

INTERNATIONAL SEMINAR ON LOCAL & REGIONAL DESERTIFICATION INDICATORS IN A GLOBAL PERSPECTIVE. BEIJING - CHINA 16-18 May 2005

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Session VI: Case Studies of B&I operational monitoring initiatives at various scales.

ABSTRACT: The *Program to Combat Desertification and Mitigate the Effects of Droughts in South America* is being implemented at a regional scale. The general objective is to provide a sound basis for addressing dry land degradation and drought in, Argentina, Brazil, Bolivia, Chile, Ecuador and Peru, in accordance with the UNCCD principles.

This initiative is being carried out by a joint effort, represented by the Inter-American Development Bank-IDB, responsible for the administration of the financial resources of a non-reimbursable fund from the Government of Japan and the Inter-American Institute for Cooperation on Agriculture-IICA, as the executing Agency, of the *Program*.

The specific objectives are: (i) to improve the institutional capacity in the participating countries to combat the socio-economic and environmental problems caused by dry land degradation and drought; (ii) to develop and apply the use of standard indicators for desertification; and (iii) to contribute to the reduction or address the causes for dry land degradation and drought. These objectives will be pursued with due consideration of gender and indigenous community participation

Among the specific objectives the harmonization and application of the agreed upon set of indicators, constituted by a 'base-line' of indicators can be highlighted. A computer based 'Desertification Indicator Management System', (Sistema de Gestion de Indicadores de Desertificacion-SIGINDES which will represent the interfacing Geographic Information System-GIS, between the databases of indicators and models to be utilized in the simulation of scenarios), currently being developed by the *Program* in cooperation with the University of Chile, is the scope of this paper.

In order to establish a common 'base-line', seminars were held in all countries, where specialized agencies and specialists convened to devise an approach and a methodology for the selection of Desertification Indicators (physical, biological/agricultural, and socio-economic and institutional) from a pool of sources already available, based on clear criteria for their selection (usefulness for specific purposes, cost effectiveness of collection or analysis).

Once the methodology and the indicators are defined, they will be tested in various affected dry land areas (Pilot Sites). These tests will be used to improve the usefulness of the Indicators and the generation of comparable data. This testing will be performed by applying a sound monitoring and evaluation system, using the SIGINDES at selected Pilot Sites.

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Harmonization of Indicators at Regional Level in South America.

The *Program to Combat Desertification and Mitigate the Effects of Droughts in South America* is being implemented at a regional scale. The general objective is to provide a sound basis for addressing dry land degradation and drought in, Argentina, Brazil, Bolivia, Chile, Ecuador and Peru, in accordance with the UNCCD principles.

This initiative is being carried out by a joint effort, represented by the Inter-American Development Bank-IDB, responsible for the administration of the financial resources of a non-reimbursable fund from the Government of Japan and the Inter-American Institute for Cooperation on Agriculture-IICA, as the executing Agency, of the *Program*.

Objectives:

Within the context of the general objectives there are a number of specific objectives that will be briefly mentioned, keeping the focus mainly on two aspects. How a base line of indicators was derived as a result of several national workshops, as well as, the Desertification Indicator Management System-SIGINDES, to be utilized as a planning and decision making tool.

The specific objectives are: (i) to improve the institutional capacity in the participating countries to combat the socio-economic and environmental problems caused by dry land degradation and drought; (ii) to develop and apply the use of standard indicators of desertification; and (iii) to contribute to the reduction or address the causes for dry land degradation and drought. These objectives will be pursued with due consideration of gender and indigenous community participation.

All six participating countries have ratified the United Nations Convention to Combat Desertification. Since 1996, the six selected countries have been working on a methodology for the selection of Desertification Indicators (physical, biological/agricultural, and socio-economic and institutional). Ultimately, this effort has proven fruitful through the support of the Program and a common base line of indicators was established and to utilized as a common standard for the *Program's* objectives. More

recently, the identification of indicators of participation was also included in the list of indicators to be considered by the *Program*.

