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REPORT OF THE REGIONAL SEMINAR ON ENVIRONMENTAL SYSTEMS
AND STRATEGIES FOR EXTENDING THE AGRICULTURAL
FRONTIER IN LATIN AMERICA

(Santiago, Chile, 28 to 30 October 1986)

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Foreword

The present report contains the basic background information and a summary of the debates of the regional seminar on "Environmental systems and strategies for extending the agricultural frontier in Latin America".

This seminar is part of the project of the same title which was executed by ECLAC through the Joint ECLAC/UNEP Development and Environment Unit, with financial and technical support from the Federal Republic of Germany.

I. ATTENDANCE AND ORGANIZATION OF WORK

Place, date and purpose of the meeting

1. The regional seminar on "Environmental systems and strategies for extending the agricultural frontier in Latin America" was held from 28 to 30 October 1986 at the ECLAC Headquarters in Santiago, Chile. The seminar was organized by ECLAC through its Joint ECLAC/UNEP Development and Environment Unit.

2. The purpose of the meeting was to make a contribution to the execution of the project on "Environmental systems and strategies for extending the agricultural frontier in Latin America". The main purpose of this project is to provide viable methodologies and instruments which will help to reduce the ecological cost of the changes and to establish sustainable agroforestry systems which can be used by planners and persons responsible for regional and agricultural development policies and projects in areas where the agricultural frontier is expanding.

Attendance

3. The meeting was attended by experts from several Latin American countries and also by experts from the Food and Agriculture Organization of the United Nations (FAO), the Organization of American States (OAS), the Inter-American Institute for Agricultural Sciences (IICA), the Latin American Institute for Economic and Social Planning (ILPES) and ECLAC. They all attended in a personal capacity (see the list of participants attached).

Opening session

4. The seminar was opened by the Deputy Executive Secretary of ECLAC, Gert Rosenthal. A statement was also made by the co-ordinator of the Joint ECLAC/UNEP Development and Environment Unit, Osvaldo Sunkel, who spoke on the subject of "Development, crisis and extension of the agricultural frontier".

Co-ordination

5. During the three days of debate, the seminar was co-ordinated by the expert in the Joint ECLAC/UNEP Development and Environment Unit, Nicolo Gligo.

Organization of the seminar

6. The seminar was held in plenary sessions which discussed five topics. These topics were selected after reviewing nine papers prepared by consultants from different Latin American countries on the basis of 36 questions contained in a questionnaire especially prepared by the project's co-ordinators.

7. The replies to the questionnaire were processed and compiled in ECLAC document LC/R.532 of 20 October 1986.

Agenda

8. The seminar dealt with the following topics:
1. Incorporation of ecological criteria into development activities on the agricultural frontier.
 2. Factors determining the structure of land tenure in the areas of extension of the agricultural frontier.
 3. Systems of production in areas where the agricultural frontier is being extended.
 4. Protected areas on the agricultural frontier.
 5. Policies for agricultural management and human settlements in agricultural frontier areas.

II. SUMMARY OF THE DEBATES

9. A summary of the main issues raised during the debate is given below to assist in drafting the seminar's conclusions and recommendations on the project. The points highlighted in this summary reflect the views most widely held during the debate but do not necessarily represent the opinion of all the participants.

10. The considerations refer both to unoccupied areas to which the agricultural frontier is likely to extend and to areas recently settled (during the last 15 to 20 years) which have still not been consolidated and which are considered areas to which the frontier will extend.

11. The process studied refers basically to the three predominant forms of settlement: directed settlement carried out through State settlement programmes; spontaneous settlement caused by the eviction of peasants from other areas or by the desire to exploit certain ecosystems; and settlement induced and promoted through infrastructure works mainly highways.

Incorporation of ecological criteria in the development
activities on the agricultural frontier
(Agenda item 1)

12. The extensive debate on this subject centred primarily on defining, on the one hand, criteria and objectives and methodologies and indicators, on the other. Its main conclusions are given in the paragraphs below.

13. The basic criteria for transforming ecosystems or for consolidating recently settled areas must have the following basic objectives: productivity, sustainability and the maintenance of several options.

14. For each of these objectives there is one method which is considered the best. Productivity is proposed mainly through studies on the use potential of the land or the ecosystems; sustainability through the ecosystems' vulnerability studies to agroforestry processes, and the way to keep several options open is outlined in studies outlining a plan for the area consisting of a mosaic of ecosystems, with different levels of entropic transformation. These three types of studies can be conducted using different methodologies, whose characteristics will be adapted to the environment.

15. The studies on use potential tend to be based to a large extent on eight soil types defined by the United States Conservation Service. This classification obviously has serious limitations for the wet tropical area, which is where the greatest extension of the agricultural frontier takes place. Other systems of classification such as the one used by the FAO or that used by a number of Brazilian organizations would be more appropriate.

