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REPORT ON THE SECOND SEMINAR-WORKSHOP "REHABILITATION OF
TERRACES AND OTHER TRADITIONAL TECHNOLOGIES:
PROBLEMS AND SOLUTIONS"

(Lima, Peru, 18-20 April 1989)

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Introduction

1. This report contains the background and summary of the conclusions of the second seminar-workshop on "Rehabilitation of terraces and other traditional technologies: problems and solutions", held in Lima and San Pedro de Casta from 18 to 20 April 1989.

2. The seminar-workshop was organized by the Economic Commission for Latin America and the Caribbean (ECLAC) and the National Watershed Management and Soil Conservation Programme (PRONAMACCS) of the Peruvian Ministry of Agriculture. Also participating were the Peruvian Studies Institute (IEP), the Development and Environment Institute (IDMA) and the Nature, Science and Local Technology Association for Social Service (NCTL).

3. The meeting formed part of the activities of the ECLAC/UNEP project on "Technical co-operation for the integration of environmental considerations into development planning in Latin America and the Caribbean, Phase II", which is being carried out by the Joint ECLAC/UNEP Development and Environment Unit.

I. ATTENDANCE AND ORGANIZATION OF WORK

Place, date and objectives of the meeting

4. The seminar-workshop was held from 18 to 20 April 1989 in Lima at the headquarters of the National Office for the Evaluation of Natural Resources (ONERN).

5. Its objectives were as follows:

a) To present a feasibility study for a national development project in terrace rehabilitation areas in Peru, prepared by an ECLAC advisory group. This group was composed of Efrain González de Olarte (Co-ordinator), Carmen Felipe-Morales and Luis Masson Meiss;

b) To collect the experience and research of other experts, specialists and persons interested in the topic, which might be useful in further improvement of the study presented;

- c) To examine and discuss aspects of terrace rehabilitation;
- d) To draw attention to the urgency of creating public awareness of the need and usefulness of conserving the environment, approaching development within a framework of the rational and sustained use of natural resources;
- e) To strengthen co-operative ties among governmental and non-governmental organizations and international bodies and to lay the foundations for inter-agency concerted efforts to promote the implementation of the project;
- f) To recommend future measures.

Attendance

6. The meeting was attended by experts from governmental and non-governmental Peruvian bodies and international organizations.*/

Opening meeting

7. At the opening meeting, the participants were welcomed by Gonzalo Pajares, Director of PRONAMACCS.

8. Nicolo Gligo, Co-ordinator of the Joint ECLAC/UNEP Development and Environment Unit, spoke on behalf of the international organizing body.

Organization of work

9. During the first part of the meeting, the most successful experiences in the rehabilitation and recovery of traditional technology (terraces) in Peru, which had been carried out by governmental and non-governmental agencies mainly in the departments of southern Peru, were described to panels of experts.

10. Special attention was given to the presentation of the book Cinco años de conservación de suelos con los campesinos de los Andes peruanos (autoevaluación del Programa Nacional de Conservación de Suelos y Aguas en Cuencas Hidrográficas), which is one of the most complete studies on experiences in erosion control; it deals with, inter alia, the experience of PRONAMACCS in the rehabilitation of pre-Incan technology.

11. The results of other three terrace rehabilitation projects using different strategies were examined and compared. The panel

*/ See list of participants in annex 1.

was composed of outstanding professional experts on the subject, who discussed the physical, technical, social, economic, and strategic aspects of the issues presented in order to appraise and consider these aspects for purposes of a large-scale terrace recovery project in Peru.

12. The progress made in preparing the National Inventory of Terraces, which is being conducted by the National Office for the Evaluation of Natural Resources (ONERN), was also discussed.

13. In the second part of the meeting, statements were made on topics which need to be taken into account in the rehabilitation of terraces, such as physical and climatic factors, social aspects and mechanisms for promoting terrace rehabilitation.

14. At the end of this part, two round tables were held. In the first, a multidisciplinary group of experts discussed the rehabilitation of terraces in a strategy of watershed management and environmental planning. The second dealt with management tools, concerted efforts and inter-agency co-operation for terrace rehabilitation in Peru.

15. During the third part of the seminar, the ECLAC consultants, headed by Efraín González de Olarte, presented the Feasibility study for a national development project in terrace rehabilitation areas in Peru (LC/R.747) to a multidisciplinary panel of experts from public and private institutions, as well as to the other participants. The schedule of activities for each day is presented in annex 2.

