced changes. The past decades have therefore seen a rise of interest in the biological and cultural dimensions of diversity, the interactions between them and their connection to social and economic development (Persic and Martin, 2008). This has resulted in an increased awareness of the crucial role that traditional knowledge plays in sustainable development. In this context, national and international policy processes for the protection of traditional knowledge of indigenous peoples and local communities are under way in various fora. At the international level, these include, *inter alia*, the Convention on Biological Diversity (CBD), the World Intellectual Property Organization, the World Trade Organization, the Convention on the Protection of Intangible Cultural Heritage under the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the

International Treaty on Plant Genetic Resources for Food and Agriculture under the Food and Agriculture Organization (FAO) of the United Nations.

With time, and especially since the general adoption of the notion of “sustainable development” at the Rio Summit in 1992, development paradigms evolved from a very reductionist and segmented vision of development to a more holistic, multidisciplinary approach that relies on the promotion of “knowledge dialogues”; that is, dialogues among different knowledge systems. In the area of natural resource management, this paradigm shift results from the observation that reductionistic science, as opposed to more holistic knowledge and different ways of knowing, has largely failed in promoting sustainable pathways for natural resource management (Pimbert, 2006).

The “rehabilitation” of traditional knowledge in relation to natural resource management is part of the evolution of the way we consider the potential contributions of different forms of knowledge to dealing with issues related to sustainable development. An important step in the recognition of the contribution of traditional knowledge to sustainable development has been the specific mentioning of it in the text of relevant international legal instruments, in particular the CBD and the Convention on the Protection of Intangible Cultural Heritage.

In this regard, a clarification needs to be made. The CBD does not provide a *per se* definition of traditional knowledge. According to Article 8(j) of the Convention, traditional knowledge can be described as indigenous and local knowledge, practices and innovations that contribute to the achievement of the three objectives of the CBD and which, therefore, should be respected, preserved and maintained, and the application of which should be widely promoted with the approval and involvement of the holders of such knowledge, practices and innovations.¹

Two questions arise from a critical reading of the Convention’s text in relation to the definition of traditional knowledge. One is the qualification that traditional knowledge is to be held by indigenous and local communities “embodying traditional lifestyles”. This statement is open to discussion in that the attribution of the function of traditional knowledge holder should encompass *all* indigenous and local communities that prove to hold knowledge and related applications that are useful for realizing the objectives of the Convention, including those communities embodying non-traditional lifestyles. The other question relates to the fact that traditional knowledge applications which have been widely utilized have in most cases not benefited from the approval and involvement of the holders of this knowledge. Hence, there is a need to fully define the rules of access to and the sharing of benefits arising from the utilization of traditional knowledge, in the context of relevant intergovernmental

processes. Both questions, which are worthy of mention but fall beyond the direct scope of the chapter, are treated in relevant chapters of this book, in particular those dealing with communities and ethics and equity.

A more recent evolution in our perceptions of and opinions on the contribution of different forms of knowledge to solving issues related to sustainable development relates to a “scale shift” whereby traditional knowledge is seen not only as a tool to preserve and enhance the value of natural resources but also as a potential vehicle for sustainable territorial development strategies and plans. In this chapter, we advocate that traditional knowledge has with time become an important asset for planning and development beyond its direct environmental management applications at the local level. In essence, we attempt to provide evidence that traditional knowledge is an important ingredient of planning for sustainable development.

The chapter starts with a recollection of the evolution of traditional knowledge applications, which conventionally used to relate to traditional management systems. The notion and examples of ingeniously managed systems are used to illustrate how traditional knowledge has been used to promote development and early landscape level planning at a time when planning in the modern meaning of the term did not exist. The contribution of traditional knowledge to innovation is then briefly illustrated. The chapter also summarizes considerations on traditional knowledge and multiple scales and epistemological systems of environmental management. Finally, through examples pertaining to specific ecosystems and then a general discussion, the contribution of traditional knowledge to territorial development is further articulated and demonstrated.

The role of traditional knowledge in territorial development

Traditional knowledge, innovations and practices of local communities are collectively held and inextricably linked to natural resource use and environmental management. The preservation and value-enhancement of this link is opening innovative pathways for scaling-up the contribution of traditional knowledge to rural development strategies at the territorial level, through the creation of economic clusters based on the promotion of local identities throughout the territory.

Different concepts and approaches illustrate this emerging recognition of the role of traditional knowledge in territorial development, especially in rural areas, such as: 1/ the French concept of *terroir* – an idiomatic expression used to characterize the relationship between a rural community and its natural environment (Louafi et al., 2005) that relies on traditional knowledge and know-how which serve as a basis for the production of goods and services linked to a specific territory; 2/ the Spanish concept of

desarrollo territorial rural con identidad cultural developed by the Latin American platform RIMISP (Centro Latinoamericano para el Desarrollo Rural), which illustrates development strategies in rural territories that promote market access on the basis of goods and services linked with specific identities; 3/ the Japanese concept of *satoyama*, which relates to the traditional agricultural landscape of Japan and the strong interactions that exist between local communities, traditional knowledge and natural resource management in those areas.

Despite some differences among them, all of these approaches advocate that cultural factors and expressions associated with traditional knowledge appear important not only in maintaining a rich biological diversity at the territorial level; they may also become the basis of new types of income-generating activities contributing to biodiversity conservation and sustainable natural resource management that have the potential to strengthen communities' ownership of local identities and culture.

These approaches may be part of a broader movement of thought reflecting a new way of looking at culture in general, and more specifically at local heritage. In this context, greater emphasis is placed on the distinct cultural and ecological character of traditional knowledge. Therefore, the interactions between biological and cultural diversity are perceived as components of local "biocultural" heritage, and such local knowledge systems analysed through their different cultural, biological and landscape components.

For example, the preservation of traditional animal breeds and the associated culinary heritages can go beyond the recovery of production systems showing strong genetic and cultural identities and can result in the maintenance of networks of traditional and local forms of knowledge promoting the conservation of biodiversity and of tangible and intangible heritage, at the landscape level. This way of looking at biological-cultural diversity interactions not only highlights the contribution of traditional knowledge to management at higher scales than the local scale, but also makes it possible to reconsider the notion of local heritage in a more dynamic and comprehensive way.

If we assume that sustainable territorial rural development strategies should be based on the diversification of activities and should be value-adding from the local to higher levels, revitalizing traditional livelihood systems and resource management practices could become an important leverage to fulfil these objectives. The explicit recognition and integration of traditional knowledge in territorial development plans and programmes is necessary if sustainable development initiatives are to be effectively implemented. Embedded local cultures and, in particular, traditional knowledge are key features of the potential comparative advantage of rural communities to achieve sustainable environmental

Box 9.1 Traditional environmental management and the worldview of the James Bay Cree People

Forms of territorial systems found among the James Bay Cree People, who live in eastern subarctic Canada, are of the communal property type. Each community holds a communal territory that is further subdivided into hunting territories of family groups. A senior hunter leads each group and enforces the community's rules. Only members of the family or people invited by them are permitted to trap and hunt animals on this land, but it is generally understood that any community member can hunt or fish to feed his or her family. Violations of general rules of hunting, fishing and trapping are dealt with through customary law and enforced by social sanction. Hunting rights limit the number of hunters who can operate in the family territories and in the communal territory as a whole. This way, high levels of productivity can be obtained with a limited hunting pressure. Where the human population is large and growing, the territory system can have the effect of limiting the number of active hunters and stabilizing the overall hunting pressure.

In the Cree worldview, it is the animals that control the success of the hunt, and hunters have obligations to show respect to the animals. Another important principle that characterizes the Cree worldview is the belief that the continued use of resources is important to achieve a sustainable, productive harvest. The tallyman (a senior hunter in charge of a territory, a steward) takes care of the land so that the beavers continue to be productive. "Taking care of the land" means not killing too many. A trapper paces himself, killing what he needs and what can be prepared by the women, so that there is no wastage of meat and fur, and respect for the animals is maintained. He should also make sure that the area is rested by rotating the sectors of the area of hunting.

Normally a trapper should rest parts of his land for two or three years but no more than four years. If he leaves it, say, for ten years, he is not properly using his area, and the beaver will not be plentiful. The concept of resting the hunting area is fairly well known. Many Cree trappers divide their territory into three or four sectors. They hunt and trap only in one sector at a time, and "rest" the others, as in fallowing in agriculture. The trapper continually observes the environment and monitors the health of the beaver-vegetation system. He observes changes in vegetation, beaver tooth marks on cut wood to estimate the age composition of beaver in lodges and looks for other evidence of overcrowding, such as fighting among the beaver. The practice of resting an area, followed by heavy harvesting of beaver, keeps the system from reaching the critical point at which food would be depleted. Thus,

Box 9.1 (cont.)

in the Cree worldview, both overuse and underuse can lead to a drop in productivity.

Traditional systems inspire a new resource management science open to the participation of resource users in management, one that uses locally grounded alternatives to top-down centralized resource management. Subsidiarity is the general principle here: using as much local-level management as possible, and only so much government regulation as necessary. This helps humanize resource management, addressing local needs and taking into account local knowledge, practice and values. Respect for indigenous knowledge and management systems levels the playing field, and helps find a new balance against an expert-dominated positivist science.

Source: Adapted from Berkes (2008) with kind permission of Fikret Berkes and the copyright holders (Taylor & Francis).

management. Long histories of cultural richness and diversity have the potential to be mobilized for the conservation of biodiversity and the maintenance of ecosystem services on which human well-being depends. Moreover, if capitalized upon, these attributes can become a source of new competitive sustainable economies in the local, regional and global marketplace.

Traditional knowledge and traditional management systems

Traditional management systems have evolved over thousands of years to seamlessly integrate with their respective regional ecosystems; to the point that ecosystems and landscapes can and should be looked at as “biocultural” entities (Bridgewater and Arico, 2002).

Traditional management systems exhibit central features of sustainability: they are well adapted to their particular environments, rely on local resources, are small-scale and decentralized, tend to conserve the natural resource base and ensure continued ecosystem services.

Through their reliance on and interactions with nature and natural resources, communities have acquired an immense knowledge of their natural environment. Nevertheless, over the past fifty years, new uniform crop varieties have replaced thousands of local varieties throughout vast production areas of the territory, and more than 20 per cent of the breeds documented with population figures are at risk of extinction. Sixty breeds have been lost during the last five years – an average of one breed per

month, and many others have yet to be formally identified and may disappear before anything is known about them. It is now clear that increased specialization at the field, farm and territorial levels has considerably reduced biodiversity, ecosystem functions and ecological resilience, which in turn has increased the level of vulnerability to natural and human-induced changes.

These findings have contributed to rising global awareness of the necessity to conserve, adequately value and capitalize upon traditional management systems and practices that have succeeded in addressing issues related to sustainable management of natural resources, maintenance of ecosystem services, management of diversity to satisfy, for example, nutritional and income needs, pest and disease control, and mitigation of and adaptation to abiotic stresses (e.g. soil erosion, soil acidification, eutrophication, the effects of climatic variability) in specific local situations.

The demonstration that, using inventive self-reliance, experiential knowledge and locally available resources, indigenous farmers have often succeeded in developing farming systems with sustained yields is not a recent finding (Harwood, 1979; Reijntjes et al., 1992). On the other hand, there is now growing recognition of the multiple functions of traditionally-managed agro-ecosystems at the territorial level. These systems have multiple functions which modern, uniformed conventional systems lack, namely, they embody diversity – biodiversity, diversity of ownership, of cropping systems, of landscapes, cultures and traditions.

Knowledge plays a crucial role in building sustainable relations between man and the biosphere. Hence, knowledge is important because it shapes society not only through its practical applications such as technology, but also through instilling values and assumptions which motivate human beings and inform national policies (Pimbert, 2006).

In essence, traditional knowledge and traditional management systems constitute a unique capital and an asset of fundamental value for the future of humankind. However, these systems will not be maintained *per se*. The challenge lies in nurturing and implementing a paradigm shift giving emphasis to management systems based on diversity of knowledge and practices. Moreover, it will be necessary to promote a shift from standardized management systems, which rely on reductionist knowledge and a positivist approach, towards a mosaic of traditional management systems, which tend to rely on traditional knowledge and a constructivist approach.

Finally, these different types of traditional and local knowledge systems, as well as scientific knowledge systems, will need to engage into a true knowledge dialogue, each trusting on the other in order to identify adaptive solutions to sustainable development that reflect changing natural and socio-economic conditions.

Traditional knowledge and indigenously managed systems

Indigenous “agri-cultural” systems are recognized for having contributed to the production and delivery of important goods and services throughout centuries, based on innovative traditional and local knowledge systems. The FAO initiative on Globally Important Agricultural Heritage Systems (GIAHS) provides a platform for the identification of case studies and other information that will constitute a base for the safeguard and support of these systems (FAO, 2009).

The GIAHS Project has benefited from experience gathered in the context of UNESCO’s World Heritage Convention, especially in relation to the Convention’s category of continuing, organically evolved landscapes.

For the purpose of this chapter, emphasis will be put on the following criteria for identifying and selecting indigenous “agri-cultural” systems:

- outstanding characteristics in terms of biodiversity and ecosystem functioning, landscape and land and water resource management, food and livelihood security, social organization and culture, knowledge systems and farmers’ technologies, and other environmental benefits of global importance or specific features such as archaeological/historic value or contribution to political stability;
- global significance, which entails the provision of global public goods and heritage deserving economic valuation and value-added attribution in terms of global benefits through global heritage recognition such as labelling and World Heritage and Conservation.

Current GIAHS sites include a number of pilots being implemented worldwide in Algeria and Tunisia (oases of the Maghreb), Chile (Chiloé agriculture), China (rice-fish agriculture), Kenya and Tanzania (Maasai pastoral systems), Peru (Andean agriculture), and the Philippines (Ifugao rice terraces). Moreover, candidate sites have been identified in the Carpathian Region (traditional agro-ecosystems), India (Koraput agriculture, Soppina Bettas systems), Iran (Qanat irrigation systems, Qashqai nomadic pastoralism), Italy (lemon gardens in southern Italy), Mexico (Milpa-Solar systems, Chinampa agriculture), and Sri Lanka (Wewe irrigation systems).

Bridgewater et al. (2007: 406) advocate that “[c]ultural heritage is obviously a deeply human phenomenon, but now we understand more clearly the role humans – and their heritage – have had, and continue to have on what is often called ‘natural heritage’. In effect we believe this to be a false dichotomy, and that the two forms of heritage are but two sides of the same coin, and a reflection of the two diversities. For simplicity . . . we will speak only about diversity, but always with the heritage background outlined above.”

Therefore, traditional knowledge underlying agricultural and other heritage systems should also be considered as common heritage and be dealt with as such, which entails a number of implications, especially from the standpoint of access to, and the sharing of benefits derived from the utilization of, such knowledge. This should be taken into due account in the context of relevant international policy fora.

At the same time, considering only knowledge associated with application of “outstanding value” would exclude knowledge and practices “less deserving (because less aesthetically beautiful or less ‘indigenous’) than others nonetheless providing ecological benefits that are crucial to the populations inhabiting them; contrariwise, sites that are ecologically simplified due to human activity may retain high cultural values according to the World Heritage criteria” (Bridgewater et al., 2007: 410).

Traditional knowledge and innovation

Tindemans (2005) distinguishes “experiential” from “science-based” knowledge but recognizes that the former is part of the factors that ensure the production of goods and services on which depend highly valued benefits such as a sustainable environment, good health care and different forms of cultural expression.

Traditional and science-based knowledge interact synergistically in the making of scientific discoveries and the development of related commercial and non-commercial applications. Moreover, often when a given discovery is made, it is difficult to discriminate between the contribution by traditional knowledge to that particular discovery and the contribution made by science-based knowledge. Hence, traditional knowledge should be considered as an integral part of innovation systems.

Many scientific discoveries and related applications have relied significantly on traditional knowledge, especially with regard to pharmaceutical and industrial applications of biodiversity (Leary et al., 2009; Gokhale, 2009, personal communication).

The UNESCO Programme on Local and Indigenous Knowledge Systems (LINKS) has identified many applications of traditional knowledge that are important for environmental management. They include, *inter alia*: the Mayangna forest knowledge systems in the Mesoamerican corridor; fishers’ knowledge in fisheries science and management from around the globe; community knowledge for sustainable water resource management; and Small Islands knowledge systems for the management of land and sea resources as exemplified by Solomon Islanders’ knowledge system (UNESCO, 2009).

Since issues related to environmental management are characterized by multi-scale processes, such as human and animal migrations, global

and climate change, and environmental policies from local to national and international scales, it remains to be assessed whether traditional knowledge can inform multiple scales of environmental management beyond the local scale.

Traditional knowledge and multiple scales of environmental management

Maintaining awareness of scale and the existence of more than one scale is a key factor in sustainable environmental management. The Millennium Ecosystem Assessment (MA) (2005) has overcome the issue of scale (that is, how to define an appropriate scale for assessing ecosystem services without knowing the scale at which those services are deployed and the rate and scale of ecosystem change) by adopting a multi-scale approach. This approach has provided the following advantages in assessing the status and trends of ecosystems:

- findings at any scale of a multi-scale assessment will be improved by information and perspectives from other scales;
- smaller-scale assessments will provide greater resolution of processes;
- conclusions of individual assessments are validated independently;
- response options are matched to the scale where decision-making takes place;
- assessments focused only on a particular ecosystem or particular nation are insufficient because some processes are global and because local goods, services, matter and energy are often transferred across regions.

An example of such multi-scale assessments of ecosystem services is the Southern Africa MA assessment, which included a regional assessment of the Southern Africa Development Community (SADC) Region, two river basin assessments nested within that region (Gariep and Zambezi) and a set of local community assessments.

The MA was undertaken on the assumptions that different groups involved in, and to benefit from, the assessment may have not only different needs but also diverse views. This assumption included diverse traditional knowledge and spiritual worldviews. For example, the MA conceptual framework had to be adapted to the views of the indigenous communities in Vilcanota, Peru, whose vision of the cosmos includes the notions of reciprocity (*Ayni*), the inseparability of space and time, the cyclical nature of all processes (*Pachakuti*), love (*Munay*), and working (*Llankay*) (which bring humans to a higher state of knowledge (*Yachay*) about their surroundings) and *Ayllu* (governance) – these being all important components of the Inca definition of ecosystems. The

Vilcanota conceptual framework also included multiple scales encompassing both the spatial and temporal factors and reflected the interlinkages between them, the recognition of which has allowed for the development of adaptive capacity by local communities, who consider change as part of life.

The MA has demonstrated that traditional knowledge is not confined to the local scale of environmental management but rather represents a grid through which the perceptions of the relationships of peoples with their environments are translated into a system of values and behaviours that will allow those relationships to continue to evolve and mutually adapt, at multiple scales, from local to global.

Issues related to traditional knowledge and territorial development in the terrestrial context

Territorial development strategies based on the conservation and enhanced value of traditional knowledge raise the issue of how traditional knowledge is characterized, preserved and valued. Analyses of experiences with traditional knowledge and their contribution to territorial development in the terrestrial context suggest two main types of approaches to dealing with the above: an endogenous force that relies on cultural affirmation and strategies for the conservation and transmission of traditional knowledge; and an exogenous force that finds its origin in the emerging demands from urban consumers and tourists for goods and services that are linked to specific territories and which are culturally marked.

The re-valorization of cultural resources and traditional knowledge can provide local actors with strategic capacity for endogenous development and for the harnessing of extra-local forces in a market economy (Jenkins, 2000). Yet, sustainable development strategies based on the valorization of traditional knowledge imply that this knowledge has been compiled, characterized, and that mechanisms of transmission to young generations have been put in place. The mechanisms which would allow such knowledge important for development to be maintained and transmitted are complex. National and local policies should be focused on developing “modern” and innovative systems of conservation and transmission of this knowledge while also relying on the local and traditional mechanisms already in place. The objective being to enhance community members’ ownership of the value and uniqueness of their knowledge that is important for environmental management and to link endogenous processes to exogenous demands so as to increase incomes for local communities based on the sustainable use of local resources.

Box 9.2 The intercontinental biosphere reserve of the Mediterranean, Morocco and Spain

Established by UNESCO in October 2006, this transboundary biosphere reserve represents a pioneering initiative, as this site represents the first transboundary protected area involving two countries in two continents.

The designated sites in the two countries, which are connected by a marine transition area, present strong similarities in terms of geology, ecology and cultural heritage. Additionally to its conservation and logistical function, this biosphere reserve fosters sustainable development, in particular for the rural communities of both shores. One of the specific development strategies included in the joint management plan aims at linking the booming demands from urban consumers for locally based products and for new forms of tourism with innovative territorial rural development initiatives. The development goal of the biosphere reserve is to go beyond “vertical” value chains and to build a cross-cutting process that will ultimately lead to the development of “baskets” of localized goods and services that are culturally marked and can be shared with visitors throughout the territory.

In this context, the diversity of cultural expressions and, more specifically, the entire body of traditional knowledge embedded in local food production and consumption systems and other natural resource uses become a powerful vehicle to foster sustainability in rural areas. In essence, local specificities that are a factor of differentiation also become a factor of competitiveness.

It has been observed that, in the context of this biosphere reserve, there are significant differences in the levels of economic development and welfare between populations on both shores. Whereas on the Spanish side multiple actions linking tourism, gastronomy and locally based products have been developed and implemented successfully, this type of initiative is still emerging on the Moroccan side. While the Rif Mountains of the northern region of Morocco represent a region of international significance from the standpoint of high levels of endemism of plant diversity (e.g. *Abies maroccana*), deforestation largely due to the illegal cultivation of cannabis, soil erosion, high rural population density and population growth constitute serious environmental threats and have already generated significant losses in terms of biodiversity and its associated knowledge.

In this difficult context, an innovative experience called “Chaouen Rural” was launched on the Moroccan side of the biosphere reserve with the support of a Catalan NGO. The initiative aims at gathering

Box 9.2 (cont.)

rural guest house owners to promote a new generation of tourism based on a strong and active interaction between visitors and the knowledge embedded in traditional management practices. This tourism is defined by UNESCO as “creative tourism”, or “travel directed toward an engaged and authentic experience, with participative learning in the arts, heritage, or special character of a place, [which] . . . provides a connection with those who reside in this place and create this living culture” (UNESCO, 2006). In the context of the Chaouen rural initiative, tourism activities include participation in the preparation of food in rural communities using traditional and local crops, introduction to the use of traditional herbs and medicinal plants, visiting culinary fairs during festivities, and purchasing of food products prepared in the community. This type of project, which is intended to be duplicated in other biosphere reserves and protected areas, shows that the attraction of tourists and urban consumers can contribute to improving the income of local rural communities while also strengthening their ownership of traditional knowledge and cultures.

In this context, the contribution of local and traditional cultures and knowledge systems to economies for sustainable territorial development is not limited to attracting tourism. Rather, traditional knowledge can act as a catalyst for other economic activities, as illustrated in Box 9.2.

Issues related to traditional knowledge and territorial development in the marine context

Traditional knowledge is increasingly recognized as a central element of the knowledge base for the integrated management of marine areas and the resources and biodiversity therein. In the marine environment, in the next twenty years, human activities will increase significantly. Sectors thus far considered as relying on “modern” science and technology are likely to soon become “traditional” (fisheries, oil and gas exploration, marine transportation, sand and gravel mining, marine recreation), and these uses will increasingly compete with new uses of the marine environment, namely, offshore renewable energy and aquaculture (Ehler and Douvere, 2009).

In the marine environment, climate change already poses several risks (such as increased flooding and intensity of other effects of natural disasters, sea-level rise), and the ongoing acidification of the oceans may also significantly alter marine ecosystems and the services they provide.

In this context, there is a need to rely on traditional knowledge of the marine environment as an important factor in adaptive management (Box 9.3).

Discussion

Traditional knowledge based on biological and cultural diversity is an important constituent of sustainable development at multiple scales, including at the territorial (landscape/seascape) level. In this regard, there is a need for it to be mainstreamed into sustainable environmental management.

A condition of success for the future will be to integrate traditional knowledge into sustainable economic markets based on the conservation and sustainable use of biodiversity and natural resources, and the maintenance and further valorization of associated culture, social organization and equitable sharing of the benefits derived from the application of traditional knowledge.

The integration of local and traditional knowledge into market-based strategies entails the risk of diluting the identity of knowledge and traditions, and also generating conflicts in the community if related incomes are not distributed in an equitable manner. One way of minimizing these risks is to combine traditional with technology-based innovation and other creative processes, thus ensuring that further value is added to the traditional knowledge being relied upon by each actor in the production process. This will make it possible to preserve the dynamic nature of traditional knowledge associated with the resources being utilized, the recognition of the proportionality of “factors of production” (both direct and supportive) (Suneetha and Pisupati, 2009) and the active and participatory engagement of all stakeholders concerned.

Another risk when exploring ways of enhancing the value of local bio-cultural heritage is the marginalization of knowledge that is not yet economically viable and/or knowledge that perhaps never will be so but which is part of our creative diversity and, as such, a potential source of development (Bindé, 2005).

Actions aimed at conserving and enhancing the value of traditional knowledge should be preceded by rigorous analyses of the different trade-offs related to the integration of traditional practices and know-how into market access strategies based on the promotion of goods and services bearing identity.

A brief analysis of different strategies which rely on the use of traditional knowledge applied to natural resources management as a leverage to foster sustainable development strategies indicates the existence of some “keys to success” that could be summarized as follows:

Box 9.3 Traditional perceptions of marine issues, related knowledge systems and implications for management

In the Pacific Region, the dominant perception of the marine environment is that of a broad cultural system “that do[es] not separate in a clear-cut way or at all the ocean from its constituents (coastal versus marine, pelagic versus benthic, etc.)”. In 2006, the representative of the International Indigenous Forum on Biodiversity (IIFB) stated in front of other participants in the eighth meeting of the governing body to the CBD that “[m]any Indigenous peoples have always had a significant relationship and body of traditional knowledge related to marine areas, even in what is known under the United Nations Convention on the Law of the Sea (UNCLOS) as the ‘high seas’” and that “[u]nlike the UN Law of the Sea, Indigenous peoples do not draw distinctions between different areas of the sea and assign different jurisdictions based on miles, such as the ‘Exclusive Economic Zone’ or the ‘high seas’” (Vierros et al., 2006). This perception may prove very useful with regard to the need to operationalize the ecosystem approach under the CBD.

Moreover, certain uses of marine resources by indigenous and local communities, including resources to be found in vulnerable areas such as seamounts (which are subject to intense destructive practices on behalf of modern uses such as fisheries relying on trawling nets), appear as sustainable, as exemplified by drop-line fishery for black scabbard fish (*Aphanopus carbo*) in Madeira, Portugal.

Indigenous peoples worldwide are traditional owners of many coastal areas and are therefore legitimately both stake- and right-holders.

In recent years, Marine Spatial Planning (MSP) has emerged as an important tool for anticipating and solving conflicts related to resource use and for the operationalization of ecosystem-based management, the ecosystem approach and integrated coastal and ocean plans and programmes (Ehler and Douvère, 2007, 2009).

A recommended step-by-step approach to MSP foresees the following main steps that relate directly and indirectly to local and indigenous communities: identifying needs and establishing authority; organizing the process through pre-planning; organizing stakeholder participation; defining and analysing existing and future conditions; preparing and approving the spatial management plan; implementing and enforcing the spatial management plan; monitoring and evaluating performance; and adapting the spatial management process (Ehler and Douvère, 2009).

The knowledge held by local and indigenous communities will be instrumental in implementing all these steps in relation to MSP, which in turn will be indispensable for the purpose of ensuring the sustainable management of the marine environment and its biodiversity and resources at various spatial and temporal scales.

- promote participatory, endogenous cultural affirmation processes as a prerequisite and a driver for the creation of collective dynamics around the conservation and promotion of traditional knowledge;
- encourage the consolidation of a large range of stakeholders: farmers, craftsfolk, artists, development stakeholders, cultural mediators, policy-makers, private sector representatives, etc. to initiate collective and sustainable dynamics at the local level;
- promote innovation and creativity as a deterrent to the process of artificialization and standardization of traditional knowledge;
- create specific spaces for exchanges between consumers and producers (farmers' markets, creative tourism strategies, etc.);
- build and develop local strategies for multicultural education and the transmission of traditional knowledge practices and know-how. These strategies should ultimately be based on knowledge systems – a living heritage that needs to be further characterized and transmitted intra- and inter-generationally in order to reduce its further loss.

The mainstreaming of traditional knowledge into sustainable territorial development would ensure recognition of the twofold contribution of traditional knowledge to sustainable development (related both to economies and to identities). Moreover, traditional knowledge will continue playing a key role with regard to ensuring the environmental pillar of sustainable development. The integration of traditional knowledge with territorial development strategies is crucial if sustainable development initiatives based on the conservation and enhanced value of living heritage are to be encouraged.

Note

1. Article 8(j) states: “[Each Contracting Party shall, as far as possible and as appropriate:] Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices”. Text of the Convention on Biological Diversity. Available at <<http://www.cbd.int/convention/convention.shtml>> (accessed 13 June 2009).

REFERENCES

- Berkes, F. (2008) *Sacred Ecology*. 2nd edn. New York and London: Routledge.
Bindé, J. (ed.) (2005) *Towards Knowledge Societies: UNESCO World Report*. Paris: UNESCO.

- Bridgewater, P. and S. Arico (2002) "Conserving and managing biodiversity sustainably: The roles of science and society", *Natural Resources Forum* 26(3): 245–248.
- Bridgewater, P., S. Arico, and John Scott (2007) "Biological diversity and cultural diversity: The heritage of nature and culture through the looking glass of multi-lateral agreements", *International Journal of Heritage Studies* 13(4-5): 405–419.
- Ehler, C. and F. Douvère (2007) "Visions for a sea change", *Report of the First International Workshop on Marine Spatial Planning, Intergovernmental Oceanographic Commission and Man and the Biosphere Programme, UNESCO. IOC Manual and Guides, No. 48.*
- Ehler, C. and F. Douvère (2009) *Marine Spatial Planning: A Step-by-step Approach toward Ecosystem-based Management*. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme, UNESCO. IOC Manual and Guides, No. 53.
- FAO (2009) *GIAHS (Globally Important Agricultural Heritage Systems) Project*. Available at <<http://www.fao.org/nr/giahs/giahs-home/en>> (accessed 13 July 2009).
- Gokhale, Yogesh (2009) Presentation at a UNESCO side event during the seventh meeting of the Ad Hoc Open-ended Working Group on Access and Benefit-sharing of the Convention on Biological Diversity, 2–8 April 2009, Paris, France.
- Harwood, R. R. (1979) *Small Farm Development: Understanding and Improving Farming Systems in the Humid Tropics*. Boulder, CO: Westview Press, p. 160.
- Jenkins, T. N. (2000) "Putting postmodernity into practice: Endogenous development and the role of traditional cultures in the rural development of marginal regions", *Ecological Economics* 34(3): 301–313.
- Leary, M., G. Vierros, G. Hamon, S. Arico and C. Monagle (2009) "Marine genetic resources: A review of scientific and commercial interest", *Marine Policy* 33: 183–194.
- Louafi, S., L. Bérard, M. Cegarra, M. Djama, P. Marchenay, B. Roussel and F. Verdeaux (2005) "Local ecological knowledge and practice: an original approach in France", *Analyses* 01: 11–17.
- MA (Millennium Ecosystem Assessment) (2005). Washington, DC: Island Press.
- Persic, A. and G. Martin (eds) (2008) *Links between Biological and Cultural Diversity: Concepts, Methods and Experiences*, report of the International Workshop. Paris: UNESCO.
- Pimbert, M. (2006) *Transforming Knowledge and Ways of Knowing for Food Sovereignty*. London: International Institute for Environment and Development.
- Reijntjes, C., B. Haverkort and A. Waters-Bayer (1992) *Farming for the Future*. London: Macmillan.
- Suneetha, M. S. and B. Pisupati (2009) *Benefit Sharing in ABS: Options and Elaborations*. Yokohama: UNU-IAS.
- Tindemans, P. (2005) "Producing knowledge and benefiting from it: The new rules of the game", in *UNESCO World Science Report 2005*. Paris: UNESCO.

UNESCO (2006) "Towards sustainable strategies for creative tourism 2006", UNESCO's Creative Cities Network discussion paper at the Planning Meeting for the 2008 International Conference on Creative Tourism in Santa Fe, New Mexico.

UNESCO LINKS Programme (2009) Available at <http://portal.unesco.org/science/en/ev.php-URL_ID=1945&URL_DO=DO_TOPIC&URL_SECTION=201.html> (accessed 13 July 2009).

Vierros, M., F. Douvere and S. Arico (2006) *Implementing the Ecosystem Approach in Open Ocean and Deep Sea Environments: An Analysis of Stakeholders, their Interests and Existing Approaches*. Yokohama: United Nations University Institute of Advanced Studies.

10

Traditional knowledge and biodiversity: Can the co-evolution of natural and social systems continue?

Suneetha M. Subramanian

Biological diversity (biodiversity) encompasses “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (CBD, 1992, Article 2). It is obvious that humans, as do other living beings, owe their survival and well-being to this diversity. Every production activity that we are involved in requires some “natural good or service”, be it in terms of food and beverage production systems, medicine, construction or manufacturing, marking the significance of biological diversity to our economies.

It is also an acknowledged fact that the livelihoods of traditional communities¹ are closely interlinked to the natural resources amidst which they live. Depending on the ecosystem, these include the flora, fauna from terrestrial and marine resources, abiotic resources, and related habitats. Given their long historical associations and observation of functioning and changes to the natural resources, communities have collected exhaustive information on plant and animal behaviours, life cycles, and habitats (Dahl, 1989) that can be found in their oral histories, often in the form of stories, narratives, folklore and songs (Cruikshank, 2001).

The chapter aims to highlight the strong cultural and functional relationship between local communities and biological diversity. Much of the interdependency between local communities and biodiversity is being covered in the chapters on environmental management and agriculture. What is unique about biodiversity is the impact that the implementation

of different macro policies has had on use of these resources by traditional communities, and in the process it has become a rallying theme for such communities for advocacy related to their rights and development priorities. The chapter ends with some suggestions for integrating the concerns and strengths of the different actors who derive utility from biological resources.