16. Another important consideration is the fact that when a use potential is established, it is assumed that a given type of technology will be used. A technological model linked to the so-called green revolution is the one usually adopted and it tends to eliminate options and to promote changes which are accompanied by an inappropriate degree of artificialization (entropic transformation).

17. Sustainability studies tend to apply methods which are based on a very thorough knowledge of the ecosystem, without which the impact on the environment cannot be predicted. The greater the knowledge of the ecosystem, the greater will be the opportunity to study its vulnerability. The ecosystem's behaviour must be studied using methods which explain its structure, functioning and the biocenosis and evolution of the species present. Diversity, stability and dominance are also clues to understanding the complex interaction between the living species and their environment. The vulnerability of ecosystems to the entropic action must be studied from the standpoint of specific attributes such as resilience and size.

18. However, the studies mentioned in previous paragraphs are so complex that the use of indicators that are easier to estimate and based on deterioration processes are recommended. The most important ones are: i) susceptibility to erosion (or "erodability") measured by the kilo of soil lost per unit of land; ii) percentage of nutrient loss per unit of land ("exhaustibility"); iii) flood risks, and iv) fire risks, which is a key question in areas of prolonged

drought. These relatively simple indicators should accompany every study on use potential of the ecosystems.

19. Studies on a mosaic of ecosystems which seek to keep the various development options, ought to use methodologies which allow the specific features of each characteristic unit to be established and require a maximum knowledge of the ecosystem. Consequently the same factors should be taken into consideration as for sustainability studies.

20. These studies require an analysis of the information available. Generally speaking, it can be said that the existing information processed refers only to the productive capacity and that there are few studies which include easily manageable ecological aspects. Usually there are ecological maps drawn for the most part according to the Holdridge system or which refer to the breakdown of the ecosystems which have reached their point of maximum dynamic equilibrium or climax which once existed. However, the information obtained through remote sensing techniques, if these are applied on the right scale, should make it possible to study the vulnerability and the mosaic-like nature of the ecosystems. The basic problem does not seem to lie in the information itself but in the demand for it: the requirements for conducting the studies must be more clearly stated.

Factors determining the structure of land tenure
in the areas of extension of the agricultural
frontier (Agenda item 2)

21. The structures of land tenure today in the areas of extension of the agricultural frontier, correspond to a greater or lesser degree to the ways in which land is subordinated to capital. In this context, the different land tenure systems and forms respond to a logic which does not make allowance for dislocations, despite the conflicts of interest which exist among different producers. Some aspects of the land tenure structures are outlined below.

22. The form or system of land tenure determines to a considerable extent the kind of change that can occur. The thinking of productive agents, who ultimately determine how resources are used, depends largely on the contact they have established with the land in terms of the uses to which it lends itself, security or length of stay on the land, ownership and value of the land, etc.

23. It is important to have a dynamic diagnosis of change in the structure of land tenure in particular, of the processes of concentration and subdivision of the estates and the penetration and establishment of other forms of land ownership. The structure which currently dominates is the entrepreneurial large landed estate and it has served to boost the development process of "livestock-rearing" which has contributed greatly to the deterioration of the ecosystems.

24. The close link between the type of land tenure and the technological model has had a striking influence on employment levels. The predominant technological model tends to be less labour intensive, with a high degree of human interference in the ecosystem and is capital intensive. The consequences

for the society and the physical environment are obvious. Socially, it creates an oversupply of labour with the result that the peasants are driven to other frontier areas. In the physical environment, the ecosystems are abused and there is considerable entropy as transformation takes place and changes are irreversible.

25. There are two factors which the ownership structure of the patrimony should try to ensure, namely, a reasonable and stable income and an expectation of security. The first should be achieved by means of systems which will make it possible to earn a net family income that will provide a decent standard of living, even in supposedly bad years of low prices and production.

26. In the extension of the agricultural frontier in Latin America today, the most favourable forms of land tenure are unquestionably joint, community and mixed forms. However, these should also have strong government backing, especially in the marketing of inputs and products and in legal matters. The success or failure of these forms will depend, furthermore, on the socioeconomic framework, a minimum level of training and the cultural base.

27. Except in very rare cases and under special circumstances, it is not advisable to use tax concessions since they tend to lead to overexploitation of the ecosystem. While the other forms (peasant, family, medium and large capitalist, and others) have some advantages, they must be subject to restrictions on the use of resources, to prevent them from adding to the deterioration.

28. Discussion of the size of the holdings has little relevance and should only be considered in the light of the objectives and aims set out in paragraph 22. However, in the region, today, holdings tend to be exceedingly small and this leads to overexploitation of resources which hinders the consolidation of the frontier areas and encourages the extension of the agricultural frontier to other areas.

