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Policy issues for information and communications technology: enhancing space applications in Asia and the Pacific for the implementation of the Sustainable Development Goals

Enhancing space applications in Asia and the Pacific for the implementation of the Sustainable Development Goals

Note by the secretariat

Summary

Improved data, information and knowledge will be critical for the implementation, follow-up and review of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. Space applications, geospatial services and their digitization have rapidly evolved in the past years with the potential to provide far-reaching solutions to pressing issues facing humanity, ranging from health, education, food security, agriculture, climate change, energy and natural resources management to disaster risk reduction and resilience-building.

For close to two decades, the Economic and Social Commission for Asia and the Pacific (ESCAP) has provided a regional platform that, in tandem with technological advances, has progressively promoted the use of space applications and geospatial information for sustainable development across the region. In alignment with this ESCAP approach, an ever increasing number of developing countries are using space applications for sustainable development in the region.

The adoption of the 2030 Agenda has offered the space community a unique opportunity to scale up the use of space applications and derived geospatial information across the region. With the completion of the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012–2017, ESCAP is working with member States to formulate a new Asia-Pacific plan of action on space applications for sustainable development (2018–2030). The objective is to enable space applications and geospatial information services to contribute to the fullest extent to efforts to achieve the regional road map for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific and to support country and regional needs in relation to the 2030 Agenda. The new action plan will encompass and define a concept entitled "Space+".

* ESCAP/CICTSTI/2018/L.1.

The present document contains a brief review of emerging best practice in the Asia-Pacific region as well as the challenges to be addressed. It also contains information on the preparatory process leading up to the third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, which will be held on 10 October 2018. The Committee on Information and Communications Technology, Science, Technology and Innovation is requested to provide guidance on the future direction of the secretariat's regional work and on how best to leverage geospatial information, applications and services through the new regional action plan under preparation, in support of sustainable development.

The Committee may wish to discuss the issues raised in the document and propose policy action to promote the utilization of geospatial information services for sustainable economic and social development.

I. Achieving the Sustainable Development Goals through enhanced regional cooperation

1. Space applications, geospatial services and their digitization have rapidly evolved in the past years, providing an ever expanding array of tools for a more sustainable future. They have been recognized as innovative technologies in supporting the implementation of the global development agendas, including the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Paris Agreement. They can provide far-reaching solutions to pressing issues facing humanity, ranging from health, education, food security, agriculture, climate change, energy and natural resources management to disaster risk reduction and resilience-building, by enhancing information for evidence-based decision-making.

2. The Economic and Social Commission for Asia and the Pacific (ESCAP) has a well-established track record in this area, having established its Regional Space Applications Programme for Sustainable Development over twenty years ago. More recently, it has been placing renewed emphasis on the importance of countries being able to monitor and measure high-quality, timely, reliable and accurate data, including Earth-observation and geospatial information, to address the challenge of leaving no one behind. The work is well grounded in the ESCAP intergovernmental process.

3. Notably, the regional road map for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific,[1] which the Commission endorsed in its resolution 73/9, contains references to ways in which regional cooperation on technology can be enhanced to support the implementation of the Sustainable Development Goals.

4. Furthermore, the Asia-Pacific Space Leaders Forum, which was held in New Delhi on 2 November 2016, highlighted the role of space applications in the implementation of the Sustainable Development Goals and expressed support for the preparation by the secretariat of a new Asia-Pacific plan of action on space applications for sustainable development (2018–2030) for adoption at the third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific.

5. Consequently, the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development at its twenty-first session, held in October 2017, agreed on an ambitious vision for the plan of action: that, by 2030, all countries in the Asia-Pacific region would

[1] E/ESCAP/73/31, annex II.

be able to access and use space science, technology and their applications to the fullest extent to meet their individual and regional needs for achieving the Sustainable Development Goals.[2]

6. A drafting committee was set up and, under the chairmanship of the representative of Thailand and the vice-chairmanship of the representative of Sri Lanka, met at the end of May 2018 to draft the plan of action. Further details are provided in section IV below.