Program description

The project comprises the following activities: (i) harmonization and application of existing indicators / data at the pilot level with baseline information; (ii) design of policy proposals to address desertification issues; (iii) institutional strengthening / training, and public awareness / information dissemination. These activities are consistent with priority areas set out in the Conference of the Parties of the Convention and in the National Action Program of the participating countries.

Special attention is to be given to traditional expertise and practices, and their improvement, as well as the collection, analysis and exchange of information on relevant matters to address desertification and drought. The selection of socio-cultural Desertification Indicators will take into consideration traditional practices in dry-lands of the region, compiled in 1999 as mandated by the Conference of the Parties of the UNCCD. Traditional practices will be monitored considering the geographic location of indigenous population in the Pilot Sites in order to assess which management practices are more conducive with prevention or mitigation of desertification, so that good practices could be extracted and disseminated. Likewise, gender issues will be addressed where appropriate. This approach is already being put into practice in the implementation of the first Pilot Projects in Argentina and Brazil.

FRAME OF REFERENCE

Background

Desertification is the degradation of the productive capacity of land in arid, semiarid and dry-sub-humid areas. In the region, at the beginning of the 1990's the total population affected by dry land degradation, without considering Central America and the Caribbean, was around 100 million. The majority of the population was poor (25% of the total regional population), in about 5 million km² of vulnerable dry lands (25% of the total regional area).

Most dry land degradation is caused by inappropriate land-use practices that convert usable land to marginal land to barren land. Examples include excessive grazing; cutting vegetation for fuel; soil-depleting cropping; soil salinization and water logging; and poorly planned public works. Periodic droughts make dry lands increasingly un-usable.

Aimed at halting the process of dry land degradation, the United Nations called for specific actions at the Convention to Combat Desertification, that entered into effect on December 26, 1996. Since then, 172 countries have ratified the Convention.

The main objective of the Convention is to secure the long-term commitment of its Parties to combat desertification and mitigate the effects of drought through effective action at all levels, with a view to contributing to the achievement of sustainable development in affected areas. The Convention calls on the affected countries to develop National Action Programs to Combat Desertification and Drought (NAPCD), within the

framework of national development plans. These include strategies and priorities, paying special attention to the related socioeconomic factors, addressing the underlying causes of dry land degradation, promoting the participation of local populations particularly women and youth, and providing an enabling environment by issuing as necessary new laws and policies.

The countries participating in this project (Brazil, Argentina, Bolivia, Chile, Ecuador and Peru) all have extensive dry lands prone to desertification and have asked the Bank to provide them with technical assistance. As a result, the IDB contributed to the financing of the National Action Plans to Combat Desertification and Drought (NAPCDs) in these – as well as other – countries in the region. These NAPCDs identify key dry land areas within the countries, set priorities for public and private interventions to prevent and fight desertification and mitigate the effects of drought. Emphasis is given to the bottom-up approach with local communities, NGOs, private sector, institutions of civil society, and local governments, working together in the decision-making to formulate and execute the programs.

Summaries on desertification indicators by nation in participating countries

In *Brazil*, around 15% (1 million Km²) of the land is semiarid and subject in large areas to degradation processes, often combined and aggravated by recurrent drought, impacting around 16 million poor population. The economic losses directly derived from both phenomena are not yet properly assessed. As for desertification, rough estimates indicated in the country's National Action Program (1997) suggest annual losses close to US\$300 million, disrupting social and productive structures. The observed losses in Northeast Brazil for 1993 were equivalent to 30% of agricultural output of food products. A more comprehensive NAP was elaborated and formally launched on June 17th, 2004 during the CCD+10 meeting held in Fortaleza –Ceará.

Moreover, Brazilian States and Federal agencies incur expenditures that cost usually US\$1 to \$1.5 billion during extreme years (2 out of 5 years) or close to \$600 million yearly adjusted. All together combined annual losses equate to 1% to 2% of Northeast GDP, and significant investment is used just to rebuild social and productive structures disrupted by the phenomena of drought and land degradation.

- Up to 60% of the landmass of *Argentina* (around 1.6 million Km²) is subject to desertification. This includes the northern highland provinces of Salta and Jujuy, the down slopes and valleys at the base of the Andes including the important agricultural area of Mendoza, and most of Patagonia, affecting a population of 9,0 million inhabitants.