29. The legal aspects of the forms of land tenure are of the greatest importance because they impact on the security of tenure and on resource conservation. In many countries of the region, proof must be given of the actual exploitation of a piece of land, in order to obtain legal ownership and this is usually done through indiscriminate felling of trees with the attendant environmental consequences.

30. The need to reclaim areas in order to re-extend the agricultural frontier shows how urgent is to establish ad hoc land tenure structures for them and apply subsidy policies which will make this reclamation work.

Systems of production in areas where the agricultural frontier
is being extended (Agenda item 3)

31. There is no doubt that the productive systems applied in the areas where the agricultural frontier is being extended have failed to be self-supporting, especially in the wet tropical area. This is due partly to the lack of any

policy to provide encouragement for alternative systems and the existence of economic conditions which cause overutilization of the existing resources.

32. The productive systems that are most common and most prone to environmental deterioration are used because of their profitability and the ease with which they can be applied in the early years of exploitation. Productivity usually increases with the "harvest" of the ecosystem, when some of its matter and energy is extracted from the soil because of the development processes used.

33. Foremost among these processes are the livestock-rearing systems of the wet tropical area which appear to be extremely simple, not very dangerous, and very economically and biologically flexible. Livestock-rearing is also an excellent system for preserving value, especially during periods of inflation; livestock requires very little labour, it represents a secure investment and in many countries it implies easy access to loans for which the livestock herds serve as guarantee. The livestock settlement processes can have an extremely damaging effect on the environment because the soil development systems are based on the removal of the forest coverage by fire and usually lead to overgrazing.

34. Often, the State promotes the establishment of agrosystems which cause soil depletion. The State research institutes, with some exceptions, use exogenous research methods and promote research to encourage export crops without any consideration as to how they will affect land tenure systems. Strange as it may seem, there are no significant differences between the production systems promoted in a managed settlement and those in a spontaneous or induced settlement. This supports the assertion that, save in exceptional cases, the State has not as a rule proposed viable alternative systems or coherent support policies.

35. With respect to job creation, the results obtained in the frontier area have been poor. One of the main causes of this is the policy of technological dissemination and generation which contributes to the application of systems with a high labour productivity. The aims of equity are not fulfilled either, because those systems demand a large capital input and this creates differences between the peasants from the very start of the settlement.

36. According to the experts on the subject, there are alternative productive systems which can be self-supporting in the medium and short term. Some of them, although they do not need economic subsidies, require strong support from State technological adoption and dissemination policies.

37. The alternative systems tend to reduce the ecological cost of the transformations, avoid entropy and create a sustainable agrosystem. Foremost among these are the marmade forests (the Taulley system), agroforestry crops grown on forest border areas, the many agroforestry-livestock systems, farming on ecosystemic strata, terracing and other similar systems, zero farming systems, organic farms, the small garden systems, comprehensive farms, etc.

Protected areas on the agricultural frontier
(Agenda item 4)

38. In order to understand the role of the protected areas in places where the agricultural frontier is being expanded, all the roles they fill as a factor in scientific and technological development, the conservation and creation of resources, global environmental management, tourism expansion, etc., must be discussed.

39. The static conservation areas, which apply the traditional management patterns in Latin America will probably continue to be established and managed from the centre. However, it should be remembered that in addition to fulfilling a national function in terms of the specificity and representativeness of the ecosystem, they must be linked in some way to regional development, avoiding the creation of enclaves in areas where there is frequently a heavy demand for the resources.

40. The dynamic conservation areas are of major importance in regions where the agricultural frontier is being extended. These include national and communal forests, mining reserves, forests to protect river basins, plots reserved en bloc by farming communities, community managed native reserves and protected native community areas.

41. With respect to these communities, their complexity needs to be understood and purely conservationist approaches should not be the only ones used. As they represent a part of the human patrimony of the country, the native communities must be regarded both from the ethical and political viewpoints.

42. It is very important that the people should be included in the management of the protected areas and through participation which seeks to secure the direct advantages of managing the areas. One subject, which deserves special mention, is the creation of intermediate zones between the protected areas and the rest of the territory, preferably with native populations.

43. Continuous encouragement should be given to the action of environmentalist groups because they play an important role in denouncing the inappropriate use of protected areas, especially in the agricultural frontier zones, which are usually subject to very few controls.

44. With respect to the criteria to be used for determining what areas should be protected, the discussion centred on the representativeness of the ecosystem combined with exclusiveness. It was stated furthermore, that in light of the progress made in genetic engineering, both the maintenance of genetic diversity and the conservation of specific species had become even more important and their value as resources enhanced.

45. There were differences of opinion over conservation in situ. Some participants were very pessimistic that it could be done whereas others were very emphatic in asserting that no country could use laboratory reproductions as a basis for its conservation policies.