7. Over and above this process, since 2017, ESCAP, in collaboration with spacefaring countries in the region, has continued to provide timely services and support on space-derived data and products to countries affected by severe disasters. Over the past decade, an average of more than 400 high-resolution satellite images and products have been provided annually to disaster-affected developing countries for damage assessment, from disasters that include drought, cyclones, earthquakes and floods. There are now over 150 experts in member countries of the Regional Space Applications Programme for Sustainable Development directly involved in this continuously available service and support. In-kind contributions of free data and services worth more than $1 million are estimated to have been provided by ESCAP member States, through the Regional Space Applications Programme, to countries affected by disasters.

8. With the advances that have been made in space applications, countries require not only better technology, tools and infrastructure, but also the human capacity to operate the systems. Many developing countries, including small island developing States, may not have sufficient human resources and experts to fully take advantage of these innovative technologies. Through the Regional Space Applications Programme, as well as regional partnerships, countries can strengthen their human resources base.

9. In this regard, the Regional Cooperative Mechanism for Drought Monitoring and Early Warning serves as one example of a substantive operational platform of the Regional Space Applications Programme. The Regional Cooperative Mechanism has created a series of information tools and other service products to support drought-prone developing countries in a customized, situation-specific way, delivered in-country through capacity development activities.

10. Specifically, the Regional Cooperative Mechanism, through its regional service nodes in China, India and Thailand, has been providing customized technical support to enhance the use of Earth-observation data for drought monitoring and assessments, and has thereby helped build long-term human and institutional capacity. The recent operationalization of the drought monitoring system in Myanmar has significantly improved the drought-monitoring capability by providing agricultural drought information in terms of its prevalence, severity and persistence using moderate resolution data.[3] Multiple indices were used for drought assessment, ground databases were augmented and synergy between ground observations and satellite-based interpretation were strengthened. Through this process, both the user-friendliness and the frequency of information dissemination were enhanced. Similarly, the drought monitoring system operationalized in Mongolia uses

[2] For the summary meeting report, see www.unescap.org/sites/default/files/E_ESCAP_ICC%2821%29_9_SummaryReport_REV.pdf.

[3] This drought monitoring system was customized using the one developed by the National Remote Sensing Centre of the Indian Space Research Organization.

space-referenced and ground-based data that synthesize various drought indices,[4] thus offering crucial baseline data against which to issue early warnings for the *dzud*.[5] By deepening the understanding of disaster risk and its dynamic components, more context on the progress of the *dzud* and the resulting damages for nomadic herders has been provided for decision-making by policymakers.

11. Since 2016, and with sponsorship from the Government of Japan and technical support from the Indonesian Agency for Meteorology, Climatology and Geophysics and the Asian Institute of Technology, ESCAP has been assisting Pacific island countries to strengthen institutional capacities in the use of geospatial data and to build national geoportals as key components of multi-hazard early warning systems for extreme weather-related disasters.[6] The Common Alerting Protocol, a digital format for exchanging emergency alerts in an internationally standardized format, has been implemented in Solomon Islands[7] and Tonga. National meteorological services authorities in these countries are now able to make weather predictions available with a resolution of 2.3 kilometres, compared to 25 kilometres previously. The drought monitoring system in Papua New Guinea, which was established with support from the Indonesian Agency for Meteorology, Climatology and Geophysics and ESCAP, has enabled forecasts of consecutive dry days, dry and wet spells and monthly rainfall. The predictions are disseminated online through the official website of the National Weather Service.[8] Similarly, in Solomon Islands, the accuracy of predictions on ocean conditions and tropical cyclones has been improved using images with a resolution of 7 kilometres. Another example shows that when Cyclone Gita, an intense tropical cyclone, hit Tonga in February 2018, geoportal and numerical weather prediction models enabled a precise and impact-based forecast, averting a disaster with potentially catastrophic impacts through greater preparedness and with the timely evacuation of communities.