Traditional values and sustainable use of resources

Traditional communities as a norm treated all living beings and their habitats with respect as they were considered part of a whole living system (Cunningham and Stanley, 2003), which resulted in fostering an active co-existence and mutuality between the resources and resource users. For instance, in hunting and fishing communities, the fish or prey provided food, hide and related products to those who hunted them, and in turn their survival was taken care of by the people through norms and regulations on the ways, degree and periods of hunting (Berkes, 2008). Customary law and practices enabled enforcement of the principles of mutuality. Such norms and practices include, among others, taboos on hunting for totems, pregnant animals, rotational harvesting and restrictions on use of a natural resource to maintain its population.²

Resources hold spiritual significance for the communities who use them. Illustrations of this include offering prayers to the resources prior to harvesting them,³ or the management of sacred groves and sacred sites which are still common in many tropical countries, especially in Asia⁴ and Africa. These areas within a forest or in inhabited places also serve as a refuge for biodiversity in the area. Sacred areas and biological resources are important components in rites of passage to adulthood in indigenous communities. For example, successfully hunting specific animals is considered crucial to qualify for transition to adulthood, and use of specific plants and animals is integral to traditional ceremonies. Some of these practices are still in vogue among traditional communities in Asia, Africa and Latin America (personal communication, community representatives, May 2008) and point to the strong connections between diversity of biological resources and richness of cultural practices. Hence, while maintaining the diversity of life is closely related to management of the environment that they live in, communities have been known to consciously introduce and maintain variety as seen, for instance, in the types of foods consumed or the numbers of varieties of a species cultivated (Johns and Sthapit, 2004). Visually compelling evidence of the strong linkages between biodiversity and cultural diversity, or what is termed biocultural diversity, was published by the World Wide Fund for Nature

(WWF) and Terralingua, who cross-mapped known ethnolinguistic groups of the world with 238 of the most important eco-regions of the world (Oviedo and Maffi, 2000). The resulting map clearly illustrates the coincidence of biological and cultural diversity.

This brings us to the natural corollary that centuries of co-existence with ecosystems has resulted in some of the richest collective memories on patterns and behaviour of biological resources and environmental changes. Given the unique evolution of different ecosystems and subtypes, the depth and width of such a collective memory is indeed enormous. All these highlight some crucial elements of practical significance of traditional approaches to biodiversity:

1. Traditional communities have intricate relationships with biodiversity resources embedded in their cultures, that by themselves served as a self-limiting mechanism to ensure sustainable use of resources; and
2. These communities, through this unique relationship with nature, have an exhaustive repertoire of information on characteristics of biodiversity resources and about the components of the environment in which they live. This knowledge can be deployed for assisting modern approaches to data creation on various aspects of the environment and biodiversity, forecasting on natural phenomena, and methods of coping with biotic and abiotic changes brought about due to changes in environmental conditions.

Subsistence livelihoods and biodiversity

Biological resources are known to contribute significantly to the incomes of indigenous and traditional communities by their commodity nature. In addition, they also serve as resources to meet food and nourishment, health care, fibre, building materials, fuel and spiritual requirements of such communities. Given the nature and extent of dependence over biodiversity for their livelihoods, it is not surprising that communities have also evolved, over time, management and use, norms and governance systems, interlinked with their customary laws, to conserve and use biodiversity resources in a sustainable fashion reflecting, as mentioned earlier, the evolution of unique cultures of communities in different ecosystems of the world. Consequently, changes in one are reflected in the dynamics of practice/use of the other.

However, the counter side of this is that, given that biodiversity resources often serve as a significant asset and livelihood base to the local communities, they are also the most vulnerable to excessive prospecting and use in order to supplement incomes. Income from sale of biodiversity-based goods and services is dependent on quantity of sale, as the true price of the resources is not realized due to unfair pricing and marketing

practices and inadequate access to appropriate institutions such as credit, infrastructure and markets, as seen in representative resources such as medicinal plants (Olsen and Larsen, 2003; Suneetha and Chandrakanth, 2002). Over-exploitation is considered one of the reasons for problems of non-optimal harvesting and loss of resources, although there are other more dominant reasons such as habitat destruction (Earthwatch Institute et al., 2006).

Economic value of biodiversity

A question that often arises is on the worth of biodiversity to humanity and life processes. As an initial argument, the economic value of biodiversity can be gauged from the utilities it provides to various stakeholders. Considering that the major stakeholders include indigenous and local communities (ILCs), traders, bio-businesses, government, conservation groups, NGOs and consumers of biodiversity-based products, the economic value of biodiversity in finite terms should at least reflect the combined values that each stakeholder derives from a resource. These include traded direct-use utilities (such as food, medicine, raw material), direct utilities that are not traded (as in the case of spiritual, aesthetic or cultural utilities), and indirect utilities (e.g., benefits from species interactions). It should also reflect the potential future value of these resources, given the fact that we have very limited understanding of the different uses of biodiversity. However, when we attempt to monetize the value of biodiversity, we are unable to arrive at a definitive figure reflecting the various utilities, primarily due to computational challenges of the various values. This results in a partial valuation of only the *traded* resources and products. This asymmetry in computation of value reflects on the prices of the resources and dampens the true value of the resources, and thereby has serious consequences in terms of income distribution for traditional communities.

Commercial value of biodiversity and knowledge

As mentioned in the preface to the chapter, biodiversity figures prominently in international negotiations on issues related to access and use, equity and development. One of the primary reasons why biodiversity has become a controversial area for policy negotiation is its increasing presence in commerce and trade. Traditionally, biological resources were considered to be part of a common heritage and a source of subsistence livelihoods, and had a low trade frequency. Biodiversity resource markets typically constituted direct sale between a gatherer/community representative and a buyer, facilitated by an agent/trader (Olsen and Larsen, 2003;

Suneetha and Chandrakanth, 2002). Resource flows were simple and chiefly confined to territorial/regional boundaries. Specifically, knowledge related to use of resources was used as appropriate, and in discretion depending on the nature of the information and its potential for improper use or misuse (Suneetha, 2004). The nature of such knowledge is usually collective or communal in ownership, utilitarian in purpose primarily to the people in the region, offered as a service often as a reciprocal measure, and hardly ever as a commercial venture, even if it is the primary source of livelihood. Over time, the nature of the flow of biodiversity resources and knowledge has changed substantially. Although both have become increasingly traded commodities, the frequencies of trade in both differ, with the resource being traded more actively and the knowledge accessed either as a common resource or as an exotic curiosity.

Biological resources are used in various end-products such as crop varieties, biopharmaceuticals, nutraceuticals, cosmetics and the like (ten Kate and Laird, 1999; Wynberg, 2008). Advances in biotechnology and related sciences and an open access regime have enabled the rapid inclusion of biological resources from different and unique regions of the world. To a great extent, traditional knowledge related to location, nature and use of resources has also contributed to the development of end-products and to research and development efforts either directly or indirectly (Newman and Cragg, 2007; ten Kate and Laird, 1999; Wynberg, 2008; Reid, 1994; Rausser and Small, 2000). Estimates indicate that the probability of successful development of a product improves significantly with inputs from traditional knowledge, with a resultant reduction in the costs of development, particularly in the costs involved in identification of lead candidates of resources for further research and development (Reyes, 1996; Subramanian, 2004).

With the structuring of world markets and the evolution of regulations on trade in goods and services, trade in bioproducts also improved. This is evidenced by the increasing growth in trade in agricultural goods and services. A report by the Food and Agriculture Organization (FAO) of the United Nations shows that while trade intensity (measured as a ratio of value of trade in goods and services to total GDP) of all goods and services increased to 50 per cent between the 1970s and 2003, trade intensity of agricultural goods and services (including forestry, fishery and livestock) increased to almost 100 per cent (FAO, 2005). Being technologically driven, these commercially lucrative products were traded chiefly by technologically advanced countries. The Millennium Ecosystem Assessment reveals that it is during this period that major losses in biodiversity were also made (MA, 2005). In addition to the gains from trade, subscribing to the incentives provided by legal trade regimes such as those enunciated by the World Trade Organization enabled researchers and companies that develop these products to gain exclusive rights over

them. This then created an inherently unfair scenario among countries and stakeholders in the market where the technologically superior are able to derive high economic rents from their products, while the biodiversity-rich players, who also live in developing countries, were not obtaining a fair, if any, share of these incomes, in addition to losing inherent and traditional rights over their use.

Challenges to biodiversity, traditional knowledge

Increase in demand for resources used in industrial products such as pharmaceuticals or biotechnology products usually results in an increase in the prices for the resource paid by these industries. Usually, we also witness a spurt in demand for the resource from other markets such as botanicals and raw drug markets, often at low prices, and the emergence of untested products that ride high on the credibility of the resource, and the associated traditional knowledge, established by the industrial product, as was seen in the case of the *Hoodia* plant (Wynberg, 2008). Improper and unregulated use of such products often results in adverse reactions with consequent negative publicity to the resource and more so to the associated traditional knowledge.

Inequities in the market place, whether international or domestic, have given rise to problems for both biodiversity and traditional knowledge. As mentioned earlier, biological resources are often the predominant assets and means to livelihood for ILCs. With increasing integration into mainstream economies and attendant rising costs of living, practices of over-harvesting and unsustainable use of resources are being widely reported from these communities. Compound this with the debates on development priorities over environment and resultant land-use changes, and we are witnessing an unprecedented loss of biodiversity resources and traditional cultures (MA, 2005). A case in point is the rapid conversion of tropical forests in Malaysia and Indonesia to oil palm plantations. These plantations are not considered supportive to biodiversity, but are highly productive and high revenue-generating enterprises. Clearing of forests in the region has endangered habitats and biological life within them, and at the same time has deprived several communities from practising their traditional forest-based livelihoods, with no substantial economic alternatives (Colchester et al., n.d.).

Any knowledge system needs a receptive and patronizing population to survive, evolve and sustain. The poor prices for resources and the seemingly lower status ascribed to traditional worldviews by mainstream sciences, are believed to be discouraging youth from traditional communities from seeking to learn, understand and build on their traditional knowledge, with the consequent erosion in the carriers of the knowledge

and then the knowledge itself.⁵ One of the immediate impacts of the loss or erosion of traditional knowledge would be a loss of distilled information on biodiversity – related to all aspects of identification, management and use.

Access to knowledge and biodiversity

During the commercialization of biological resources, it has often been observed that the source of the knowledge related to their use is not acknowledged and any consequent commercial benefits not shared with the TK holders. Such practices have been variously termed as “misappropriations” of biodiversity resources and even “biopiracy” (Svarstaad, 2005). Attendant to this are concerns of traditional communities over loss of their traditional rights to use and manage natural resources, their habitats and ecosystems and thereby their practices – referred to as Resource Rights (Posey and Dutfield, 1996: 95). It is an acknowledged fact that the bulk of what we know of natural resource use comes from the multi-generational links that such communities have had with nature.⁶ It therefore becomes extremely difficult for such communities when policies insensitive to their links to nature are framed and implemented, as this compromises their ability to interact with traditionally used and sometimes culturally important resources. Threats to loss of traditional knowledge related to biodiversity are therefore well entrenched in threats to loss of resource rights.

Examples of misappropriations of knowledge have been reported in various sectors including from researchers, biopharmaceuticals and crop development. The following examples point to some of the scenarios that have cropped up in this regard. Unfortunately, most cases of misappropriation often go unnoticed or unattended to, although increasingly there is an inclination for ethical practice among the different user groups of biodiversity and associated TK.

1. Extracts from a medicinal plant *Artemisia judaica* from Libya, Egypt and other North African countries for the treatment of diabetes was patented by a UK company, Phytopharm plc. The company admits to knowing that the plant has been used in Libyan traditional medicine for the treatment of diabetes, although no benefit sharing deal is apparent (McGown, 2006). This example is also indicative of the collective ownership over resources/related knowledge between communities of different countries and of the need to ensure that sufficient policy space is provided to address such issues, when they crop up.
2. The indigenous communities of Madagascar use the plant *Catharanthes roseus* as an antidiabetic. “Vincristine” and “Vinblastine” are anti-

cancerous alkaloids (different use from TK) developed from the plant. These products were isolated and identified for their potential by Eli Lilly Pharmaceutical Company based on an indirect lead obtained from the indigenous communities (Reid, 1994). There was no benefit sharing involved with the communities or the country. This is an instance of a foreign researcher/commercial body interacting with traditional communities, and developing a product different from original use. The contribution of TK in this case lies in providing a lead candidate for drug development, and thereby increasing the probability of success. Failure to consider sharing benefits with the traditional users, in this case can be considered an unfair business practice.

3. The San tribe of South Africa uses the *Hoodia* plant as an appetite suppressant, which was used by the Council for Scientific and Industrial Research (CSIR) of the country to develop an anti-obesity drug. This drug was then licensed to a private international pharmaceutical company. Initially there was no benefit sharing with the San tribe, but later, with advocacy and pressure, the CSIR negotiated a benefit sharing deal with the tribe (Wynberg, 2008). This case also throws up an interesting situation where the knowledge is held among tribe members across national territorial borders, and amidst different community members; this situation resulted in negotiations among tribesmen to arrive at a satisfactory resolution.

A more compelling challenge for traditional communities is the modification of their knowledge. Putting a price on resources they consider invaluable and sacred runs counter to their value systems, and has resulted in conflicts within communities wherever such commercial exchange has occurred, as seen in examples of either the *Hoodia* case (Wynberg, 2008) or the Kani case (Suneetha, 2004). A related challenge is the commonality of knowledge related to resources among different communities, who live in similar ecosystems. Hence, attribution of knowledge related to biological resource use, and sharing of commercial benefits with a few communities, results in discontent among the other communities.

Policy initiatives

Realizing the urgency, multipronged efforts are under way to stem this erosion both in resources and traditional knowledge. Some of the most important intergovernmental policy initiatives include global instruments such as the Convention on Biological Diversity (CBD), United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Permanent Forum on Indigenous Issues (UNPFII). The

UNPFII recognizes the inherent rights to land, resources, culture and traditional livelihoods of indigenous communities. The CBD acknowledges national sovereignty over biodiversity and requires member countries to take appropriate steps to conserve biological resources, ensure their sustainable use, and further ensure that in the event such resources and related knowledge are accessed from traditional communities, the benefits arising from the commercialization of products derived from such resources/knowledge should be shared in a fair and equitable manner with the communities, and ensure that their traditional ways of life are not affected in the process.⁷ The CBD also calls on parties to obtain prior informed consent (PIC) of the communities to access their resources/knowledge, and enter into Material Transfer Agreements (MTA) on Mutually Agreed Terms (MAT). These terms include terms for access, sharing benefits and sharing intellectual property rights over the final product developed based on the resource/knowledge (together referred to as Access and Benefit Sharing [ABS]). The CBD has adopted guidelines for conducting research in sacred lands of traditional communities (Akwé: Kon Guidelines). These guidelines emphasize the need to consult traditional communities and arrive at consensual decisions on the research or development activity based on the potential consequences of the activities on their lands. While there are cases of misappropriations, there are also instances now of national governments facilitating various partnerships between different stakeholders so that benefits of bio-prospecting can be shared among all actors. An interesting international policy that was recently adopted under the aegis of UNESCO is the Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2005) that, while reiterating the need to ensure cultural diversity, seeks to promote and protect cultural expressions and foster interculturality between different cultural worldviews.⁸

Developments on global commitments to community rights over resources, intellectual property

While globally binding, the implementation of the provisions of the CBD is left to national discretion. However, as a study on bio-prospecting in Africa illustrates,⁹ most of the countries who participated in the study felt that the lack of national ABS guidelines and an international framework to regulate ABS are the major constraining factors in implementing the principles of the CBD. Currently, the CBD is working on developing an International Regime on Access and Benefit Sharing by 2010 that could possibly have more enforcement and dispute settlement provisions. What is noteworthy here is that indigenous and local communities actively contribute to the negotiations on these provisions.

Institutions such as the World Trade Organization (WTO) are also concerned about national legislation on biodiversity. With increasing trade of these resources in international markets, national legislations could have an impact on their free movement. These regulations may act as non-tariff barriers to trade, which is of concern to the WTO. Conversely, specific agreements within the WTO, such as the Agreement on TRIPS, do not have explicit provisions to recognize collective, exclusive knowledge such as represented by TK or mechanisms requiring identification of the source of a resource/knowledge.

In line with the Doha Declaration of the WTO Ministerial Conference (1991), which mandated the TRIPS Council to identify ways to integrate the concerns of CBD and TRIPS, the TRIPS Council is looking at issues of compulsory inclusion of PIC certificates and certificates of origin (of resource/knowledge) during the filing of patent applications as measures to curb misappropriations (Tobin, 2008). Intellectual property rights issues in genetic resources also figure predominantly within the mandate of WIPO, which has set up an Intergovernmental Committee on TK, Genetic Resources and Folklore (IGC). The IGC provides guidance, based on research and findings of fact-finding missions, to countries on strategies for protection of TK and genetic resources. Some of the measures being adopted to meet this requirement include development of biodiversity registers or databases that include information on biodiversity resources in a region with related uses, and documentation of TK (Alexander et al., 2004). While these are considered defensive methods of protection of TK (where the knowledge is protected from being exploited as against proactively developing on the knowledge to gain intellectual property rights), countries can develop other measures of protection suited to their peculiarities (*sui generis* measures). Some such country initiatives include recognition of collective ownership over resources and knowledge by communities and co-ownership over final product between communities and research partners.¹⁰

Local initiatives

Local communities are also taking proactive measures to ensure sustained availability of their natural capital. Often linking biodiversity conservation measures to their livelihoods and income augmentation programmes, these communities have managed to chart endogenous ways to co-exist with mainstream markets and their traditional values and ways of managing resources. Several hundreds of such successful community initiatives can be seen from the Equator Initiative's community partners.¹¹ The different community case studies clearly demonstrate that

Box 10.1 Some examples of best practice community partnerships

1. The Chibememe Earth Healing Association (CHIEHA) is an association of ethnic communities based in Zimbabwe. They have built on their traditional activities, involving livestock grazing, small grains production, fishing, hunting, collection of fruits, medicinal plants and NTFPs to achieve the objectives of food security, economic security and environmental security. By cultivating and rearing native varieties of crops and animal breeds, focusing on supplying to a certain domestic local market, and entering into a business relationship with an industrial partner for supply of selected products, they have been able to buffer natural, economic and political emergencies that have affected their country in recent years. Their perspectives have also expanded since entering into smart partnerships with domestic and international non-governmental and inter-governmental networks (Personal communication with Gladman Chibememe, CHIEHA Community Representative, 2009).

2. The Gram Mooligai Company Limited (GMCL) is a public limited company registered in India. Its shareholders are made up of small groups comprising members of a community of medicinal plant gatherers. The GMCL procures plants and plant products directly from these groups, at remunerative rates but specifies the quality parameters for harvesting. The company also promotes sustainable harvesting practices among the communities. The company sells the herbs and shares 70 per cent of the returns with the communities. In addition to this, the company is also involved in the production of simple medicinal formulations based on traditional knowledge. These formulations are now available in the mainstream markets. This is also an example that indicates how a domestic company can involve local communities in the development of products and markets, with an emphasis on sustainable use of genetic resources and equity in transactions. It is also an instance of how knowledge related to genetic resource use can be effectively utilized to widen the economic opportunities of the communities.

Source: Personal communication, Mr Muthu Velayutham, Covenant Centre for Development, Madurai, Partner of GMCL, 2005.

there is a groundswell of initiatives among traditional communities, and they seek to succeed through developing effective partnerships – with the government, NGOs, business partners, marketing agents and so on (see examples in Box 10.1).

Conclusions

The crucial issues in the debates regarding biodiversity and traditional knowledge, apart from appropriate management of resources, are related to ownership of genetic resources, the terms of access to these resources, governance of the resources and importantly, their value to different stakeholders, ranging from the sacred to the commercial. Both developed and developing countries have stakes in enhancing links between traditional knowledge and biodiversity to meet their development priorities. Issues related to equity and justice that cover the gamut of resource rights, equitable terms of partnership among the different actors involved in bioproduct development, adequate freedom or autonomy for communities to choose between alternative uses of and access to their resources and knowledge systems will have to be clearly addressed if we seek to sustain “biocultural” diversities and continue to enrich and widen our resource and knowledge bases. Successful case studies highlight that a development paradigm that would ensure this is possible if we integrate principles learnt from our past with current realities. It certainly is heartening that global policymakers are making efforts to listen closely to the ground, and the momentum that is being gained in the present times needs to be ably steered through respectful exchanges between the different players.

Notes

1. The term “traditional communities” is used interchangeably with indigenous communities and local communities in this chapter.
2. Personal discussions with community representatives from different regions who are partners of the Equator Initiative, May 2008 at the Community Dorf organized during the Ninth Conference of Parties of the Convention on Biodiversity, Bonn, Germany.
3. Ruth Lilongola in Posey (1999).
4. Available at <http://www.plantcultures.org/themes/sacred_and_spiritual_sacred_groves.html> (accessed 12 March, 2009).
5. Personal discussion with community representatives at Community Dorf, May 2008, *ibid.*
6. For more details, please refer to the UNPFII website. Available at <<http://www.un.org/esa/socdev/unpfii/>> (accessed 28 May 2010).
7. Article 10 of the CBD states “protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements”. Article 8 (j) requires these same Parties “to preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote the involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices”.

8. Available at <http://portal.unesco.org/culture/en/ev.php-URL_ID=33232&URL_DO=DO_TOPIC&URL_SECTION=201.html> (accessed 31 July 2009).
9. Available at <http://www.abs-africa.info/bioprospecting_cases.html> (accessed 8 May 2007).
10. Some examples include the Biodiversity Law of Bangladesh and the National Biodiversity Act of India.
11. The Equator Initiative (EI) is an initiative of the UN Development Programme (UNDP) that seeks to identify and reward outstanding local biodiversity-based entrepreneurship that addresses both biodiversity conservation and poverty alleviation concerns.

REFERENCES

- Alexander, M., K. Chamundeeswari, A. Kambu, M. Ruiz and B. Tobin (2004) *The Role of Registers and Databases in the Protection of Traditional Knowledge: A Comparative Analysis*. Tokyo: United Nations University Institute of Advanced Studies.
- Berkes, Fikret (2008) *Sacred Ecology*, 2nd edn. New York and London: Routledge.
- CBD (1992) "Text of the Convention on Biological Diversity". Available at <<http://www.cbd.int/convention/convention.shtml>> (accessed August, 2009).
- Colchester, Marcus, Norman Jiwan, Andiko, Martua Sirait, Asep Yunan Firdaus, A. Surambo and Herbert Pane (n.d.) "Promised land: palm oil and land acquisition in Indonesia: implications for local communities and indigenous peoples (executive summary)". Available at <<http://mekongdmp.net/data/Resourcespapers/filepdf/PromisedLand.pdf>> (accessed 31 July 2009).
- Cruikshank, Julie (2001) "Glaciers and climate change: perspectives from oral tradition", *Arctic* 54(4): 377–393. Available at <<http://pubs.aina.ucalgary.ca/arctic/Arctic54-4-377.pdf>> (accessed 28 May 2010)
- Cunningham, Chris and Fiona Stanley (2003) "Editorial: Indigenous by definition, experience or worldview", *BMJ* 327: 403–404 (23 August).
- Dahl, Arthur Lyon (1989) "Traditional ecological knowledge and resource management in New Caledonia", in R. E. Johannes (ed.), *Traditional Ecological Knowledge: A Collection of Essays*. Gland and Cambridge: IUCN, the World Conservation Union. Available at <<http://islands.unep.ch/dtradknc.htm>> (accessed August 2009).
- Earthwatch Institute, International Union for the Conservation of Nature, World Business Council for Sustainable Development and World Resources Institute (2006) "Business and ecosystems: Ecosystem challenges and business implications", Issue Brief. Switzerland.
- FAO (2005) "The state of food and agriculture, 2005, agricultural trade and poverty: can trade work for the poor?", *FAO Agriculture Series (SOFA)*: 36.
- Johns, Timothy and Bhuwan R. Sthapit (2004) "Biocultural diversity in the sustainability of developing country food systems", *Food and Nutrition Bulletin* 25(2), 143–155.
- Laird, Sarah and Rachel Wynberg (2008) *Access and benefit sharing in practice: trends in partnerships across sectors*, CBD Technical Series No. 38, Secretariat of the Convention on Biodiversity.

- MA (Millennium Ecosystem Assessment) (2005) *Ecosystems and Human Well-being: Biodiversity Synthesis*. Washington, DC: World Resources Institute.
- McGowan, Jay (2006) *Out of Africa: Mysteries of Access and Benefit Sharing*. Washington, DC: Edmonds Institute and African Centre for Biosafety.
- MIC/STI (Secretaria de Tecnologia Industrial do Ministério de Indústria e Comércio) (1982) *Mapeamento e Levantamento do Potencial das Ocorrências de Babaçuais. Estado do Maranhão, Piauí, Mato Grosso e Goiás*. Brasília: Núcleo de Comunicação Social da Secretaria de Tecnologia Industrial do MIC.
- Newman, David J. and Gordon M. Cragg (2007) "Natural products as sources of new drugs over the last 25 years", *Journal of Natural Products* 70: 461–477.
- Olsen, Carsten Smith and Helle Overgaard Larsen (2003) "Alpine medicinal plant trade and Himalayan mountain livelihood strategies", *The Geographical Journal* 169(3): 243–254. Available at <<http://www.jstor.org/stable/3451450>> (accessed 23 February 2009).
- Oviedo, Gonzalo and Luisa Maffi (2000) *Indigenous and Traditional Peoples of the World and Ecoregion Conservation: An Integrated Approach to Conserving the World's Biological and Cultural Diversity*. Gland: WWF. Available at <<http://www.terralingua.org/publications/Sharing/EGinG200rep.pdf>> (accessed 31 July 2009).
- Posey, Darrell A. (ed.) (1999) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*. Nairobi: United Nations Environment Programme and Intermediate Publications.
- Posey, Darrell A. and Graham Dutfield (1996) *Beyond Intellectual Property: Toward Traditional Resource Rights for Indigenous Peoples and Local Communities*. Ottawa: IDRC.
- Rausser, Gordon C. and Arthur A. Small (2000) "Valuing research leads: bioprospecting and the conservation of genetic resources", Berkeley Olin Program in Law and Economics Working Paper Series No. 20, University of California.
- Reid, Walter V. (1994) *Biochemical Prospecting, Strategies for Sharing Benefits*, Biopolicy International Series No. 16. Nairobi, Kenya: African Centre for Technology Studies (ACTS) Press.
- Reyes, Viki (1996) "The value of Sangre De Drago". Available at <<http://www.grain.org/publications/mar963-en.cf>> (accessed 28 May 2010).
- Suneetha M. S. (2004) "Economic Valuation of Medicinal Plants in the Context of the Convention on Biological Diversity and Intellectual Property Rights Regulations", unpublished Ph.D thesis, University of Agricultural Sciences, Bangalore.
- Suneetha M. S. and M. G. Chandrakanth (2002) "Trade in medicinal plants in Kerala: issues, problems and prospects", *Journal of Medicinal and Aromatic Plant Sciences* 24 (2002): 756–761.
- Svarstaad, Hanne (2005) "A global political ecology of bioprospecting", in Susan Paulson and Lisa L. Gezon (eds), *Political Ecology Across Spaces, Scales and Social Groups*. New Brunswick, NJ: Rutgers University Press, pp. 239–256.
- ten Kate, Kerry and Sarah A. Laird (1999) *The Commercial Use of Biodiversity: Access to Genetic Resources and Benefit Sharing*. London: Earthscan Publications Ltd.
- Tobin, Brendan (2008) "Monitoring compliance under an international ABS regime: the role of an international certificate scheme", *Asian Biotechnology and Development Review* 10(3): 95–111.

Wynberg, Rachel (2008) "Access and benefit-sharing agreements in the commercial development of *Hoodia*", in Sarah Laird and Rachel Wynberg (eds), *Access and Benefit Sharing in Practice: Trends in Partnerships Across Sectors*, CBD Technical Series No. 38. Montreal: Convention on Biological Diversity, pp. 83–99.

Supplementary feature 1

The complex rite of passage from invisible subjects to "subjects of rights" to attain benefit sharing in the implementation of the CBD: The case of the babassu breaker women in Brazil¹

Joaquim Shiraishi Neto, Noemi Miyasaka Porro and José Antonio Puppim de Oliveira

Women who identify themselves as *quebradeiras de coco babaçu* – babassu breaker women – make their living by gathering and breaking the fruits of *babassu* palms.² This collective identity, embraced by their traditional communities, is a social construction emerging from their struggles against processes of enslavement, detribalization, forced migration and attempts at illegal land evictions. Therefore, the traditional knowledge sustaining their current systems of production and conception of rights is strongly founded on ideals of autonomy and freedom in controlling family labour for protecting their traditional territories in the babassu palm forests – which they call "the mother of the people". Despite their undeniable social, economic and environmental achievements, these traditional communities have been historically excluded from major agrarian and economic policies favouring logging, cattle ranching and agribusiness. To face these antagonistic contexts, babassu breaker women have mobilized themselves to struggle for their rights and to demand specific policies to protect their traditional knowledge and practices.³ Their traditional knowledge is the basis of a fundamental governance mechanism for the maintenance of the babassu forest, as it is a form of social control to manage the babassu production system sustainably (both environmentally and socially) as well as to protect it from encroachment by unsustainable use.

The idea of benefit sharing in the CBD found resonance in the claims of their social movements, as it could provide opportunities to reaffirm their collective identity and to achieve fair returns from businesses that profit from their traditional knowledge and conservation of biodiversity (for example, babassu oil is used by many firms in the production of high value soap and cosmetics). However, throughout their experience with

benefit sharing initiatives, they have faced a lot of obstacles, in practice and in theory, to implementing the CBD and transforming their local realities. It has not been easy to operationalize policies regulating concepts like fairness and justice in the division of benefits between such culturally differentiated parties as traditional communities and companies. Although the contributions of their traditional knowledge to sustainable development and social well-being seemed very clear, the contributions of benefit sharing policies to their local practices were less so. Therefore, at this point of the agenda towards the Millennium Development Goals, a reflection on how such policies have affected babassu breaker women's practices and, consequently, their knowledge, is timely and necessary to reach desired governance over resources of biodiversity in their traditional territories.

The genetic resource and associated traditional knowledge referred to in this case study are those related to the *babassu mesocarp* processed as flour.⁴ Although oil from kernels has been in the market since the nineteenth century and charcoal from endocarp has long been used for industrial purposes, until recently mesocarp flour had limited integration into markets other than local. One of the babassu breaker women's grassroots organizations, the Association in the Settlement Areas of the State of Maranhão (ASSEMA), began to invest in adaptive technological improvements for processing mesocarp flour in 2002, through one of its cooperatives (COOPAESP). In 2004, a large national cosmetic company bought samples of *mesocarp* flour from COOPAESP. In 2005, the company sent professionals, who accessed traditional knowledge associated with this resource, and proposed to discuss consent and benefit sharing. Before answering the company, COOPAESP looked for guidance from the governmental Council for Management of Genetic Resources at the Ministry of Environment (CGEN; Conselho de Gestão do Patrimônio Genético). In 2006, with the support of ASSEMA, they began to discuss the regularization of access and benefit sharing. In 2007, after a year of debates and intense negotiations, supported by ASSEMA and the Interstate Movement of Women Babassu Breakers (MIQCB; Movimento Interestadual das Quebradeiras de Coco Babaçu), COOPAESP signed the terms of consent and the contract for benefit sharing. Throughout the process, many difficulties were faced and overcome through conciliation; but many others remained to be discussed.

At the root of these difficulties stands a debate over the juridical notion of "subject of rights",⁵ a central category of modern law. In the very recent past, traditional communities were not visible to society and to the Brazilian state as "subjects of rights", as they were rather "subjects of tutelage." However, international conventions such as the CBD and the International Labour Organization (ILO) Convention 169 impelled

member states to the recognition of the social existence of these ethnic-based groups with specific collective identities. As a consequence, traditional communities and resources of biodiversity were brought into national juridical systems, respectively as “subjects of rights” and “objects of rights”. But a complex rite of passage from “invisible subjects” to “subjects of rights” was involved in the incorporation of these international conventions in the national juridical system.

In Brazil, the CBD was ratified by the Provisional Act 2186-16 of 2001, which regulates access and benefit sharing of genetic resources and associated traditional knowledge.⁶ The Act has been one step towards regulating benefit sharing, as it set some definitions and procedures for companies to deal with communities on these matters legally. The current legislation establishes that before companies start prospecting biodiversity in the field they have to obtain the Statement of Previous Consent (TAP) and Contract of Utilization and Benefit Sharing (CURB) from the communities or individuals owning the land where samples of the genetic resource will be collected. Likewise, before accessing traditional knowledge associated to genetic resource, the potential receiver of such knowledge must obtain a formal and informed consent by the provider. Also, an agreement must be signed in a formal contract regarding how the holders of this given traditional knowledge will share benefits from its use. Only then can interested enterprises apply for an authorization issued by CGEN.

In Brazil, traditional communities,⁷ not only babassu breaker women, but also rubber tappers, riverine peoples, *quilombolas*,⁸ and other groups practising extractive activities, have struggled against the usurpation of lands and forests, defending their livelihoods in respective territories. Historically, usurpation of their rights over genetic patrimony and traditional knowledge has been a constant as well, but struggles against it within legal arenas are as recent as the process that resulted in the PA 2186-16/2001. Therefore, the introduction of the grassroots organizations of babassu breaker women in the juridical system demands continuous and careful revision of flaws, both in terms of format and procedures and, even more, in terms of content and concepts.

In terms of format and procedures, the state has set no specific rules or parameters on how to share the benefits in the CURB so far. This leaves uncertainties that burden both traditional communities and enterprises with the onus of finding out, by themselves, fair and equitable agreements. On the one hand, companies fear the risk that they can get into conflicts with communities and damage their image if they try to negotiate benefit sharing without clear rules. As a result, few for-profit companies have decided to make legal contracts with communities to access and use their genetic patrimony and associated traditional knowledge.

On the other hand, communities feel powerless to negotiate with large firms with much more knowledge than their own about market relations and potential benefits. Power differentials between the involved parties demand clearer rules. In the case of the babassu breaker women, the main procedural obstacles constraining the process were:

- Access to samples of genetic resources and traditional knowledge without TAP and CURB are prohibited. Enterprises find it difficult to invest financial and personnel resources in these usually lengthy and complex accords with communities, without at least having bio-prospecting and initial phases of research done;⁹
- The CURB is a contract that should be made for benefit sharing before the prospecting starts, and at this stage neither communities nor companies have a good idea of the future benefits. The questions are: Is it a percentage? If so, how much per cent of what?
- It is difficult to assess the value-added of the knowledge and products obtained from the communities. It may be just a small input in a complex research and development process until the product is commercialized, or it may worth much more than the local people themselves can evaluate;
- Communities and their supporters are not yet informed about the magnitude of their rights, and may be allured by contracts they were not expecting anyway. The density and complexity of the information flow have an impact not only on negotiations, but on the community and its grassroots organizations' functioning;
- Neither research institutions nor commercial enterprises have yet established adequate protocols to contact and negotiate with traditional communities. Expected cultural clashes frustrate both sides, and are fertile ground for mistakes by professionals, serving either one or the other part, as this is a new field of work and there are no good parameters to follow;
- Confidentiality is a routine issue to enterprises used to industrial secrecy, but confusing to communities and supporters accustomed with the fluidity of information among social movements. Careful negotiation is needed;
- The PA does not clarify whether the individual or juridical person representing the traditional knowledge provider must be the exactly same person representing the traditional knowledge holder(s) to share the benefit. Companies and providers may be concerned about whether other knowledge holders will consider themselves entitled to share the benefits.