- In *Bolivia*, about 41% (450,000 km²) of the land is affected, involving a similar percentage of the national population (around 5 million people) in three key areas: the highland plateaus, the Yungas valleys leading down from the mountains and the Chaco region to the southeast.

- Much of *Chile's* agricultural production derives from areas subject to the effects of desertification: the irrigated valleys in the northern arid and semiarid areas of the country down to Region IV, and south of Santiago down to Region VII. The areas considered

vulnerable amount to about 45% (340,000 km²) of the national land surface, affecting 1.5 million inhabitants.

In *Ecuador*, the affected geographic areas are relatively small but significant in terms of population affected. These include most of the coastal province of Manabi and adjacent areas of Guayas; mountainous areas in the southern province of Loja; and the southern coastal area abutting Peru.

In *Peru*, about 22% of the landmass (283,000 km²) with 20 million people of the country is vulnerable to desertification. Of particular importance are the irrigated valleys of the coastal plain, where most people live. In those areas, soil salinization is a significant problem. Also, much of the Andean highlands are affected by over-cultivation and overgrazing.

The project's strategy

The project's strategy follows the IDBank's strategy, by providing technical training to local stakeholders of the participating countries in the identification of physical, biological/agricultural, socio-economic and institutional indicators of dry land degradation, to address its control. In that context, the Program also contributes to public awareness, information dissemination and institutional strengthening within the framework of the Bank's Institutional Strategy of environmentally sustainable growth and poverty and inequality reduction.

The reduction or loss of the biological or economic productivity and complexity of dry lands (e.g. rained or irrigated cropland, or range, pasture, forest and woodlands) has its roots in land uses or from a process or combination of processes, including those arising from unsound human activities and habitation patterns that affect the livelihood of local populations. With this *Program*, Desertification Indicators (meaning very sensitive characteristics of the dry land environment to degradation processes) will be used, monitored and evaluated in Pilot Project Sites of the participating countries, to standardize their use for dry land degradation prevention and control, aimed to desired results towards policy formulation and application. This in fact will represent a step forward, regarding public policies formulation envisaging structural changes. The primary purpose is to promote scenario changes by physical intervention to control and to reverse the situation of environmental degradation and the overall process of desertification.

Efforts to prevent or control dry land degradation processes within the region, have given raise to an early warning information methodology to cope with them timely and effectively¹.

Harmonization and compilation existing indicators / data

This component was aimed at revising a methodology for the selection of Desertification Indicators (physical, biological/agricultural, and socio-economic and institutional) from a

pool of sources already available, based on clear criteria for their selection (usefulness for specific purposes, cost effectiveness of collection or analysis). The revision and implementation of a methodology to identify test and adjust key indicators that can be used throughout the region for the identification and evaluation of desertification processes in order to recommend appropriate control measures was deemed necessary.

As a next step the definition of the base-line of indicators as adopted will be tested in various affected dry land areas (Pilot Projects). These tests will be used to improve the usefulness of the Indicators and the generation of comparable data. Applying a sound monitoring and evaluation system, such as the SIGINDES, to be utilized at the Pilot Project sites, will perform this testing. This component was extensively discussed during the workshops organized by the respective National Focal Points of the participating countries. The vast majority of the stakeholders had the opportunity to attend these events enabling an in depth debate on the selection of feasible indicators to be adopted nationally and henceforth regionally.

The specific activities of this component are as follows:

Indicators. The methodology to be used will take elements from indicator models designed in the participating countries. The methodology is based on levels of interpretation, analysis and aggregation of information, going from basic information to analyzed information to Indicators. If, for example, the information relates to human exploitation of the soil, possible indicators are the degree of erosion, salinization, contamination, compaction, or organic matter content. Once the indicators can be measured, they can be more effectively addressed with the use of appropriate technology. Indicators can also be integrated to summarize the state of desertification in a given area.

The lines of thought regarding the discussion on indicators as conducted by the Program by means of a series of specific workshops organized in the participating countries has been outlined in more detail henceforth.