12. Additionally, the secretariat has been working closely with the secretariat of the Association of Southeast Asian Nations (ASEAN) to implement activities in the subregion given its high disaster risk profile. An ongoing ESCAP-ASEAN joint study on drought capitalizes on knowledge-based space applications to promote risk-sensitive policies and interventions based on drought monitoring and assessments, both in-season and in the long-term. Its aim is to highlight three types of evidence-based policy intervention: strengthening drought risk assessment, impact-based forecasting and early

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4 This drought monitoring system was customized using the one developed by the Institute of Remote Sensing and Digital Earth of China.

5 The *dzud* is a phenomenon of drought that leads to inadequate pasture, severely affecting the livelihood of herding-based nomads, followed by severe winter that kills much of their already enfeebled livestock.

6 For further information on training and workshops held as part of the ESCAP project entitled "Strengthening multi-hazard risk assessment and early warning systems with applications of space and geographic information systems in Pacific island countries", see www.unescap.org/events/first-pacific-regional-workshop-multi-hazard-risk-assessment-and-early-warning-systems, www.unescap.org/events/training-national-geo-database-and-geo-portal-drr-and-sustainable-development, www.unescap.org/events/1st-expert-group-meeting-pacific-strategy-knowledge-hub-early-warning-system and www.unescap.org/events/training-national-multi-hazards-early-warning-systems-geo-spatial-applications-disaster-risk.

7 See https://smartalert.met.gov.sb.

8 www.pngmet.gov.pg/Climate_Division.

warning; fostering the development of drought risk financing; and promoting a culture of prevention by enhancing adaptive capacity to drought.

13. Addressing gaps in human skills remains a key challenge, particularly in countries in the region that have high disaster risk and low capacity. The secretariat continued to address this need, through a number of customized training programmes implemented in partnership with countries that have high capacity. For example, in late 2017, the secretariat in collaboration with the Korea International Cooperation Agency conducted capacity-building on spatial data and technologies for urban planning and disaster management for Central Asian countries such as Kyrgyzstan, Tajikistan and Uzbekistan. In 2018, the secretariat provided sponsorship for young technicians from Bangladesh, Mongolia, Myanmar and Tajikistan to take master’s degree courses on remote sensing and geographic information systems (GIS), with full scholarship from the Government of India, at the Centre for Space Science and Technology Education in Asia and the Pacific.[9] Similarly, under a memorandum of agreement between ESCAP, the South-South Education Foundation and the Chinese University of Hong Kong, two junior government officials from Papua New Guinea and Sri Lanka will soon be joining the master’s degree course on geospatial information applications at the Institute of Space and Earth Information Science of the Chinese University of Hong Kong, with full scholarship provided by the South-South Education Foundation. In addition, collaboration with the ASEAN Research and Training Centre for Space Technology and Applications will focus on research and knowledge-sharing for ASEAN countries in disaster risk reduction, environment and agriculture development.

14. Sharing knowledge products and best practice will be critical to developing countries for the effective application of geospatial information. In this connection, the launch of a biennial Asia-Pacific report on geospatial information applications for sustainable development, as well as an online compendium of regional geospatial information services, is under consideration by the Intergovernmental Consultative Committee on the Regional Space Applications Programme for Sustainable Development, with the aim of enhancing research and knowledge-sharing on capacity development and emerging trends in innovation in geospatial information applications.

II. Good practice

15. As compared to the early 1990s when the Regional Space Applications Programme for Sustainable Development was set up, there is a growing body of good practice on space applications for sustainable development emerging from developing countries in the Asia-Pacific region. Increasingly, countries are effectively integrating space applications, Earth-observation data and geospatial data, and combining such outcomes with statistical and demographic data, for near real-time analysis of conditions and modelling of complex and dynamic risk scenarios. Digital maps and other visualizations are particularly useful for supporting the evaluation of impacts across sectors and regions and allowing change over time to be monitored in a more consistent and standardized manner. The result is improved decisions, policy and accountability. These outcomes are beginning to have a transformational impact on many of humanity’s most significant challenges in the developing

[9] The Centre for Space Science and Technology Education in Asia and the Pacific is affiliated to the United Nations and hosted by the Government of India (Department of Space) in Dehradun, India.

world, improving the ability of global scientists, resource and planning managers and politicians to monitor and protect fragile ecosystems, ensure resilient infrastructure, manage climate risks, enhance food security, build more resilient cities, reduce poverty and improve governance. The sections below illustrate this potential through selected examples of country practice in Asia and the Pacific.