In terms of concepts and content, the flawed situation is even more complex. The CBD and ILO 169 Convention emphasize constitutive elements of the notion of "subject of rights", which allow the recognition of

traditional communities with all their differences based on their “tradition” and “heritage”. The recognition of these differences as a social group demands a conceptualization of “subject of rights” based on collective rights, instead of or besides the individual rights. International conventions reinforce the notion that these subjects may have diverse conceptions of rights. However, in the notion of “subject of rights” in juridical systems based on modern law, rights are basically conceived as universal and a-historical.¹⁰ Therefore, when traditional communities are introduced as “subjects of rights” in the Brazilian juridical system, they are assumed as individuals with universal rights, denuded of all their cultural and political roots and historical trajectories, which made them what they actually are, how they actually live. Many of those aspects are difficult for any current legal definitions or laws to capture. They need to be treated as cultural and social issues to be dealt through a reviewed understanding of rights, considering the specificities of traditional communities. In not doing so, there are risks of destroying the same “traditions” and “heritage” that make those communities “subjects of rights” entitled to specific instruments such as the CDB or the ILO Convention 169. As the processes and associated debates regarding benefit sharing are prioritizing procedures and formats instead of concepts and content, their cultural particularities have been made invisible throughout the debates over benefit sharing.

With such indefinable themes, companies and traditional communities are left with no more than vague directions to deal with crucial issues in unknown terrains. How to conceive and achieve a jointly established “fair and equitable” agreement on benefit sharing is a major challenge. In this context of undefined procedures and missing conceptual debate, a Bill is still pending between the Ministry of Environment and the Ministry of Agriculture. However, even with all the problems with the present legal environment on benefit sharing in Brazil, companies can learn some lessons from the few cases of dealings between communities and companies. These are some of the main obstacles faced and gateways sought by traditional communities seeking their rights in this new field of potential social transformation.

- Genetic patrimony and traditional knowledge as collective assets have brought moral and ethical issues when contracts privatize benefits to only one individual or one grassroots organization providing the samples and/or information, among many that exist and have the same resources and knowledge. This can generate doubts and conflicts among communities. Up to now only COOPAESP have decided to share the benefits received from the company with other representative organizations. In this case, the provider COOPAESP called in ASSEMA and MIQCB to establish a jointly managed fund with the shared benefit, which can be accessed by any *quebradeira de coco babassu* in Brazil.

- In the pioneer cases, in the absence of clear rules, the role of a public authority, in the case the public attorney,¹¹ has become a key figure to compensate for the flaws of the PA, guaranteeing a power balance in the negotiation between unequal parties and helping them to reach a fair deal. Although there are risks of going backwards towards a new “tutelage”, in this new field of interactions between parties with such unbalanced powers, the presence of the state – Federal Public Ministry – is still necessary.
- According to the PA 2186-16, traditional communities have rights to services from lawyers, economists and other professionals, in addition to an anthropologist to attest previous informed consent and other requirements such as respect to traditional social organization (paid by the interested enterprise). Under time pressure and novelty of such demands, integration of qualified experts may happen only by chance. CGEN and the Federal Public Attorney (MPF; Ministério Público Federal) should be the sources of guidance.
- Negotiation must follow the rhythm of the traditional communities. Companies need to be aware of the time frame to start and finish a negotiation process, taking into account that the protection of the traditional knowledge and of those who maintain it is what is at stake. The usual market-oriented rhythm of the technological innovation can lead to conflicts and mistrust among the stakeholders involved, resulting in further delays instead of advances.

Even with all the risks of unclear legislation, responsible firms would benefit from being proactive in looking for deals on benefit sharing with communities. In this process, they gain the complex tacit knowledge of interacting and negotiating with traditional communities. Sooner or later, more regulatory pressures will come, and those responsible businesses will be ahead in the learning curve of social interactions and negotiation abilities. However, good negotiations can happen only under good governance, and governance “is not only about formal institutions or regimes entitled to impose obedience, but it is also about informal agreements on interests of peoples and institutions”. Therefore, one must learn about laws and regulations, but there is much more to be learned about the informal rules and agreements based on the “tradition” and “heritage” that makes traditional knowledge alive. The way communities manage their resources and think about this process based on their traditional knowledge may differ from laws and “scientific” or modern “western” knowledge. It is fundamental that companies and policymakers understand the importance of maintaining their traditional knowledge, which in turn is the key for governing the sustainability of the natural resources, even though this may require efforts that go beyond the strict interpretation of the law. Without the traditional knowledge, there will be a high risk of deterioration of the natural resource from where the community

livelihood and the commercial products themselves come (in our case, the babassu forests). Besides the risk of business failure in the medium and long term, this also risks generating social and environmental degradation in the community.

Implementing benefit sharing is a complex negotiation process for communities, companies and governments. Lack of clear rules makes implementation even more difficult, and these rules must provide not only the format and procedural orientation, but should express a shared understanding of rights. The Brazilian Provisional Act is an attempt to provide some guidance on how to share the benefits of biodiversity and traditional knowledge, but it still falls short of providing the clear institutional environment that protects communities and give incentives to businesses to negotiate with them. Countries rich in biodiversity have to move faster to create clear rules for benefit sharing. Otherwise, they take the risk of damaging both communities and responsible businesses trying to promote the CBD.

As governance can be defined as “a totality of all the different ways through which individuals and institutions, public and private, manage their common problems”,¹² we need to make clear which common problems are the problems addressed by benefit sharing initiatives. The problem from the company’s point of view may be the formal and legal aspects of the terms and contracts, as well as its economic feasibility. However, this may not be a problem for the community, as traditional knowledge for them has not been considered as a marketable commodity, whose transactions can be regulated by contracts and terms. Nevertheless, if the common problem is about protecting biodiversity and the traditional knowledge that maintains it, then both community and company can share the benefits of solving such problem that is, in fact, a common problem of all. Only then can governance become “a continuous process through which it is possible to accommodate conflicting or diverse stakes and perform cooperative actions”.

Notes

1. This text is based on Porro and Puppim de Oliveira (2008) and Shiraishi Neto and Dantas (2008).
2. *Attalea speciosa*, previously known as *Orbignya phalerata*, forms homogeneous and equilibrated secondary forests, with estimated area of 20 million ha in northern, north-eastern and central Brazil (MIC/STI 1982), where approximately 300,000 families live on agricultural and extractive activities. The official amount in the vegetal extractive production data for babassu in 2007 was 114,874 tons of kernels, with value of production of R\$ 113,268,000.00 (IBGE 2007 at <www.ibge.gov.br> [accessed 28 May 2010]). Babassu kernels are for domestic consumption, but mostly sold to lauric oil processing industries for the production of soap, margarine, edible oil and cosmetics.

3. Currently, the inter-state movement of the Babassu breaker women (MIQCB) represents grassroots organizations in the States of Maranhão, Tocantins, Piauí and Pará. Babassu breaker women have two seats in the national commission in charge of the National Development Policy of the Traditional People and Communities, in addition to seats in Committees at the Ministry of the Environment and Ministry of the Agrarian Development.
4. Babassu fruits are composed of the epicarp – a thin layer of longitudinal fibers covering the mesocarp – a thick layer of starchy pulp that involves the endocarp – an extremely hard shell containing around six kernels. Mesocarp processed as flour is consumed as pudding, used for fish bait or for medicinal purposes.
5. For the notion of “subject of rights” see: Miaille (1977). See also Kashimura Junior (2009).
6. In 1995, Marina Silva, then senator and later Minister of the Environment, a rubber tapper herself, authored the first draft of a law attempting to implement the CBD in Brazil. In spite of a consistent public discussion in course, the process was overthrown by a sudden top-down Act by the previous Fernando Henrique Cardoso’s government, in order to regulate a deal between a multinational company and a social organization constituted by governmental agents. Next, protesters blocked the deal. The first version of the Provision Act was contested and repeatedly amended (see Santilli, 2005). Today, a proposal for a new law, after undergoing questionable public consultation, is under discussion within the Ministry of Environment and Ministry of Agriculture.
7. Traditional people and communities are culturally differentiated groups, who recognize themselves as such, who have their own forms of social organization and occupy and use territories and natural resources as condition for their cultural, social, religious, ancestral and economic reproduction, using knowledge, innovations and practices generated and transmitted by tradition. Decree 6.040-2007 Art 3 Inc I.
8. Current black communities who share the ideals of the former runaway slave communities, also known as maroon communities in Latin America.
9. PA 2186-16, associated Resolution 06 and Resolution 12, and Decree 6159/2007 regulate obligations by commercial enterprises. Decree 5459/2005 establishes charges up to US\$ 27,000,000 for juridical persons violating the PA 2186-16.
10. These notions are profoundly rooted in state law. The law has vindicated a universal homogeneity deeply related to a “global project of society”, which tends to erase all the culturally different forms of conceptualizing rights. See Bourdieu (2001).
11. In Brazil, the 6th Chamber of Coordination and Revision: Indigenous People and Minorities at the Federal Public Ministry and its attorneys at state level have supported traditional communities in these negotiations.
12. Comissão sobre Governança Global (1996).

REFERENCES

- Bourdieu, Pierre (2001) *Contrafogos 2: Para um Movimento Social Europeu*. Rio de Janeiro: Jorge Zahar.
- Comissão sobre Governança Global (1996) *Nossa comunidade global*. Rio de Janeiro: Editora da FGV, p. 2.
- Kashimura Junior, Celso Naoto (2009) *Crítica da Igualdade Jurídica*. São Paulo: Quartier Latin.
- Miaille, Michel (1977) *Une Introduction Critique au Droit*. Paris: François Maspero.

- Porro, N. and J. A. Puppim de Oliveira (2008) "Implementation of legal rules for benefit-sharing: A new challenge for the Amazon, CDB", *Business 2010* 3(1), 24–25.
- Santilli, J. (2005) *Socioambientalismo e Novos Direitos. IEB e ISA*. São Paulo: Peirópolis.
- Shiraishi Neto, J. and F. A. C. Dantas (2008) "'Commoditização' do conhecimento tradicional: notas sobre o processo de regulamentação jurídica", in A. W. B. Almeida (ed.), *Conhecimento Tradicional e Biodiversidade: Normas Vigentes e Propostas*, Vol. 1. Manaus: PPGUEA/FFord/FUA, pp. 57–83.

Supplementary feature 2

Hoodia and the San¹

Rachel Wynberg

Many biodiversity-based products traded commercially today have their origins in traditional knowledge, including aspirin, the new antimalarial drug artemisinin, and a wealth of plant varieties, botanical products, herbal supplements and cosmetics. The way in which traditional knowledge has been used in these products is increasingly in the spotlight, along with questions as to whether the informed consent of knowledge holders was obtained prior to commercialization; whether traditional knowledge holders receive any benefits and, if so, whether these are equitable; and how benefits are distributed to knowledge holders.

These issues are vividly demonstrated in the case of the *Hoodia* species, succulent plants indigenous to southern Africa and long used to stave off hunger and thirst by the indigenous San peoples, the oldest human inhabitants in Africa (White and Sloane, 1937). This knowledge was published by colonial botanists and led to further research about *Hoodia* by the South African-based Council for Scientific and Industrial Research (CSIR), one of the largest research organizations in Africa. In 1997, after a lengthy period of development, the CSIR patented use of the active constituents of the plant responsible for suppressing appetite. A subsequent agreement was developed in 1998 between the CSIR and the UK-based company Phytopharm, and a further licence and royalty agreement between Phytopharm and Pfizer, the US-based pharmaceutical giant. Following the withdrawal of Pfizer from the agreement, Phytopharm granted the consumer giant Unilever plc an exclusive global license for *Hoodia gordonii* extracts, with their likely incorporation into existing food brands as a functional weight-loss product for the mass market (Phytopharm, 2004). Developments reached an advanced stage, including clinical safety trials, manufacturing, the cultivation of some 300 hectares of *Hoodia* in South Africa and Namibia, and an agreement to

develop a R750 million extraction facility. However, in 2008 Unilever announced it was abandoning plans to develop *Hoodia* as a functional food, because of safety and efficacy concerns. Phytopharm is presently seeking other partners to further develop *Hoodia* and bring products to market (Phytopharm, 2008) but a parallel *Hoodia* market has also emerged based on the incorporation of raw material into herbal supplements.

An issue that has dominated the case has concerned the way in which the San will benefit from commercialization of their traditional knowledge. Up until 2001, the San remained oblivious to the fact that their knowledge of *Hoodia* had commercial application, and that this knowledge had led to research, scientific validation and the filing of international patents by the CSIR. They were, moreover, excluded from lucrative deals being struck to develop commercial products. In 2003, however, following intense negotiations, an agreement was reached between the CSIR and the San, to give the San a share of royalties from product sales. In terms of the agreement, the San will receive 6 per cent of all royalties received by the CSIR from Phytopharm as a result of the successful exploitation of products. This will be for the duration of the royalty period or for as long as the CSIR receives financial benefits from commercial sales of the products. The San will also receive 8 per cent of the milestone income received by the CSIR from Phytopharm when certain performance targets are reached during the product development period. In the event of successful commercialization, these monies will be payable into a trust set up jointly by the CSIR and the South African San Council to raise the standard of living and well-being of the San peoples of southern Africa.

The *Hoodia* case study tells a complex story of many strands, and from it a number of important lessons and conclusions can be drawn that are important to integrate into ongoing debates about ways in which benefit sharing for communities can be made more equitable. One of the most crucial lessons to emerge from the case is the need to get it right from the start. Obtaining the prior informed consent of communities holding knowledge about biodiversity from the very outset of a project – and engaging them as active partners – is an absolutely fundamental principle of benefit sharing. The *Hoodia* case study illustrates what can go wrong when this principle is ignored. Recent adoption of this principle in South African legislation is likely to set new ways in which communities are consulted about use of their knowledge about biodiversity.

The negotiating process between the CSIR and the San has demonstrated the importance of building trust between role players and of having in place a political climate conducive to fair deliberations. It has also reaffirmed the importance of having community based institutions through which holders of traditional knowledge can be represented in

negotiations, and benefits channelled. The process has highlighted the prominent role played by NGOs, legal representatives and intermediaries in benefit sharing – in this case not only in assisting the San to attain their rights but also in shaping San politics and economic development.

One of the major impacts arising from the commercialization of *Hoodia* has been the wide-ranging interest it has aroused about the importance of protecting traditional knowledge and ensuring that holders of such knowledge receive fair compensation. Amongst the San, the *Hoodia* case is considered an important empowering tool to enable more informed decisions to be made about their intellectual property and ways to protect it. At government level, the case has led directly to an increased focus and prominence for biodiversity and its potential value, and in South Africa, the inclusion of prior informed consent and benefit sharing within new biodiversity legislation and the requirement of disclosure of origin prior to the granting of patents. At the international level, the case is widely considered to set precedents about the ways in which holders of traditional knowledge should be compensated for their knowledge.

There is clearly an urgent need to introduce new forms of protection for traditional knowledge that not only give communities rights over their knowledge but also enable the wider preservation and promotion of such knowledge systems. The *Hoodia* case demonstrates not only the value of having an integrated system to protect and promote traditional knowledge, but also the importance of so-called “defensive protection”, to prevent the misappropriation of traditional knowledge.

Some of the lessons are still to be learnt and some are only unfolding. If significant monies are eventually received by the San there will be extremely difficult issues to deal with in terms of determining who benefits and how benefits are spread across geographical boundaries and within communities, and of minimizing the negative social and economic impacts and conflicts that could arise with the introduction of large sums of money into impoverished communities. The due compensation of other communities such as the Nama, Damara and Topnaar will also require careful consideration. Overwhelmingly, there will be a need for continued legal, administrative and technical support to enable beneficiaries to claim what is rightfully theirs, and to do so in a manner that consciously and cautiously brings tangible and effective benefits to the original holders of *Hoodia* knowledge.

Note

1. This case study draws substantially from Wynberg (2004) and Wynberg and Chennells (2009).

REFERENCES

- Phytopharm (2008) "Preliminary results for the period ended 30 September 2008", 27 November, 2008. Available at <<http://www.phytopharm.com/assets/News-releases/PrelimsFY2008Final081127.pdf>> (accessed 5 May 2010).
- White, A. and B. L. Sloane (1937) *The Stapelieae*, Vol. 3, 2nd edn. Pasadena, CA: Abbey San Encino Press.
- Wynberg, R. (2004) "Rhetoric, realism and benefit-sharing: Use of traditional knowledge of *Hoodia* species in the development of an appetite suppressant", *World Journal of Intellectual Property* 6(7): 851–876.
- Wynberg, R. and R. Chennells (2009) "Green diamonds of the South. A review of the San-*Hoodia* case", in R. Wynberg, D. Schroeder and R. Chennells (eds), *Indigenous Peoples, Consent and Benefit-Sharing. Learning from the San-Hoodia Case*. Berlin: Springer, pp. 89–124.

11

Bridging formal and informal governance regimes for effective water management: The role of traditional knowledge

Alphonse Kambu

Introduction

Water is undeniably one of the fundamental elements essential for human survival, biodiversity and ecosystem functioning. Regrettably, water in a state capable of sustaining life on earth is denied to many people (Harte et al., 1991). The denial of this fundamental life-supporting component of the environment is brought about by its scarcity, first, due to the physical and geographical locations of place; and second, due to overexploitation, excessive extraction and pollution. However, drivers of change to water quality have always existed; especially, pollution is not strictly a modern phenomenon. It dates back to early human history and more than likely before the first recorded incidents. The noted difference compared with the past and nowadays is that the earliest forms of water pollution primarily occurred due to natural cycles or phenomena, such as volcanoes, algae blooms, storms and run-offs, which can alter the quality of water or the ecological status of water. Yet in recent times, water pollution caused by human activities has been occurring at a rate which has exceeded pollution caused by natural phenomena, and imposes considerable stress on natural systems and adds to the scarcity issue. Other conventional drivers of change include population pressure, urbanization and over-extraction. Furthermore, new threats such as climate change aggravate the already complex water crisis (Bates et al., 2008). It is clear that human-induced factors contribute extensively to the current water crisis facing the world. This can be confirmed by the fact that approximately 1.1 billion poor

people already lack access to safe water supply and 2.6 billion people lack appropriate sanitation. The seriousness of the water crisis is predicted to worsen in the next fifty years, especially with new threats like climate change, if a business-as-usual situation persists. Moreover, if the drivers of change are not addressed now the water crisis will fall heavily on the world's poor people. This can easily jeopardize the achievement of the Millennium Development Goals (MDGs) and subsequently take a toll on human well-being.¹

Given that water related problems have existed for a long time, society has designed both formal and informal governance, legal and management regimes to deal with conservation and sustainable use, distribution, and allocation of water resources. However, there has been a bias in the selection and pursuance of the governance regimes where society focused primarily on formal systems that are built around mainstream western ways and concepts of governance, legal and institutional frameworks,² while the informal regimes of governance which include traditional knowledge (TK) have been given less attention. Although both the formal and informal water governance regimes possess the same intention, they have often been developed and pursued independently. While the formal governance regimes took their own courses, the holders of TK developed and used their knowledge systems to manage water and the local problems associated with water irrespective of formal governance regimes.

As society changes and the issue of water crisis is intensified by both conventional and new threats, the formal governance frameworks alone are not sufficient to deal with the trends. In fact, the formal governance frameworks have come under scrutiny nowadays for not delivering their purported goals effectively and adequately. The water crisis the globe is facing today is perceived as a crisis of governance (ADB, 2003). Given the current water crisis and the governance crisis, those entrusted with the responsibility of ensuring water availability for all life and human activities need to be creative by proposing and testing new ways of managing water resources. One such way is to build synergies among the various regimes, disciplines and knowledge systems to address the water crisis. The rationale behind such an undertaking is primarily because experience has taught us that both formal and informal governance regimes possess positive attributes, and by combining and applying these traits to the water crisis they could lead to positive results. Building such synergies could trigger the mobilization of scarce resources that lie in both the informal and informal governance regimes.

This chapter discusses the formal and informal governance regimes in the context of water governance, the issues facing the regimes and how the governance regimes could be improved to address the water crisis.

Box 11.1 A working definition of water governance

Water governance is about the set of formal and informal rules, norms, practices, institutions and actors that exist and operate in an interactive manner to ensure conservation, sustainable use, and fair and equitable access to or allocation of water resources for all life and human activities. These rules, norms, practices, institutions and actors cut across a broad range of areas including the ecological, social and cultural, political, and economic dimensions of water resources.

The primary focus is on bridging the formal and informal governance regimes with a specific emphasis on the role of TK and how TK could be used to manage water resources. The chapter also attempts to illustrate the role of TK in water resources management in the past through a few case studies and attempts to suggest that TK can also contribute in one way or another to the conservation and sustainable use of water resources.

Water governance

Governance can be a difficult concept to understand. In simple terms, governance can include both formal and informal rules, norms, practices, approaches, institutions and actors that co-exist and operate in an interactive manner to achieve a certain outcome. In terms of water governance, it is about the formal and informal rules, norms, practices, approaches, institutions and actors that exist to ensure conservation, sustainable use and equitable and fair access to and distribution of water resources. These rules, institutions and actors associated with water cover a broad range of areas that extend to the ecological, social and cultural, political and economic dimensions of water resources.

Realizing the significant role of water and its scarce nature, society has come to recognize the need to manage this vital but scarce resource with caution. Moreover, ways of managing water have been framed into some form of governance frameworks throughout human history to deal with the issues of scarcity, fair access and allocation, and the need to regulate drivers of change to the quality of water resources (UNEP, 2002).

Formal governance frameworks

Most countries have established a range of policy, legal and governance frameworks at the international, regional, bilateral and national levels to

address the many issues associated with water such as conservation, extraction, regulation of pollution and navigation. At the international level the Convention and Statute on the Regime of Navigable Waterways of International Concern, 1921,³ Convention Relating to the Development of Hydraulic Power affecting more than one State and Protocol of Signature, 1923,⁴ Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), 1971,⁵ and the United Nations Convention on the Law of the Non-Navigable Uses of International Watercourses, 1997 exist to deal with various aspects of water.⁶ In addition, regional arrangements exist to foster cooperation among countries that share water bodies. Some of the arrangements include the La Plata Basin Treaty, 1969,⁷ the Revised Protocol on shared watercourse systems in the Southern Africa Development Community, 2000,⁸ and the Convention on Cooperation for the Protection and Sustainable Use of the River Danube (Danube River Protection Convention), 1994.⁹

Again, despite the existence of such formal arrangements, we continue to face an array of water-related problems of contamination, unfair access and allocation, degradation of aquatic biodiversity and ecosystems. And the issues faced are intensifying. The question then is: why do we continue to face water issues when we already have formal rules, institutions and actors to deal with the problem? This is an indication that these formal rules, institutions and actors are not responding effectively and adequately to the water crisis. Numerous factors contribute to the problem, such as the lack of capacity of implementing institutions in terms of administrative, technical, financial and human resources. These matters can be permanent and require constant attention and improvement.

An additional factor is related to the substantive issues embedded within the governance frameworks, which can be a core cause of ineffectiveness, and one example is the conventional practice of centralizing control and ownership rights of water with the state. The vesting of control and ownership rights of water in the state is premised on grounds related to its public good and fluid characteristics, which have good justifications. For these reasons the state has applied sovereignty over water resources, which centralizes control and ownership of water resources.¹⁰ However, acquiring rights also comes with a bundle of responsibilities which the state must execute. The responsibility to manage water resources is only one of the multiple tasks which a government must oversee equally with other tasks. Sometimes governments may not possess sufficient capacity in terms of resources to execute all of their responsibilities effectively. It is already evident that for a small government with multiple responsibilities and insufficient resources to manage an issue, it is becoming strenuous for governments to carry out their tasks

adequately. As the global economy moves into a recession, the financial capacities of governments also shrink to the extent that government responsibilities become even more challenging to implement. Such a situation is found not only within developing countries but also in developed countries (Gunningham and Grabosky, 1998). Thus, the old tradition of conducting business as usual is no longer realistic. This requires one to look for innovative ways of addressing the problem. One way is to review substantive or core issues of governance frameworks, such as the centralization of control and ownership rights of water with an intention to make changes where necessary to lift some of the burdens of governments. For instance, decentralization can be a way that triggers the sharing responsibilities. Decentralization and the sharing of responsibilities can only take place when other stakeholders both within the formal, at least at the lower levels, and informal sectors are empowered. This proposition for decentralization and sharing of responsibilities is made on the premise that stakeholders outside the public sector sometimes possess the resources and those at the lower levels of the formal sector are better placed to execute public tasks in furtherance of public policy.

Informal governance systems

In addition to the formal governance frameworks, informal regimes exist parallel to the formal frameworks and deal with water related problems. They can be found to operate in either a loose or structured manner. Informal actors can include environmental non-governmental organizations (ENGOs), such as IUCN – The World Conservation Union¹¹ or World Wide Fund for Nature (WWF),¹² industry and local communities. ENGOs have worked on water issues either independently or in partnership with governments and other stakeholders to improve water crisis situations. Industry has also been working on improving water quality. Some industries use water in their production and manufacturing processes, and through use and discharge they can cause water quality deterioration. However, they have pursued self-regulatory measures to use cleaner techniques and state-of-the-art technologies to address water quality deterioration. These informal actors and the approaches they have developed exist to complement the formal governance frameworks.

One informal governance regime we would like to single out for a detailed discussion is the governance systems of indigenous and local communities and the relevance of TK in water management. In attempting to bring into perspective the governance systems of indigenous and local communities through the definition provided above that encompasses three key components, namely, institutions, actors and rules, the follow-

ing analysis is provided. The local community as a unit is the institution and its members are the actors. The rules that the actors use in the community are multiple and can include the customary laws and practices, norms, values and beliefs (UNEP, 1999). These elements are usually captured within TK. Arguably, the role of TK in water governance is therefore crucial as the rules of organization and interaction among members of the community and their natural and physical worlds, including water, are embedded in TK. Moreover, TK has been part of the informal water governance regime for many centuries and continues to occupy a crucial place in the informal governance regime.

The role of traditional knowledge in water management

TK is in fact loaded. It embodies knowledge, techniques and wisdom that cut across every thematic area and all aspects of social, ecological, economic and political aspects of indigenous and local communities. The local know-how to manage the environment, use plants and animals for therapeutic and medicinal purposes, preserve seeds for food and agriculture, and conserve and use water resources sustainably are a few examples of the loaded nature of TK. In this perspective, TK can be regarded as the code of life for many indigenous and local communities. More importantly, for most indigenous and local communities TK has been the foundation for many services that they could not otherwise afford (Chambers and Kambu, 2005). Moreover, water being a fundamental life-supporting resource makes it natural for indigenous and local communities to develop a specific body of TK to manage water resources. Its development evolves in a similar manner to the development of TK in other sectors; that is, through the process of interaction with the environment over a prolonged period of time. TK is usually detailed but it can also be dynamic. TK is often very pragmatic, as it is developed and applied to solve specific and real problems that indigenous and local communities grapple with in their daily lives. Indigenous and local communities are part of the ecosystems; in the event of change in their environments they would be the first ones to be affected, and it can sometimes be a life-and-death situation for them. In order to prevent such risks and to nourish their livelihoods they have to develop and have methods ready at hand, so that they can be able to apply them to the issues facing them and their environments. For instance, in the case of water pollution, practical solutions must be designed to avoid the danger of consuming contaminated water that threatens their lives. In the case of water scarcity and the fair and equitable sharing of scarce water resources the local communities must develop ways to deal with such equity issues to avoid

Box 11.2 Case study 1: Water clarification and purification in Singida District, Tanzania

In the Singida rural district of Tanzania local communities extract water for drinking, bathing and other household purposes from Msange dam and Charma dams, which are regarded as the most reliable sources of water bodies. However, water from these dams is highly turbid or contains a high level of bacteria and faecal coliforms. The local women use traditional methods of purifying such water before using it for drinking and cooking or for other purposes including bathing, laundry and washing utensils. For drinking and cooking, the seed powder from *Vigna unguiculata*, *Voandzeia subterranea*, *Arachis hypogaea*, *Vicia faba* and *Parkinsonia aculeate* are used, and the charcoal wood is used for purifying water for bathing, laundry and for cleaning utensils. Women fetch water early during the mornings and use coagulation-flocculation to remove suspended and dissolved matter. The purified/clarified water is usually stored in cool places and used in the homes of the local people.

Source: Adapted from Marobhe, Renman and Jacks, 2007

conflict. In fact, they have been doing all of these things in the past by learning, through accumulated TK, how to deal with and live in their environments. The manner in which indigenous and local communities developed and applied their TK in water related issues whether it is in dealing with water pollution (see Box 11.2), equity or other issues can be illustrated in the few case studies below. In addition to the pragmatic and specific nature of TK, which is derived from prolonged experimentation and use, it is also flexible and it can be applied to a particular change in the environment such as climate change.

In terms of dealing with water scarcity, they have developed methods of collecting and storing water for use in a sustainable manner that they can use over a prolonged period of time. In the process of collecting and storing water they are able to develop numerous techniques and predict the timing and the duration of the rains and droughts so that they can build this knowledge into their water management systems. The prediction and techniques of managing water are accumulated into the body of TK that they pass on from one generation to the next (see Box 11.3).

In terms of fairness regarding the utilization of water, indigenous and local communities have also developed coordination and distribution mechanisms that allow members of the community to access water in an

Box 11.3 Case study 2: Water collection in the Sundergarh district of India

In the Sundergarh district of India the local communities construct *gh-aghra*, a kind of mountain reservoir, to collect rainwater run-off that flows down the hillside/slopes which they use for drinking, cooking, bathing, sustaining animals, and watering terraced crops and lowland fields. The water is captured in a number of barriers constructed from stone and mud also known as *bunds*. The water captured in the structures is sufficient to sustain the communities for a long time especially over prolonged dry season droughts. During their administration the British colonialists destroyed the structures which almost dried out the fields and villages. The tribal public works project rescued the traditional technique and saved the village and fields in the vicinity from disappearing entirely.

Source: Adapted from Palmbach, 2004

Box 11.4 Case study 3: Irrigation and water allocation in Bali, Indonesia

In Bali, Indonesia the high priest of the supreme water temple at the sacred crater lake has worked together with other priests at temples downstream to successfully manage water for irrigation in the area for over ten centuries. The high priest coordinates the cropping cycle and timing of operations, based on TK drawn from natural signs and prescribing rituals that mirror the flow of irrigation water. The management of water is said to be fair as the priests coordinate irrigation and planting schedules in such a manner that every village or community plants at different times, which prevents competition and conflict over water and subsequently leads to fair and equitable use of water. The water management system has been regarded as the most perfect system as it contributes to the optimization of productivity, soil fertility, water utilization and regulation of the spread of plant disease, insect pests and rats.

Source: Adapted from IUCN Inter-Commission Task Force on Indigenous Peoples, 1997

equitable and fair manner (see Box 11.4). This has also contributed to the prevention of competition and conflict among different users of water in the community.

Threats to traditional knowledge

Traditional knowledge has come under threat due to numerous factors. The globalization process, westernization, colonization and misappropriation are the most common factors that continue to threaten the existence of TK. As globalization and westernization continue to spread, one culture becomes dominant and it starts to have an impact on other cultures. TK is usually one aspect of such cultures that is impacted by the processes. For instance, as dominant languages, such as English or French are imposed, encouraged and taught to school children whose first languages are not any of the introduced or foreign languages, they tend to forget their local languages. Languages of indigenous and local communities usually encompass important knowledge about the environment and how to conserve and use it (Maffi, 2001). When the languages are lost the knowledge of how to conserve and use the environment is also lost. Furthermore, as these children are educated in the western system and grow accustomed to it they leave their local villages and begin to migrate to urban centres to pursue alternative ways of life. As they migrate out a gap is being created between them and their culture, people and land to the extent that they can lose some components or even their entire cultural heritage, including TK. This process of cultural and TK erosion usually takes place very slowly and can be difficult to notice immediately.

Another factor responsible for the erosion of cultural heritage and TK is the formal policies on assimilation adopted by colonial governments or merely bad policies by successive governments that inherited the old policies on language, culture and other relevant issues affecting indigenous and local communities without thorough reviews. Countries like Australia, with the now abolished White Supremacy Policy,¹³ and Japan's persistent position and view on the promotion until 2008 of the ethnically homogenous Japanese race and society,¹⁴ are illustrations of assimilation of the traditional peoples of both lands. Not only policies, but teachings and views of western science, which perceives TK as mythical and unreal, are also part of the hesitance to use TK for the broader sustainable development purposes, and that can be seen as a disincentive to use and protect it from its erosion. As can be seen in case study 2 (Box 11.2) above, the demolition of local water management techniques and structures by colonialists could also contribute to the loss of significant management practices, techniques, and TK of indigenous and local communities.

Moreover, many experts and advocates of TK protection have expressed the idea that some of the factors discussed here including globalization, westernization, colonization and misappropriation can contribute and have contributed to the loss of TK generally and TK re-

lated to water resources management in particular. The implications of TK loss will be felt hardest by the poor indigenous and local communities who depend on it for its contribution to their livelihoods (Inglis, 1993). This will leave the objectives of poverty alleviation, environmental sustainability and health of the MDGs far from reality.

Reactions and responses to threats of traditional knowledge

Given the threats of TK erosion, its proponents are working toward the prevention of its entire loss and misappropriation through numerous initiatives. Some of these ongoing initiatives include its protection through legal frameworks, documentation, and more pragmatic solutions such as through in situ conservation. These protection initiatives take place at various scales including the global, regional and national levels.

At the global level multilateral agreements and organizations including the Convention on Biological Diversity (CBD), the Ramsar Convention, the Convention for the Safeguarding of the Intangible Cultural Heritage, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the Agreement on Trade Related Aspects of Intellectual Property (TRIPS) and the World Intellectual Property Organization (WIPO), are either deliberating on the various means of protecting TK or at least providing some formal protection of TK. While a more detailed discussion on some of the different dimensions of TK, especially agriculture and biodiversity, is offered in other chapters of this book, this section discusses TK and its relevance to water.