Indicators in Focus:

Indicators help to reflect and communicate a complex idea. They are everywhere and are part of our everyday lives. They are used to observe, describe, and evaluate actual states, to formulate desired states or to compare an actual with a desired state. These simple numbers, descriptive or normative statements can condense the enormous complexity of the world around into a manageable amount of meaningful information.

To support a monitoring network as envisaged by the *Program* a set of indicators should be evaluated in order to monitor progress towards meeting the targets and goals set out together with the institutional and the community stakeholders.

Indicators, as mentioned, are used to simplify, quantify, communicate and create order within complex data. They provide information in such a way that both policy-makers and the public can understand and relate to them. They help to monitor progress and trends in the use and management of natural resources, and associated aspects to the control and reverse the process of environmental degradation and its consequent social impacts, over time and space.

Possibly, the most widely used and known approach to indicator development is the cause-effect approach. The pressure-state-response (PSR) conceptual framework was first introduced by the Organization for Economic Cooperation and Development (OECD) in 1994. Several cause-effect classifications have been developed such as the Driving Force-Pressure-State-Impact-Response (DPSIR). The Driving Force-state-Response (DSR) framework of the United Nations Commission on Sustainable Development was used for the indicators of Agenda 21. The Driving Force-Pressure-State-Exposure-Effects-Action (DPSEEA) framework is used in the burden of disease studies of the WHO.

Although this is the most applied approach and offers a very promising guideline for indicator development. It all too often fails to take the entire system into consideration because of the subjectively involved in understanding the pressure, state and responses. Similarly, indicators can help in the comparison of results in many areas or countries and examine potential links between changing conditions, human behavior and policy choices. Because 'good indicators are easy to understand, they offer a tool for raising awareness about desertification water issues that cut across every social and political group.

The development of indicators is not an easy task, for it involves a great amount of work in collection, storage, retrieval, analyses and systematization of data. The need for clarity and ease of understanding means that indicators often condense large volumes of data into brief overviews and reduce the complexities of the world into simple and unambiguous messages.

The need for scientific validity, on the other hand, requires that indicators must simplify without distorting the underlying patterns or losing the vital connections and interdependencies that govern the real world. They must therefore also be transparent, testable and scientifically sound. Because the same indicator has to satisfy often conflicting but equal important social, political, financial and scientific objectives, deriving indicators becomes an objective maximization exercise constrained by available time, resources and partnership arrangements.

The solution lays in identifying or developing denominators common as many cases as possible, so that comparisons may be made. If data can be gathered according to commonly agreed or standardized norms, then lessons can be drawn that may be transposable from one case to another.

Indicators can tell a different story or message according to specific contexts, for particular purposes and for specified target groups, and therefore resist universal application. Both the design and the use of indicators involve many personal and negotiated decisions, explicit and implicit assumptions, normative and subjective judgment, and disciplinary and method-specific rules. They are based on beliefs, internalized values and norms and on one's perception of "reality".

In establishing indicators, the criteria must be absolutely clear. Yasuda and Murase propose the following six criteria, 2002.

- Relevance: The numerical values of an indicator should represent the degree of ‘what should be measured’ directly;
- Clarity: Ambiguity and arbitrariness should be excluded from measuring with an indicator;
- Cost: The cost of the evaluation by an indicator should be affordable low;
- Continuity: Availability of coherent data both in historical and regional scope should be respected;
- Comprehensibility: Definition/expression of an indicator should be intuitively/easily comprehensible to users;
- Social benefit: Net social benefit that an indicator yields, as it is applied, should be maximized.

The main functions of indicators are thus simplification, quantification, communication and ordering. Indicators can relate and integrate information and allow comparison of different regions and different aspects.