A. Space applications for disaster risk reduction and resilience

16. The Asia-Pacific region is the most disaster-prone region in the world. Since 2005, the region has recorded over 60 per cent of total global deaths, 80 per cent of affected people and 45 per cent of total economic damages due to disasters.[10] This situation is a result of rapid economic growth and population expansion. Combined with the impact of climate change, over the coming decade, the region is expected to become increasingly vulnerable to disasters. Disasters within the region are also becoming more complex, often affecting multiple countries at once and sometimes cascading into multiple catastrophes. Disasters such as floods, droughts, tropical cyclones, earthquakes, tsunamis, and sand and dust storms are increasingly transboundary in nature, making them difficult to manage. With the advancement of technical innovations, space technology and geospatial data have emerged as strong tools to analyse disaster risks, enhance detection and prediction, and support recovery and rehabilitation from disaster damages while enhancing resilience.

17. The Geo-Informatics and Space Technology Development Agency of Thailand has used geospatial data through space applications to create an open-source platform of high-level, data-driven monitoring systems. These systems utilize a combination of Earth-observation imagery, GIS data and national disaster surveys embedded into a web map service. The four main monitoring systems cover floods, wildfire, drought and coastal radar. These systems work as a data-sharing mechanism which combine satellite imagery, geospatial data, spatial models and thematic processing for the use of policymakers, crisis managers and governors in decision-making.

18. The deployment of GIS-based safety map services by the Government of the Republic of Korea since 2014 has helped elevate attention to disaster situations. This service has been made available to 229 municipalities through a safety information integration system, giving people access to safety information through multiple media platforms such as computers and mobile phones, to identify location-based disaster risks and information such as the degree of risk of landslides and floods, coastal flooding forecast, and landslide and earthquake history.

19. Advanced emergency communication systems using geospatial services in China is another good example. The emergency satellite communication system in China has provided important support in disaster situations, including in the fight against floods and droughts, by helping efforts with respect to search and rescue, relief work and major emergencies. The BeiDou Navigation Satellite System has significantly improved the accuracy and reliability of data, and has been widely used in forest-fire prevention,

[10] E/ESCAP/73/31, annex II.

disaster reduction and relief, and emergency rescue, as well as hydrological monitoring, weather forecasting, surveying and mapping.[11]

B. Space applications for climate change

20. The Asia-Pacific region is already experiencing the negative effects of climate change, with higher temperatures, a rise in sea level and an increase in extreme weather events. In the coming years, these events are likely to intensify, straining regional economies and natural and physical assets and potentially compounding development challenges.[12] Given that all livelihoods, nutrition and economic opportunities depend on utilizing the terrestrial and marine resources and ecosystems of the planet, coordinated policy action across the region is needed.

21. Space applications can contribute to achieving the goals set out in the United Nations Framework Convention on Climate Change, the Paris Agreement and the 2030 Agenda. In endorsing the New Delhi Declaration, adopted by the Asian Ministerial Conference on Disaster Risk Reduction in 2016, space agencies acknowledged the need to coordinate their methods and their data to monitor human-induced greenhouse gas emissions.[13] In developing countries, remote sensing may offer important insight into urban and environmental conditions that are currently not available through traditional sources of governmental and private sector data. This collected data can support land-use monitoring and ecosystem changes, urban developments, ocean cycles and air-quality developments.

22. A number of countries are already incorporating space applications into their climate response strategies. For example, in the Bangladesh Climate Change Strategy and Action Plan 2009, emphasis is placed on geospatial applications using satellite technology by developing an understandable early warning and forecasting system that helps minimize risk to lives and properties by improving the prediction and accuracy of cyclones tracking and flooding.[14] Similarly, the Department of Meteorology of Sri Lanka is developing downscaled high-resolution climate change scenarios for specific regions by combining models provided by the Met Office Hadley Centre of the United Kingdom of Great Britain and Northern Ireland, including the “Hadley Centre Coupled Model” and the regional climate model from the “Providing Regional Climates for Impacts Studies” system. To improve its weather forecasting capability, the Department of Meteorology is also using receiving stations for data from geostationary weather satellites, and is receiving imagery and data from Meteosat, the Moderate-resolution Imaging Spectroradiometer, the Advanced Scatterometer and Oceansat to analyse the various weather and climate impacts.