The CBD is perhaps the biggest Multilateral Environmental Agreement (MEA) that formally recognizes the significant role of TK in the conservation of biodiversity. In addition, an international regime on access and benefit sharing related to genetic resources and TK is being deliberated within the framework of the CBD. When the international regime evolves it will perhaps provide more clear directions on the protection of TK which would elaborate on Article 8 (j) of the CBD.¹⁵ In terms of water and biodiversity, the link is very clear that biodiversity requires water to survive. Furthermore, certain aquatic forms of biodiversity provide vital services like food for livelihoods. This link is embedded in TK. If TK is lost, this crucial information about the link between water and biodiversity and how to manage them will be lost too. The Ramsar Convention during its Eighth Conference of the Parties in 2002 passed a resolution (Resolution VIII.19 on Cultural values of wetlands) that stresses the need to take into account the significant role and link of cultural heritage including TK and the conservation and wise use of wetlands. The Ramsar Convention has also laid down in the Annex to the

resolution some guiding principles on the link between TK and wetlands.¹⁶ The 2003 Convention for the Safeguarding of the Intangible Cultural Heritage of the United Nations Educational, Scientific and Cultural Organization (UNESCO) also recognizes knowledge and practices concerning nature and the universe as part of the intangible cultural heritage which must be protected.¹⁷

Building synergies between formal and informal governance

In the discussion above it has become clear that the formal and informal governance regimes have developed independently, but exist in parallel now to fulfill the same objective of ensuring conservation, sustainable use and fair sharing of water resources. Both formal and informal regimes are relevant and have played important roles in water resources management. TK, being part of the informal governance system, plays a vital role in how indigenous and local communities manage water resources. The case studies above illustrate the role TK has played and continues to play in water resources management. TK has provided the basis for real and practical solutions to water issues and its management, such as purification of corrupted water and the fair distribution among users of water. Recently, we have witnessed the entry of TK into formal regimes as in the case of the CBD, the Ramsar Convention and other multilateral agreements and organizations. We see the bridging of the formal and informal regimes. This merger is a positive trend as the regimes would be seen to complement each other in efforts to further better management of water resources. Given that both the formal and informal governance regimes have strengths and weaknesses, building synergies between them and drawing from the positive attributes of the respective systems can help solve some of the governance issues for effective management of water resources. For instance, it is sometimes true that formal governance regimes may not have the financial, human and other resources to implement policies, which can contribute to their ineffectiveness and inadequacy. Some of the resources required by the formal governance regimes could be found outside the formal context in the informal setting. When synergies are built, some of the resources existing in the informal sector can be mobilized and used to the benefit of public policy, such as water resources management. This can be seen in the governance and management practices of indigenous and local communities, where all or most of the activities associated with water resources management is personalized and where no costs except for time and human capital can be invested in the water resources management exercise. Furthermore, local resources and TK from the local area can be used in

the construction of structures or techniques for water use and management.

Conclusion

It is clear that both the formal and informal governance regimes have beneficial attributes, but they also have weaknesses. The trend in terms of choice and focus on the type of water resource management has been primarily the formal governance regimes. However, the formal governance regimes have come under scrutiny for not effectively delivering their purported goals leading to the governance crisis and subsequently exacerbating the water crisis. In order to improve both the crisis of governance and the water crisis, innovative ways are needed. There are a number of ways in which these issues could be addressed. One way would be to reassess the substantive issues of governance frameworks such as the control and ownership rights of water in the state and pursue decentralization, which brings with it the sharing of responsibilities. An additional means which is also related to the decentralization process would be to look beyond the formal governance regimes to seek ways and means that in the informal governance regimes and build synergies for better management of water resources. The informal regimes may sometimes possess the resources and answers to some of the problems faced in the formal water governance regimes. The case of TK and its use by the indigenous and local communities to address water issues as illustrated in the case studies above reminds us of the significant role of the informal governance regime. As such the inclusion and use of TK within the formal water governance regimes can be helpful. To date, some recognition is provided to TK and its role in conservation of natural resources including water resources, such as the CBD and the Ramsar Convention, but its application in the formal context is still minimal. For instance, its use to complement scientific knowledge is still far from reality. In addition, TK continues to be threatened by erosion and misappropriation, which could discourage its useful contribution to effective water resources management in particular and sustainable development in general. There are numerous initiatives that attempt to protect TK through establishing TK databases and registers and encouraging in situ conservation, which are crucial. An additional initiative that could drive the continued development and application of TK is for the holders of TK to be empowered. Their empowerment would be in terms of recognizing their rights over TK. Such empowerment would be a useful incentive for the protection of TK from erosion and loss.

Notes

1. The Millennium Ecosystem Assessment identifies four constituents of human well-being including security, basic material for a good life, health and good social relations. A fifth, interconnected constituent, is freedom of choice and action. For further details see MA (2005).
2. Exceptions can be found in various water regimes of countries where customary rights to use water under customary laws and practices are sometimes recognized in formal law. In other words, some formalization of practices under customary laws is seen to take place. However, a distinction is made between usufruct rights and control rights of water, where the control rights of the state can override the usufruct rights. Control and ownership rights form part of the sovereign powers of the state and sovereignty is perhaps the most absolute form of right within a country when the hierarchy of property rights is considered.
3. The primary focus of the Convention is on navigational purposes and regulates the behaviors of riparian states.
4. The purpose and focus of this Convention is related with hydropower.
5. The Ramsar Convention concerns the conservation of wetlands and the biodiversity and ecosystems therein.
6. This Convention is about the management and conservation of international water-courses and their uses for purposes other than navigation. At the time of writing the Convention has not yet entered into force. Sixteen states have already signed and nineteen more are required before it enters into force. See also Loures et al. (2008).
7. Argentina, Brazil, Uruguay, Bolivia and Paraguay are the five countries that are party to the treaty.
8. The focus of this arrangement is on cooperation in terms of shared water resources and includes Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.
9. This Convention aims to ensure that surface waters and groundwater within the Danube River Basin are managed and used sustainably and equitably. It calls for cooperation among the upstream and riparian states. For further details on some of the existing arrangements of international water governance, see Iza (2004) and Beach et al. (2000) for a summary of treaties on international waters.
10. In some societies, some control and ownership rights over certain water bodies exist outside the public domain in private spheres. For instance, the hot springs and irrigation ponds in Japan fall under the private sphere of ownership. In addition, under some customary laws and practices of indigenous and local communities ownership of water resources is recognized. The Australian Aboriginals, for example, recognize the ownership of water bodies including certain parts of the ocean. Their laws and practices are very similar to the old Roman law maxim governing property: *cujus est solum, ejus est usque ad coelu et usque ad inferos*, which means that what is on the land, below it or above it belongs to the landowner.
11. For further information see <<http://www.iucn.org/about/work/programmes/water/index.cfm>> (accessed 23 April 2010).
12. For more information visit <http://www.panda.org/about_wwf/what_we_do/freshwater/index.cfm> (accessed 23 April 2010).
13. See Hage (1999).
14. See IPS at <<http://www.ipsnews.net/news.asp?idnews=42738>> (accessed 23 April 2010).
15. The Working Group on Article 8(j) within the CBD is currently working on the details of how TK should be protected.

16. See the Ramsar Convention <http://www.ramsar.org/res/key_res_viii_19_e.htm> (accessed 23 April 2010).
17. See <<http://www.unesco.org/culture/ich/index.php?pg=00002>> (accessed 23 April 2010).

REFERENCES

- Asian Development Bank (ADB) (2003) *ADB Review: Special Issue, Water for All?* January–February.
- Bates, B. C., Z.W. Kundzewicz, S. Wu and J. P. Palutikof (eds) (2008) “Climate change and water”, technical paper of the Intergovernmental Panel on Climate Change (IPCC) Secretariat, Geneva.
- Beach, H., J. Hammer, J. Hewitt, E. Kaufman, A. Kurki, J. Oppenheimer and A. Wolf (2000) *Transboundary Freshwater Dispute Resolution: Theory, Practice, and Annotated References*. Tokyo: United Nations University Press.
- Chambers, W. B. and A. Kambu (2005) “Mohammed and the mountain: The sui generis debate on traditional knowledge”, *Journal of International Biotechnology Law* 2(1): 150–154.
- Gunningham, N. and P. Grabosky (1998) *Smart Regulation: Designing Environmental Policy*. Oxford and New York: Clarendon Press.
- Hage, G. (1999) *White Nation: Fantasies of White Supremacy in a Multicultural Society*. Sydney: Pluto Press.
- Harte, J., C. Holdren, R. Schneider and C. Shirley (1991) *TOXICS A to Z: A Guide to Everyday Pollution Hazards*. Berkeley, Los Angeles and London: University of California Press.
- Inglis, J. T. (1993) *Traditional Ecological Knowledge: Concepts and Cases*. Ottawa: Canadian Museum of Nature and International Development Research Centre.
- IUCN (International Council for the Conservation of Nature) Inter-Commission Task Force on Indigenous Peoples (1997) *Indigenous Peoples and Sustainability: Cases and Actions*. Utrecht, The Netherlands: IUCN and International Books.
- Iza, A. (ed.) (2004) *International Water Governance: Conservation of Freshwater Ecosystems*, Vol. 1: *International Agreements: Compilation and Analysis*. Gland, Switzerland and Cambridge: IUCN.
- Loures, F., A. Rieu-Clarke and M. Vercambre (2008) *Everything You Need to Know about the UN Watercourses Convention*. Gland, Switzerland: WWF International.
- Maffi, L. (ed.) (2001) *On Biocultural Diversity: Linking Language, Knowledge, and the Environment*. Washington and London: Smithsonian Institution Press.
- Marobhe, N. J., G. Renman and G. Jacks (2007) “The study of water supply and traditional water purification knowledge in selected rural villages in Tanzania”, *Tribes and Tribals* (Special Issue) 1: 11–20.
- MA (Millennium Ecosystem Assessment) (2005) *Ecosystems and Human Well-being Synthesis*. Washington, DC: Island Press.
- Palmbach, J. (2004) “Traditional water harvesting”. Available at <<http://academic.evergreen.edu/g/grossmaz/palmbajp/>> (accessed 18 November 2008).

UNEP (1999) *Cultural and Spiritual Values of Biodiversity*. London: Intermediate Technology Publications and United Nations Environment Programme.

UNEP (2002) *Global Environmental Outlook 3: Past, Present and Future Perspectives*. London: United Nations Environment Programme and Earthscan.

Supplementary feature Cultural rehydration: Toward sustainable water governance alternatives¹

Ameyali Ramos Castillo

It is 3 May, the mist is receding into the mountains of San Cristobal de las Casas in Chiapas, Mexico, as the people of the Cuxtitali barrio gather around their sacred spring to celebrate and thank the Water Gods. Water from underground aquifers rushes past flowers, candles and crosses adorning the spring and, infused with symbolic and cultural meanings, flows into the metal pipes of the modern urban infrastructure. Gravity compels the water through eight kilometres of developments and into the homes of 1,100 Cuxtitali residents in a communally agreed rotation.

Less than three kilometres away in the barrio of La Almolonga, an electrical pump thrusts water from a spring into a cement tank in response to ever increasing urban demand. Driven by efficiency and infused with market logic, water gushes through the underground architecture of the city, skirting the less populated areas, the neighbourhoods unable to afford the US\$60 connection fee and the homes of those who have not yet paid their monthly fee, before flowing into the home of Water User #11,288.

From a bird's eye perspective these two systems of urban water provision are identical – both share the common mandate of “supplying urban residents with water”, both depend on water from springs, both use networked metal pipelines for distribution, and both systems deliver water to urban dwellings – and yet, a closer look at the circulation of water through these systems reveals starkly different “relationships to water” that shape the flows, distribution, governance and sustainability of their respective systems.

SAPAM: the municipal system of water provision

The city of San Cristobal de las Casas is located in a small bowl-like valley surrounded by mountains in the heart of the “forgotten state” of Chiapas in Mexico. Annual floods kept the majority of the valley uninhabited. In 1528, the first Spaniards arrived in San Cristobal and with

them a distinct “relationship to water” that would endure in the circulation of water in the city – wells were built, rivers and streams were dammed, and springs were exploited.

In the late 1880s, the first efforts to establish an urban water distribution system led to the construction of dams and aqueducts that diverted water flows from the Amarillo and Fogotico Rivers and various springs to public water fountains and into the homes of the Spanish elite.

In 1935, a boom in population growth coupled with conflicts over water quantity and a shift in federal legislation compelled local authorities to seek financing for the construction of the first piped system of water provision in the city. By 1940, the construction of the first piped system of water provision – which was later christened as the Municipal System of Water Provision (SAPAM) – was completed providing piped water from four water springs to the homes of nearly 12,000 urban residents. For the San Cristobal waterscape the impact was profound: water flows disappeared from the visible geography of the city and the urban imagination (Kaika and Swyngedouw, 2000) into an invisible system of underground pipes that radically transformed the people-water relationship. The growing use of water within the home facilitated the formulation of an “individual” and “private” relationship to water. Activities that had previously been public and communal – washing and bathing – were individualized and moved inside the privacy of the home. The piped system “disconnected urban residents from each other and from social and natural processes” (Kaika, 2004).

The piped system also consolidated the stratified and exclusionary practices of previous water systems: Spanish neighbourhoods would have in-house piped water but indigenous and mestizo barrios were forced to continue to rely on public fountains. Constitutional reforms in the 1980s decentralized water management from the federal to the municipal government resulting in decreased financial resources for SAPAM. The system was plagued with huge problems of water loss – 47 per cent of water is lost in leaks – and was old, poorly designed, installed with inappropriate workmanship and suffering from decades of neglect.

By the late 1990s it became evident that existing water sources would not be enough to satiate water users’ demand. SAPAM, being a demand-driven system, strove to meet the demand by exploiting two more springs in San Cristobal and by taking out loans to finance the necessary infrastructure. By 2002 SAPAM was deeply in debt, water users were dissatisfied with the service, and the available water quantity and quality in the valley had drastically decreased.

Today, SAPAM continues to face the same challenges that it was facing in the 1980s and 1990s – poor infrastructure, low water quality and insufficient quantity to meet the ever-increasing demand. Less than three

kilometers away from SAPAM's head office, however, an independent system of water provision distributes water to more than 1500 urban residents. In its currents it carries a different relationship to water that may suggest alternative approaches to urban water management.

Chupactic: an urban alternative

Cuxtitali was founded in 1528 by Nahuatl indigenous peoples who were taken by the Spanish to San Cristobal as slaves. The pluralism of Cuxtitali created distinct socio-spatial configurations that were infused by visions and ideologies of "nature" and "water" that were simultaneously Indigenous, Mestizo and Spanish.

Until the early 1970s, Cuxtitali residents depended on water from the Peje de Oro spring, the Amarillo River, public fountains and the aqueduct system for their daily water needs. In 1974, Cuxtitali residents submitted a proposal to local authorities for the construction of Chupactic, an independent piped system of water provision. The municipal and state governments agreed to provide technical advice and some financial resources but stated that Cuxtitali residents had to provide the rest of the financial resources needed and all of the manual labour required. The Chupactic system – the fusion of cultural beliefs, local knowledge, engineering innovations and the urbanization dream – was completed in 1976 and provided water to 150 families in the barrio.

From the onset, the Chupactic piped system symbolized a quasi-mystical link between society, nature, cosmos, the divine and the myth of progress. The belief in water as a spiritual essence and a communal resource had survived and evolved in the barrio of Cuxtitali, as evidenced by the ceremonial gatherings to honor the Water Gods that took place at the public fountains in the church plaza. These ritual expressions of water as a living entity served as tools of resistance to the spiritual conquest of the region by western culture and Catholic beliefs and were woven into the construction and design of the water distribution system.

The relationship to water in Cuxtitali shaped the very construction of the water distribution system. Water was understood to be a communal resource – every resident had rights and responsibilities to water and to the system that facilitated its circulation. The exercise of building the system – communally and with their own hands – was a powerful expression of the intimate relationship between people and water. Communal construction meant that the community – not engineers or hired workers – were responsible for deciding where water would flow and where it would not. Although the pipes of the networked system were invisible – like in the SAPAM system – they were not imperceptible. Every resident was aware of where the pipes were, how much water they could trans-

port, who had laid it and who it would deliver water to. The piped water system connected residents not only to the water source but also to each other. Participation in the construction of the system not only ensured that the piped system remained visible – albeit in the geographic imagination – but also enforced the relationship between people and water and people and people. In essence, the action of constructing the system facilitated residents' inclusion in the “modern” city while simultaneously reinforcing local beliefs and community cohesion.

The governance of the piped water system was also deeply rooted in the communal relationship to water. At the inception of the piped water system, residents set up an *Asociacion Civil* (AC) – a Mexican legal term for a non-profit organization – to govern the Cuxtitali system of water provision. Every Cuxtitali family was recognized as a member of the AC and was granted the right to vote and participate in decision-making. The AC hired two workers to collect contributions and to maintain the system but the community would continue to be the guiding force in the circulation of water in the *barrio*.

The monetary contribution of the Chupactic system was – and is – reflective of the relationship to water in Cuxtitali. Spiritual beliefs about water, combined with shared struggles of resistance and a communal memory of oppression, have firmly established water as a communal resource: water cannot be owned by anyone but is the responsibility of everyone. This shared responsibility for caring for water extends into caring for the system that circulates water. In order to care for the system, the AC requests “monetary contributions” – rather than monthly water fees – for the repair and maintenance of the system. Repairs are communally paid for and residents are expected to help by contributing money or labour. Although seemingly the difference between “contributions” and “monthly fees” is only a matter of discourse, in practice the subtleties of discourse translate into very different realities. Whereas in SAPAM water users' responsibility to water is thought to be fulfilled simply by paying their water fees, in Chupactic financial contributions satisfy only one of their many responsibilities to water. Regardless of their monetary contributions, all Chupactic members are expected to participate in annual ceremonies to honour the Water Gods, to attend the AC's meetings, and to use water respectfully and wisely. In Chupactic, the sense of entitlement to water stems not from money but from sustaining an integrated relationship to water.

Today, Chupactic is experiencing challenges similar to those SAPAM is experiencing. Throughout the 1980s and 1990s the population dependent on the Chupactic system increased from 150 families in 1976 to 450 families in 1987 to 1020 families in 2000. The Kembo caves, from where Chupactic sourced 80 per cent of their water, and the Santiago el Pinar

and San Luis Chupactic springs, are becoming insufficient to meet the growing demand for water in the barrio. The underlying relationship between people and water, however, has led Chupactic to pursue different solutions to their demand problem, like voluntary rationing, sharing and awareness campaigns.

One of the greatest threats to the Chupactic system today is that many of its members are joining SAPAM lured by SAPAM's promise to deliver water daily regardless of availability. Many believe that in the not so distant future Chupactic will be absorbed into the SAPAM system. Unfortunately, this would mean that the underlying relationship between people and water in Cuxtitali and the important local knowledge of how to accommodate complexities, risks and uncertainties that flows in the currents of the Chupactic system will be lost.

Toward a culturally rehydrated relationship to water

Present conventional practices in urban water systems have led to the construction of systems that are destroying our ecosystems, isolating our communities and leaving cities ill-prepared to face the challenges of environmental change in the coming years. These challenges are, in many ways, the acute expression of a growing disconnect between an unsustainable relationship to water that has been socially produced and purposefully engineered and water availability.

In many ways, climate change has acted as a catalyst for critically analysing "our relationship to water". The need for resilient, adaptive and sustainable systems has thrown new light on the perceived wisdom that our ability to respond to increasing environmental change depends on carefully defined and enforced administrative, technical and financial standards. Indeed, our adaptive capacity does not depend on improved infrastructure or water trading but on our ability to re-ignite a sustainable relationship with water.

Perhaps, then, one of our most pressing needs is to recognize the viability of relationships to water – like that in Chupactic – that have prompted resilient, adaptive and effective mechanisms for facing water challenges and to incorporate some of these principles into our urban systems of water provision.

Note

1. Archival and empirical information for this piece draws on extensive field research conducted in San Cristobal de las Casas, Chiapas between July 2005 and December 2009 and draws heavily on a chapter from Ramos Castillo (forthcoming).

REFERENCES

- Kaika, M. (2004) *City of Flows: Modernity, Nature and the City*. New York: Routledge.
- Kaika, M. and E. Swyngedouw (2000) "Fetishising the modern city: The phantasmagoria of urban technological networks", *International Journal of Urban and Regional Research* 24(1): 120–138.
- Ramos Castillo, Ameyali (forthcoming) "Sustainable flows? Water, culture, and the city", in B. Johnston (ed.), *Water, Cultural Diversity, and Global Environmental Change: Charting Sustainable Paths for the Future*. Paris: UNESCO.

12

Integrating traditional knowledge in climate change adaptation

Agni Klintuni Boedhihartono

Local peoples' experiences and interpretations, as well as scientific research, indicate that climate change seldom acts in isolation, but interacts with other environmental and social factors. Interactions tremendously affect peoples' perceptions, interpretations, and adaptations to climate change (Salick and Byg, 2007).

Introduction

All peoples have traditional knowledge and much of this knowledge will be of value in dealing with climate change. In this chapter we will discuss examples of traditional knowledge from a diversity of origins that has potential applications in mitigation or adaptation to climate change. However, much of the recent literature on traditional knowledge and climate change and my own research focuses on the knowledge of peoples who are considered to be indigenous. Below I have therefore given indigenous peoples and their knowledge special attention. Nonetheless, where information is available, I have drawn upon traditional knowledge from more mainstream sectors of society. People have adapted to climate change in the past. The emergence of agriculture and many fundamental attributes of human societies were driven by the episodes of climate change in the Holocene. However, none of these periods of climate change were as rapid as those as we are now experiencing and it is doubtful if they have much to teach us about the problems that we face today.

Specific empirical data on the issues of traditional knowledge and climate change is sparse. The numerous reports that have been disseminated by advocacy organizations are largely anecdotal and present opinions rather than verifiable facts and analysis. I have given a lot of attention in this chapter to knowledge of relevance to natural resources and agriculture. There are of course many other aspects of human life that will be impacted by climate change and where traditional knowledge will be a valuable resource, for instance housing and health. I have focused on agriculture and natural resources, largely because that is where my expertise lies but also because some of the most pressing and potentially dangerous impacts of climate change will be on natural resources and agriculture. I have also given special attention to the knowledge of hunter-gatherer communities whose lives are likely to be most seriously impacted by climate change and whose interests are often ignored in mainstream debates on this subject. Farmers and hunter-gatherers have had to adapt to changing conditions for thousands of years and have consequently developed a rich diversity of techniques using traditional knowledge, especially of biological diversity, to deal with variations or changes in climate (Ulsrud et al., 2008).

Traditional knowledge of any sort is scarcely recognized in the reports of the Inter-governmental Panel on Climate Change (IPCC) or in any of the recent inter-governmental reports on post-Kyoto arrangements for mitigating climate change, for instance Reduced Emissions from Deforestation and Degradation (REDD). Similarly, the numerous initiatives to enhance society's ability to adapt to climate change give little more than token recognition of the role that traditional knowledge might have in adaptation strategies. Most official documents on climate change portray indigenous people and traditional knowledge as quaint artifacts. Salick and Byg (2007) comment that the fact that formal processes treat:

“indigenous peoples” as passive and helpless at best, and as obstructionist and destructive at worst is not new, with roots going back to colonial periods and reoccurring in contemporary discussions of development, conservation, indigenous rights and indigenous knowledge. (Salick and Byg, 2007)

In contrast, there has been a proliferation of reports and meetings to raise awareness that many of those most at risk from climate change are indigenous peoples living in remote areas. These people often retain their cultural identity precisely because they live in areas that are cut off from mainstream society. They inhabit remote forests, drylands that are marginal for agriculture, isolated islands or coastlines, high mountains and polar regions. These people often exist on lands that have poor agricultural endowments; lands that are already marginal for most major

Box 12.1 A story from the Ecuadorian Andes

Impact of carbon forestry on indigenous peoples and peasant communities in the Ecuadorian Andes.

Communities involved in voluntary carbon offset plantation projects in the Ecuadorian Andes have complained of the following social and economic problems:

1. Communities were not properly informed of the exact amount of net payments they would receive.
2. They were not informed of the social and economic risks and potential costs and their legal obligations under the project.
3. They were not advised on the purpose or logic of certified carbon credits and how they produce income for the company.
4. They were not told about penalty clauses under the contract before community members signed long-term agreements.
5. They were victims of manipulation of their own rules about free prior and informed consent.
6. They suffered the economic costs of being displaced from communal grazing lands which were given up for the project.
7. They have had to use much of the modest payments received to pay for technical services from outside experts.
8. They have suffered long delays in receiving payments.
9. They have not received promised levels of payments and employment.
10. Some people are actually worse off and have become indebted as a result of payment of contract penalties.
11. They have had to meet all of the unforeseen costs – for instance replacing seedlings that died.
12. They have had questions and complaints about company expenditures and accounting routinely dismissed by company officials.

commodity agricultural crops, and in many cases where climatic conditions are close to the limits to support agricultural activities. Soils can only produce annual crops with heavy chemical inputs or with long fallows as part of swidden cultivation systems. In some forests, high mountains, deserts and polar regions livelihoods are still largely independent of agriculture and hunting and gathering remain important. In such remote areas modern health services are weak, endemic diseases threaten people's health and there is little capacity to deal with new disease problems. The people of these remote areas have made almost no contributions to the flux of greenhouse gases that are causing climate change but they may be amongst the most vulnerable to the resulting impacts.

An added danger for such remote peoples is that they are likely to be heavily impacted by the efforts of mainstream society to mitigate climate change. The traditional knowledge of these populations can help them to adapt to climate change but it also needs to be harnessed to help design scientific efforts for both mitigation and adaptation measures. The predicament of traditional peoples is well illustrated by the findings of a report published by the Forest Peoples Programme (Griffiths, 2008) on REDD issues regarding indigenous peoples and local communities (Box 12.1).

There is no excuse for the sorts of problems listed in Box 12.1 to occur with carbon sequestration projects, but the prevalence of such stories in the informal literature has led to a situation of great mistrust amongst indigenous peoples and the less powerful rural population at large. The reality is that both climate change mitigation and adaptation measures are planned and operated by people who are part of the global elite, and however good their intentions they often fail to understand or empathize with the poor rural peoples who have to endure not only climate change but also the consequences of mitigation and adaptation measures.

Traditional knowledge as a resource for modern innovation systems

Research on traditional knowledge has tended to focus on studying it and archiving it as a contribution to cultural heritage. I would like to argue in this chapter for a more use-oriented approach to traditional knowledge and learning. Traditional knowledge is of value precisely because it is experiential and has been constantly tested and updated over time (Boedhihartono, 2004). The challenge today is not simply to accumulate traditional knowledge in a static form as a record of the past but to integrate traditional knowledge into modern knowledge and innovation systems. The development science community has gone further than cultural anthropologists in seeking out traditional knowledge and building bridges between it and modern science. There is now an emerging literature on citizen science, sustainability science, appreciative enquiry and so on (Sayer and Campbell, 2004) that shows how modern knowledge and innovation systems can engage with traditional knowledge and link it to modern innovation systems (Asenso-Okyere et al., 2008).

Adapting to change

Many people have no choice but to adapt to a changing climate. In general poor people are more vulnerable than the more wealthy. Lack of

Box 12.2 A Nepalese story

Changes in the climate forced local Nepali farmers in the Kaski and Tanahun Districts in central Nepal to change their agricultural techniques. Irregularity and great variation in the climate created uncertainties and this made it difficult for farmers to plan which crops to plant, when they could harvest and how much production they could get every year. Rainfall patterns varied more during monsoons, with timing and intensity of rainfall becoming more erratic within and between seasons. This caused major disruption not only in biodiversity but also to local/traditional plant varieties. Crops that are adapted to the local environmental conditions (landraces) are needed. Farmers know that these landraces possess characteristics that could better cope with adverse climatic impacts and other problems. From sixty-nine varieties of local rice landraces, after a participatory varieties selection, they came up with eight improved varieties that are expected to be adapted to several climatic impacts, such as rainfall and long droughts. However, this also puts farmers in a situation of risk as they have fewer choices and they become dependent upon companies for provision of the improved varieties. Awareness, knowledge and dependence on a broader range of agricultural techniques reduces the risk of climate related losses from farms and increases the capacity to adapt income generating activities to changing weather conditions.

For generations, communities have been using their traditional methods of adaptation. Local level adaptation strategies that help small-scale farmers to deal with adverse impact of climate change are:

- innovations in farming techniques;
- participatory plant breeding;
- local institutional arrangements.

Some activities that have been identified that would enrich the capacity of the farmers in the region and allow them to better cope with the changing environment would be: farm diversification, off-farm income generating activities, improved markets for agricultural products, conservation of local varieties and species, organic farming, supporting and strengthening farmers' groups.

economic resources, education, proper health services and food increases their level of vulnerability (Ulsrud et al., 2008). Farmers have to adapt to changing situations in order to be able to survive and compete with others. They often have to shift from land-use practices based upon organic subsistence farming towards modernization and intensification. Modern techniques and new varieties of crops increase production, de-

mand high utilization of fertilizer and pesticides and have major impacts on ecosystems. These modern systems can raise productivity of crops, but at the same time they are costly for local communities and expose them to risks of disruption of supplies of inputs or failures to access markets. Rapid transformation from locally self-sufficient agriculture to intensified modern systems leads inevitably to the loss of local varieties or endemic crops and also to a loss of knowledge.

An example of how Nepali farmers who moved towards cultivating a few high-yielding varieties released by the national agricultural agency were confronted with changes in monsoon patterns is taken from *More Than Rain*, a report of the Development Fund on Identifying Sustainable Pathways for Climate Adaptation and Poverty Reduction (Ulsrud et al., 2008) (Box 12.2).

Dealing with variability or adapting to long-term change

Adaptation measures need to move beyond climate risks and physical adaptation measures, to include the social context and people's perception of climate change, in order to build their capacity and resilience to cope with barriers and thresholds. (Ulsrud et al., 2008)

Many accounts of the application of traditional knowledge to climate change are in reality recent applications of the traditional knowledge that has enabled societies to address the problems of climatic variability. Where people lack the possibility of stocking food for long periods or of accumulating capital in order to purchase food in times of scarcity they take very conservative, low risk attitudes to agriculture. The anthropological literature contains numerous examples of traditional agricultural practices that were designed to deal with extreme climatic conditions. People planted a diversity of varieties of a crop species to include those adapted to shorter or longer growing seasons, resistant to different diseases and local soil conditions and so on (Boedhihartono, 2004). This meant that they "evened out" the volatility caused by higher yields in years with "good" weather but lower yields in years of extreme drought. The knowledge, crop varieties and management practices employed to deal with climate variability are a valuable foundation upon which to build in dealing with climate change. But alone they are not adequate, as the direction and magnitude of future changes will greatly exceed the variability that traditional practices have evolved to address.

The ethnic groups collectively referred to by outsiders as Dayaks on the island of Borneo have agricultural systems that are highly adapted to deal with climate variability. They plant a large number, commonly

several dozen, varieties of rice in their rainfed swidden agriculture systems in the knowledge that in any one year only a small proportion will yield well. They do not know in advance which ones will yield but they can feel confident that in any one year at least some of the varieties will thrive under whatever conditions occur (Boedhihartono, 2004). Agricultural development agencies tend to consider these diverse systems as backward and old-fashioned and do not support them. They tend to advocate a small number of “improved” varieties but these are often only adapted to “normal” conditions and fail when unusual weather patterns occur. They produce good yields when fertilized heavily and are susceptible to diseases when not treated with pesticides. There is a tendency for people to take sides in the argument on the merits of these different approaches to farming. Clearly there is room for both and modern agriculture, especially under the threats posed by climate change, should combine the two. Diversity should be maintained but new varieties also need to be introduced into the traditional systems. In reality this is what many thoughtful traditional farmers do. They allocate only a proportion of their land for the new varieties and retain the rest for their range of traditional varieties.

The Punan are one of the remaining hunter-gatherer communities in East Kalimantan (Indonesian Borneo). According to their calendar, the different phases of the moon help them decide upon activities such as planting agricultural and tree crops, clearing cultivation areas, hunting etc. But with climatic changes and irregularity of rainfall patterns or longer dry seasons, these lunar signals may no longer coincide with the times favourable for these activities (Boedhihartono, 2004).

Observations in modern Europe show similar examples of the active use of traditional knowledge. In Central France, Switzerland, Germany and beyond, people delay planting a number of vegetables and flowers until after the Saints days of the “Ice Saints” in mid-May. This tradition was viewed by many as a quaint relic of the past until recent analysis of weather patterns showed that there was indeed a recurring pattern of cool periods that coincided with these saints’ days. Curiously, the tradition was not apparently adapted to deal with the changes in dates of these saints’ days with the move to the Gregorian calendar in 1582. This shows the danger of too rigid adherence to traditional knowledge but in this case had the curious result that the tradition was pre-adapted to present-day climate changes.

The “Ice Saints” Pankratius, Servatius, and Bonifatius as well as the “Cold Sophie” are known for a cooling trend in the weather between 12 and 15 May. For centuries this well-known rule had many gardeners align their plantings after it. Observations of weather patterns over many years have shown, how-

ever, that a drop in temperature occurs frequently only around 20 May. Are the “Ice Saints” not in tune anymore? The solution to the mystery is found in the history of our calendar system: Pope Gregory VIII arranged a calendar reform in 1582, whereby the differences of the Julian calendar could be corrected to the sun year to a large extent. The day of the “Cold Sophie” (15 May) was the date in the old calendar and corresponds to today’s 22 May. Therefore the effects of the “Ice Saints” were traditionally felt in the period 19–22 May. (Today’s warmer climate means that the new saint’s days earlier in May correctly predict the period of cold spells). Sensitive transplants should only be put in the garden beds after this date. (Tuohy, 1964: 214)

Box 12.3 An Ethiopian watershed story

Ethiopia has experienced a range of climatic changes such as droughts and floods, as well as environmental degradation and a breakdown of traditional land and resource management arrangements during conflicts. A study in Tigray Regional State (from Kolla Tembien and Abergele districts) of community needs showed the emphasis given to conserving and developing the productivity of the land, water and plant resources by the people living in a watershed. A strategic integration of three dimensions of food security was taken into account: availability, access and utilization.