Purpose and Use of Indicators: Clearly, the growing interest in the use of indicators and indices is closely connected to the increasing complexity of policy problems and the large amount of available data. In the water sector, beyond their face value, indicators can provide various types of information such as:

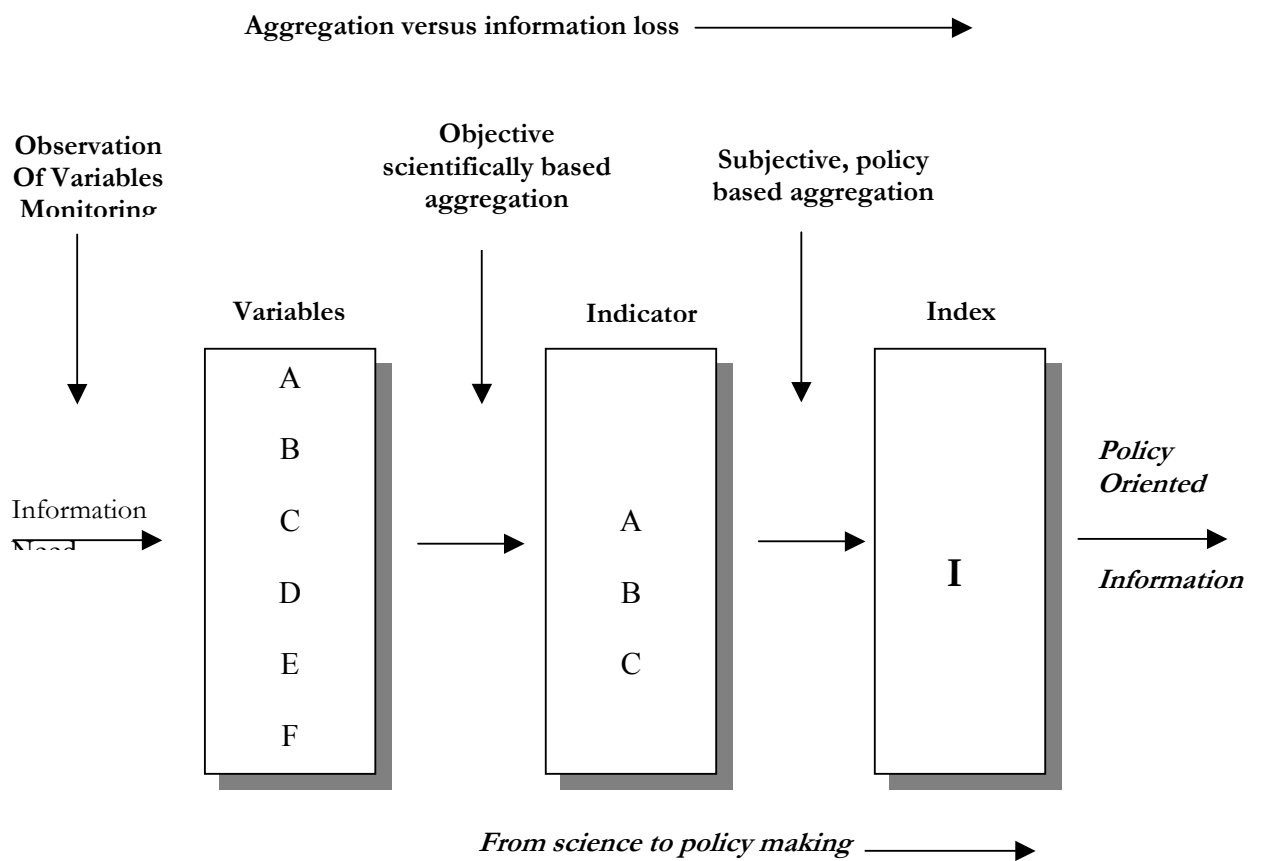
Descriptive: Describing the state of the resource, or social target group, is the most common use of indicators. In terms of water resources an example of the descriptive use of indicators could be by presenting the values of available water resources, water demand, internal renewable water resources and water supply on a regional scale.

This could be presented on maps clearly showing differences in resources, demand and supply of water. Similarly, maps with social indicators could be produced showing number of landowners holding land titles, family average annual income, number of associations or cooperatives as an indicator of social organization among others. Such maps could eventually indicate a human development stage (HDI) to be utilized as guidelines for development policies.

Showing Trends: Regular measurement of indicators provides time series, which can show trends that may provide information on the system’s functioning or response to management. The increase of productivity and yield of agricultural systems run by resettled groups through associations or cooperatives may be an indicator of economic success and sustainability. Benchmarking is important to show scenarios over time.