[11] China, State Council Information Office, “China’s space activities in 2016”, 27 December 2016. Available at www.scio.gov.cn/wz/Document/1537091/1537091.htm.

[12] E/ESCAP/73/31, annex II.

[13] Indian Space Research Organization, “World’s space agencies unite to face the climate challenge”, 3 June 2016.

[14] Office for Outer Space Affairs and National Institute of Aeronautics and Space of Indonesia, “United Nations/Indonesia International Conference on Integrated Space Technology Applications to Climate Change: abstracts” (Jakarta, 2013). Available at www.unoosa.org/documents/pdf/psa/activities/2013/Indonesia/Indonesia_Abstracts.pdf.

C. Space applications for management of natural resources

23. Improved management of natural resources and the protection of ecosystems is a key priority in the regional road map for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific. Currently, the Asia-Pacific region consumes more than half of the world's natural resources with increasing rates of absolute resource use and increasing resource use per person.[15] Through the use of space applications, large scale spatial data can be used to support conservation and sustainable management of resources.

24. The Global Mangrove Watch, established under the science programme of the Japan Aerospace Exploration Agency, provides geospatial information about mangrove extent and changes.[16] Space applications using satellite data can be used as tools to facilitate periodic monitoring of mangroves over large areas. Key Earth-observation sensors that use the Japan Aerospace Exploration Agency's series of satellites equipped with synthetic aperture radars provide suitable data for regular monitoring and change detection in cloud-prone coastal regions. This data coupled with other optical and digital elevation data provide annual global mosaics at a resolution of 25 metres for national wetland practitioners and decision makers as well as non-governmental organizations.[17]

25. Spatial modelling for natural and environmental vulnerability through remote sensing and GIS technologies was undertaken in Astrakhan, Russian Federation, by Samara State Aerospace University, American Sentinel University and Hokkaido University. It used multiple thematic layers with multidisciplinary approaches to observe the changes in land use/cover and vulnerability over the past 15 years. The results show that large parts of the area had moderate vulnerability (54.62 per cent), and that the increase in vulnerable land was due to population growth, increased deforestation, conversion of farmland to built-up areas, road expansion and uncontrolled grazing activities.[18] With the help of geospatial technologies, the Governments and policymakers were able to identify vulnerable areas that needed environmental recovery, rehabilitation and protection.

26. In Turkey, precision agriculture practices are being developed to analyse wheat, corn and cotton crops by using multispectral satellite imagery and aerial data. Ground measurements will also be collected to analyse the data in a geographic information system. This work is under the Hassa project, whose aim is to study the development of precision agricultural practices within the region covered by the South-Eastern Anatolia Project, to help improve the efficiency of farms and enhance production by reducing input such as water, fertilizer and pesticides into the agricultural land.

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[15] E/ESCAP/73/31, annex II.

[16] Group on Earth Observations, *Earth Observations in Support of the 2030 Agenda for Sustainable Development* (Tokyo, Japan Aerospace Exploration Agency, 2017).

[17] Ibid.

[18] Komal Choudhary, Mukesh Singh Boori and Alexander Kupriyanov, "Spatial modelling for natural and environmental vulnerability through remote sensing and GIS in Astrakhan, Russia", *Egyptian Journal of Remote Sensing and Space Science* (May 2017). Available at www.sciencedirect.com/science/article/pii/S1110982317302120?via%3Dihub.