Soil and water conservation activities are crucial to environmental rehabilitation and livelihood security measures. Some of the interventions made to cope with and adapt to climate change were:

- Rehabilitation of gullies, construction of water-harvesting check dams, construction of fords and different type of terraces.
- Soil and Water Conservation (SWC) work on farms, in backyards and communal land. (SWC use various techniques to reduce soil erosion and increase vegetation cover).
- Enclosure of degraded communal hill areas in order to rehabilitate the land and regenerate the natural forest. This is mainly done by using Food for Work and community labour mobilization. The area enclosure aims at stabilizing the soil, natural regeneration of the vegetation and reducing erosion which damages the farmland at the bottom of the hill. It also has economic benefit by serving as a source of livestock feed through “cut and carry” systems and honey production. The hillsides closure is providing business opportunities for the landless youth through tree and honey production.
- Plantation of trees on rehabilitated areas and private plots.
- Integrated interventions such as agro-forestry using multipurpose trees to improve soil fertility and supply fodder.
- Check dams used for reclaiming land and conservation of moisture.

This is just one example of modern science demonstrating the wisdom of traditional knowledge. The weather lore section on wikipedia catalogues numerous other examples and provides references to scientific studies that have, in general, demonstrated that long-term weather patterns are consistent with the guidance provided by this traditional knowledge.

Another example of climate vulnerability and adaptation comes from Ethiopia, where rural people pursued a holistic yet local approach which considers the most crucial factors to build assets and resilience to deal with climatic hazards for the local people. It is explained in the *More Than Rain* report (Ulsrud et al., 2008) (see Box 12.3).

Are traditional farming systems more resilient than modern ones?

The Intergovernmental Panel on Climate Change notes that societies have a long record of adapting to the impacts of weather and climate through a range of practices. Traditional livelihoods have been developed in close interaction between people, society, technology, the local nature and climate conditions. People have tried to cope and adapt to circumstances that they are unfamiliar with or less familiar within the limits shaped by the social, political, economic and environmental barriers they face (Ulsrud et al., 2008).

Traditional farming systems embody a huge wealth of traditional knowledge. This is true for all human societies that practice agriculture and is as true for a smallholder in rural Europe, a shifting agriculturalist in the rainforests of Indonesia or a nomadic pastoralist in the Sahel of Africa. Traditional farming systems include numerous provisions to help address extreme climatic events but they remain extremely vulnerable. Examples of changes that traditional systems could not deal with include the potato blight in nineteenth-century Ireland, the phylloxera that devastated vineyards in nineteenth-century France and the famines that have recurred in the arid lands of Africa throughout history. Traditional knowledge was inadequate to confront the challenges posed by these catastrophes. In modern times frontier science has been able to avert dangers posed by extreme climatic events and new pests and diseases in ways that traditional knowledge alone could not have matched. The biological control of the cassava mealy bug in Africa by the use of a pathogen imported from South America is an excellent example of modern science contributing to the protection of a traditional farming system. Chemical pesticides have been controversial because of their environmental and human health side effects but on balance the evidence suggests that many tradi-

tional farmers have benefited enormously from industrial chemicals applied to their crops and in the protection of their health.

There is a popular view in the environmental literature that the industrial monocultures that produce a large proportion of the world's staple food crops are inherently fragile and will be vulnerable to external shocks such as those produced by climate change. Many authors have decried the loss of the vast range of landraces that were used by many traditional farmers as a protection measure against climate extremes and pest and disease threats. Much of the world's rice now comes from a tiny number of improved cultivars, most of them highly dependent on fertilizers and pesticides. The fact that we are now placing "all of our eggs in one basket" is seen as a potential source of future problems. However, the green revolution has served to greatly increase food production and has averted famine for hundreds of millions of people. So far it has not suffered from any of the problems that its critics have predicted. When new pests and diseases have appeared new treatments have been developed or resistance has been bred into the crops.

The evidence does not support the hypothesis that traditional farming is more resilient than modern agriculture. What it does suggest is that the most productive and stable systems have been developed where modern science has effectively been applied to complement traditional knowledge. The African mealy bug example is perhaps one of the best examples. We therefore conclude that the tendency to advocate traditional knowledge as an alternative to modern science is presenting a dangerous dichotomy. Dealing with climate change will require the careful application of modern science combined with a carefully nurtured body of traditional knowledge.

The current wave of interest in conducting research on so-called orphan crops is a good example of linking traditional knowledge with modern science. Orphan crops are the very numerous crops and crop varieties that have been neglected during the recent decades of focus on the green revolution and on a reduced set of commodity crops (Crops for the Future <http://www.underutilized-species.org/record_details.asp?id=309> [accessed 29 April 2010]). These orphan crops could be vitally important in enabling agriculture to adapt to climate change. They include landraces that are adapted to conditions considered extreme today but that may become the norm in the future under changed climates. But it is equally clear that it is not just a question of preserving these cultivars and the knowledge of the farmers that still use them. Modern science can exploit the qualities of these marginal crops and deploy it in varieties that will be more widely grown. The International Center for Agricultural Research in the Dry Areas (ICARDA) has one of the world's largest gene banks in the world for dryland crops. All the accessions to

Box 12.4 A Nicaraguan story

Farmers in Nicaragua are developing various methods for adapting to climatic changes associated with El Niño and la Niña (ENSO).¹ The extreme weather patterns in Nicaragua could include both droughts and hurricanes in the course of the same year. Excessive rainfall could wash away soils from the land to complement the impacts of degradation of the natural resource base due to agro-chemicals, over-cultivation of soils, deforestation, slash-and-burn agriculture and deterioration of water sources. Landslides and landslips are also great threats in the region.

The collaborative programme for Participatory Plant Breeding in Meso-America (PPBMA) was initiated in 2001 in the Municipalities of Codega, Puebla Nuevo and Totogalpa; farmers worked with the Centre for Promotion of Rural and Social Development (CIPRES), a local NGO supported by the Development Fund to domesticate and improve varieties of basic grains by means of ancestral practices, generating the biological diversity that characterized the region.

The participatory plant breeding programme takes place in farmers' fields. The local farmers led the process themselves with support from CIAT-CIRAD² at first, which was then continued by CIPRES. Researchers and farmers work together to develop stronger and better food plants that are better suited and resistant to droughts, pests and diseases, with good plant size, greater yield, better quality of final product in term of taste, nutritional qualities and forage for animals. The work has been done with local varieties of maize, beans, sorghum and millet that were gathered and introduced into different agro-ecological conditions at different elevations.

By diversifying and building their farm assets, farmers make sure that they have a safety net and when conditions become adverse, they know that at least one of these crops will produce. Crop rotation and diversification on the farms is a strategy that the farmers are practicing primarily to have food all year round, but also to generate income when there is surplus. Farmers combine crops in their fields, such as squashes, onions, sweet peppers, yucca/cassava and cooking bananas. This diversification has also improved food security for the families, and at the same time helped them to overcome their dependency on basic grains, diversifying and improving family diets, producing food for the animals and earning extra income.

As a result of these activities farmers conserve the local biodiversity of plants and crops to overcome various difficulties including climate change.

the collections are geo-referenced. The availability of Geographical Information System (GIS) climate overlays enables the accessions in the gene banks to be screened to identify the climatic characteristics of the areas from which seeds were collected. This greatly accelerates the process of exploiting seed collections for genetic material to use in breeding programmes to produce varieties adapted to new climatic conditions. This is yet another example of the successful combination of traditional knowledge and modern science.

Genetic modification of crops has been highly controversial, with advocates of more traditional agriculture expressing fears over the potential harm that could come from releasing “Frankenstein” crops into farming systems. Here again genetic engineering needs raw materials with which to work. The huge diversity of crop varieties found in traditional farming systems have been and will continue to be an invaluable resource for both conventional plant breeding and genetic modification. As more and more of the world’s land comes under cultivation it will be necessary to have crops that are adapted to a greater variety of conditions. This means that relying on a single rice variety for a large part of Asia, as was the case with the initial green revolution, will no longer be a viable option. This need for crop breeders to produce more diversified materials to suit the more diverse conditions produced by land pressures and the new conditions produced by climate change will put a premium on the production of crops precisely designed for special conditions. The improvement in the performance of gene sequencing and transfer technologies means that it will soon be possible to produce “designer crops”. Again this requires a judicious combination of traditional knowledge from traditional farming systems with state-of-the-art technology (Box 12.4).

Harnessing traditional knowledge to innovation and adaptation systems

Simply being aware of traditional knowledge and taking it into account is clearly important. But one can go much further in more fully integrating it into modern knowledge and innovation systems (Sayer and Campbell, 2004). However, although most people will subscribe to this principle the reality is that such integration is rarely achieved. Asenso-Okyere et al. (2008), in a synthesis of papers presented at a conference on knowledge and innovation for advancing agriculture in developing countries, make almost no reference to traditional knowledge. The existing knowledge of the intended recipients of the new research generated knowledge

receives almost no mention. One paper does describe how the Bolivia Agriculture Technology System has experimented with the idea of tapping local or indigenous farmer knowledge systems in an attempt to harmonize tacit knowledge with the explicit knowledge of researchers and extension workers. The researchers are investigating whether being embedded in and connected to social networks has an effect on the rate of application of agricultural technologies. The paper concludes that social interactions and networks can contribute to the adoption of innovations. Remarkably, this is the only one of the forty-two papers presented at the conference that makes any reference to traditional knowledge (Asenso-Okyere et al., 2008). This is surprising in the light of the strong body of evidence assembled by Douthwaite (2002) that innovation and change is much more likely to be adopted if it is developed in the context of local knowledge systems.

One technique that is useful for linking traditional local knowledge with scientific knowledge has been visualization. Participatory techniques can be employed where local people and external scientists use drawings to share their understanding of the environmental and livelihood values of landscapes. The drawings are geo-referenced and can subsequently be related to remote sensed imagery. Drawing is a skill that is shared by all and the technique places local people and external scientists on a level playing field. The use of drawing has revealed just how rich and extensive local knowledge of natural resource issues is, and the scientists often learn more than the local participants. Visualization is used in negotiations of sustainable development scenarios and Bell and Morse (1999) have described the approach with the term “rich pictures”. Visual techniques were fundamental to much of the work on Punan hunter-gatherers described elsewhere in this paper (Boedhihartono, 2004).

A second effective technique has been the participatory building of simulation models. A facilitator works with local people and external scientists to build simple simulation models for natural resource management systems. These models can be used to explore the flow of environmental and livelihood benefits to local people from different land cover patterns or different management approaches. The general approach is described in Sayer and Campbell (2004) and a useful case study is given in Sandker et al. (2007). In this study a simulation model was built in the proprietary software (STELLA) of the environmental and livelihood outcomes that might be expected from the development of oil palm estates in Indonesian Borneo. Local people contributed their knowledge of their own existing and potential benefits and of local environmental values, external scientists and economists contributed facts and figures derived from studies of oil palm expansion in other similar

regions. The model was then used to answer “what if” questions and its use greatly enriched the local debate on the pros and cons of the planned establishment of industrial scale estates.

Lynam et al. (2007) have reviewed a number of tools that can be used to incorporate local knowledge into improved decision making. However, our overall impression is that such tools are not widely employed in practice and are still mainly used by researchers. These tools are a valuable resource in harnessing traditional knowledge to modern knowledge and innovation systems and deserve to be much more widely used in natural resource management. The literature on “Appreciative Enquiry” (Cooperrider et al., 1995) is rich in examples of the synergies that can be gained from the integration of traditional and modern scientific knowledge. Reed et al. (2008) provide interesting perspectives on how participatory processes, in this case for determining indicators of environmental changes, can be used to combine traditional and external scientific knowledge. The title “Participatory indicator development: What can ecologists and local communities learn from each other?” captures nicely the richness that can come from bringing these two knowledge systems together. The very widespread use of participatory techniques in rural development activities is driven by this need to harness the two knowledge systems.

Traditional knowledge and the mitigation of climate change

Measures to mitigate climate change may in the future be a source of major financial support for the maintenance of forests. Funding under programmes for Reduced Emissions from Deforestation and Degradation (REDD) is now emerging in many countries and billions of dollars are being pledged to such programmes (Griffiths, 2008).

REDD provides an interesting example of a major initiative that has been established through international negotiations that could have a major impact in shaping the future of forested landscapes throughout the world and that is being designed in the almost total absence of the people who have traditionally depended upon those forests. In its purest form REDD would establish forest carbon as a tradable commodity and vast amounts of money would change hands in exchange for commitments to manage forests in specified ways that increased their carbon stock. There are already market mechanisms in place in Chicago, London and other stock exchanges and billions of dollars already change hands in exchange for carbon commitments. The problem is that the livelihoods of a significant proportion of the world’s poorest people depend on the forests that

are the object of these payments – the World Bank estimates that 1.2 billion of the world's poorest people live in or around forests and depend upon them for their livelihoods to a greater or lesser extent. Viewed from the perspective of international negotiations, these forests occupy large “empty” spaces on the map and many of them are located in “poor” countries. For these countries, agriculture or agro-forestry would be better uses of land from the perspective of the livelihoods of families dependent on this land rather than leaving it “untouched”. There is a fundamental logic that it must be good for rich countries to transfer money to these countries in order to guarantee the maintenance of the forests, thus paying local people to forgo use. The problem is that the deals are being done between national governments and the big commercial enterprises that have emerged as carbon brokers – these groups need simple measures that are easily verifiable to justify their payments. There is a great deal of interest in the use of remote satellite imagery to measure carbon stocks so as to assess payments. These simple payment and measurement systems ignore the true complexity of the forests and of their traditional ownership and uses. Traditional use rights are often not recognized in national legislation – in many countries traditional uses are even classed as illegal. If they are to operate in an equitable manner and bring benefits to the poor, REDD payments need to be built from the bottom up – the starting point needs to be the situation as it exists today, and REDD has to be adapted to meet specific local conditions – this requires that local people and their knowledge of the forests have to be built in right from the beginning of the negotiations. Local people often have knowledge of how to manage fire risks, they often have livelihood systems that are consistent with the retention of high carbon stocks, they are frequently allies in resisting conversion of forests to agro-industrial uses, and they have the knowledge to restore forests and increase carbon stocks on degraded land.

In 2008 UNESCO, the Secretariat of the Convention on Biological Diversity, the Secretariat of the UN Permanent Forum on Indigenous Issues (UN-PFII), and the Office of the High Commissioner for Human Rights (OHCHR) initiated a discussion forum called the Frontlines Forum. Indigenous or rural communities from small islands, high altitudes, the Arctic, desert margins and other vulnerable environments participate in this forum and exchange their own stories, concerns and innovations on climate change: impacts, opportunities and adaptation strategies (<http://www.climatefrontlines.org/>). One of the hot topics in the discussion is REDD for Climate Change (<http://www.climatefrontlines.org/en-GB/node/169>) where indigenous peoples and other observers have also expressed concern about possible negative impacts of REDD. “If forests

are given monetary value under REDD schemes, many fear that – where land tenure rights are unclear and decision-making remains top-down – new conflicts could arise among indigenous and local communities and between them and the state” (Ravels, 2008). REDD mechanisms might exclude local populations from implementation and benefit-sharing processes, and possibly even expel them from their own territories: “The increased monetary value placed on standing forest resources and new forest growth, opens the door for corruption in countries where this is already rife in the forest sector. Centralized planning . . . where the national government creates plans, receives payments and disburses the new funds only adds to the marginalization of forest people” (Dooley et al., 2008).

The Samdhana Institute has embarked upon an innovative programme in Indonesia to prepare communities for REDD. It is supported by the Packard foundation to host workshops in remote rural areas to sensitize people to the options and threats posed by REDD. The objective is to empower people so that if REDD schemes are proposed for their traditional lands, the people are equipped with the knowledge to be able to engage meaningfully in the negotiations. REDD could in theory provide the funding that is badly needed to enable traditional forest management systems to become economically sustainable – thus conserving the forests and the knowledge of the people who inhabit them – but this will only happen if REDD schemes are built from the ground up and use the traditional knowledge and management systems as their starting point – at present, in their haste to get these systems into operation both governments and private companies are not prepared to go through these often lengthy and complex processes with local stakeholders.

Traditional knowledge and adaptation to climate change

The International Union for Conservation of Nature (IUCN) and the Center for International Forestry Research (CIFOR) have initiated work with local communities in Africa and South-East Asia to explore options for helping local people to adapt to climate change. A valuable tool that was used in Africa and Asia to help communities to better anticipate climate change impacts and plan for adaptation measures is a computerized tool developed by the IISD (International Institute for Sustainable Development) known as CRiSTAL (Community Based Risk Screening Tool – Adaptation and Livelihoods). CRiSTAL is a decision support tool used to facilitate discussions with communities. It encourages them to

contribute their local knowledge of technologies that could contribute to adaptation with scientific knowledge contributed by the facilitators (http://www.iisd.org/security/es/resilience/climate_phase2.asp). These initial trials have enabled local people to contribute their knowledge and concerns to the debate and also help them to learn more about the potential impacts of change and of mitigation measures. The sophisticated and detailed knowledge that local people possess is inevitably going to be a richer source of ideas and techniques for adapting to climate change than the broad-brush generalized technologies that are the product of international negotiations and advance research institutes. This is another and very pertinent example of the imperative of linking traditional knowledge systems to frontier science in order to achieve resilience in the face of the high levels of uncertainty that surround our predictions of climate change (see Boxes 12.5 and 12.6).

Conclusions

Poor people have developed many adaptation strategies as a response to land shortage, low productivity, droughts and other threats to food security and income generation.

Some dimensions of adaptive capacity are generic, such as education, income and health, while others are specific to particular climate change impacts and can be related to knowledge, technology and institutions (Adger et al., 2007). People are adapting to a whole set of factors that influence them, both climatic and non-climatic (Ulsrud et al., 2008). Research has considered indigenous people and knowledge as key elements for adaptive management. The importance of including both “expert” scientific and stakeholder knowledge through more participatory procedures has been emphasized by Wilcock (2007). Proposed climate change mitigation measures provide a good example of interventions that could be an opportunity for local communities or could be a threat. People could benefit if they get extra income for maintaining natural forests where they can still go hunting and collect Non-Timber Forest Products. But they may suffer if mitigation involves planting exotic monocultures in areas where people are still “hungry” and have no alternative way of meeting their basic needs.

Education is vital for the improvement of livelihoods as it enables people to enter the market economy. But there is a tendency for modern education to compete with and replace traditional knowledge and education systems. A balance between the knowledge from formal education systems and traditional knowledge systems will enable people to cope

Box 12.5 Harnessing traditional knowledge and modern science

As we see in the three examples given by the Development Fund in their report *More Than Rain* (Nepal, Nicaragua, Ethiopia), some activities are very useful for communities and individual farmers to strengthen their capacity for adaptation to climate change.

A very good example here is shown by the activities led by REST (Relief Society of Tigray), a local NGO in Ethiopia with communities, where traditional knowledge is enforced by modern technology and the sharing of experiences with others.

a. Yield-increasing technologies

By development of irrigation systems (check dam ponds, under ground water tanks, river diversion, hand-dug wells, mini-dams, water pumps, treadle pumps, motorized pumps, water saving technologies such as drip irrigation and water harvesting); selected and improved varieties of crops to adapt to intensification of production and climate variability; using compost from livestock dung and fertilizer; and improved farm management practices with introduction of frequent and timely weeding practices.

b. Community seed banks

The seed banks managed by community groups help farmers to have access to local seed varieties; they also act as a buffer stock following a disaster and during periods of shortages; and they are also useful for preserving local biodiversity and landraces and reducing the reliance on external and often expensive seed inputs.

c. Livestock improvement

Livestock are important income generation and food security resources for local communities in the Tigray region. They are also important assets used as wealth indicators. A productive breed of dairy cow, the Begite cow, produces 6 litres of milk instead of 1.5 litres from the local cow. This Begite cow also survives the harsh conditions as well as local cattle, therefore becoming important for the economy and food security under climate variability and change.

d. Study tours and south-south learning

Some women's groups have shared experiences on market oriented production, dairy development, and vegetable and root crops production. Some others have transferred their knowledge on drip irrigation techniques from India to Tigray in Ethiopia.

e. Increased livelihood diversification

Increasing livelihood diversification has been developed through small scale enterprises producing and selling dairy products, small ruminant development, honey processing and formation of honey cooperatives, petty trade, handicrafts and small business management training.

Box 12.6 Tuvalu stories

Some climate change and sea level rise challenges observed in Tuvalu are listed below:

- a) rising sea level and high groundwater level/floods during high rainfall intensities;
- b) water scarcity due to high frequency of low rainfall days and prolonged drought;
- c) decrease in agricultural productivity due to pest and fruit flies infestation;
- d) coral bleaching and extirpation of some marine species, and reduction of lagoon fisheries productivity due to the high soil erosion burying adjacent corals;
- e) increasing severity of coastal erosion;
- f) increasing and wider saltwater intrusion into coastal areas and pulaka pits; and
- g) coastal flooding, inundation and erosion
- h) rise of sea temperature
- i) tropical cyclones increased in frequency.

The Department of Environment of Tuvalu has a National Adaptation Programme of Action (NAPA) with the main objectives:

- to develop a country-wide programme that encompasses urgent and immediate needs of communities;
- to implement immediate and urgent adaptation activities to climate change and variability;
- to enhance communities' awareness and livelihood; and
- to mainstream adaptation measures into national and sectoral planning.

In Tuvalu, communities use traditional knowledge to adapt to changes of climatic conditions. *Te Panakua* is a traditional knowledge used to attract rainfall clouds and is practised during droughts and periods of low rainfall. *Te Kaufata* is a traditional knowledge for preserving local food in case of shortage during disasters (for example: strong winds or cyclones). *Matematega o Kaumana* is a traditional knowledge of reading clouds to locate school of fishes in the oceans and predict approaching disasters (strong wind, drought, waves etc.).

They applied traditional law *Te Lüga* banning the harvesting of land and marine resources on identified portions of the island to enhance the recovery of marine and land biodiversity.

Source: Extract from the Report from the Ministry of Natural Resources, Environment, Agriculture and Lands. Dept of Environment, 2007, and a presentation from Poni Faavae [2004], Tuvalu NAPA project, Ministry of Environment.

better with changing environments, natural disasters and man-made changes such as logging or mining, palm oil plantations, roads and development programmes. Major investments are now planned in REDD schemes, carbon sequestration and other payments for environmental services; these have potential to make valuable contributions to local livelihoods or to place people in even greater difficulty. A major determinant of whether these investments produce outcomes that are favorable to local people or harmful to them will be the extent to which these programmes fully integrate traditional knowledge alongside modern scientific knowledge in their design.

Traditional knowledge is very rich and is constantly being tested, further enriched and updated. The challenge today is not to document and archive traditional knowledge but to build upon it and to use it as a basis for further development of modern knowledge and information systems. Culture and knowledge are eternally changing and must continue to co-evolve to enable us to adapt to our changing environment (Macchi et al., 2008).

Notes

1. El Niño/Southern Oscillation (ENSO) is a general term used to describe both warm (El Niño) and cool (La Niña) ocean-atmosphere events in the tropical Pacific. ENSO is associated with floods, droughts and other disturbances in a range of locations around the world.
2. CIAT: International Centre for Tropical Agriculture. CIRAD: *Centre de coopération internationale en recherche agronomique pour le développement*.

REFERENCES

- Adger, N., I. Lorenzoni and K. O'Brien (2007) *Living with Climate Change: Are there Limits to Adaptation?* Cambridge: Cambridge University Press.
- Asenso-Okyere, K., K. Davis and D. Aredo (2008) *Advancing Agriculture in Developing Countries through Knowledge and Innovation*. Washington, DC: International Food Policy Research Institute.
- Ayto, J. (2006) *Brewer's Dictionary of Phrase and Fable*, 17th edn. New York: Collins.
- Bell, S. and S. Morse (1999) *Sustainability Indicators: Measuring the Immeasurable?* London: Earthscan.
- Boedhihartono, A. K. (2004) "Dilemme à Malinau", Ph.D. thesis, University of Paris VII.
- Climate Frontlines website. Available at <<http://www.climatefrontlines.org/>> (accessed 28 May 2010).
- Cooperrider, D. L., F. Barrett and S. Srivastva (1995) "Social construction and appreciative inquiry: a journey in organizational theory", in D. Hosking, P.

- Dachler and K. Gergen (eds), *Management and Organization: Relational Alternatives to Individualism*. Aldershot: Avebury Press, pp. 157–200.
- Dooley, K., T. Griffiths, H. Leake and S. Ozinga (2008) *Cutting Corners: World Bank's Forest and Carbon Fund Fails to Forest and Peoples*. Moreton-in-Marsh, UK: Forest Peoples Programme.
- Douthwaite, B. (2002) *Enabling Innovation: A Practical Guide to Understanding and Fostering Technical Change*. London: Zed Books.
- Faavae, Poni (2004) "Using local traditional knowledge to enhance adaptation to climate change", PowerPoint presentation for UNFCCC. Available at <<http://enviroscope.iges.or.jp/modules/envirolib/upload/147/attach/S4-3-Poni-Faavae.pdf>> (accessed 27 April 2010).
- Griffiths, T. (2008) "Seeing 'REDD'? Forests, climate change mitigation and the rights of indigenous peoples and local communities" (advance draft), UNFCCC COP 14, Poznan, Forest Peoples Programme.
- Lynam, T., W. De Jong, D. Sheil, T. Kusumanto and K. Evans (2007) "A review of tools for incorporating community knowledge, preferences, and values into decision making in natural resources management", *Ecology and Society* 12(1): 5. Available at <<http://www.ecologyandsociety.org/vol12/iss1/art5/>> (accessed 28 May 2010).
- Macchi, M., G. Oviedo, S. Gotheil, K. Cross, A. Boedhihartono, C. Wolfangel and M. Howell (2008) *Indigenous and Traditional Peoples and Climate Change: Issues Paper*. Gland, Switzerland: IUCN.
- Ravels, S. (2008) *REDD Myths: a Critical Review of Proposed Mechanisms to Reduce Emissions from Deforestation and Degradation in Developing Countries*. Amsterdam: Friends of the Earth.
- Reed, M. S., A. J. Dougill and T. R. Baker (2008) "Participatory indicator development: what can ecologists and local communities learn from each other?", *Ecological Applications* 18(5) 1253–1269.
- Salick, J. and A. Byg (2007) "Indigenous peoples and climate change", Symposium Report, 12–13 April, The Tyndall Centre for Climate Change Research, Oxford, UK. Available at <<http://www.tyndall.ac.uk/publications/Indigenouspeoples.pdf>> (accessed 28 May 2010).
- Sandker, M., A. Suwarno and B. M. Campbell (2007) "Will forests remain in the face of oil palm expansion? Simulating change in Malinau, Indonesia", *Ecology and Society* 12(2): 37. Available at <<http://www.ecologyandsociety.org/vol12/iss2/art37/>> (accessed 28 May 2010).
- Sayer, J. and B. Campbell (2004) *The Science of Sustainable Development: Local Livelihoods and the Global Environment*. Cambridge: Cambridge University Press.
- Tuohy, Frank (1964) *The Ice Saints*. London: Macmillan.
- Tuvalu's National Adaptation Programme of Action: Under the auspices of the United Nations Framework Convention on Climate Change (2007) "Ministry of Natural Resources, Environment, Agriculture and Lands, Department of Environment". Available at <<http://unfccc.int/resource/docs/napa/tuv01.pdf>> (accessed 28 May 2010).
- Ulsrud, K., L. Sygna and K. O'Brien (2008) *More Than Rain: Identifying Pathways for Climate Adaptation and Poverty Reduction*. Utviklingsfondet:

- The Development Fund. Available at <<http://www.utviklingsfondet.no/filestore/MoreThanRainwebsitesize.pdf>> (accessed 28 May 2010).
- Wilcock, D. (2007) "Examining 'inclusiveness' in adaptive natural resource management", in Wilson et al., *Proceedings of the 5th Australian Stream Management Conference, Australian Rivers: Making a Difference*. Thurgoona, New South Wales: Charles Stuart University.
- Wilson, A. L., R. L. Dehaan, R. J. Watts, K. J. Page, K. H. Bowmer and A. Curtis (2007) *Proceedings of the 5th Australian Stream Management Conference: Australian Rivers: Making a Difference*. Thurgoona, New South Wales: Charles Stuart University. Available at <http://www.csu.edu.au/research/ilws/news/events/5asm/docs/proceedings/Wilcock_Deirdre_455.pdf> (accessed 30 April 2010).

13

Traditional knowledge and economic development: The biocultural dimension

Kabir Bavikatte, Harry Jonas and Johanna von Braun

Introduction

The idea that traditional knowledge (TK) can be used as a driver for the economic development of indigenous peoples and local communities (ILCs) has gained international currency since the coming into force of the Convention on Biological Diversity (CBD). The genealogy of the linkage between TK and economic development begins with Article 8(j) of the CBD; the most significant attempt to make Article 8(j) operational is within the ongoing negotiations of the Working Group (WG) on Access and Benefit Sharing (ABS) towards the development of an International Regime on Access and Benefit Sharing (IRABS).¹

Article 8(j) is unprecedented in international law to the extent that it acknowledges the stewardship role played by ILCs in conserving and sustainably using biological diversity. It also makes a clear link between conservation of biological diversity and the protection and promotion of the knowledge, innovations and practices of ILCs. While there have been a few high-profile ABS agreements between ILCs and commercial organizations regarding the use of the former's TK,² there is still a lack of clarity on how TK and economic development ought to be understood under Article 8(j). More often than not, negotiations relating to TK in the WG on ABS seem to understand TK as a commodity that will be traded by ILCs in exchange for monetary and non-monetary benefits, thereby making the link between TK and economic development. While such an understanding has validity, it is an understanding of TK and economic

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development that is enclosed in a market framework and is thus unable to encompass a range of ILC perspectives and understandings of their own TK.

This chapter discusses the most relevant of the many reasons for the suppression of competing narratives on TK and economic development that challenge the dominant market paradigm. Our aim is to outline the limitations of the existing approaches to TK and economic development within the WG on ABS and the reasons for such a limited reading of Article 8(j). We then reinterpret Article 8(j) in a manner that best represents the concerns of ILCs. Finally, we present the biocultural protocol, an operational tool that has the potential to facilitate the realization of the aspirations of ILCs and the spirit of Article 8(j).

Commodifying traditional knowledge

The word “commodification” has a pedigree that begins with Karl Marx.³ Commodification implies the transformation of social relationships into relationships mediated by the market. A commodity in market terms is a good or service that is alienable from the worker/producer in exchange for money.⁴ Anything including labour could become a commodity as long as it can be sold.

The commodification of TK tends to simplify TK in that it ignores that it is a process and an outcome of the interface between communities and their land, culture and spirituality. TK exists at the node of a complex set of relationships between communities and their ecosystems that are grounded in their spirituality and regulated by customary laws. The masking of the relationships that produce TK results in a kind of commodity fetishism,⁵ in which aspects of ILCs’ lifestyles that underpin and produce TK are ignored and even undermined at the expense of valuing TK as a commodity.

Dominant interpretations of Article 8(j) read it as a provision that affirms the right of ILCs over their TK, which is understood in market terms as the right to their intellectual property. Such a right is market-alienable to the extent that it can be sold or transferred to the highest bidder. The market-inalienable rights of ILCs, such as the right to live on their traditional lands and practise their ways of life that underpin the development of TK, are masked through the commodification of TK. Market-inalienable rights are the hidden aspects of TK. TK in its essence is a manifestation of a cluster of alienable and inalienable rights (Vermeulen, 2008).

The understanding of Article 8(j) as only affirming the intellectual ownership of ILCs over their TK is based on a market-driven approach

to stemming the rapid depletion of biological diversity and associated TK that is due to the loss of ILCs' land and ways of life. The loss of biological diversity and associated TK has adverse effects on the business interests of pharmaceutical, biotech, agribusiness, cosmetic and other industries that make use of genetic diversity and TK to develop new products.⁶ The market approach then seeks to incentivize ILCs to conserve what little remains of their biodiversity and TK in exchange for a share in the profits that such biological resources and TK generates.

The grand bargain of Article 8(j) and the inalienable rights of ILCs

The problem we have identified here is that the acknowledgement of market-alienable aspects of TK such as ILCs' ownership of their TK tends to mask the existence of inalienable aspects of TK, such as ILCs' rights to their traditional lands and to practise their cultures which are in effect the wellspring of their TK. The market inalienability of certain rights is based on an understanding that certain aspects of personhood or community cannot and should not owe their recognition to whether or not they are market-efficient (Sandel, 2005: 122). On the contrary, they should be placed outside the realm of the market since they are integral to human flourishing and well-being.⁷ The rights of ILCs to their traditional lands and sacred sites and to conditions in which they can freely practice their cultures and spirituality form the basis of their well-being, and the recognition of these rights should not be conditional on whether or not their TK and biological resources have economic value.

At its core, Article 8(j) is innovative, for it strikes a grand bargain. It acknowledges that it is the traditional lifestyles of ILCs that have conserved and sustainably used biological resources and that the future of biological diversity rests on protecting the inalienable rights of ILCs that will enable them to continue their traditional lifestyles. It is implicit in the political history of Article 8(j) and in the history of the struggle for legal rights of ILCs culminating in instruments such as the Declaration on the Rights of Indigenous Peoples (see Box 13.1) that these inalienable rights have been repeatedly violated through history by colonialism, repressive state policies and theories of development based on market efficiency. The dispossession of ILCs' traditional lands and the annihilation of their cultures have consequently led to the depletion of biological diversity, which has begun to negatively affect humanity in general. Article 8(j), however, is pragmatic to the extent that it understands that one of the ways to secure the inalienable rights of ILCs is by securing their alienable rights over their TK. The grand bargain contained in Article

8(j) is the safeguarding of TK through its commodification, while, in order to protect TK as property, one would have to safeguard the conditions that give rise to TK: ILCs' traditional ways of life.

The commodification of TK through the acknowledgement of rights of ILCs over their TK may appear to be a response to widespread biopiracy.⁸ However, it is important to note that biopiracy is recognized as a legal problem only after the recognition of the ownership rights of communities over their TK, with the right giving rise to the crime of its violation. The grand bargain of Article 8(j) furthers the argument that if the rights of ILCs over their TK are to have any efficacy and if TK is understood as dynamic, then their rights to traditional lands and ways of life must also be secured since they are what elicit TK in the first place.