II. BACKGROUND

16. Beginning in 1980, an important institutional movement towards a new approach to development arose in Peru. This was mainly based on conservation of natural resources, preservation of the environment and restoration of traditional pre-Hispanic conservation and resource management technologies. All these are regarded as basic to a harmonious and sustained development.

17. Because of its topographical and climatic conditions, Peru has very little agricultural land (only 3.8% of the total surface area of the country consists of arable soil). This fact, together with increasing demographic pressure, means that large land areas with severe limitations are being put to agricultural use, resulting in very serious threats to existing resources and the environment (deforestation, erosion, overgrazing, depredation of genetic resources, flooding, salinization, pollution, increased risk of natural disasters, etc.). A large part of the rural population of Peru (approximately one third) is settled in the sierra, mainly in

the countryside (on the slopes of narrow, dissected valleys), where subsistence agriculture is the primary activity.

18. For approximately 30 years, the edaphic reality of the country has forced the State to seek ways of expanding the agricultural frontier, mainly by irrigating the plains and desert areas of the narrow coastal strip. These extremely costly efforts have not yielded the expected results. On the contrary, in most cases, more land is being lost than gained. In the past 50 years the sierra has been practically abandoned by the State. The result of this neglect has been the scourge of erosion, which is further decimating the hillside soils, to the detriment of the inhabitants and development possibilities. At the same time, the high-forest and low-forest areas are suffering from the impact of spontaneous settlements; if these continue, an ecological disaster can be expected whose consequences are only beginning to be felt.

19. The pre-Hispanic cultures which inhabited Peru were aware of these limitations, and developed and applied technologies which enabled them to grow in harmony with the environment. They built nearly a million hectares of terraces and applied other technologies for this purpose.

20. Some public and private development institutions have undertaken or carried out occasional, scattered small-scale activities in an effort to find ways of recovering pre-Hispanic conservation techniques and natural resource and environmental management technology. The results, although haphazard and incomplete, are very positive. The creation of PNCSACH, now known as the National Watershed Management and Soil Conservation Programme (PRONAMACCS), marked the beginning of a new phase of expanded efforts, especially with respect to its willingness to co-ordinate and integrate its work with other institutions.

21. Thus, the first seminar on the rehabilitation of terraces and other traditional technologies, organized by NCTL, ONERN and ECLAC and held in May 1988 in Lima, was very beneficial. It was one of the first steps in comparing local public and private experiences in traditional technologies for terrace recovery and rehabilitation, and was an opportunity for an open exchange of views and plans for the future.

22. The conclusions of the first seminar drew attention to the following points: a) the importance of terrace rehabilitation for the rural development of the Peruvian sierra; b) the need to quantify the terraced areas; c) the urgent need to open up new lines of scientific and technological research on the recovery of traditional technology; and d) the need for a co-ordinated, multisectoral and institutional effort to rehabilitate and recover traditional technologies.

23. The main recommendations of the first seminar were as follows: to promote future meetings on the topic; to establish a national network for the recovery of traditional technology and to promote the implementation of a comprehensive programme on terrace rehabilitation as part of PRONAMACCS; and, lastly, to request ECLAC to continue to encourage meetings of this kind and to maintain its support for the preparation of feasibility studies.

24. PRONAMACCS, in accordance with its purposes and objectives, welcomed the recommendations of the first seminar. After establishing contacts and co-ordination with the Joint ECLAC/UNEP Development and Environment Unit, PRONAMACCS had asked for the support of ECLAC in preparing a feasibility study on a national development project in terrace recovery areas. ECLAC had contracted the advisory group, which had carried out the study together with a PRONAMACCS counterpart, whose presentation, analysis and discussion were the primary reasons for the present meeting.

III. CONCLUSIONS AND RECOMMENDATIONS

1. Motivation

25. Agricultural land is very scarce in Peru; most of its surface is made up of fragile areas which are very much exposed to degradation. Conservation is therefore a constant and basic concern in the search for a harmonious and sustained development.

26. Only 1.7% of the surface area of Peru is used for the production of food crops. The reconstruction of terraces, which would enable idle, abandoned land to be successfully incorporated for agricultural use, is a concrete opportunity for improving the nutritional situation of 22 million Peruvians, who nowadays import more than half the food they consume.