Communication: Indicators can be instrumental to communicate policy objectives and results to the public. Such indicators help promote action and could reflect the degree of participation of a community.

Translation of an Information need into Policy-Oriented Information using Variables, Indicators and Indices



‘This figure shows the difference between variables, indicators and indices, which all represent different stages of information collation, indicators take variables and condense them into manageable information sets, which then are further condensed by indices. These can be translated into policy-oriented information’. (Lorentz-1999).

Monitoring System. The selected set of Desertification Indicators will be applied in the Pilot Projects Sites (preferably two per country) in dry lands selected by the NFI, preferably within a municipality. The Pilot Sites will be well-defined micro or sub-watersheds, supporting agricultural (i.e. crops, livestock, agro forestry, forestry) and other economic activities. The Pilot Sites will have good secondary information on their natural resource base. The desertification monitoring system will be designed and implemented based on a geographic information system (GIS), satellite products and conventional information in order to follow up the Desertification Indicators. Some of these elements are already being gathered from the Pilot Projects that are carried out in Argentina.

The monitoring process will start with known baseline information. Periodic evaluations will be done to build up the information needed to prevent and halt desertification processes. To design the monitoring system specific expertise will be brought in by the Program and in close collaboration with local experts from the participating countries will define said system for its application in the Pilot Sites. In this context, the operational guidelines, software and other applications for the effective implementation of the system will also be identified and be made available for each country.

Desertification Indicator Management System-SIGINDES. This system is currently being developed with the support of the *Program* relying on the inputs provided by the University of Chile, IADIZA-Argentina in addition to the data bases on socio-economic indicators as developed by a previous project conducted by ECLAC when the REDATAM-data base/system was constructed with data collected from Argentina, Brazil and Chile. Currently this database is being updated with the insertion of the socio-economic indicators from Ecuador, Peru and Bolivia. Another database input will be provided by RIOD (International NGO's to Combat Desertification) who is in the process of construction a database on Indicators of Participation. Other software components of interest of the system that could make it more useful and comprehensive can be aggregated as additional contributions and arranged in a user-friendly manner.

The SIGINDES upon completion will have as a core element the Monitor developed years ago by the Centre of Agriculture and Environment at the University of Chile. The aim of this software is to act a management system to interface databases associated to a map-producing tool capable to generate any display based on the variable or set of variables stored in the database. Basically it can be considered a Geographic Information System that interacts as an interface between data bases and models utilized to simulate scenarios that represent a diagnosis of a given situation of desertification or future scenarios based on assumed changes that represent a prognosis due to possible changes of the variables either due to natural causes or anthropogenic activities. Therefore, the Monitor within the SIGINDES context is able to simulate scenarios reflecting the change

of state of variables considering a varying time scale as defined by the user of the system. One of the objective of the *Program* is to make the SIGINDES available to institutions representing the participating countries, as well as, those interested in the exchange of experiences in combating desertification as an international cooperation effort.

Institutional strengthening / training

In order to ensure the wide application and human resources sensibilization, awareness and capacity to analyze the data to be collected, appropriate training material will be produced for different target groups (land users and community leaders; local government officials, private institutions, press, NGOs; and decision makers). They will be guidelines on desertification processes, their prevention and control, and guidelines on Desertification Indicators, prepared by local universities inserted in dry land areas.

Depending on the target group, short courses will be delivered by specialized professionals. Courses for public officials should enable them to interpret and analyze the data to be generated by the monitoring system and as a consequence prepare adequate response programs or policies addressing the causes of desertification. Courses for land users and community leaders should provide them with the necessary understanding of the effects of desertification as well as provide them with options that will mitigate, reduce or adapt to said effects.

Furthermore, a post-graduate / or specialty track university program (curricula, teacher profile, costs per student) will be developed for interested universities in the participating countries and in the region. The participating universities will be selected on the basis of certain criteria, such as geographical location and proven interest in desertification programs. The universities will design this program in collaboration with national institutions involved in the gathering and interpretation of Desertification Indicators, as to ensure an adequate human resources needs profile / demand for technical expertise.