Desperate exchanges⁹

The reality that most ILCs are desperately poor, with lifestyles under serious threat, contributes to the enormous inequality of bargaining powers between ILCs and commercial interests who seek access to their TK. Communities are rarely organized and knowledgeable enough about the legal issues at stake to be able to affirm their inalienable rights to their lands and culture through the commodification of their TK in a manner that does not violate its sanctity. The norm generally is that culturally devastated and economically deprived communities with little or no understanding of the legal implications of the contracts they enter into tend to sell their TK for whatever price they think they can get.¹⁰ This issue becomes particularly urgent when dealing with TK because full-scale commodification of TK without securing its market inalienable aspects has serious implications for how ILCs understand their TK, how TK is developed and the relationships between communities that share TK.

The problem of commodifying TK under Article 8(j) lies in the market inalienability of some of its aspects. Article 8(j) acknowledges that TK emerges through a dynamic interface between the ecosystems and cultures of ILCs and is the result of a biocultural process that is informed by customary laws and spiritual values.¹¹ While TK has been shared and exchanged within and between communities for millennia, such sharing or exchange has always been regulated by customary laws and values of ILCs. The emergence, preservation and growth of TK is intrinsically linked to the relationships ILCs have with each other and their ecosystems. According to ILCs, TK is less of an alienable product than a manifestation of a dynamic set of relationships. The very existence of TK depends on these relationships and any disruption or lack of respect for them will adversely affect the preservation and dynamism of TK.

In any attempt to engender economic development through the commodification of TK, the challenge is to ensure that the cultural and spiritual relationships, land rights, customary laws, and values that are market-inalienable and integral to the growth and preservation of TK are not adversely affected. Debates around commodification of TK range between two poles of a spectrum with the dominant pole being that TK, like any other good or service, can be commodified and therefore bought and sold. At the opposite pole is a view that TK as a whole is market-inalienable and cannot be commodified without adversely impacting on the bioculture of ILCs that have conserved and sustainably used biodiversity for millennia and engendered the TK in the first place.

Most discussions around TK in the WG on ABS revolve around the dominant pole, in which TK in all its forms can be commodified as long as the community has consented to such a sale and any benefits generated from the use of such TK are fairly and equitably shared with the community. The grounds for concern here are not about the market-inalienability of the TK, but rather of ensuring that communities are able to negotiate with commercial and research interests on a level playing field. Issues of whether and how one can ensure that the non-commodifiable aspects of TK are affirmed and remain untainted by aspects of TK that are commodified remain unaddressed. In contrast, the opposing view highlights the dangers of a domino effect (Radin, 1987) in which the moment that communities begin to commodify their TK, it necessarily affects their biocultural relationships and the rights of other communities that share or have contributed to the development of such TK. Thus, this school of thought believes that even under the most equitable contractual conditions, the commodification of TK is morally untenable (Shiva, 1997).

Both poles of the spectrum regarding the commodification of TK seem to be plagued by the problem of the double-bind. On the one hand, it seems hypocritical to hold the view that desperately poor ILCs that have been marginalized by colonialism and discriminatory state policies cannot commodify their TK in exchange for much needed monetary and non-monetary benefits. In fact, for some ILCs, the acknowledgement of their rights over their TK and thereby their right to commodify it is itself a triumph. On the other hand, however, it is equally important to acknowledge that the wholesale commodification of TK with no concern for its consequences would have a devastating impact on communities and their relationships with each other and the ecosystems they manage. The question that such a double-bind raises is whether or not it is possible to explore the option of incomplete commodification,¹² wherein some aspects of TK can be commodified while ensuring the market inalienability of others. In other words, is it possible to incompletely commodify TK and thereby affirm ILCs' market-inalienable rights to land and culture?

Reifying traditional knowledge in Article 8(j)

The current negotiations in the WG on ABS towards IRABS has focused on ensuring fair contracts with ILCs for the sale of their TK, but have given little attention to the ecological and cultural relationships within which TK is embedded. TK is no longer seen as a product of an organic process but rather appears as an abstract thing in itself, uprooted from the community processes from which it arises. Such a reification¹³ of TK creates a false objectification that paradoxically destroys its foundations in its attempts to protect it.

As a result, TK is alienated from community processes that underlie it and is presented as a self-evident fact. The reality is that TK is a process and for such a process to be sustained, community rights to their lands and cultures must be secured. There is a small gap between understanding TK as a detached product owned by a community and the reality of interpreting Article 8(j) as a provision that merely seeks to secure intellectual property rights (IPRs) of communities. This is because how we understand the fact of TK is based on how we perceive our world. Facts are discourse-dependent; what we describe as facts are based on our perception of the world. The dichotomy between facts and values is illusory to the extent that our values inform what we perceive as facts, rather than the other way around.¹⁴

The current crisis of Article 8(j) is that the perceived consensus on facts masks the real differences in values. The so-called facts around which there seems to be agreement in the WG on ABS is that TK is a commodity that can be traded and that operationalizing Article 8(j) requires a good ABS agreement between communities and commercial interests. The disagreement on values is over what would constitute a good ABS agreement with different perspectives on best practices and due process. The problem is that the moment we all agree that TK is a purely tradable commodity we sever the linkage with its market-inalienable aspects and thereby foreclose discussion of how ABS agreements can affirm ILCs' market-alienable rights. To agree on the fact that TK is purely an alienable commodity is to agree on a set of values of how we see our world, where knowledge is not seen as an outcome of dynamic relationships, but a static object to be bought and sold on the market.¹⁵

Aspirational cultural memory and indigenous notions of identity

A common argument against understanding TK as a process rather than a product is that it bears little semblance to the current realities of many ILCs.

Box 13.1 Indigenous peoples declarations

On 14 September 2007, the United Nations General Assembly adopted the Declaration on the Rights of Indigenous Peoples. Article 25 of the Declaration states: “Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.”

In May 2007, forty-four indigenous peoples groups meeting in New York issued the Declaration on Indigenous Peoples’ Rights to Genetic Resources and Indigenous Knowledge, which begins by stating:

We, the undersigned indigenous peoples and organizations, having convened during the Sixth Session of the United Nations Permanent Forum on Indigenous Issues, from 14 to 25 May 2007, upon the traditional territory of the Onondaga Nation, present the following declaration regarding our rights to genetic resources and indigenous knowledge:

- Reaffirming our spiritual and cultural relationship with all life forms existing in our traditional territories;
- Reaffirming our fundamental role and responsibility as the guardians of our territories, lands and natural resources;
- Recognizing that we are the guardians of the indigenous knowledge passed down from our ancestors from generation to generation and reaffirming our responsibility to protect and perpetuate this knowledge for the benefit of our peoples and our future generations . . .

On 7 August 1997, the *Heart of the People Declaration* was adopted by the North American Indigenous Peoples Summit On Biological Diversity and Biological Ethics. In the preamble, they stated:

We, the participants in the North American Indigenous Peoples Summit on Biological Diversity and Biological Ethics, held in conjunction with the 8th Annual Indigenous Environmental Network Protecting Mother Earth Conference and hosted by the White Clay Society and Buffalo Chasers Society and Gros Ventre and Assiniboine Nations in what is now Montana, of the United States; express our profound concern for the well being of our Mother Earth and the Indigenous Circle of Life known as “biological diversity”.

We wish to add our voices to ongoing global discussions regarding the protection of biological diversity, the safeguarding of traditional knowledge and sustainable development practices, and the ethical use and treatment of all forms of life based on harmony, respect and the spiritual interconnectedness of the natural world.

Box 13.1 (cont.)

Principles

We endorse by consensus the following principles as a statement of our beliefs and a guide to our actions.

- Mother Earth and all human, plant and animal relatives are sacred, sovereign, respected, unique living beings with their own right to survive, and each plays an essential role in the survival and health of the natural world.
- Human beings are not separate from the rest of the natural world, but are created to live in relationship and harmony with it and with all life.
- The Creator has given us a sacred responsibility to protect and care for the land and all of life, as well as to safeguard its well being for future generations to come.

Conclusions

- We uphold the sacredness of life and oppose ideas, systems, worldviews and practices, including global finance and patent laws, which define the natural world, its life forms and the knowledge of Indigenous Peoples as property or “commodities”.
- We oppose the actions of government agencies, corporations, educational institutions and religious bodies which promote the idea that the natural world is to be dominated and exploited by humanity using non-sustainable development practices that contaminate or destroy the natural world, species and habitats, sacred sites, and our communities and homes.

On 19 February 1995, in Phoenix, Arizona, eighteen indigenous peoples organizations adopted the Declaration of Indigenous Peoples of the Western Hemisphere Regarding the Human Genome Diversity Project which begins by stating:

- We are the original peoples of the western hemisphere of the continents of North, Central and South America. Our principles are based upon our profound belief in the sacredness of all Creation, both animate and inanimate. We live in a reciprocal relationship with all life in this divine and natural order.
- Our responsibility as indigenous peoples is to insure the continuity of the natural order of all life is maintained for generations to come.
- We have a responsibility to speak for all life forms and to defend the integrity of the natural order.
- In carrying out these responsibilities we insure that all life in its natural process and diversity continues in a reciprocal relationship with us.
- We hold precious all life in its natural form. The harmonious progress of the natural order in the environment shapes and defines healthy genetic diversity.

Box 13.1 (cont.)

- We oppose the patenting of all natural genetic materials. We hold that life cannot be bought, owned, sold, discovered, or patented, even in its smallest form.
- We denounce and identify the instruments of intellectual property rights, patent law and apparatus of informed consent as tools of legalized western deception and theft.

Source: www.ipcb.org

Loss of traditional lands, cultural erosion and a history of colonial and state repression has reduced many communities to viewing their TK as the remnants of lifestyles that are fast dying out. To view TK as the outcome of cultural and spiritual relationships with ecosystems is perceived as romantic to the extent that it seeks to aspire towards something that has long disappeared.

The problem with this argument is that it denies the normative nature of Article 8(j) and the fact that many ILCs seek to rebuild their fragmented identities based on a cultural memory that is aspirational. Many ILCs are acutely aware that their current reality is non-ideal since they confront its harshness every day. Attempts to secure rights to land and culture are a way that they can rebuild their communities without denying their current reality. Similarly, Article 8(j) seeks to combat the reality that biodiversity is fast being eroded along with the destruction of ILCs' ways of life that help conserve and sustainably use it. Thus, Article 8(j) arguably seeks to restore a value system that is rapidly deteriorating.

Current efforts towards protecting TK through commodification also make the mistake of individualizing the collective rather than collectivizing the individual (Gibson, 2005). The legal challenge that is being wrestled with in forums such as the World Intellectual Property Organization (WIPO) is how existing legal structures of ownership can inhere in collectives (as with TK) rather than with individuals (as with conventional patents and copyrights). The solutions proposed in general seek to individualise the collective by viewing it as a trading entity quite similar to a corporation. What such an approach fails to recognize is that for a number of ILCs, the individual is constituted through the collective; the self is not an enclosed unit, but a relationship with the wider community. Similarly, TK is not just a thing that a community can own, but is a manifestation of a way of being with its development and use being informed by customary laws and spiritual values.

There are various examples of such understandings of the self in declarations of indigenous peoples, as seen in Box 13.1.

Box 13.2 The relational self

The sense of connectedness experienced by the San healer in a state of *kia* (trance) is experienced at the level of the body. The body of the legal subject is often understood as the ground zero of the law. The initial sense of separation comes from the notion of the self that is embodied and it is at the level of the body that separation between the self and the world begins. The primary difficulty for the law to seriously engage with indigenous notions of kinship or connectedness between the self and the world is that the body that the law understands interrupts any conception of the world as an extension of the self.

For the San healer, however, the body is not separate from the world but is coextensive with it. The body is a sensation of the world. As French philosopher Merleau-Ponty writes in his *Phenomenology of Perception* (Merleau-Ponty, 1962), the embodied consciousness is essentially a relationship with the world and any examination of the self body is an examination of this relationship rather than an examination of the self per se. The indigenous relationship with the world is pre-reflective, wherein the indigenous self is inconceivable outside this relationship. The healer's perception is neither an empiricist one in which he perceives the world separate from him nor is it a judgement for which he decides to feel connected to this separate world. On the contrary: his very perception is a relationship between his body and the world; he cannot perceive of the world as separate from himself or of himself as separate from the world. Paraphrasing Merleau-Ponty, for the San healer, inside and outside are inseparable, the world is wholly inside him and he is wholly outside himself. The legal subject and the world are separate not because such a separation really exists or because the law says it is so. In reality, the law itself is a way of seeing the world. Legal perception is a learnt competence and through law we learn to see the self and the world as separate. From an indigenous point of view, the legal subject and the world are separate, not because they are inherently separate but because the law is a way of seeing them as separate.

The healer's relationship with his natural environment is not something that is thought out. The natural environment becomes incorporated into the healer's body rather than remaining separate from it. He does not think about nature, but thinks through it or as it. The experience of the healers of communicating with animals or plants comes from such a relationship with nature. This is the reason why indigenous communities generally do not perceive land, animals and plants as material and intellectual property and legal practitioners find it inconceivable to see nature itself as the body of the self. Neither has learnt the other's way of seeing.

In all the indigenous peoples declarations described in Box 13.1, what seems strikingly common is an understanding of personhood that is integrally related to the ecosystem. The indigenous self in these declarations is not a separate entity that owns TK but is constituted through the spiritual and customary relations with the ecosystem, and TK is one manifestation of such a relationship.

The foundation of secular law is the construction of the legal subject as an atomistic, self-enclosed bearer of rights. This insular legal subject has rights over land, knowledge, biological resources and so on, all of which are seen as objects to be possessed separate from the legal subject. The difficulty in applying such an understanding to TK is that indigenous customary and spiritual values construct the self as a porous and a relational entity. The indigenous self in a normative sense is a strand in a web of relations with all living and non-living natural beings. There is no integral self outside these relationships.

The challenge for Article 8(j) is to secure the conditions for such a relational understanding of the self (i.e., ILCs' rights to land and traditional culture). It is a relational identity that lies at the heart of the conservation of biological diversity and the development of TK. Land and culture are not separate from the individual subject but intimately intertwined with it. The customary laws and spiritual values of ILCs at every stage emphasise an intimacy and kinship with nature to the extent that conservation of biological diversity and the development of TK are a way of life. Such a kinship with all of creation is the basis of the values of stewardship (Box 13.2).

Incomplete commodification: The African operational text at ABS 7

To pose the question in absolute terms of whether ILCs should commodify or not commodify their TK expresses a poverty of imagination. The question should in fact be the following: how can willing ILCs commodify market-alienable aspects of the TK while at the same time retaining or even stimulating its market-inalienable origins? To rephrase the question: how can ABS agreements with ILCs over the use of their TK affirm a way of life that underlies this TK? The challenge that ILCs are confronted with is to make sure that the spirit of Article 8(j) is captured in every ABS agreement they enter into in order to guard against the reification of their TK.

Commodification theorists have proposed incomplete commodification (Radin and Sundar, 2005) as the way out of the moral double-bind for impoverished individuals and communities when non-commodification is not a viable option. Incomplete commodification has two preconditions: 1) a clear understanding of the market-alienable and market-inalienable

Box 13.3 African model legislation for the protection of the rights of local communities, farmers and breeders, and for the regulation of access to biological resources

The specific objectives of this legislation shall be to:

- a) recognize, protect and support the inalienable rights of local communities including farming communities over their biological resources, knowledge and technologies . . .

16. Recognition of the Rights of Local and Indigenous Communities

The state recognizes the rights of communities over the following:

- i) their biological resources;
- ii) the right to collectively benefit from the use of their biological resources;
- iii) their innovations, practices, knowledge and technologies acquired through generations;
- iv) the right to collectively benefit from the utilization of their innovations, practices, knowledge and technologies;
- v) their rights to use their innovations, practices, knowledge and technologies in the conservation and sustainable use of biological diversity;
- vi) the exercise of collective rights as legitimate custodians and users of their biological resources . . .

17. Application of the Law on Community Rights

The State recognizes and protects the community rights that are specified in Article 16 as they are enshrined and protected under the norms, practices and customary law found in, and recognized by, the concerned local and indigenous communities, whether such law is written or not.

18. Prior Informed Consent (PIC) of Local Communities

Any access to a biological resource, innovation, practice, knowledge, or technology shall be subject to the prior informed consent (PIC) of the concerned community or communities ensuring that women fully and equally participate in decision making.

19. Right to Refuse Consent and Access

Local communities have the right to refuse access to their biological resources, innovations, practices, knowledge and technologies where such access will be detrimental to the integrity of their natural or cultural heritage.

Box 13.3 (cont.)

20. Right to Withdraw or Place Restrictions on Consent and Access

Local communities shall have the right to withdraw consent or place restrictions on the activities relating to access where such activities are likely to be detrimental to their socio-economic life, or their natural or cultural heritage.

21. Right to Traditional Access, Use and Exchange

- 1) Local communities shall exercise their inalienable right to access, use, exchange, or share their biological resources in sustaining their livelihood systems as regulated by their customary practices and laws.
- 2) No legal barriers shall be placed on the traditional exchange system of the local communities in the exercise of their rights as provided for in paragraph (1) above and in other rights that may be provided by the customary practices and laws of the concerned local communities.

22. Right to Benefit

- 1) The state shall ensure that at least 50 per cent of benefits provided for in Article 12.2 shall be channelled to the concerned local community or communities in a manner which treats men and women equitably.
- 2) The sharing of benefits in paragraph (1) above shall involve the full participation and approval of the concerned local community or communities.

23. Recognition of Community Intellectual Rights

- 1) The Community Intellectual Rights of the local communities, including traditional professional groups, particularly traditional practitioners, shall at all times remain inalienable, and shall be further protected under the mechanism established by this legislation.
- 2) An item of community innovation, practice, knowledge or technology, or a particular use of a biological or any other natural resource shall be identified, interpreted and ascertained by the local communities concerned themselves under their customary practice and law, whether such law is written or not.
- 3) Non-registration of any community innovations, practices, knowledge or technologies, is not to mean that these are not protected by Community Intellectual Rights.

The publication of a written or oral description of a biological resource and its associated knowledge and information, or the presence of these resources in a genebank or any other collection, or its local use, shall not preclude the local community from exercising its community intellectual rights in relation to those resources.

Box 13.3 (cont.)

Akwé: Kon Guidelines

The 7th meeting of the CBD COP on the basis of recommendations by the WG on Article 8(j) adopted the Akwé: Kon Voluntary Guidelines for the Conduct of Cultural, Environmental and Social Impact Assessment Regarding Developments Proposed to Take Place on, or Which are Likely to Impact on, Sacred Sites and on Lands and Waters Traditionally Occupied or Used by Indigenous and Local Communities.

The guidelines do not just refer to developments that directly impact community sacred sites, lands and waters but also developments that are *likely* to impact or indirectly impact on the sacred sites, lands and waters of ILCs. The significance of the Akwé: Kon guidelines to ABS is the clear possibility that ABS agreements with ILCs regarding their TK can have an impact on their biological and cultural resources, thereby highlighting the mutually reinforcing relationship between the ecosystem and culture. This interconnection between the ecosystem and culture is affirmed by the title of the guidelines: “Akwé: Kon”, which comes from a Mohawk term meaning “everything in creation”. Community sacred sites, lands and waters are not merely physical entities but are infused with cultural and spiritual significance. Relationships communities have with these entities are biocultural relationships and any impact on a community’s culture (such as associated TK) will necessarily impact the community’s biocultural relationships with ecosystems and therefore their sacred sites, lands and waters.

Negotiations towards the IRABS must in accordance with the Akwé: Kon guidelines consider the social, cultural and environmental impacts of any regulatory framework it puts in place to govern access to ILCs’ TK. The Akwé: Kon guidelines list procedural considerations that need to borne in mind, such as identification of ILC stakeholders, mechanisms for meaningful participation, process for recording views, and sufficient assistance for full participation of ILCs at various stages of the ABS process. Regarding the biocultural impacts of any regulatory framework the IRABS puts in place, the Akwé: Kon guidelines point out that the ramifications on customary use and exchange of TK within and between ILCs should be considered.

Bearing in mind the practical impacts of any ABS activity vis-à-vis TK, the Akwé: Kon guidelines suggest in paragraph 60:

In all circumstances related to the proposed development, the customary laws and IPRs of ILCs with respect to their TK, innovations and practices should be respected. Such knowledge should only be used with the PIC of

Box 13.3 (cont.)

the owners of that TK. In order to safeguard their rights, ILCs should establish or be assisted to establish protocols consistent with relevant national legislation for access to and use of TK, innovations and practices in the cultural, environmental and social impact assessment processes.

The Akwé: Kon guidelines indicate that any regulatory framework set up by the IRABS to address access to ILCs' TK will have social, cultural and environmental impacts on community-level procedures and customary systems of regulating access to TK. It is therefore important for ILCs themselves to develop protocols that affirm these community-level procedures and customary systems of access within and between communities that share associated TK. The regulatory framework of the International Regime must then recognize and facilitate the enforcement of these protocols. Such a way forward is based on the clear understanding that the owners of TK are in the best position to determine the impact of any access to it and therefore should be supported to determine the conditions for such access.

Source: the author; source for the Akwé: Kon guidelines: www.cbd.int/doc/publications/akwe-brochure-en.pdf

source for the African model law: <http://www.grain.org/brl/?docid=798&lawid=2132>

aspects of the subject of commodification and 2) the act of commodification must secure the market-inalienable aspects of the subject of commodification, or in the very least not adversely affect them. The African Model Law and the Akwé: Kon Guidelines are classic examples in which efforts have been undertaken regionally and internationally to ensure incomplete commodification.

At the 9th Conference of Parties (COP 9), held in May 2008, parties to the CBD resolved in Decision IX/12 that Annex 1 to the decision will be the basis for further negotiations towards the IRABS.¹⁶ Decision IX/12 requires parties to submit operational text and explanations that they would like to see in the IRABS under each of the main components of Annex 1. Further negotiations towards the IRABS, beginning with the 7th meeting of the WG on ABS (ABS 7) in April 2009, would then be based on the operational text submitted by Parties.

Under the heading, "Measures to Ensure Compliance with Customary Laws and Local Systems of Protection" under the Compliance component, the African Group of countries introduced operational text that sought to secure the market-inalienable aspects of TK through its incomplete commodification. This text was an attempt to operationalize the spirit of Article 8(j) and adhere to the African Model Law and the aspirations of the Akwé: Kon Guidelines. Despite parties' bracketing of the

text during the negotiations at ABS 7 due to concerns about its form, its substance was widely supported. The International Indigenous Forum on Biodiversity, which is the formal representative of ILCs in negotiations, supported the African text with a few changes, demonstrating that it resonated with their expectations of the IRABS.

The main concern of the African Group, as highlighted in their explanation to the operational text, was over the restrictive interpretation of Article 8(j). The African Group argued:

Article 8(j), however, is far wider in its reach and should be read in the broader context of the CBD, particularly its aims of conserving and sustainably using biodiversity. Article 8(j) is clear that the conservation and sustainable use of biological diversity in the context of ILCs is dependent on aspects of their TK which is rooted in their 'ecological values'. This is the reason why Article 8(j) does not refer to the protection and promotion of all the TK of all ILCs but specifically the TK of ILCs embodying traditional lifestyles relevant to the conservation and sustainable use of biodiversity. Such ecologically integral TK is based on a value framework that regulates the relationship between the cultures of ILCs and their lands. Thus TK relevant for the conservation and sustainable use of biodiversity rests on 'ecological values' which in turn rest on secure rights to land and culture. The truth of the matter is that ILCs have conserved and sustainably used biological diversity for thousands of years, not because they have been able to trade in their TK but because they have been able to live on their traditional lands in accordance with their ecological values. (CBD, 2009: 52)

Interestingly, the African Group articulated the inalienable aspects of TK as the "ecological values" of ILCs, which rest on secure rights to land and culture. Ecological values, according to the African Group, could be sustained not by commodifying TK but by protecting the lifestyles rooted in these values. The African Group reinforced the argument by adding:

ABS in the context of ILCs focuses inordinately on an agenda of TK protection that perceives TK outside of the relationships which generate it, divorcing it from the ecological values that lead to its formation. The relation that the ILCs have with nature is one of a perpetual dialogue between land and culture, each constituting and reconstituting the other. Ecological values are therefore rooted in an experience of relatedness between community and nature. Current IPR systems perceive TK in a manner that is quite similar to conventional property systems where land, for example, is viewed as a commodity separate from the network of relations within which it operates. TK is also viewed as an object separate from the cultural and spiritual relationships with the land within which it is embedded.

TK in reality is the manifestation of a particular kind of relationship with nature. TK is not just information but a set of relations that is embodied in

traditional lifestyles of ILCs that ensure conservation and sustainable use of biodiversity. Currently there are no internationally agreed definitions of TK and all efforts towards defining it tend to treat it as a product rather than as a process.

Efforts to protect TK should be oriented less towards protection of knowledge as information and more towards sustaining the relationships based on ecological values that produce the knowledge. It is the ecological values that have sustained indigenous peoples within natural habitats, and the erosion of these values through the dispossession of indigenous lands and consequent annihilation of their cultures has seriously threatened biological diversity. (CBD, 2009: 52)

The African Group also adopted an idea being pioneered in Africa by Natural Justice¹⁷ and referenced biocultural community protocols in their operational text as a tool to assist communities to ensure that the market-inalienable rights associated with their TK are safeguarded. The African Group seemed to be acutely aware of the problem of desperate exchanges wherein impoverished or marginalized communities are forced to negotiate the commodification of their TK on terms that are counter-productive to their inalienable rights. Biocultural community protocols are agreements developed within communities to describe their biocultural values and assert their rights in relation to the IRABS and national laws. If this approach were adopted, all ABS agreements regarding TK would then have to be governed by the community's protocol. The African Group elaborated on the idea by stating:

This implies ensuring that the ecological values of the ILCs in question are central to all stages of the ABS negotiation, i.e. at the stage of 'PIC', 'MAT' and 'benefit sharing'. While the overarching framework of ecological values within which ABS agreements must be negotiated does not preclude monetary and non-monetary benefits to ILCs in exchange for the use of their TK, these benefits should not be the sole aim of ABS agreements. The process and the outcome of an ABS agreement between ILCs and the relevant stakeholders must affirm aspects of their traditional lifestyles that conserve and sustainably use biological diversity. (CBD, 2008)

The African Group explained biocultural community protocols as going beyond merely highlighting best practice standards for obtaining prior informed consent or negotiating mutually agreed terms with communities of TK-holders. The African Group continued:

A community protocol is an outlining of ecological values on which PIC, MAT and benefit sharing would be based. A useful analogy for a community protocol would be the "bill of rights" in the Constitution of a country that lists the core

values of a people. It enunciates a community's core values and while it remains a flexible instrument, it provides community members and outside interests a level of certainty about the principles upon which any ABS agreement will be negotiated. Community protocols are perhaps the best chance for ILCs to ensure that their ways of life and values are respected and promoted. Merely relying on the benefits of ABS agreements without affirming their 'ecological values' would reduce ILCs to sellers of TK who warm themselves on the embers of a lifestyle that is fast dying out. (CBD, 2008)

The submission of the African Group highlights that biocultural community protocols should be based on the ecological values of the community, wherein genuine attempts at TK protection must protect the ways of being and knowing that generate such TK. In this sense, TK is a current expression of an ongoing process. The question is: what exactly are these ecological values or indigenous ethics that must constitute biocultural community protocols? The framework of indigenous ethics must begin from an indigenous conception of the self that parts ways with the current legal understanding of the individual. For the San healers, for example, an examination of the self is in effect an examination of a relationship with the world, and by looking long enough at the self, one arrives at the world. As previously discussed, the relation that the healer's body has with nature is one of a perpetual dialogue with each constituting and reconstituting the other. The familiarity the healer has with the plants, animals and land results from a lived relationship with indiscernible boundaries between the self and the world.

The San–CSIR ABS agreement: A biocultural analysis

Background

On 24 March 2003, an ABS agreement was entered into between the South African San Council (San Council) and the Council for Scientific and Industrial Research (CSIR) for the use of San TK relating to the appetite suppressant properties of the *Hoodia* plant. While the San historically lived as nomadic hunters and gatherers, today they mostly live in small, desperately poor settlements, eking out a living through the gathering of forest produce, livestock raising and farm labour. Dispossessed and persecuted by colonization and apartheid, the San live below the poverty line and number between 85,000 and 90,000 in southern Africa, spread over South Africa, Namibia, Angola and Botswana (Evans, 2004; Wynberg, 2004).

The *Hoodia* plant, referred to by the San as Ghaap, !hab or !Khubab, is a leafless succulent that is indigenous to southern Africa. The San have ingested *Hoodia* for centuries to suppress hunger and thirst when food is scarce. In 1996, the CSIR extracted and patented the bioactive compound in the *Hoodia* responsible for appetite and thirst alleviation. The *Hoodia* patent had lucrative potential as a super-drug in the anti-obesity market which, in the US alone, has an annual revenue of \$3 billion and treats 65 million clinically obese people.

In 1997, the CSIR licensed its patent rights to Phytopharm, a small UK-based biotech company specializing in the development of phyto-medicines. In August, 1998, Phytopharm entered into a sub-licensing agreement with the US drug company Pfizer, Inc., the largest pharmaceutical company in the world with annual revenues of approximately \$48 billion. The sub-licensing agreement enabled Pfizer to take it through development and commercialization. The deal fell through after Pfizer closed its phyto-pharmaceutical arm and returned the license to Phytopharm. Phytopharm then sub-licensed the *Hoodia* patent to Unilever, a global consumer products company. In November 2008 after spending 20 million euros over a period of four years on *Hoodia*-related research and development, Unilever pulled out of its agreement with Phytopharm, stating concerns over the safety and efficacy standards of *Hoodia* extract.

Until 2001, the San remained oblivious to the fact that their knowledge of *Hoodia* had commercial application and that this knowledge had led to the research, scientific validation and filing of international patents by the CSIR. They were, moreover, excluded from lucrative deals being struck between the CSIR and Phytopharm (UK) to develop the drug. When questioned by journalists from the newspaper the *Observer*, the director of Phytopharm said he believed that the San were extinct. In its defence, the CSIR stated that they had always intended to share benefits derived from indigenous knowledge, as that was their official organizational policy on bioprospecting. The CSIR, however, argued that it is difficult, if not impossible to identify the owners of indigenous knowledge when it is widely shared between different communities and that it was important not to raise expectations of communities regarding benefits until successful commercialization of the relevant products.

In June 2001, as a result of an outcry by South African NGO Biowatch based on the news report in the *Observer* and the succeeding media interest in the *Hoodia* case, the CSIR was forced to enter into ABS negotiations with the San. In 2003, after intense negotiations, a benefit sharing agreement was reached between the CSIR and the San to share with the San a portion of the royalties from potential drug sales (CBD, 2008).

Indigenous ethics and PIC, MAT and benefit sharing

To develop a biocultural analysis of the San–CSIR ABS agreement, it would be useful to carefully unpack the three stages of this agreement, prior informed consent (PIC), mutually agreed terms (MAT) and fair and equitable benefit sharing, and to look at each of these stages under the critical lens of indigenous ethics.

Prior informed consent

In October 2002, the 6th meeting of the COP to the CBD adopted the Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising out of their Utilization. The Bonn Guidelines, despite being voluntary, were adopted by 180 parties to the CBD and are the most widely accepted best practice standard for ABS agreements. According to Paragraph 31 of the Bonn Guidelines, when TK is accessed, the PIC of ILCs and the approval and involvement of holders of TK should be obtained in accordance with traditional practices and national access policies and subject to domestic laws. The San–CSIR agreement was pioneering to the extent that it was the first ABS agreement in Africa and that it took place in a domestic legal context devoid of national access policies relating to ABS. It was essentially up to the San to negotiate the ABS agreement with the CSIR.

The South African San Council was authorized by the regional San representative body, the Working Group on Indigenous Minorities in Southern Africa (WIMSA), to negotiate the ABS agreement with the CSIR on behalf of all San of Southern Africa. The South African San Council had been formed just over a year before the ABS agreement was negotiated. It consisted of a group of individuals tasked with representing a broken and widely spread community that had never had a Council before or commodified their TK. However, the CSIR insisted on negotiating with a formal body that would represent all of the San in order to prevent any unanticipated claims to benefits that may come from different factions within the community. The situation was further complicated by the fact that the TK relating to the *Hoodia* was shared with other indigenous communities in the region such as the Nama.

The San Council representing the San of Southern Africa made legal sense in terms of basic contract law, as it was a party technically authorized to give consent. However, in reality, the consent was not drawn from a participatory process that gave the larger San community an opportunity to reflect on the implications of completely commodifying their TK. The San Council agreed to a *Hoodia* patent in exchange for a percentage of royalties and milestone payments received by the CSIR from Phytopharm.

The patent had a wide scope that covered any extract from any *Hoodia* plant with appetite suppressant activity, not just extracts from the varieties known to San, as well as any extract from any plant that contained the identified bioactive compound with appetite suppressant qualities.

It is pertinent to note that the PIC that was given by the San Council was entirely in accordance with the Bonn Guidelines, wherein a formal representative body of the San gave consent on behalf of the larger community. The hard question however is to what extent the consent took into consideration historical San values relating to their ecosystem and whether it affirmed these values. The fact of the matter is that the San–CSIR agreement was a desperate exchange between a hastily assembled group of people unable to obtain the full views of the community on a new issue and a powerful research institution that had already patented their TK.

Mutually agreed terms

Paragraph 43 of the Bonn Guidelines states that MAT could consider regulating the use of the resource, taking into consideration ethical concerns of ILCs, and make a provision to ensure continued customary use of the TK, joint research and joint ownership of IPRs.

The terms of the San–CSIR agreement stated that the San Council was the legal custodian of the TK related to the *Hoodia* and that it will not enter into any agreement with third parties relating to the development of products or patents that will compete with those of the CSIR. The San Council also indemnified the CSIR against any claims by third parties regarding *Hoodia*-related TK arising from any acts or omissions of the San Council in transferring the TK to the CSIR. If any successful claims were made by third parties against the San Council on the basis that the third party had a right to share in the benefits of the ABS agreement, the San Council would resolve the matter and if necessary, share the benefits received with the third party. The CSIR, however, would not be obliged to make any additional payments to the San Council beyond what was stated in the original ABS agreement.

The MAT of the San–CSIR ABS agreement had serious implications for the rights of other ILCs who shared the *Hoodia* TK. The Namibian Nama, for example, were deeply concerned that unilateral consent to the *Hoodia* patent was given by the San Council when it was TK that was commonly held by both the San and the Nama. Despite the TK having been developed freely as a result of sharing between communities, it had been commodified to the extent that it severed the market-inalienable relations that underpinned its development. The ABS agreement not only excluded the Nama but was a clear disincentive for any other commercial or research interest entering into an ABS agreement with the Nama re-

lating to the *Hoodia* TK for fear of violating the CSIR patent. The MAT that the San Council agreed to once again raises the issue of a desperate exchange wherein the commodification of TK paradoxically began to destroy the relationships of sharing and exchange between communities that were the original source of the TK.