27. The rehabilitation of terraces expands the amount of land available for profitable agriculture, and also includes advantages as: protection of human and animal lives; reduction of the amount spent for recovering infrastructure; increase of the useful life of reservoirs, highways, bridges, hydroelectric turbines, etc.; decrease in the amount spent on the treatment of water for human consumption; regulation of the volume of water in rivers and other watercourses; and conservation of genetic resources.

28. In addition to these positive effects, the recovery of terraces could help to improve the socio-political situation of the country by creating more jobs and raising the living standards of the inhabitants of the Andean region, thereby avoiding such adverse effects as mass migration and violence.

2. State intervention

29. Soil conservation, specifically the rehabilitation of terraces, requires not only favourable macroeconomic policies but also an appropriate institutional context and political will.

30. The Peruvian State has made very little effort to tackle the enormous problem of soil degradation, especially in the sierra. The present efforts have been made by persons concerned about the problem who have carried out small projects. In most cases, the resources for their implementation have come from outside the country. The State should now assume the leadership role in dealing with this problem.

31. The full decision-making power in this respect is in the hands of the governmental authorities, through the agricultural sector. Support from non-governmental organizations and international agencies plays a complementary role in the task of generating concrete measures and mechanisms to make this alternative viable in the short term.

32. It is urgent for the State to demonstrate the political will to ensure that conservation measures, and especially the institutions which carry them out, have real force and institutional continuity. The State should assume part of the investment necessary in the form of an ongoing programme to complement external resources.

3. The environment and overall development

33. The rehabilitation of terraces is a new, rational approach in the changing direction of agricultural research and development; it is also a valid and harmonious alternative for expanding the agricultural frontier by incorporating otherwise unproductive agricultural lands, or land in great danger of deterioration.

34. The terraces rehabilitation should be considered in an overall perspective on rural development, not merely in terms of agriculture or stock-raising. This perspective should include the hydrographic basin as a whole (in a holistic approach), and as a systemic and self-sustaining totality.

35. For the success of future terrace rehabilitation measures, such rehabilitation must be considered in an overall context which includes, inter alia, climatic, edaphic, social, economic, political and cultural aspects. In other words, it is a question of envisioning the Andes within a more comprehensive system.

36. The debate on the ecoclimatic factors in terrace recovery, and on technological constraints within the current socioeconomic possibilities of Peru, demonstrates that terrace recovery and

conservation in general still represent rational forms of development, not only for the Andean region but also for the harmonious management of watersheds.

4. National Inventory of Terraces

37. The advances made thus far by ONERN in preparing the National Inventory of Terraces were evaluated. The survey has been completed for all of zone 1, which is composed of the departments of Arequipa, Moquegua, Tacna and Puno, and part of zone 2, which includes the departments of Ica, Huancavélica, Ayacucho, Apurímac and Cuzco. Zone 3, which includes the departments of Ancash, Huánuco, Pasco, Junín and Lima, and zone 4, composed of Cajamarca and La Libertad, have yet to be evaluated.

38. The work on the inventory cannot be completed within the time schedule initially projected by ONERN, owing to lack of funds.

39. It was recommended that ways should be found, and the necessary measures taken, to complete the terrace inventory. In addition, it was recommended that studies should be pursued in more detail in certain priority areas.

5. Experiences

40. Concrete experiences in terrace recovery and rehabilitation in Peru are still sporadic; large segments in proportion to total land area have not yet been rehabilitated.

41. The issues of terrace rehabilitation experiences presented at the seminar provided insufficient information about the costs of rehabilitation, which in some cases are too high to be practical. It would therefore be appropriate to design mechanisms to facilitate terrace rehabilitation and make it more feasible. It is also necessary to make an in-depth study of the cost/benefit ratios of rehabilitation, taking into account such aspects as productivity, social impact and environmental effects.

42. In most of the experiences presented, some elements, such as the rehabilitation of irrigation and water supply systems, are being ignored or minimized. It is important to give them more emphasis in future measures. Water supply and irrigation systems should be regarded as indispensable elements in any recovery programme.

6. The technological problem

43. Rehabilitating terraces means not only recovering the base of a pre-Hispanic agricultural structure, but also finding a rational

way of expanding the agricultural frontier by harmoniously managing the ecological parameters.

44. Little has been done to systematize the traditional knowledge still retained by rural dwellers about terrace rehabilitation; furthermore, little information on current terrace rehabilitation technology has been systematized and researched. Further research in this area, and studies on the behaviour of terraces as modifiers of climatic effects on crops, would therefore be helpful.