D. Space applications for connectivity for the 2030 Agenda for Sustainable Development

27. Space technology applications and geospatial data are a key component for optimizing the expansion and integration of infrastructure such as highways, railways, dry port networks and digital connections, which make connectivity more inclusive and spread the benefits extensively to marginalized people. Improvements in regional connectivity in terms of transport, information and communications technology and trade will help boost economic growth.[19]

28. To improve connectivity within South Asia, work on the China-Pakistan Economic Corridor is under way, with a view to expanding economic opportunities through trade and infrastructure. Geospatial technologies have been used to determine the viability of the highway network through three key aspects: (a) vulnerability of the highway trade route to violence and threats; (b) the number of people living in close proximity to the trade route; and (c) the extent to which emerging economic regions in Pakistan will be connected via the trade route. The second aspect was calculated using geospatial statistics such as zonal statistics, and it was found that 25 per cent or more of the population lived within a 5-kilometre radius of the highway network and that in almost all regions more than 80 per cent of the population lived within a 50-kilometre radius, indicating that the route provides connectivity to the majority of the population in Pakistan. With regard to the third aspect, it was found that 85 per cent of areas that had experienced growth of between 0 and 50 per cent from 1993 to 2013 were within a 10-kilometre radius of the trade route, making the highway network a viable location for economic growth.[20]

29. One of the key components of the initiative by the Government of the Russian Federation to build a "Great Eurasian Partnership", towards sustainable economic growth in the region, is the deployment of intelligent transport systems using the Global Navigation Satellite System. The Government implemented regulations on the mandatory installation of the Global Navigation Satellite System in every new vehicle sold from 2017 for road tracking. By applying this system, it provides real-time tracking on deliveries and shipments, with a view to streamlining regulations, promoting competition and encouraging entrepreneurship to support growth.[21]

30. In New Caledonia, work is under way towards including the Sustainable Development Goals in local policy and planning, and 48 baseline indicators have been selected for reporting. Through space applications, namely GIS and remote sensing, the Government has created a geoportal to share, view and download imagery, data and metadata to share with stakeholders for better decision-making and management.

E. Space applications for energy

31. Alongside the rapid expansion and growth experienced throughout Asia and the Pacific, nearly half a billion people are still lacking access to electricity. More than 80 per cent of the countries in the region have targets to improve energy efficiency and increase the share of renewable energy within

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[19] E/ESCAP/73/31, annex II.

[20] See https://sites.tufts.edu/gis/files/2016/01/Usman_Mohammad_DHP207_2016.pdf.

[21] Business Wire, "Russia transportation and logistics market insights report 2017: research and markets", 2 January 2018. Available at www.businesswire.com/news/home/20180102005484/en/Russia-Transportation-Logistics-Market-Insights-Report-2017.

the region.[22] The Committee on Energy, at its first session, acknowledged the new Asia Pacific Energy Portal, which offers access to comprehensive statistical data and visualization, using space applications. Using this geospatial data can contribute to more efficient and knowledge-based decision-making processes, potentially leading to more targeted intervention efforts.

32. In India, the potential of solar and wind power is being harnessed by using remote sensing technology and mapping renewable energy sources. Satellite data were used to assess the actual solar power potential of concentrated solar power and centralized solar photovoltaic systems in each district. GIS and remote sensing can help identify key solar power locations, calculate technical requirements and identify the economic viability of systems.[23] To increase the renewable energy consumption in India, a comprehensive GIS-based energy map and a geospatial energy portal are being developed.[24]

33. In Georgia, the energy sector is considered to be one of the main users of space applications and data resources. Space applications such as digital maps and satellite imagery and data on the ownership of lands and registration can be used in the construction of hydropower plants, and to analyse potential sites for natural oil and gas reserves. Between 2012 and 2017, 23 new thermal power plants (with a capacity of 782.15 megawatts), one hydropower plant and one wind power plant were installed in Georgia. Using geospatial applications and data, the country is working towards a future of sustainable, renewable energy.[25]

34. In Indonesia, through the increased use of space applications, the best practices and programmes are being utilized to increase the share of renewable energy through GIS and data-driven research. Indonesia has a renewable energy target of 23 per cent by 2025, and important strides are being made towards universal access to power across the whole country.[26] Using night-time Earth-observation data, an electricity network has been developed in the eastern part of the country. This is extremely important as most of the population of that area live in remote mountainous or island communities with little access to power.