The claims of the Namibian Nama, backed by the Namibian government, resulted in a *Hoodia* Multi-Stakeholder Meeting at Khwattu (near Cape Town) in January 2009. One of the questions posed in the meeting was how TK that was developed through sharing and custodianship had begun to be discussed in terms of ownership and exclusion and whether that was detrimental to the spirit of Article 8(j) and indigenous ethics. Dawid Fredricks, one of the Namibian Nama Chiefs, acknowledged the claim by the San to be holders of *Hoodia* TK but questioned whether that right was an exclusive one. He further argued that the Nama should not be expected to play “second fiddle” and that there needed to be a consensus between the communities about their common TK (Anonymus, 2009b). This meeting led to a more formal meeting between the Namibian San Council and the Nama Traditional Authorities Association in Windhoek in April 2009. Nama Chief Josef Christiaan stated on behalf of the Nama Traditional Authority that the Nama acknowledge the San’s rights over the *Hoodia* TK but at the same time wanted an agreement with the San that would lead to the joint management and protection of the knowledge. This was accepted by Petrus Doeseb on behalf of the Namibian San Council (Anonymous, 2009a).

It is crucial to note that the cause for concern by the Nama chiefs resulted from the commodification of *Hoodia* TK, which led to the severing of the relational or market-inalienable aspects of TK – in essence, what the TK meant to the two different communities and the relationships between them.

Fair and equitable benefit sharing

Appendix 2 of the Bonn Guidelines lists a range of monetary and non-monetary benefits that could be negotiated in any ABS agreement. The San Council in the San–CSIR agreement negotiated the following monetary benefits: 8 per cent of milestone payments received by the CSIR from Phytopharm during the product development period and 6 per cent of the royalty income received by the CSIR from Phytopharm as a result of the successful exploitation of P57 products arising from its licensing income or sales anywhere in the world. Non-monetary benefits negotiated were limited to the CSIR collaborating with the San Council to make existing CSIR study bursaries and scholarships available to members of the San community.

To date, the San have received around US\$70,000, which has been used to strengthen the institutional base of the San Councils of South Africa, Namibia and Botswana. The withdrawal of Unilever from its agreement with Phytopharm has been extremely hard for the San, who have waited for over six years to see real benefits at a community level emerging from the San–CSIR agreement. Many of the San community members feel that the San Council should have negotiated non-monetary benefits such as schools, hospitals, access to land, agricultural projects and housing, rather than the mere possibility of huge monetary returns which may or may not come. Such views are also linked to the lack of transparency in the workings of the San Council. Ordinary community members feel that it would be hard for the new elite to deny them the non-monetary benefits, whereas when it came to money, there was little they could do to hold the San Council accountable (Vermeylen, 2007).

Once again, the kind of benefits negotiated by the San Council in exchange for commodifying their TK raises the question of whether these benefits risk rupturing inter- and intra-community relations. An unanswered question is whether the San Council could have negotiated other kinds of benefits that would have affirmed the market-inalienable aspects of their TK and would have promoted the well-being of the larger San community by providing for their basic needs.

Economic development, TK and biocultural protocols

Biocultural community protocols, as suggested by the African Group of countries, show us a possible way out of the double bind of “to commodify or not to commodify”. They try to capture the spirit of Article 8(j) that advocates for incomplete commodification. The purpose is to secure the market-inalienability of certain aspects of TK through the commodification of its other aspects. If another San ABS agreement was to be negotiated today, a biocultural community protocol would serve as an enabling mechanism for the various San communities to think through how the benefit sharing mechanism could assist in their local contexts and to assist with the negotiation of the agreement.

The African Group sees biocultural community protocols as a way of making explicit the customary laws and ecological values of ILCs, thereby giving ILCs the option of regulating access to their TK on their own terms and making it clear to potential users what would constitute its misappropriation. Biocultural protocols would also imply a process in which the custodians of shared TK are able to collectively vision the kind of benefits they seek from the use of their TK and to prevent the “ad hoc” ism that is likely to occur when individuals or self-appointed leaders

enter into agreements on behalf, but without the mandates of communities. Ultimately, biocultural community protocols can sustain relationships between ILCs that share TK but have different customary laws or are spread across national boundaries. They can prevent a race to the bottom wherein potential commercial users of TK pick the community that can offer them the best deal at the expense of other communities that also share the TK. The African Group envisioned biocultural community protocols as backed by state law and the IRABS and therefore enforceable in the jurisdiction of the users of community TK.

A biocultural protocol is both a process and an outcome. In terms of process, it seeks to affirm the relational aspects of TK by practicing them. In the San case, for example, a biocultural protocol would have called for an extended participatory process that would have involved members of both the San and the Nama communities. This would not have been an easy process, considering the geographical distance between the communities. However, this is not a reason to not begin with a consultative process that opens a discussion on market-inalienable aspects of the TK and how they can be affirmed both in the terms of the agreement and the benefits it provides. The process of the protocol in itself would affirm the core values of the San and the Nama communities. As an outcome, the protocol would have been an agreement within the San community and between the San and the Nama communities. There would have been an outcome of intra- and inter-community decisions on what the TK represents to them, which aspects of it are sacred, the importance of the ecologically integral relationships within and between the communities, and how any ABS agreements based on any of their TK would have to affirm their ways of life and values. If the communities had the opportunity to truly commit to such a process, the protocol as both process and outcome would have been cathartic by reinforcing a deep valuation of a holistic way of life that has been marginalized in many ways. Most important, however, is that the biocultural protocol would have been a vision for the community that is linked to the past, is rooted in the present and aspires to a collective future.

A biocultural community protocol is an opportunity for communities to rely on the legal force of Article 8(j) and the commercial interest in TK to leverage their rights to land and culture in ways that were previously unprecedented. Biocultural community protocols could be the basis and the mandate upon which community leaders could negotiate ABS agreements relating to their shared knowledge and resources. At a pragmatic level, they could also give potential commercial users and researchers of TK a degree of certainty and predictability in negotiating ABS agreements, thereby providing them with the reassurance that any agreement they enter into would have the support of the larger

community. The following example of a biocultural community protocol sets out the headings and the types of issues a community should consider.

The Raika Biocultural Protocol

Developed by the Raika and their main community-based organization, Lokhit Pashu-Palak Sansthan, with technical input from Natural Justice, the Raika Biocultural Protocol is a community response to a series of challenges they currently face.¹⁸ The Raika are a pastoralist community living across Rajasthan, north-west India, and they are custodians of rare breeds of camels and sheep. Through their interaction with the forests and communal grazing lands and by generations of selective breeding, the Raika have created breeds that are particularly hardy and are able to forage and digest rough vegetation, withstand the dry Rajasthani environment and walk long distances, all of which are adaptive behavioural and physiological characteristics that so-called high performance exotic breeds do not have. The animal genetic diversity they embody makes them responsive to changes in the local natural environment, an important ability in the context of climate change adaptation and food security. Their genetic traits and the Raikas' associated ethno-veterinary TK are also useful in breeding for disease resistance and may provide the Raika with other benefit sharing opportunities under the incumbent International Regime on ABS or possible future International Treaty on Animal Genetic Resources for Food and Agriculture.

In addition, the Raikas' traditional pastoral lifestyle has fostered sustainable use of Rajasthan's forests and common areas, providing multiple co-benefits to the region's biodiversity. For example, the grazing livestock helps to increase the fertility of the ground and the seeds in the manure have a higher chance of germination, enable gestation and increase the natural propagation of local trees. The feeding on ground-fall and tall grass also lowers the incidence of destructive forest fires. Moreover, their livestock has become integral to the animal diversity in forest areas. Predators such as panthers and wolves have traditionally preyed on their livestock and they consider the resulting loss of livestock a natural part of their integral relationship with the ecosystem. They also contribute to the health of the forests in a very direct manner by fighting forest fires, dealing with invasive species poisonous to animals and reporting illegal logging and poaching. The Raikas' grazing patterns are based on traditional ecological knowledge and establish a strict rotation based on the seasons over a five-year period. Their customary laws ban practices that degrade the environment, including the lopping of sacred trees,

with heavy punishments meted to community members who break the rules.

Lastly, but equally important for the region, is the fact that their lifestyles offer services to community members and link nearby villages to the forest. They provide manure to farmers, either by keeping their animals on their land on a temporary basis or by selling it to them directly. People from surrounding villages use the forest for a variety of needs, including collecting dry wood, fodder, agricultural nutrient inputs, medicines, thatch and famine foods. Villagers consider them to be their guardians in the forest who offer guidance and protection in an otherwise dangerous area.

Despite all this, recent trends are threatening the Raikas' ability to keep livestock. They are increasingly being excluded from the forests that are being redesignated as conservation areas and communal areas are being closed to livestock grazing. The net result is that, although this biocultural community preserves important breeds, conserves the region's biodiversity and improves access to forest products for local villagers, its future is severely under threat. The loss of their way of life, animals and associated TK would also mean the loss of their custodianship of the local forest biodiversity.

The biocultural protocol they have developed addresses the above issues with reference to national and international law in order to make a case for their rights as livestock keepers. It also addresses the issues of access to their animal genetic resources by asserting that any access is subject to their prior informed consent based on customary laws. Box 13.4 presents the main sections of the protocol with a brief explanation of their contents.

The Raikas' protocol clearly sets out the need for their market-inalienable aspects of being livestock keepers to be respected, most importantly the right to grazing lands, which is integral to their way of life. They also clarify that where any decision might affect them, including any approach by a third party that wishes to access their animal genetic resources or their TK, they maintain the overarching right to be consulted and that any access will be derived from a process of free, prior and informed consent. With clear reference to domestic and international law, the Raika are asserting their rights over market-alienable and -inalienable aspects of their lives as livestock keepers to ensure the integrity of the biocultural relationships necessary for their pastoral existence. In the terminology of Article 8(j), as a local community embodying a traditional lifestyle, they are calling for their knowledge, innovations and practices relevant to the conservation and sustainable use of biological diversity to be respected, preserved and maintained, and for their wider application to be subject to their involvement and approval according to customary law and benefit sharing.

Box 13.4 Raika Biocultural Community Protocol

Our biocultural values

The Raika assert their biocultural values by explaining who the Raika are, their spiritual origins and the virtuous interdependence between their lifestyles, their animal genetic resources and Rajasthan's forest biodiversity.

We preserve unique animal genetic resources and have associated traditional knowledge

Here, the Raika list the animal genetic resources that they conserve and explain their important contribution to genetic diversity. They also reference the ethno-veterinary and conservation-related TK critical to their livelihoods.

We conserve and ensure sustainable use of Rajasthan's biodiversity

The Raika explain the contributions they have made over centuries to Rajasthan's forest biodiversity as well as their ongoing sustainable use. They list the ecosystem services their livestock provide the forest and the services they personally provide local farmers and assistance they offer to other villagers wanting to access the forest.

Prior informed consent and benefit sharing

This section details the Raikas' customary decision-making processes involved in providing free, prior and informed consent to any actions that relate to their grazing rights or access to animal genetic resources and associated TK.

We are being excluded from customary grazing areas without our prior informed consent and biodiversity is being lost

This illustrates the disastrous impacts that the exclusion of the Raika from previously communal grazing areas and forests is having on their lives, livestock, genetic resources, TK and the forest ecosystem itself.

Our rights according to Indian laws and policies

Here, the Raika set out their rights according to the Biological Diversity Act of 2002, the Biological Diversity Rules of 2004, the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006, the Panchayat (Extension to Scheduled Areas) Act of 1996 and the National Policy for Farmers of 2007.

We call on the National Biodiversity Authority

The Raika call upon the National Biodiversity Authority to, *inter alia*:

- recognize their local breeds and associated TK;
- strengthen in situ conservation of their breeds and include them in the BMC being initiated by the government; and

Box 13.4 (cont.)

- ensure that their PIC (according to customary law) is obtained before any decisions are taken that affect their traditional way of life or access is granted to their breed diversity and associated TK for research or commercial purposes, and further ensure that they receive a fair and equitable share of the benefits arising from the utilization of their breeds and TK according to mutually agreed terms.

We commit to protecting the biological diversity and associated traditional knowledge

This section is a commitment by the Raika to uphold their biocultural values and to continue to conserve their breeds and associated TK whilst acting as custodians of the forests and communal areas.

Our rights under international law

The final section sets out the key livestock keepers' principles and rights that are founded in international law and calls on the Secretariat of the UN Convention on Biological Diversity, specifically under Article 8(j), to recognize the contribution of their traditional lifestyles to the conservation and sustainable use of biological diversity in Rajasthan; it also calls on the UN Food and Agriculture Organization to recognize the importance of their animal genetic resources and to recognize livestock keepers' rights.

Source: <http://www.naturaljustice.org/images/naturaljustice/bcps/raika%20community%20protocol%20-%20compress.pdf>

The biocultural dimension

At the heart of it, biocultural community protocols provide for the first time an opportunity for ILCs to remake the world in their image. In this sense, biocultural community protocols introduce a new biocultural dimension to the economic development of TK. They create an opportunity for ILCs to identify their cultural and economic objectives within a larger framework of their customary and ecological values, prior to entering into any ABS agreement. In doing so, they prepare ILCs to actively seek out potential users of TK that meet the community's ethical requirements by offering them the opportunity to enter into ABS agreements with well-organized and well-informed communities that have clear rules for ABS. This provides potential users of any TK or community resources with clarity and certainty as to how to obtain PIC, negotiate MAT and share benefits. They also provide government regulators with clear

Box 13.5 Impacts of biocultural community protocols

The main environmental impacts of biocultural community protocols lie in the conservation and sustainable use of biological diversity through:

- ABS agreements that move beyond merely trade in TK and biological resources towards ensuring that the ecological values of the custodians of biological diversity are at the heart of any good business model; and
- ABS agreements that understand that the conservation of biodiversity must go beyond the protection of TK to the protection of community relationships with their ecosystems that have given rise to such TK.

The social impacts of the biocultural community protocols may include:

- A biocultural process and an outcome that will facilitate an inclusive reflection within the community about what they want out of ABS agreements and how this will affirm their ecological and customary values that have led to conservation and sustainable use of biodiversity;
- A biocultural process that is a result of genuine engagement of the wider community, including women, that provides a clear mandate to the leadership regarding the terms of any ABS agreement and the long-term benefits the community has prioritized;
- The setting up of adaptive and representative systems of governance and accountability that are able to respond to new legal concepts such as ABS that can impact intra- and inter-community relations; and
- The development of a strong sense of value-based identity in hitherto culturally disempowered communities through actively deploying community values in all ABS agreements with potential users.

Biocultural community protocols may lead to the following economic impacts:

- An entrepreneurial community that will actively seek out potential business and research opportunities that meet its ethical requirements;
- The development of the ability of ILCs to facilitate new value-based community-business partnership models by basing ABS agreements on biocultural protocols;
- The negotiation of ABS agreements that give rise to benefits that move beyond the monetary to non-monetary benefits such as harvesting and processing rights, participation in research and development, and co-ownership of IPRs; and

Box 13.5 (cont.)

- The transformation of a community from being merely a recipient of benefits to a collective that seeks to actively participate in value-based business ventures that lead to conservation and sustainable use of biological diversity.

Source: the author

guidelines to assess whether or not an ABS agreement with an ILC is fair and equitable and has the mandate of the entire community. Biocultural community protocols are simple yet multi-dimensional tools similar to those community protocols that have been used beyond ABS to create the foundation for other mechanisms of biotrade such as payments for ecosystem services. All of these protocols provide ILCs with an opportunity to assert their rights and leverage the interest in their knowledge and resources to affirm their ecological values, thereby confronting business models that are profit-driven in spite of possible good intentions. Box 13.5 sets out the environmental, social and economic potential impacts of biocultural community protocols.

Beyond ABS

Biocultural community protocols can elicit many positive impacts by facilitating the negotiation of benefit sharing agreements that acknowledge TK as part of a wider relationship between the community and its culture and environment. However, they can also serve much broader purposes. Community protocols are not a new idea and have been used as a tool for community-based natural resource management in many countries in the world. Any scenario in which communities are faced with an outside interest, protocols can provide a process of considering under which conditions they will engage with those interests and of setting out their biocultural framework. Whether these questions are raised in the context of access to animal, plant or marine genetic resources, payment for ecosystem services, community-based natural resource management, or the use of community forest lands as carbon sinks as part of the climate change regime, biocultural protocols can help communities learn about their rights and enable them to develop an organized response to the relevant parties. More research is needed to fully explore biocultural community protocols' potential in these other fields.

Conclusion

This chapter asks for a rethink of the dominant understanding of TK and economic development. It illustrates that to view TK as purely a market-alienable commodity and to equate the well-being of ILCs with the economic development that may arise from the sale of TK is to do grave injustice to the nature of TK. Article 8(j) poses a challenge to implementing ABS and prompts us to address the links between the safeguarding of the market-inalienable or relational aspects of TK and the well-being of ILCs and their ecosystems. In post-development terms, Article 8(j) urges the international community to move away from dominant notions of economic development and to instead acknowledge, preserve and promote indigenous ways of being and, when considering the economic use of TK, to respect an ethical system that privileges an identity that is connected to nature and exists as an extension of the ecosystem.

Notes

1. Article 8(j) of the Convention on Biological Diversity (CBD) reads, "Each Contracting Party shall, as far as possible and appropriate [...] subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices."
2. See, for example, the Kani-Arogyapacha case and the San-*Hoodia* case.
3. The wealth of those societies in which the capitalist mode of production prevails presents itself as "an immense accumulation of commodities, its unit being a single commodity. Our investigation must therefore begin with the analysis of a commodity. A commodity is in the first place an object outside us a thing that by its properties satisfies human wants of some sort or another" (Marx, 2009: ch. 1).
4. "A thing can be useful, and the product of human labour, without being a commodity. Whoever directly satisfies his wants with the produce of his own labour, creates, indeed, use values, but not commodities. In order to produce the latter, he must not only produce use values, but use values for others, social use values" (Marx, 2009: ch. 1).
5. "The existence of the things qua commodities, and the value-relation between the products of labour which stamps them as commodities, have absolutely no connection with their physical properties and with the material relations arising therefrom. There it is a definite social relation between men that assumes, in their eyes, the fantastic form of a relation between things [...] This I call the Fetishism [...] of commodities" (Marx, 2009: ch. 1).
6. The traditional knowledge and resources of indigenous communities is used widely in agriculture, pharmaceuticals, and the cosmetic and fragrance industries. According to the WHO, 80 per cent of the world's population is dependent on health care provided by medicinal plants and they form up to 70 per cent of the basis of modern pharmaceuticals, much of it based on the traditional knowledge of indigenous communities. Some 90 per cent of these plants are found in developing countries on the lands of indigenous

- communities. The estimated market value of plant-based medicines sold in OECD countries in 1985 was US\$43 billion. The total value of non-wood forest products based on traditional knowledge of communities traded every year is US\$11 billion. See <<http://www.cbd.int/doc/publications/8j-brochure-en.pdf>> (accessed 15 July 2009); <<http://www.gtz.de/en/dokumente/en-biodiv-issue-medicinal-plants-2008.pdf>> (accessed 15 July 2009).
7. The notion of human flourishing can be traced back to Aristotle's *Nicomachean Ethics*, wherein he refers to it as eudaemonia.
 8. For examples of cases of biopiracy, see <<http://www.edmonds-institute.org/outofafrica.pdf>> (accessed 15 July 2009).
 9. The problems of desperate exchanges and the moral double-bind of commodification were first comprehensively discussed by Margaret Jane Radin (1987) in her seminal article, "Market Inalienability" as a response to the Chicago school of law and economics led by Richard Posner. The notions of market inalienability of aspects of personhood and the incomplete commodification in this chapter are based on this pioneering article.
 10. The San-*Hoodia* case, for example.
 11. Collective biocultural heritage is defined by the International Institute for Environment and Development as "knowledge, innovations and practices of indigenous peoples and local communities which are often held collectively and inextricably linked to traditional resources and territories; including the diversity of genes, varieties, species and ecosystems; cultural and spiritual values; and customary laws shaped within the socio-ecological context of communities. These components of knowledge systems and their ongoing interaction are fundamental for the creation and preservation of traditional knowledge, and are often linked to knowledge of cosmic forces (as part of indigenous peoples 'cosmivision' or holistic worldview)" (CBD, 2004: 3).
 12. "Incomplete commodification" as a way out of the commodification double-bind was developed in Radin (1987).
 13. George Lucaks, "Reification and the consciousness of the proletariat" (quoted in Radin, 1987: 1873; see note 9 above); Lucaks argued, "Commodification stamps its imprint on the whole consciousness of man; his qualities and abilities are no longer an organic part of his personality, they are things which he can 'own' and 'dispose of' like various objects of the external world. And there is no natural form in which human relations be cast, no way in which man can bring his physical and psychic 'qualities' into play without them being subject to this reifying process."
 14. Hilary Putnam (1981) *Reason, Truth and History*. Cambridge: Cambridge University Press. Cited in Radin (1987: 1882–1883).
 15. Ibid.
 16. See CBD (2008).
 17. See above note 1.
 18. A copy of the protocol is available from Lokhit Pashu-Palak Sansthan at <<http://www.lpps.org>> (accessed 15 April 2009).

REFERENCES

- Anonymous (2009a) "Minutes of the meeting between the Namibian San Council and the Nama Traditional Authorities Association, Harmony", Cape Town, April.
- Anonymous (2009b) "Report of the *Hoodia* Multistakeholder Meeting", 22 and 23 January, organized by Natural Justice, Genbenefit and the ABS Initiative for Africa, Windhoek. Available at <<http://www.naturaljustice.org.za>> (accessed 15 July 2009).

- CBD (2004) "Protection of traditional knowledge and the concept of 'collective biocultural heritage'", CBD Information Document, UNEP/CBD/WG8J/4/INF/18.
- CBD (2008) "Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its ninth meeting: IX/12. Access and benefit-sharing", 9 October, UNEP/CBD/COP/DEC/IX/12. Available at <<http://cdn.www.cbd.int/doc/decisions/cop-09/cop-09-dec-12-en.pdf>> (accessed 31 May 2010).
- CBD (2009) *Collation of Operative Text Including Related Explanations and Rationales Submitted by Parties, Governments, International Organizations, Indigenous and Local Communities and Relevant Stakeholders in Respect of the Main Components of the International Regime on Access and Benefit-Sharing Listed in Decision IX/12, Annex I*, CBD Official Document, UNEP/CBD/WG-ABS/7/5.
- Evans, Bruce (2004) "The Greatest Treasure of All: The Fifth Element of Biodiversity", Master's thesis, University of Cape Town.
- Gibson, J. (2005) *Community Resources: Intellectual Property, International Trade and the Protection of Traditional Knowledge*. Aldershot: Ashgate.
- Marx, Karl (2009) *Capital*, vol. 1. Available at <<http://www.marxists.org>> (accessed 15 July 2009).
- Merleau-Ponty, Maurice (1962) *Phenomenology of Perception*. New York: Routledge and Kegan Paul.
- Radin, Margaret Jane (1987) "Market inalienability", *Harvard Law Review* 100(8): 1849–1937.
- Radin, Margaret Jane and Madhavi Sundar (2005) "The subject and object of commodification", in Martha M. Ertman and Joan C. Williams (eds), *Rethinking Commodification, Cases and Readings in Law and Culture*. New York: New York University Press, pp. 8–33.
- Sandel, Michael J. (2005) "What money can't buy: The moral limits of markets", in Martha M. Ertman and Joan C. Williams (eds), *Rethinking Commodification: Cases and Readings in Law and Culture*. New York: New York University Press, pp. 122–127.
- Shiva, Vandana (1997) *Biopiracy: The Plunder of Nature and Knowledge*. Boston: South End Press.
- Vermeulen, Saskia (2007) "Contextualizing 'fair' and 'equitable': The San's reflections on the *Hoodia* benefit sharing agreement", *Local Environment* 12(4): 423–436.
- Vermeulen, Saskia (2008) "From life force to slimming aid: Exploring views on Commodification of TK", *Applied Geography* 28: 224–235.
- Wynberg, Rachel (2004) "Rhetoric, realism and benefit sharing: Use of traditional knowledge of *Hoodia* species in the development of an appetite suppressant", *Journal of World Intellectual Property* 7(6): 851–876. Available at <<http://www.biowatch.org.za/main.asp?include=pubs/wjip.html>> (accessed 15 July 2009).

14

A practical approach to traditional knowledge and indigenous heritage management: A case study of Moriori heritage management practice

Tom Lanauze, Susan Forbes and Maui Solomon

Preface

This chapter weaves together three authorial recollections of problems in local heritage management with the experience of a contemporary case study on Rekohu (the Moriori name for the Chatham Islands).¹ The three individual voices set the tone for this chapter, which describes the background to the struggle for Moriori to retain and control their traditional knowledge and the solutions they have developed, against the wider challenges presented by cultural misappropriation.

One of the salient factors in heritage recording on Rekohu is the distinct lack of reference to indigenous culture and traditional knowledge. Moriori silence in the heritage record is a strong factor in the subsequent “outsider” misreading of cultural landscapes on the islands. The work being undertaken now by Moriori is redressing this imbalance by ensuring that the research is being done by Moriori using their own recording system.

The three voices reflect on the consequences of unethical practice, and on the theft and misappropriation of *koimi* (human remains),² *taonga* (treasures), knowledge and identity. They conclude with a more positive explanation of Moriori solutions for safeguarding collective memory.

Introduction

Moriori are descended from Polynesian people who travelled from the south-eastern Pacific Islands to the islands of Rekohu, which is situated

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about 800 kilometres to the east of Aotearoa (the Maori name for New Zealand).

Moriiori developed a unique culture founded on peace in their new homelands through the outlawing of warfare and cannibalism. They maintained this commitment for over 500 years and held fast to their ideals even when their lives were threatened in the 1830s. Their collective vow of peace is known as Nunuku's law, after the elder who first called his people together to denounce violence and killing. The first European contact with Moriiori was in 1791 when the sailing ship *Chatham* arrived and, during an altercation on a beach, shot and killed a Moriiori. Soon after, sealers and whalers followed and by 1830 the Moriiori population had dropped from about 2,500 to 2,000 through impacts from introduced diseases. In November 1835 two Maori groups invaded Rekohu, taking advantage of their hosts' willingness to share resources and their commitment to peace. As many as 230 Moriiori adults were killed by the Maori invaders and many others enslaved (King, 2000). By 1865 the population had dropped again, drastically.

Surviving Moriiori attempted to document these events to bring the Moriiori plight to the attention of New Zealand administrators. Hirawanu Tapu³ wrote a list of 1,561 names compiled by Moriiori elders in 1862.⁴ Tapu had been a boy of about eleven during the invasion. The list stated that 118 men and 108 women had been killed and also named 1,336 Moriiori who died subsequently from despair. The list does not include the names of many of the children who were killed, and whose names had not been known. It concludes with the names of the 101 Moriiori still alive in 1862. Their legacy has been preserved in the list of names on the central post and *tuahu* (*Ka Pou o Rangitokona*) in the Moriiori *marae* (meeting place), "*Kopinga*" on Rekohu and this statement of remembrance:⁵

Nga Raumahara – you are not forgotten, your sacrifice was not in vain, your legacy of Peace and Hope endures still.

Customs check at Chathams Airport

I've been working on the land ever since I was a little kid. I farm this land and hunt on it and explore it constantly. I have taught all my kids to do the same. When you know a place you know how to look after it. When you love a place, you get to know it.

After storms, I always check the beaches. It's part of the business of knowing this place. It's also something you get from experience – I guess that is my perspective anyway. Sometimes the storms expose what we call *wāhi tapu* (sacred places), sometimes burials, and sometimes things from the land and sea, like albatross and seafood. When the burials are exposed I cover them over again, to keep them safe.

I listened to my old people about the ways we used to live here, the places where we used to live, and the names we gave these places. Partly this is what got me into the archaeological recording work. In some ways I do this work in my sleep because I am always thinking about it. The work we are doing now is really important. In fact, it is vital for our kids and theirs and the way they see themselves as Moriori and of this place. There is nothing more important than knowing who you are and where you are from.

Long before I started doing this recording work I had a passion for trying to understand who we are as Moriori. What I couldn't understand though was how others could come in to the island and carry out research here without telling us, let alone involving us. When I was younger I worked at the airport loading the planes. I would know when new people came to the island even before they landed, and what they took away with them. Some we never saw again; but others were regulars. I guess most of these people had a passion for this awesome place too because they seemed pretty keen on taking bits of it home with them. One day I noticed that luggage belonging to someone who had been doing archaeological work on the island was heavy. I checked it and found it contained a large whale jaw-bone – something very special to us on the island. I removed it and took it back where it belonged.

The irresistible urge to collect and remove specimens, samples, knowledge and treasures from Rekohu began in the early 1800s, and has continued ever since. The collecting also extended to *koimi*, hundreds of whom were removed from the islands.

Moriori, like their Polynesian cousins throughout the Pacific, buried their dead with *taonga* such as necklaces, adzes and other symbols of importance to assist them during their journey in the afterlife. These *taonga* were also plundered. . . . There are significant collections in museums throughout Europe and the United States. [. . .] The theft of *koimi*, and associated adzes, necklaces, bone pendants and other *taonga* from *urupa* (burial sites) was a misappropriation of both tangible and intangible cultural property. (Solomon, 2005)

Theft of *taonga*, like the airport example, was often audacious. Collectors openly discussed and wrote about their activities, and even sought payment for some.

although I found the remains of numerous skeletons in the woods on Pitt's island, I was unable to get one in good condition; I have, however, brought several authentic skulls, which will probably be interesting for ethnographical purposes. (Travers, 1868a)

These actions were boldly carried out because they were not considered to be unlawful or even inappropriate. For many, their removal was "justified" under the banner of protecting remnants of what they saw as a dwindling culture. The effects of disease, killing and invasion on Moriori

population were traumatic. The mythology of a “dying race” became both justification and inspiration. Even parts of *koimi* were removed for financial gain. It is reported that, in the 1830s, after Moriori had been killed in large numbers, a surgeon from the whaling ship *Harriet* was observed at Waitangi beach, “with an assistant, a small hammer and a bag, knocking the teeth out of numerous skulls laying about the beach, belonging to the original islanders”. The teeth were, apparently, to be used for dentures (*Richard Copping*, mentioned in Richards, 1962: 16).

Collecting of *taonga*, especially of the distinctive Moriori *rakau momori* (living tree carvings),⁶ and carvings into rock, was also popular. During the late 1880s, 1920s and 1960s, instead of recording images in drawings or photographs, whole trees were cut down and removed from the island. Some of these tree trunks are in the British Museum,⁷ and three New Zealand Museums: Canterbury Museum, Auckland Museum and Otago Museum.⁸ The carvings are complex and diverse portrayals of ancestors and events; many of them memorials for departed loved ones. The belief was that, by carving the image into the tree, the spirit of the departed would be infused into the tree which then acted as a kind of portal to the spiritual homeland. These places are very *tapu* (sacred) and are used for inspiration, communication, meditation and reflection. Given the great significance of the trees and carvings, it is little wonder that their removal and subsequent storage in museums is an affront to Moriori. The trees have the same significance as burial areas and should be treated as such.

Moriori cultural database work

Moriori, through their governance body Hokotehi, have embarked on a comprehensive cultural database project that involves re-recording archaeological evidence in a way that combines elder knowledge and experience, oral traditions and recollections of past landuse and events. The database incorporates the use of software gifted from its Indigenous developers in Australia, called “Traditional Knowledge Revival Pathways” (TKRP).⁹ Many of the places recorded by Hokotehi are not in the New Zealand Archaeological Association (NZAA) system. This is not unusual. The NZAA site recording system is littered with research carried out in response to emergency recording.

The Hokotehi work, first trialled in 2006, aimed to define Moriori settlement in Moriori terms, which reflect the deep attachment to and affection for the islands. The field work is responsive to environmental indicators such as landscape change brought about by ecological processes, such as erosion. Hokotehi recording uses a method that prompts the description of a range of aspects of a heritage landscape:

- what can be physically observed;
- recording conditions (weather, season, landscape use, landscape change);
- references to archival information about the place;
- how accurate is the information above and how this may be tested. This is done by drawing out reflections from elders and land-users about traditional uses of and events associated with the area and accuracy of names.

These responses are filmed and film-clips are then processed using TKRP software, which tags key words in the record so that data can be sorted, transcribed and translated. If, in the description of a place, the speaker talks about ancestral events and then moves to information about traditional practices such as fishing, the film-clip can be cross-referenced to all subjects mentioned. The outcome is an on-site record that captures the immediacy and relevancy of the interviews. Often this is information that may not otherwise have been captured in a paper-based assessment.

The field trial started by looking at the research problems such as lack of Moriori input, and the bias towards evidential recording in localised areas and shaped solutions for developing a recording model. This method works like a bicultural enquiry where the research design is constantly refreshed through the development of collective memory as more work and more research is carried out. Overlays of original names, traditional uses are, in this system, the first layer in the heritage fabric.

The limitations of carrying out survey work that is separate from local indigenous knowledge became apparent in the Moriori cultural survey work started in 2006. Until this work was started, archaeological work had been concentrated on the northern and eastern coasts, probably a reflection of the interest in the easily identifiable and accessible coastal middens. In many ways it would have been easier if no previous work had been carried out. In addition to recording in a landscape approach the Moriori research needed to unravel the knots of thinking about Moriori traditional culture. The evidential bias in the previous surveys painted a picture of unsettled occupation, and even lack of specialness and attachment to landscape. Middens characterized the archaeological occupation record. Lack of a comprehensive, landscape-based coverage has made interpretation of archaeological data problematic.

Archaeology of landscape

The prospect of a trip to Rekohu in 2006 was something I was looking forward to. Most things I had heard about the place related to the weather, the physical

beauty of the islands, endangered fauna, and its remoteness. It is said to be one of those special places that should be on everyone's "must see before I die" list! I did the usual preparation before archaeological field work – plenty of reading, and a fair bit of worrying. Apart from Michael King's book on Moriori (King, 2000), nothing else I was reading seemed helpful. So much of it consigned Moriori to the past.