45. It was recommended that PRONAMACCS should be charged with formulating, executing and evaluating specific terrace recovery projects in representative areas of the country, so that they could be used as pilot projects for a future large-scale effort. These pilot projects should be formulated and carried out within an overall perspective of watershed management, which would take into account, *inter alia*, the true magnitude of the physical, environmental, technological, socioeconomic, political and institutional aspects in consolidating and completing experiences to pave the way for a future large-scale national project.

7. Strategies and prerequisites for rehabilitation

46. The large-scale projects should begin with a diagnostic study to discover what type of terraces already exist, the size of the total land area, the feasibility of the projects and their socioeconomic and environmental consequences.

47. In rehabilitation and conservation projects and plans in general, the results of previous experiences should be carefully studied, especially the socio-cultural features of the local inhabitants and others which have had an impact on the area.

48. The strategies used by current projects and institutions vary considerably. In general, their experiences have been successful and valuable, but only partial. It was recommended, therefore, that account should be taken of the above-mentioned observations in order to take advantage of those experiences which could be valuable for future projects, especially in cases of large-scale rehabilitation.

49. In order for conservation efforts to be effective, training --and education in general-- should be functional to society, production and the environment. An intensive and widespread educational campaign on the protection of the environment should be launched in the various strata of the population, so as to create a favourable public movement on conservation and make the need for it felt by the groups involved, with special emphasis on rural communities and those which directly or indirectly benefit from or are harmed by the environment.

50. One of the fundamental aspects which should be taken into account in future terrace rehabilitation activities is the organized participation by the local population, both in the formulation and execution of projects and, in general, in their management. To this extent, incentives need to be provided for producers to form associations to avoid asymmetrical linkages between the rural economy and urban demand, which could lead to an appropriation of the economic surplus produced by farmers in the rehabilitated terraces.

51. Problems concerning land holding and ownership need to be dealt with in greater depth, in order to ensure a fair distribution of outside resources and give priority to associative and communal ownership over private and individual ownership.

8. Economic evaluation

52. Rehabilitation, conservation and other environmentally positive projects should be economically profitable, in addition to having physical, biotic and social benefits. Economic benefits without doubt represent one of the most effective incentives for awakening interest in those who would receive them and for inspiring political will in individual and institutional decision-makers.

53. It was recommended that the economic impact of large-scale terrace recovery on the national economy should be studied and publicized. This could be one mechanism for changing the State's present attitude towards investment policies, which give preference to the coast over the sierra and thus represent one of the main obstacles to the large-scale rehabilitation of terraces in the country.

54. It was also recommended that the profitability criteria for terrace rehabilitation should include the conservation, the external economies (conservation and augmentation of the useful life of the water and energy infrastructure); the preservation of the economic infrastructure (highways, bridges, industrial infrastructure and services); the protection against the loss of human and animal life; and social infrastructure (housing, etc.).

55. It was also noted that, although terrace-based production should be capable of generating surpluses to pay part of the costs of rehabilitation, the rest of the cost should be assumed by society, which benefits directly or indirectly from the advantages of rehabilitation and its positive impact on the environment in general. The farmers cannot be left to solve environmental problems alone, with their own scarce resources.

56. Experiences with rehabilitation show that it increases productivity in the Andean slopes; however, its profitability

depends on the macroeconomic environment and government pricing and marketing policies. It was also concluded that, in order to alter the present serious degradation of natural resources, the State should establish a macroeconomic and financial strategy and a form of decentralized development planning that would give priority to the sierra. Food import policies should be improved, and unfair competition between imported and national agricultural products should be avoided. This is one of the basic conditions for making agriculture in the sierra profitable.

57. There is also a need to establish linkages between the agricultural and industrial sectors, promoting national supply of the inputs required by producers and of the capital goods needed for preparing or processing products.

58. Attention was again drawn to the enormous possibilities of soil conservation, specifically terrace rehabilitation, as a source of permanent work for the rural and urban population, representing another benefit to the country's economy.

9. The institutional problem

59. In this respect it was concluded that, in order to make terrace rehabilitation feasible in the country, the National Watershed Management and Soil Conservation Programme should be provided with the means to fulfill its function as a guiding, governing and catalytic body in conservation measures and the rehabilitation of traditional technology in Peru.

60. It was suggested that there was a need to design and improve inter-agency co-ordination and efforts, as an essential precondition to an overall effort to ensure sustained and harmonious development.