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[22] E/ESCAP/73/31, annex II.

[23] Richa Mahtta, P.K. Joshi and Alok Kumar Jindal, “Solar power potential mapping in India using remote sensing inputs and environmental parameters”, *Renewable Energy*, vol. 71 (November 2014).

[24] India, presentation to the Drafting Committee for the new Asia-Pacific plan of action at its first meeting, Bangkok, 31 May and 1 June 2018. Available at www.unescap.org/sites/default/files/Committee%20Member%20Presentation-India_0.pdf.

[25] Georgia, presentation to the Drafting Committee for the new Asia-Pacific plan of action at its first meeting, Bangkok, 31 May and 1 June 2018. Available at www.unescap.org/sites/default/files/Committee%20Member%20Presentation_Georgia_rev_0.pdf.

[26] Australian Consulate-General in Makassar, Indonesia, “Renewable energy field study: eastern Indonesia”, October 2017. Available at http://australiaindonesiacentre.org/app/uploads/2017/10/Renewable-Energy-Field-Study-Overview-wide-distribution.pdf.

F. Space applications for social development to leave no one behind

35. The Ministry of Health of Indonesia is using available satellite communications and systems to enhance its health system. By implementing e-health – the use of information and communications technology to help retrieve and exchange health data and health-care services more efficiently, effectively and safely, covering electronic medical records, surveillance systems, health knowledge management, telemedicine, consumer health informatics, e-learning in health sciences and medical research – the Ministry is able to provide more readily available data, which is especially relevant to an extensive archipelago whose population is dispersed across thousands of islands, making health services and data difficult to maintain. The e-health system can help organize patient data and improve the overall care of patients, as effective clinical workflows are established and maintained. The use of space applications in e-health improves the overall quality of health facilities across the country.

36. GIS data being used in countries such as the Philippines show that access to road infrastructure and proximity to major markets have a significant effect on poverty incidence.[27] Another concrete example is the use of geospatial data and GIS by the city government of Busan in the Republic of Korea to identify the optimal location to build social welfare facilities for disabled persons. By combining data on basic living standards and the status of residents in existing welfare centres, GIS were used to determine the best location while considering the mobility of residents, moving route and accessibility of facilities.[28]

37. India is currently developing the National Spatial Data Infrastructure, which uses extensive GIS databases and resources. A national GIS has been integrated into the Government's Twelfth Five-Year Plan (2012–2017) with a view to creating a new paradigm for governance and development with an emphasis on inclusive growth and development, especially to reduce disparity, expedite development and bring demographic dividends. The new national GIS will help with the mapping of resources, disparities and the needs of beneficiaries and society, and will support sustainable and spatial planning, enable transparent systems for an inclusive society, and support real-time mapping of feedback and redress systems.[29]

III. Gaps and policy challenges

38. Despite advances in space applications and improvements in regional partnerships, gaps and challenges remain in terms of knowledge- and information-sharing, capacity development and technical assistance, as well as the forging of regional connections, norms and standards in developing countries. Countries require not only better technology, tools and infrastructure,

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[27] Brandon Manalo Vista, "Exploring the spatial patterns and determinants of poverty: the case of Albay and Camarines Sur Provinces in Bicol Region, Philippines", MSc dissertation, University of Tsukuba, 2008. Available at http://giswin.geo.tsukuba.ac.jp/sis/thesis/Vista_Brandon.pdf.

[28] Kwang-Hoon Son, "A case study on functional shift and specialization of social welfare centre to social welfare for people with disability utilizing GIS analysis in Haeundae-Gu of Busan Metropolitan City", abstract, *Journal of Community Welfare* (Republic of Korea), vol. 44 (2013). Available at www.dbpia.co.kr/Journal/ArticleDetail/NODE02373981.

[29] Environmental Systems Research Institute, "India: a vision for national GIS", May 2014. Available at www.esri.com/library/ebooks/india-a-vision-for-national-gis.pdf.

but also human capacity to operate and manage them, with skills such as those related to digital technology and creativity. Many developing countries, including small island developing States, do not have a critical mass of people who can utilize, analyse and interpret space application information at the country level.