There were two things I was worried about. One was the relative silence of Moriori voices in the archaeological literature. Hirawanu Tapu and Tommy Solomon were the lone spokesmen, followed decades later by Tommy's grandson, Maui. It was hard to know what my reference point was for stepping into other people's memories. This thought became a reality as soon as we started our field work. On the second day of survey work Tom took us to an area that, as a child, he had been told was an important place. Nothing had been recorded there before. After walking around the old pine trees and noting a few midden areas, we turned and walked along the more sheltered sides of a gently sloping hill. Clearly visible in the short grass were the signs of house sites. Nearby in a sheltered area close to the beach were eroding burials, nudged from the soft ground by grazing cattle. All my reading and earlier thoughts about how this land was (and is) lived in started to change, dramatically. These were well established settlements – seemingly inconsistent with earlier thoughts on the transitory nature of Moriori occupation.

My other worry was the knowledge that many of archaeologists before me had not laid a comfortable path in terms of ethical practice or building trust in the community. When we started the field work on Pitt Island, my worry was well founded. Most there assumed I had come to take things away.

The legacy left from the relatively short, but intense, period of archaeological and ethnographic work on the island is not a happy inheritance. The interest in collecting, sampling, classifying and studying Moriori started in the late 1860s with people like William Baucke (a school-teacher on Rekohu), Alexander Shand (the first magistrate and collector of Custom duties) and Henry Hammersley Travers (botanist and ornithologist). In the late 1880s and early 1900s well-known ethnologists like Stephenson Percy Smith (Surveyor General for New Zealand) and Henry Devenish Skinner (zoologist, curator at Otago University Museum and later Director of the Otago Museum) joined the collectors (Smith, 1892; Skinner, 1923; Jefferson, 1955; Simmons, 1962 and 1965; Richards, 1962; Sutton, 1970s and 1980s; Park 1976; Houghton, 1976; and McFadgen, 1994). These men were influential in terms of the ethnographic literature that was building on Moriori – much of it deleterious. S. P. Smith, though a surveyor, had a big interest in Polynesian migration and settlement and saw himself as a scholar in the subject. He worked with the ethnologist Elsdon Best to categorize Moriori as coming from an earlier Melanesian ("Maruiwi") migration forced out of Aotearoa/New Zealand, thus fuel-

ling the argument for colonization of Rekohu by Maori, and of Aotearoa/New Zealand by Europeans. Smith was co-editor of the *Journal of the Polynesian Society* for several decades at the turn of the century. The Society was formed principally in response to prevent the *pakeha* (European) notion that Maori were a dying race. Skinner (1923) opposed this characterization and tried to dismantle the Best–Smith stories, but without much success.

Archaeological fieldwork and more systematic recording commenced in the 1950s with the work of Christina Jefferson on *rakau momori*, then in the 1960s with David Simmons and Rhys Richards. In the 1970s and 1980s university projects started on the islands. None of this work was carried out with Moriori involvement, let alone with thought to participatory research.

With the exception of Doug Sutton's later papers (1985) where he, like Skinner before him, challenged the Best–Smith Moriori origins myth, the archaeological record tended to reinforce erroneous theories on settlement and adaptation because of the absence of research-driven methodology. It is also worth noting that Sutton's later work also attempted to refute the notion that the Moriori rejection of warfare was cowardly. Sutton argued that their way of life was evidence of a skilful adaption to environment and a culture which was effectively using natural resources (Blank, 2007).

In the 1960s and 1970s archaeological surveys of surface evidence recorded over 700 "sites", mostly as middens, burials, tree and rock carvings and artefact locations. This manner of recording was partly a result of the NZAA methodology and partly it was a reflection of the lack of research-driven approaches to recording in landscapes. This meant that the surviving physical evidence directed the research priorities.

Heritage landscapes are places "where human relationships with the natural environment over time define their essential character. The emphasis is on human history, continuity of cultural traditions, and social values and aspirations" (Mitchell and Buggey, 2000). Landscapes like these on Rekohu have been defined over centuries of affection for place and knowledge of ecological processes. The landscape approach to archaeology validates and adds weight to interpretation of evidence, especially when physical evidence has been modified. The landscape approach tries to understand relationships between areas of evidence and, in some cases, the landscape itself constitutes the cultural object. This is particularly so for prominent features such as mountains and hills but also true for places which are imbued with associated qualities, such as the ability to generate feelings of peace, comfort and, consequently, enable healing or renewal of spirit. This approach also steers away from an obsession

with chronology and linear approaches to mapping settlement and cultural evolution. This is more akin to Moriori philosophy, which measures time in a circular way – a coalescing of past, present and future.

These are all aspects of place that can only be understood through an indigenous lens; through knowledge of the land and the way it has been and is lived in, cared for and understood. Around this core of indigenous knowledge the landscape approach being used on Rekohu brings in land-owner and landuser knowledge, oral history and memory, associative knowledge, and archival data and maps.

When archaeological practice separates physical from the intangible the result is an impoverished record – and often a misread one. The gaps in the NZAA style record have left a wounded space where the associated stories and values of place should sit. The record is a monolingual, monocultural statement. Because Moriori voices and views are silent in those records some places have been misread. The outcome of this is a kind of culturally illiteracy. If traditional knowledge has not informed the interpretation it is possible, even likely, signs of settlement made be illegible to the archaeological eye.

NZAA recording forms ask for information about evidence (grid points, dates of recording, description and guides to relocation). They do not enquire about cultural values, heritage landscapes or the relationships amongst these collections of evidence. Even though large and complex middens have been recorded on Rekohu with obvious stratigraphic signs of lengthy and habitual use, no questions were ever asked about where and how these people were living. Instead, assumptions were made that Moriori were transitory, unsettled, occupants with a dependence on harvest from the sea and coast, with a lack of horticultural traditions.

It is true that Moriori depended predominantly on their relationship with the coast and sea for food, clothing and shelter but they also had a sophisticated tradition of horticulture, cultivation and harvest of the all-important *kopi* (*Corynocarpus laevigatus*). Moriori traditions show that *kopi* were brought to the islands and planted in named groves.¹⁰ The fruit from the tree was prepared through processes of cooking and fermentation and provided a bountiful addition to the Rekohu diet. Historic accounts note the large numbers of trees on the island, covering at least a third of the landscape (Hamilton, 1903).

Archaeologists need to work harder at being culturally literate because it is such a meddling profession. It meddles in the worlds of memory and identity and the consequences of getting it wrong can have irreversible effects. In this context the imperative for ethical action necessarily needs to blend scientific with Indigenous ways of working and seeing. Archaeologists need to use their skills to work alongside indigenous peoples to help reinvigorate layers of knowing and reclaim indigenous narratives.

Box 14.1 Kopi

Corynocarpus consists of five tropical species with distribution in Hawai'i, North Australia, New Hebrides, New Caledonia, New Guinea and New Zealand/Rekohu. Its dark green, glossy leaves are a sign that it originates from tropical regions. Its fruit, Kopi berries, are highly valued as a food source but the kernels contain karakin, an alkaloid poison. Extensive treatment (cooking and soaking) of the kernels is required to remove the poison, though the outer flesh is edible without treatment. The treated kernels were ground and used for flour and bread.

No longer should indigenous voices be silent in the heritage literature and stories of this place.

Legacy of peace and reclaiming Moriori identity

Moriori had a different way of life from other *iwi/imi* in the Pacific. Their philosophy of peace is something to be very proud of – not ashamed. They weren't inferior as painted by some. They decided to hold fast to their legacy of peace and the mana of their land rather than return to a way of life based on violence and killing. I think that they had evolved spiritually after 500 years or so of living like that and just could not go back to the old ways. Ironically this is why they were misunderstood.

In the 1830s they sacrificed their lives for peace as a model for others to follow. They took a different road. What happened when Maori invaded was despicable. And then the lies and damage continued. As the historian Michael King described; “nobody in New Zealand – and few elsewhere in the world – has been subjected to group slander as intense and as damaging as that heaped upon the Moriori. They were regarded by many Victorians as the lowest in God's hierarchy of created beings; and by non-Christians as negative proof of the Darwinian precept that only the fittest survived.” (King, 2000: 15–16) The myth of Moriori being ejected from New Zealand by Maori became later the justification for colonisation by pākeha.

But now their legacy of peace has been passed down as a taonga to share and honour. I think what they did is very courageous. We want the truth to be told and, as a result most Moriori are reclaiming their identity and pride.

The events of the last 170 or so years have been traumatic for Moriori. It could be understandable if we had been overwhelmed by the hopelessness of it all. However, the remaining descendants of those Moriori who survived have proved to be very resilient and are now working hard to ensure that our ancestors did not die in vain.

Today there are over 1,000 people who identify themselves as Moriori, though we estimate as many as 8,000 people may have connections to Moriori *karapuna* (ancestors). This revival began in 1980 with a television documentary about Moriori and the erection of a statue to Tommy Solomon in 1986. This statue is one of the most frequently visited places for tourists on the island today. The momentum gathered speed when Michael King agreed to work with us to write a book on our history. The critically acclaimed *Moriori: A People Rediscovered* was one of the first examples of truly collaborative work with Moriori and has ensured Michael's memory has special place in *Kopinga Marae*. In 1988 a Treaty of Waitangi¹¹ claim was filed and reported on in 2001.¹²

The opening of *Kopinga Marae* in January 2005 was celebrated with the largest gathering on the island in over 160 years and in June 2008 *Te Keke Tura Moriori* (a Moriori Identity Trust) was launched with a gift from the government to preserve, revive and promote Moriori identity, culture, language and heritage.¹³ The cultural database project and TKRP work described earlier sit within the framework of the *Keke Tura Moriori* Trust.

The purpose of the cultural landscape database is threefold. First, to provide a framework for recording Moriori places and events. Secondly, it provides a platform for informing the revival of culture and identity. Lastly, it is part of the development of a cultural redress package as part of the Treaty negotiations process with the New Zealand government.

In addition to reclaiming language and cultural identity, over the last few decades Moriori have been making efforts to reclaim ownership and control over *taonga*. These efforts have included purchasing artefacts at auction and from private collectors and seeking protection of sacred places on private land. More recently it has also included purchasing our own lands back again. One of the largest groves of *kopi* trees on Rekohu – *Hapupu* Reserve – is now back in Moriori ownership, as is the *Henga* lodge and forest reserve, which also contains carved *rakau momori*.

The positive events highlighted in this chapter are significant milestones in the process of reaffirming Moriori identity but it is important that the struggle to get this far is not forgotten and to realize that the struggles continue. In the past, the focus on collecting and taking was on tangible *taonga* (such as human remains, artefacts, tree trunks and carvings). Today the focus is more increasingly on the taking and using of intangible knowledge associated with these *taonga*. For Moriori these treasures are not simply drawings or artefacts. They are imbued with the knowledge of those who created them, those for whom they were created, and the associated events and knowledge of those who used or cared for them. They were always associated with the observance of rit-

uals and *karakii* (prayer) as protective rights. The intellectual and cultural property associated with these *taonga* is possibly better described as a set of obligations rather than set of rights. These obligations even extend to the way that *taonga* are stored and displayed.

Contemporary examples of misappropriation of images and intellectual property still occur. We are attempting to arrest this by developing our own “branding” and marketing designs for *imi* business. This includes the development of a unique lettering font that resembles the *rakau momori* depictions of ancestors’ hands, as well as Moriori websites and tourism ventures. This unique Moriori branding is seen as being a way to hold on to our cultural identity without recourse to trademarks. It is also a way of making sure Moriori art and culture is visible (and proudly so) without fear of its being misused. If Moriori use our own symbols, designs, names and history respectfully it may encourage others to do so as well.

Cultural identity and intellectual property rights

What then is the connection between cultural *taonga*, identity, and intellectual property rights (IPR)? As these issues assume more importance nationally and internationally, more questions are raised than answers provided. It seems to be a relatively recent phenomenon driven by matters such as the Treaty of Waitangi in Aotearoa/New Zealand, and globally via the focus on the rights of Indigenous Peoples in United Nations fora such as the 2007 Draft Declaration on the Rights of Indigenous Peoples, the World Intellectual Property Organisation and the Convention on Biological Diversity.

What is different today is the form of misappropriation. Whereas in the past, the focus was primarily on the tangible and collectable cultural *taonga*, the focus is now more increasingly on the intangible knowledge associated with those *taonga*. Even the display of *taonga* in museums and other public displays, without the consent or involvement of the tribal group from whom they originated, may be viewed as a form of misappropriation of IPR. Some may regard this perspective as extreme but from a Moriori perspective, it matters to us how our culture and *taonga* are portrayed and displayed.

Our Moriori experience shows that this is not so much a new phenomenon as the continuation of an old familiar theme. It seems new because the eyes of the world are now focused more keenly on these matters but for Moriori it is an old, worn cycle. An elder once told me that all of our cultural and intellectual rights are contained within the fabric of our

hokopapa (*whakapapa* or genealogical tree) and that if we understand our *hokopapa*, we understand who we are, where we have come from and where we are going. Every one of our *karapuna* represents a link in the genealogical chain. All our traditional knowledge, customs, values and birthingrights are contained within our *hokopapa*. This is far broader than the narrow legal notion of IPR that seek to exclude others by creating private property rights for commercial and scientific gain.

The theft of *koimi*, and associated adzes, necklaces, bone pendants and other *taonga* from *urupa* was a misappropriation of both tangible and intangible cultural property. Each of these *taonga* contains within it the knowledge of those who made it and is imbued with its own special *mana* or power. Today, when these *taonga* are again handled or worn by living descendants of these people, the ancient power can be revived if the wearer or bearer is the “right person”. Equally, if that person is not the “right person”, the consequences can be severe and in the most extreme cases, even lead to death. The observance of rituals and *karakii* are important in this context to cleanse the *tapu* and protect the wearer. These intangible customs and protocols are the cultural and intellectual heritage rights of indigenous peoples. But more important than the “rights” associated with these *taonga* are the obligations to observe proper respect for the *atua* (gods) and the spirits of those who have gone before.

The period from the late 1990s to the present day has witnessed a marked growth in international interest in cultural heritage tourism and the use of indigenous imagery, symbols and designs to promote commercial products in a consumer hungry market increasingly seeking to gain an edge over their competitors. Tourists are attracted to the cultures of the indigenous peoples, and their artwork and music, and indigenous designs are becoming highly prized commodities, and powerful marketing and branding tools. From a southern hemisphere and Pacific Island perspective it seems as though our art and design is very much in demand.

The Moriori cultural database project and our branding and marketing exercises are intended to prevent further instances of this commodification. We are trying to insure our identity against theft and misuse through more enduring methods because it seems clear the legal framework for IPR is inadequate for protection against unauthorised use when images and names are now very much in the public domain.

Moriori examples of cultural theft and inappropriate use highlight the inadequacies of the current system of IPR to protect indigenous cultural and IPR. Such rights and patent lawyers might argue that any knowledge in the “public domain” is fair game for trade marking but the IPR system is based on protecting private economic rights. This does not work for collective and intergenerational values and rights.

Treaty of Waitangi claim for indigenous flora and fauna (WAI 262¹⁴) – solutions for IPR protection

This claim was filed in 1991 by a number of claimants around Aotearoa/New Zealand. It is variously referred to as the intellectual property claim or indigenous knowledge claim. When its report is released the claim findings are likely to have a strong influence on the way IPR are protected and heritage is managed in Aotearoa/New Zealand, and possibly for other indigenous peoples.

The WAI 262 claimants and many other Maori have argued that it is not their fault that their knowledge has ended up in the public domain, but even if that is the case, there is still an ongoing obligation to respect how that knowledge is used and what it is used for. Having been deprived of most of their physical resource base, this form of intangible property (language, names and imagery) is often the only *taonga* that remains for many indigenous peoples. It is not surprising therefore that they would argue for better systems of protection and the right to control its future use.

The claim has been heard and is now in its final stages of reporting. Aspects of the package of redress options proposed include solutions for addressing cultural misappropriation. The claim has, since the mid-1990s, received widespread attention from the international community and indigenous peoples' organizations in particular. The late Dr Darrell Posey, an internationally renowned anthropologist, noted that the WAI 262 claim was one of the most important initiatives by indigenous peoples anywhere in the world to seek recognition and protection of their cultural and intellectual property rights.¹⁵ In the preface to the UNEP publication on the Cultural and Spiritual Values of Biodiversity, Posey noted:

In a world increasingly dominated by mega-modelling, global trading and consumer trends, it is easy to forget that values of plants, animals, landscapes and ecosystems cannot be adequately measured in statistical or monetary terms – and certainly cannot be described using the languages of only a few academic disciplines and markets, no matter how politically favoured and powerful they might be. Values of biodiversity – biological, cultural and linguistic – are intrinsic to life itself and celebrated by the myriad of cultures and societies that have co-evolved with the natural and metaphysical worlds that surround them. Indeed, human beings are an integral part of biodiversity, not merely observers and users of the “components of biological diversity”.

Indigenous and traditional peoples make this fundamental principle the very core of their societies. For them, nature is an extension of society itself, and the creatures that share life with them are manifestations of the past and future generations – of their own flesh and blood. Nature is not therefore a commodity to be bought, sold, patented or preserved apart from society precisely because

nature is what defines humanity. The earth is their (our) mother and cannot be compromised, sold or monopolised. (Posey, 1999)

Posey's words have resonance for Moriori and his values of biodiversity may equally be applied to values of culture. Indeed, they are intrinsically connected. The Hokotehi approach that sees information collected and cared for by Moriori, with, as appropriate, certain limits on access and use is something we celebrate as a lasting tribute to the Moriori culture of peace.

The work being carried out for the cultural database and upcoming projects on identity and language that will come from *Te Keke Tura Moriori* is contributing to a strengthening and flourishing of Moriori knowledge and practices.

Notes

1. Literally "seeing mist through sunlight".
2. Moriori words are kept to a minimum in the text but some have been retained because, simply, there is no better way of saying what is meant. A glossary and general translation is provided in the back of this book. Indigenous language integrity is best protected through use.
3. Hirawanu Tapu was born in about 1824. He was a Moriori from the Owenga area on Rekohu and was fluent in Moriori, Maori and proficient in English. When Moriori held their chiefly council at Te Awapatiki in 1862, Tapu was their scribe. In 1870 he was a key Moriori witness in the Native Land Court hearings. In 1868 Tapu had begun to help the young licensed native interpreter Alexander Shand (son of the first resident magistrate) to collect Moriori history, traditions, chants and vocabulary (King, 2007).
4. Hirawanu Tapu correspondence and petitions. Sir George Grey Collection manuscripts (Letter to Sir George Grey from Morioris asking for protection, 6 August, 1862, GNZ MSS 122; letter from four Morioris, 30 July 1862, in Maori copperplate; letter from a literate Moriori, 6 October 1862, in Maori; letter to W Seed, 6 June 1862, in Maori, comments attributed to Pomare; Genealogies, traditions and letters to Gov. Grey sent from Moriori elders on the Chatham Island, Maori Manuscript No 144, in Moriori, all available at Auckland Public Library); King (2000: 64); and 1861 census, published in the *New Zealand Gazette* 1862.
5. Kopinga is the name of the first Moriori marae or communal gathering place on Rekohu (see <<http://www.moriori.co.nz>> [accessed 31 May 2010]). It was opened in 2005 as a place for Moriori to gather in and also as a testament to the ancestral and ongoing commitment to peace. Kopinga means a grove of kopi trees (*Corynocarpus spp.*). In front of marae are places where visitors are welcomed and formal debates take place but it is different at Kopinga. Visitors are welcomed inside at Kopinga around a central post and altar.
6. *Rakau momori* (scar tree or dendroglyph) is an all-encompassing word for carvings into living tree bark. Though these definitions barely convey the deep spiritual associations

and values that *rakau momori* have for Moriori. “Dendroglyph” is a word that is barely adequate.

7. Five trees purchased from a schoolteacher on the island. In June 1897 Williams wrote to the Museum: “by the steamer I will forward three slabs of *kopi* or *karaka* upon which are some old Moriori carvings of rude execution” (British Museum correspondence 1896–9, cited in Richards, 2007).
8. Canterbury Museum has seven carved tree trunks, Auckland Museum has five and Otago Museum has 20 (collected by H. D. Skinner and D. Simmons – though anecdotal evidence says that Simmons collected three or four of these trees from the lagoon, not from living tree groves.)
9. See Traditional Knowledge Revitalisation Pathways (TKRP) <<http://www.tkrp.com.au>> (accessed 31 May 2010). The project was initiated in 2001 by the Kuku Thaypan elders who wanted their knowledge, beliefs and practices recorded and preserved for present and future use by their families and youth.
10. *Kopi* grow only in sheltered forest clearings and so are reliable indicators of occupation.
11. The Waitangi Tribunal was established in 1975 by an Act of Parliament as a permanent Commission of Inquiry to hear claims about breaches of the Treaty which was signed between Queen Victoria and Maori chiefs in 1840.
12. See Waitangi Tribunal (2001).
13. *Te Keke Tura* means “to be protected under the wings of the albatross”.
14. The claim was the 262nd to be registered in the New Zealand Tribunal process, hence the numeric title. The statement of claim is as follows: The claim relates to *te tino rangatiratanga* (chiefly autonomy) of Ngati Kuri, Te Rarawa and Ngati Wai in respect of indigenous flora and fauna *me o ratou taonga katoa* (and all their treasures) within their respective tribal *rohe* (district), including but not limited to *te reo* (language), *mātauranga* (knowledge), knowledge systems, laws, customs and values, *whakairo* (carving and arts), *wāhi tapu* (sacred places), biodiversity, natural resources, genetics and genetic derivatives, Maori symbols, images, designs and their use and development and associated indigenous, cultural and customary heritage rights (including intellectual property and property rights) in relation to such *taonga*. “*Taonga*” in this claim refers to all elements of the claimants’ estates, material and non-material, tangible and intangible.
15. Personal communication with the author (1997). The late Dr Darrell Posey, a Fellow at the University of Oxford, presented evidence to the Waitangi Tribunal in November 1998 at a special sitting of the Tribunal in Rotorua to hear evidence from international experts. The purpose of this hearing was to hear testimony from both indigenous and non-indigenous experts from both developed and developing countries on how the issues raised within Wai 262 are also being dealt with by governments, non-governmental organizations, United Nations organizations and indigenous peoples groups all over the world.

REFERENCES

- Blank, Jacinta Mary (2007) “Imagining Moriori: A History of Ideas of a People of the Twenty-first Century”, MA thesis, Department of History, University of Canterbury. Available at <<http://hdl.handle.net/10092/960>> (accessed 31 May 2010).

- Hamilton, A. (1903) "Moriiori carving on the trunks of Karaka-trees", *Transactions and Proceedings of the NZ Institute* 36, Article 3.
- Houghton, P. (1976) "The human skeletal material from Waihora", CH283, University of Otago.
- Jefferson, C. (1955) "The dendroglyphs of the Chatham Islands", *Journal of the Polynesian Society* 64(4): 367–441.
- King, M. (2000) *Moriiori – A People Rediscovered*. Auckland: Viking Press.
- King, Michael (2007) "Tapu, Hirawanu –1900", *Dictionary of New Zealand Biography*. Available at <<http://www.dnzb.govt.nz/>> (accessed 31 May 2010).
- McFadgen, B. (1994) "Archaeological and Holocene sand dune stratigraphy on Chatham Island", *Journal of the Royal Society of New Zealand* 24(1): 17–44.
- Mitchell, N. and S. Buggey (2000) "Protected landscapes and cultural landscapes", *The George Wright Forum* 17(1).
- Park, G. S. (1976) *The Dendroglyphs and Petroglyphs of the Chatham Islands*. Dunedin: University of Otago.
- Posey, D. A. (ed.) (1999) *Cultural and Spiritual Values of Biodiversity*. London: United Nations Environmental Programme & Intermediate Technology.
- Richards, R. (1962) "A Historical Geography of the Chatham Islands", Master's thesis, University of Canterbury.
- Richards, R. (2007) *Manu Moriiori Human and Bird Carvings on Live Kopi Trees on the Chatham Islands*. Auckland: Paremata Press.
- Simmons, D. R. (1962) "The Moriiori of the Chatham Islands", *New Zealand Archaeological Association Newsletter* 5: 238–244.
- Simmons, D. R. (1965) "A preliminary report on an associated group of dendroglyphs in the Chatham Islands", *New Zealand Archaeological Association Newsletter* 8: 39–43.
- Skinner, H. D. (1923) *The Moriioris of the Chatham Islands*. Honolulu: Bernice P. Bishop Museum.
- Smith, S. Percy (1892) "Stone implements of the Chatham Islands", *Journal of the Polynesian Society* 1: 80.
- Solomon, M. (2005) "The long journey home", conference paper delivered to the WAC Intercongress, Auckland, November.
- Sutton, D. G. (1976) "Radiocarbon dates from the Waihora mound site, southwest coast, Chatham Islands", *New Zealand Archaeological Association Newsletter* 19: 195–196.
- Sutton, D. G. (1977) *Archaeological Research in the Chatham Islands, 1973–1976: A Review*. Otago: University of Otago Press.
- Sutton, D. G. (1980) "A culture history of the Chatham Islands", *Journal of the Polynesian Society* 89(1): 67–93.
- Sutton, D. G. (1983) "Huts, hovels or houses: a clarification of prehistoric Moriiori settlement patterns", in S. E. Bulmer, R. G. Law and D. G. Sutton (eds), *A Lot of Spadework to be Done. Essays in Honour of Lady Aileen Fox*. Auckland: New Zealand Archaeological Association, pp. 185–211.
- Sutton, D. G. (1984) "Archaeological sites on the Chatham Islands", in *NZ Land Inventory, Chatham Islands. Report Accompanying NZMS 290 Maps*. Wellington: Department of Lands and Survey.

- Sutton, D. G. (1985) "The whence of the Moriori", *New Zealand Journal of History* 19(1): 3–13.
- Travers, H. H. (1868a) "On the Chatham Islands", *Transactions and Proceedings of the NZ Institute* 1: Article 27.
- Waitangi Tribunal (2001) *Rekohu: A Report on Moriori and Ngati Mutunga Claims in the Chatham Islands*, Waitangi Tribunal Report, Wai 64.

15

Conclusion

Suneetha M. Subramanian and Balakrishna Pisupati

I do not want my house to be walled in on all sides and my windows to be stuffed. I want the cultures of all the lands to be blown about my house as freely as possible. But I refuse to be blown off my feet by any.

M. K. Gandhi

The chapters compiled and presented in this book amply bring out the contemporary relevance of traditional knowledge in addressing concerns across various sectors. These extend from management of basic necessities such as food and health care, the use and governance of natural resources, to development of methods to refine human skills and capacities.

What is noteworthy is that despite the epistemological divide between the indigenous and modern “societies”, there is substantial common ground between the knowledge systems as they endeavour to tackle various challenges that impact on human development and the state of the environment. The concept of human development has certainly gone beyond the rhetoric of poverty alleviation and better access to material wealth. As the Millennium Development Goals illustrate, human well-being constitutes, at a minimum, security of income, health, nutrition, sustenance of productive resources obtained from the environment, and effective access to larger networks/partnerships. The Millennium Ecosystem Assessment, building on the Capabilities Approach to define human well-being,¹ additionally identifies the relevance of appropriate policy and institutional frameworks that will facilitate decision-making to ensure sustainable use of ecosystem services and the enhancement of human well-being. These institutions have been identified to be a mix of tradi-

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tional governance mechanisms operating within mainstream political frameworks.

Interactions between the knowledge systems have produced some interesting models, and almost always to the benefit of the different groups involved. For instance, the concept of endogenous development promotes development planning by local communities, but clearly integrating benefits from modern knowledge. Hence, while it builds on their principles, practices, skills, knowledge and assets, it strengthens these by being receptive to modern technological and communication innovations. Conversely, the World Health Organization seeks to complement modern medical health care interventions with traditional medical practices and practitioners and has designed guidelines to ensure safe and effective integration. In a similar vein, the Food and Agricultural Organization of the United Nations promotes traditional farming practices and encourages the preservation of traditional landraces and participatory plant-breeding activities that acknowledge local expertise in the sector. UNESCO's LINKS programme is another example that seeks to explore ways to integrate community knowledge and global knowledge in formal and non-formal educational processes.²

While health and agriculture may appear more conventional, practice-oriented, and hence easy to implement through integrated approaches, it is interesting that the International Council for Science, which can be considered to represent mainstream science, has been calling for greater understanding and interaction between the different sciences. Following this, their new Programme on Ecosystem Change and Society, which aims to advance understanding on wise stewardship of land and seascapes, seeks to achieve its objectives through engagement with multiple stakeholders. Such initiatives could help overcome dogmatic positions and foster activities driven by secular considerations. This argument is strengthened by the success of the case studies mentioned in this volume such as intra- and intercultural educational methods being promoted by the University of Saskatchewan, which preserve epistemic identities while promoting learning across worldviews; the assessment and validation of traditional health practices by communities in India, enabling them to access cost-effective health care from their traditional healers and preventing dependence only on government centres or often unavailable modern physicians; the reassertion of the Moriuri over their cultural landscapes through establishing a cultural database and their own branding and marketing mechanisms, so that their inheritance and philosophies are rightly understood; the development of community protocols that legally empower communities to assert their tangible and intangible rights, thereby combining local, national and international governance mechanisms; the utilization of traditional knowledge in managing marine protected areas;

the use of farmers' expertise in crop, soil and livestock management, contributing to agricultural innovation, or using traditional water use norms in urban water governance. These and other examples highlight that there are several experiences on the ground where rigid positions at the practitioners' level have been overcome, allowing a better realization of the various needs of the people. They also point that better solutions to pressing problems may be obtained by involving traditional practitioners and governance institutions within participatory planning processes.

Despite progress at a generic level, issues related to equity continue to be contentious. Equity as it is recognized today is achieved when different actors in a socio-economic milieu are treated at par and transactions and partnerships between them are based on respectful exchanges. This is recognized as an idealistic state, since there are several challenges to implementing it both within a community context and in interfaces between mainstream and traditional societies. This is because it can be endangered by intra- and inter-community hierarchies and incompatibilities in the ethics and methods of transactions between traditional and modern societies. Despite these hurdles, it is a state worth aspiring to since it sets the scene for overcoming several other obstacles in the pursuit of human welfare. It is an essential principle that can ensure fair access to resources required for productive activities and to services that meet basic needs, build capacities and guarantee just redress to all stakeholders. While recognizing its significance, its operationalization is still weak and rests on legally compliant mechanisms for its success. It also is dependent on modifications to community laws and norms concerning the roles and rights of different members.

At the time of writing, countries party to the Convention on Biological Diversity (CBD) are seeking a tool that will enable equitable access to resources and benefits between the providers (who are typically traditional communities) and users of genetic resources, and at the same time lead to sustainable use of biological resources and supporting ecosystems. While legally binding systems to promote equity, as being proposed within the CBD, are useful to ensure all-round implementation, it is important to bear in mind that unless there is a clear understanding among the actors for such an essential principle to be a matter of course (then of law), transactions between the actors at either end of the knowledge spectrum (and value spectrum) is bound to be fraught with tensions. Addressing this would require increasing awareness of the benefits of intercultural actions and a broader understanding of the acceptable norms of practice among cultures. This would then require a redefinition of our current pedagogical methods in education and learning.

Clearly, while governments and intergovernmental bodies are working on bridging different aspects between different worldviews, these are still

confined to the limits of their constituent sectors. In addition, attention to non-conventional approaches to innovation or problem-solving is still symbolic. For instance, it is extremely rare to find research support to validate or scale up traditional medical formulations for use by those who may seek it, although the government may appear supportive of traditional medicine. As pointed out in the chapter on health, traditional medical practitioners are often unable to practise legally, while the knowledge itself may be subject to government patronage. Technically they fall within different realms of governance – one under the health care sector and the other under intellectual property management, while in practice it amounts to closing avenues for advancement of effective access to health delivery mechanisms for a population. This draws a shadow against all the well-meaning international policies and guidelines in place to ensure a more pluralistic health care system.

There is therefore an urgent need to use the understanding gained from sectoral experiences and go beyond them to define a broader paradigm that allows a co-evolution of different knowledge systems and perspectives – without undermining their individual fundamental bases, to focus on ensuring and sustaining the well-being of our lands, our resources and ourselves. The various narrations of best practices in this book provide an indication that this is an achievable task: what it now requires is increased dialogue between the actors, backed by strong political and social institutions for implementation.

Notes

1. Described in Nussbaum and Sen (1993).
2. For further detail see <http://portal.unesco.org/science/en/ev.php-URL_ID=1945&URL_DO=DO_TOPIC&URL_SECTION=201.html> (accessed 3 February 2010).

REFERENCE

- Nussbaum, Martha C. and Amartya Sen (eds) (1993) *The Quality of Life*. Oxford: Clarendon Press.

Glossary

Hokopapa	<i>Whakapapa</i> , genealogical tree
Hokotehi	Governance and management body which represents all Moriori wherever they may live (formed in 2001)
Imi	People. The Maori word is “iwi”
Karakii	Prayer
Karapuna	Ancestor
Koimi	Human skeletal remains
Kopi	<i>Corynocarpus laevigatus</i> , <i>karaka</i> tree species
Kotaa	Northern Ghana traditional institution term for labour-pooling groups
Magazia	Northern Ghana traditional institution term for indigenous woman leader who derive her power from the chief
Mana	Authority, integrity, prestige, influence
Maori	Indigenous people of New Zealand
Marae	Meeting place, open space in a collection of communal or tribal buildings, usually the place of debate and encounter
Moriori	Indigenous people of Rekohu
mijuaji’j	Mi’kmaq term for child
mitakuye oyasin	Lakota concept meaning “I am related to all that is”
Nnoboa	Southern Ghana terms for self-help groups
Pākeha	European
Poge Naa	Northern Ghana traditional institution term for female chief who co-exists with the community chief
Momori	Ancestral images carved into living trees (dendroglyph, tree carving or scar tree)
Rakau	Remembrance

Raumahara <i>tabula rasa</i>	Mi'kmaq term for notion of blank slate
Rekohu	“Seeing mist through sunlight”, name for the main island of the Chathams group, as well as the inclusive name for the whole collection of Chatham Islands
Tangata whenua	Literally, “people of the land”, indigenous peoples
Taonga	Treasure, prized and valued item or quality
Tapu	Sacred
Tchakat henu	Tchakat or kara henu is similar to the Maori term, Tangata Whenua and means “people of the earth”
Te Keke Tura	Mori Identity Trust, “to be sheltered under the wings of the albatross”. The albatross is an important guardian for Mori
Tindana/Tingansob/ Tortina	Northern Ghana traditional institution terms for Custodian of the Land and Spiritual Leader
Tindanpogo	Female <i>Tindana</i> Custodian of the Land and Spiritual Leader
Tuahu	Altar
Urupā	Burial ground
Wāhi tapu	Sacred place(s)

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