Design of policy proposals to address desertification / public awareness

Based upon the results of the above-mentioned testing period for the application of the monitoring system and based on the selected Desertification Indicators, draft policy and / or program proposals will be prepared. This activity will also be accompanied by actions to raise public awareness on desertification issues. These actions will be performed with the support of community councils or other local NGOs or groups, and made public through different communication media.

Expected outcome / results

It is expected that the principal outcome of this operation will be the formulation of congruent indicators to measure desertification, and as such the production of readily comparable data for various countries in South America. Furthermore, for this information to be translated into concrete actions addressing desertification occurrences, it will be complemented by training activities for specific target groups, and other actions leading to an improved institutional capacity of agencies responsible for measuring and

interpreting environmental data as well as for policy making. Furthermore, the design of sound local and specific policy proposals will be an important output of this operation, which will also be supported by the production of awareness material, and the design of academic postgraduate programs or specialty tracks. It is expected that these products lead to the long-term sustainability of the efforts initiated with this *Program*.

Environmental and social aspects

The *Program* has been designed for environmental protection and sound use of the natural resource base of dry lands in the region. Its inputs are basically technical assistance; training and policy design on environmental issues related to degradation control and sound management of dry lands for stakeholders and the well being of local communities. It also includes dissemination of information and the preparation of graduate training programs on dry land management at the national and regional levels.

Beneficiaries / benefits

The *Program* will contribute to raising community awareness of and sensitivity to significant environmental problems associated with desertification. Tools will be developed on a regional scope to assist experts and local communities address the causes of desertification. The consolidation of socioeconomic and environmental indicators on a regional level, as well as their application and analysis at pilot sites, will provide key information conducive to the formulation policies and programs addressing the causes of desertification.

Complementary to the above, it is expected that the training sessions tailored to specific target groups will contribute to the improvement in the planning and management of natural resource use. Additional activities envisioned for institutional strengthening will further support that aspect. Also, the training sessions will promote the conservation and protection of dry land's natural resource base, as well as promote the adoption of environmental friendly agricultural practices and other environmentally appropriate uses of dry lands.

Furthermore, this Program will strengthen existing cooperation on dry land management and conservation activities, among governmental and non-governmental institutions on a national and regional level. This cooperation will ensure continued exchange of technical expertise on desertification/dry land management issues, and as such enrich the formulation of policies or programs in this field.

Benefits and Beneficiaries: The project will contribute to raising community awareness of and sensitivity to significant environmental problems associated with desertification. Tools will be developed on a regional scope to assist experts and local communities address the causes of desertification. The consolidation of socioeconomic and environmental indicators on a regional level, as well as, their application and analysis at pilot sites, will provide key information conducive to the formulation of policies/ programs addressing the causes of desertification.

This approach is aimed to foster and promote the conservation and protection of dry land's natural resource base, as well as promote the adoption of environmental friendly agricultural practices and other environmentally appropriate uses of dry lands.

Conclusions.

Besides having the overall objective and the specific objectives of *the Program* in implementation and having achieved one of its main targets the harmonization of indicators of desertification at regional level, seconded by the Desertification Indicators Management System-SIGINDES about to be implemented in the Region, as described throughout this text, other aspects could be highlighted as well.

The *Program* has represented an invaluable instrument in the Region in terms of institutional building and in the process of generating knowledge on how to approach the issues of desertification in a comprehensive manner, as well as, providing important means to foster the exchange of experiences among the institutions of the participating countries.

The very means for the implementation of the *Program*, as provided by the financial resources from the Government of Japan in close cooperation with the Inter-American Development Bank-IDB are essential in the pursue of concepts to design policies and strategies backed by methodological approaches and techniques on how to tackle, control and reverse socio-environmental degradation processes that eventually may lead to desertification.

By abiding to the premises of Agenda 21, Chapter 12 and more recently to the Millennium Development Goals, the international cooperation as provided by the executing agency Inter-American Institute for Cooperation on Agriculture-IICA has also proven essential in this overall effort to construct partnerships in the context of international cooperation to combat desertification.

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