46. There was agreement, to a greater or lesser extent, that there was no knowledge of the ecosystems to ensure suitable conservation policies for the flora and fauna species.

47. It was also stated that greater training and dissemination of information was necessary in order for these subjects to leave the exclusive realm of specialists and reach both experts in general and public opinion.

48. Finally, it was stated that conservation data centres should be established.

Policies for agricultural management and human
settlements in agricultural frontier areas
(Agenda item 5)

49. Before discussing specific management policies, the experts debated the important and crucial role which the State and its technical and scientific officials play in more rational land settlement, whether spontaneous or managed.

50. This role of the State heightens the importance of the information and ongoing inventory policies, and their scope should be dependent on decision-making needs.

51. For the agricultural frontier areas, therefore, the possibility of carrying out inventories and accounts of the natural and cultural patrimony assumes special significance. It has been observed that as the agricultural frontier extends, countries usually take into account the increase in agricultural output but fail to measure or consider the ecological cost. The countries have no overall and regular physical inventory programmes of their national patrimony; nor do they make an economic evaluation or include them in the national accounting system. Programmes of this kind could serve to monitor the level of transformation and deterioration of the frontier areas and also to sensitize planners who are ignorant of the environmental considerations.

52. It was stated that institutional strategies based on projects of a manageable size should be formulated, a clear definition given of who is to benefit from the strategies (generally peasants) and in particular simple and practical mechanisms are proposed.

53. The importance of introducing methodologies with an environmental impact was also discussed. In this connection, it was stated that these methodologies should evaluate the possible impact of an induced or produced extension through settlement programmes, before such an extension actually took place and also the effects of settlement in areas recently settled. However, given the scanty information available, a warning was issued against erroneous quantification and the problems caused by quantitative estimates when working without much accurate data.

54. With respect to the specific policies to be pursued in the frontier areas, special mention was made, first of all, of the policy of investing in transportation, since such a policy encourages settlement, and enables inputs

to enter and products to leave and requires considerable financial resources. In this connection, it was pointed out that a distinction had to be made between the major transport axes which frequently fulfil different objectives and those of agricultural settlement and the secondary and tertiary axes which do fulfil the latter objective. It was agreed that the transport policies should consider:

- i) For the wet tropical area in particular, not only road construction, but also the option of river transport.
- ii) The variety of goals that can be achieved through the construction of highway networks, thus putting an end to the exclusive predominance of the geopoliticians or of communication between the large populated centres.
- iii) Benefits that can accrue if the highways connect areas of greatest productive capacity and of least ecosystemic fragility.
- iv) A transport plan, which through decentralized management combines options according to the needs of the various communities.
- v) The development and repair of railways.

55. With regard to the technology generation policy, there was discussion of the need to modify its orientation substantially so that it will really respond to the needs of the areas where the agricultural frontier is expanding. The policies should be geared to providing the factors of production, since usually in Latin America, capital is scarce and manpower is available. Consequently, care should be taken to avoid the imposition of any technological policies which are based on highly capital- and energy-intensive models or human interference which depreciates the basic and the intrinsic attributes of the ecosystems. The experts at the seminar agreed that there was enough scientific knowledge available to generate more appropriate technologies.

56. With respect to land and settlement policies, the lack of free lands in the new frontier areas, because of legal appropriation, was first considered. There is generally a de facto closure of the border in many places where there is an expanding process of "livestock-rearing" and this takes away the best lands. Ownership by peasants yields the best results in terms of land yield and absorption of employment even though they are on land of inferior quality. The way resources are treated in terms of conservation is no different in the latter case.

57. Energy development policies for these areas must be given a new orientation in order to reduce excessive firewood consumption. It should be borne in mind that the majority of soils in the extension areas are forest soils. The need to make use of local and non-traditional sources of energy such as wind energy was also discussed, especially in the Orinoco region and solar energy in the high Andean river basin. The debate on this topic also dealt with the need to replace the consumption of combustible liquids because of their high transport cost. Proper forest management and the establishment of urban forests would make it possible to create thermal energy plants which cause little damage to the environment.

58. With respect to the market and distribution policies, their crucial role in comprehensive rural development was emphasized. They help to consolidate

recently settled areas and thus prevent the settlement of massive areas with methods which have a low economic cost but cause considerable environmental deterioration.

59. Finally the participants drew attention to the need to co-ordinate the five basic points discussed in terms of extension strategies which will make it possible to consolidate the areas and make the transformations sustainable. It was agreed that the extension is taking place in increasingly fragile environmental areas. The capacity to administer them satisfactorily will depend not only on efficient planning but also on the fact that the recently settled areas (over the last two decades) are consolidated productively and socially, so that they will not be temporarily settled areas from which the population will be later evicted.

Annex

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