39. Many of these challenges in accessing and building capacity for using space applications can be addressed through regional cooperation. Good examples of programmes that bring together the expertise of spacefaring countries, and those that use space applications extensively, to support member States with less capacity have already been demonstrated. Such examples include the various ESCAP knowledge products, as well as capacity development provided through the Regional Space Applications Programme for Sustainable Development. However, these programmes need to be scaled up, with a focus on cutting-edge innovations that provide policymakers with advice that is ahead of the curve, if countries are to continue to effectively unleash the potential of the technological and information advances in the space sector.

40. Notwithstanding the ongoing capacity-building programmes, scholarships and individual projects that are being provided in the region, more intense delivery of research, policy analysis and training through regional cooperation is therefore needed for low-capacity countries. In some instances, more extensive institutional development of national education institutes and curricula will be essential to support the scaling-up of individual capacity-building programmes.

41. Beyond this though, there is a greater need to bridge the gap between the space applications community – with its own language, priorities and means of working – and the potential end users who could benefit from Earth-observation information. In addition, many excellent pilot activities are being undertaken in the region. Unless the benefits and potential of these activities are applied across other important sectors, including planning and financing, they will remain academic activities and will not be incorporated into country development plans.

IV. The way forward: the Asia-Pacific plan of action on space applications for sustainable development (2018–2030)

42. As a follow-up to the successful implementation of the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012–2017, the secretariat is supporting member States in formulating a new Asia-Pacific plan of action on space applications for sustainable development (2018–2030). The aim is to further scale up the use of space applications and geospatial information to achieve the regional road map for implementing the 2030 Agenda for Sustainable Development and relevant global agendas.

43. At its first meeting, held in late May 2018, the Drafting Committee for the new Asia-Pacific plan of action prioritized the Sustainable Development Goal targets to which space applications could most significantly contribute. It identified 48 Goal targets, and the corresponding targets of the Sendai Framework for Disaster Risk Reduction 2015–2030, as being high- or medium-priority in terms of their role and applicability. It also proposed concrete actions that could be associated with those targets, centred around (a) research and knowledge-sharing, (b) capacity-building and technical

support and (c) regional intergovernmental norm- and standard-setting processes. Discussions also covered the use and appropriateness of indicators for measuring the progress of implementation.

44. The Drafting Committee was of the view that the 48 Goal targets selected should contribute to the priority thematic areas outlined in the regional road map, in the following order: (a) disaster risk reduction and resilience; (b) climate change; (c) management of natural resources; (d) connectivity; (e) energy; and (f) social development.

45. The Drafting Committee was also of the view that the new regional plan of action should encompass and define a concept entitled “Space+”, which would seek: (a) to leverage frontier technologies such as artificial intelligence and big data; (b) to engage end users in multiple sectors, youth and the private sector; (c) to more effectively manage information through the creation of a regional or national cloud-based metadata platform; and (d) to strengthen implementation through the creation of a trust fund and through enhanced partnership with global and regional stakeholders.

46. The final plan of action will be presented for adoption along with a declaration at the third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, to be held on 10 October 2018, and the outcomes will be submitted to the Commission for endorsement at its seventy-fifth session.

V. Recommendations

47. Based on a two-year preparatory process and in view of the background and issues identified above, the Committee may wish:

(a) To encourage member States to mobilize the participation of ministers and high-level policymakers and decision makers in the area of space technology and space applications, national space agencies, and science and technology ministries at the third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, to be held in Bangkok on 10 October 2018;

(b) To encourage the Ministerial Conference to adopt a ministerial declaration and an Asia-Pacific plan of action on space applications for sustainable development (2018–2030) and support their endorsement by the Commission at its seventy-fifth session, in 2019;

(c) To agree to commissioning an Asia-Pacific report on geospatial information applications for sustainable development, to be published biennially, which would enhance the availability of research and knowledge products on new regional trends in digitally led innovations in geospatial information applications and services.

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