61. Inter-agency work should be carried out in areas of joint action for priority microbasins, first pooling and harmonizing the efforts of institutions in the agricultural sector (specifically the offices of the Vice-Ministry of Natural Resources and Rural Development), as a basis for advancing towards multisectoral efforts at a later stage.

62. The importance and role of non-governmental organizations in conservation efforts, especially rehabilitation, was pointed out, and it was recommended that co-ordination among them, as well as co-operation with State bodies should be improved.

63. The importance was also pointed out of linking governmental and non-governmental institutional efforts with institutions representing the farmers and the community in general, to ensure collective participation in conservation, which should be everyone's responsibility.

64. ECLAC and other international organizations were thanked for their support, without which it would not be possible to concretize any conservation and pro-environment efforts, and these bodies were urged to continue providing their valuable support in the future.

65. Lastly, it was agreed that PRONAMACCS and ECLAC should be requested to further improve the study presented as much as possible. It was also agreed to request that, through the Peruvian government, negotiations be undertaken with international agencies in order to obtain financing for the new studies that would be needed and for the execution of programmes.

Annex 1

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Annex 2

PROGRAMME FOR THE SEMINAR

18 April 1989

Presentation of the book Cinco años de conservación de suelos con los campesinos peruanos. Presentor: Pablo Sánchez Zevallos (Universidad Nacional Técnica de Cajamarca). Panel: Efraín González de Olarte (Peruvian Studies Institute), Luis Paz Silva (Board of the Cartagena Agreement), and Fernando Eguren (Director, Peruvian Centre for Social Studies).

19 April 1989

- i) Presentation on three experiences with the rehabilitation of terraces in the central and southern departments of Peru. Presentors: César Díaz Zevallos (Universidad Técnica del Altiplano, Puno), Fernando Astete Victoria (National Cultural Institute, Cuzco) and Emilio Paz Vergara (Proyecto Acondicionamiento Territorial y Vivienda Rural - PRATVIR). Panel: Jorge Yáñez (CARE-PERU), Telmo Rojas (Universidad Nacional Técnica de Cajamarca), and Pablo Sánchez (Universidad Nacional Técnica de Cajamarca).
- ii) Presentation on the progress made in preparing the National Inventory of Terraces, Victor Rojas (National Office for the Evaluation of Natural Resources - ONERN).
- iii) Presentation on physical and climatic factors relating to the rehabilitation of terraces in Peru, Carlos Zamora Jimeno (former Director of the National Office for the Evaluation of Natural Resources - ONERN).
- iv) Presentation on social factors relating to the rehabilitation of terraces and promotion mechanisms, Julio Alfaro Moreno (Universidad Nacional Agraria La Molina).
- v) Round table on the rehabilitation of terraces, river basin management and the environment, Nicolo Gligo (Economic Commission for Latin America and the Caribbean), Mario Tapia (National Agricultural Research Institute), Eduardo Seminario (Universidad Nacional Agraria La Molina), Enrique Kolmans (Development and Environment Institute), and Lorenzo Chang-Navarro (Universidad Nacional Agraria La Molina). Moderator: Roger Evangelista (National Office for the Evaluation of Natural Resources - ONERN).

20 April 1989

- i) Presentation on a feasibility study for a national development project for terrace recovery in Peru, Efrain González de Olarte (Peruvian Studies Institute, ECLAC consultant), Carmen Felipe-Morales (Universidad Nacional Agraria La Molina, ECLAC consultant), Luis Masson Meiss (Nature, Science and Local Technology Association for Social Service - NCTL, ECLAC consultant), and Juan Mejía Zamalloa (National Basin Management and Soil Conservation Programme). Panel: Carlos Collantes (National Board of the Cartagena Agreement), Fernando Eguren (Peruvian Centre for Social Studies), Hilda Araujo (Universidad Nacional Agraria La Molina), Gonzalo Pajares Tapia (National Basin Management and Soil Conservation Programme), and Jaime Llosa (Centre for Development and Participation Studies).
- ii) Round table on management tools, concerted efforts and inter-agency co-operation for terrace recovery in Peru, Luis Paz Silva (National Board of the Cartagena Agreement), Luisa Galarza (National Planning Institute), Gustavo Benza P. (Peruvian Institute for Indian Affairs), Nicolo Gligo (Economic Commission for Latin America and the Caribbean), and Guillermo Figallo (Agrarian Law Institute of Peru - IPDA). Moderator: Lorenzo Chang-Navarro (Universidad Nacional Agraria La Molina).