

BRAZIL

**SUSTAINABLE LAND MANAGEMENT
IN THE SEMI-ARID SERTÃO PROJECT**

PROJECT BRIEF REPORT

APPENDICES

APPENDICES

- Appendix 1:** Incremental Cost Analysis
- Appendix 2:** Logical Framework
- Appendix 3:** Response to Project Reviews
- Appendix 4:** Detailed Project Components Description
- Appendix 5:** Project Costs
- Appendix 6:** Land Degradation and Agricultural Sustainability Issues in the Project Area
- Appendix 7:** Socio-Economic Diagnostic Study in the Project Area
- Appendix 8:** Background and Additional Considerations for the Establishment of Payments for Environmental Services Schemes in the Project Area
- Appendix 9:** Documents in the Project File and Record of Consultations and agreements

Appendix 1 – Incremental Cost Analysis

1. General Aspects

1. The project **development objective** is to contribute to an increase in the sustainable development and the quality of life in communities affected by land degradation in the semi-arid North-East of Brazil, through promoting a pilot cross-sectoral approach in support of productive activities and poverty reduction.

2. The **global objective** is to minimise the causes and negative impacts of land degradation on the integrity of the Caatinga biome ecosystem in the North-East of Brazil through the implementation of sustainable land use systems.

3. The **principal project outcomes** are: (i) development of a collective “culture” among smallholder farmers, community leaders, school teachers, students and decision makers for the protection of natural resources and the prevention and control of land degradation in the semi-arid Sertão; (ii) increased public awareness on the importance of land degradation issues and appropriate land management in the sustainable economic development of the semi-arid Sertão region; (iii) increased environmental services provided by sustainable land use in the project area and likely to be sustainable; (iv) establishment of a monitoring and evaluation system to monitor project progress and track the impact on peoples’ livelihoods and the ecosystem, and to support replication of lessons learned and successes in other regions of Brazil and Latin America; and (v) a model for participatory management implemented capable of ensuring the achievement of the projects objectives and goals.

4. The GEF Alternative will achieve these objectives at an incremental cost of US\$ 15.08 million¹, the proposed contribution by GEF of US\$ 5.94 million, and co-financing of US\$ 9.14 million, from the following sources: (i) US\$ 4.34 from National Government (Ministry for the Agrarian Development – MDA), US\$ 4.74 from Helder Câmara Project (PHHC), financed by IFAD; and (ii) US\$ 0.06 million from the contributions of the proposed project beneficiaries.

5. The main **types** and associated **causes of land degradation** which affect the structural and functional integrity of the project area ecosystems are :

- **Erosion** caused mainly by i) deforestation of Caatinga for annual cropping or livestock, particularly in hilly areas; ii) overgrazing (pastures and rangeland), and iii) inappropriate agricultural practices; erosion is more severe when related to intense rainfall in hilly agricultural areas (during a short annual rainfall period) with low vegetation cover;
- **Elevation of the groundwater table** caused by excessive irrigation from groundwater;
- **Salinisation** caused by irrigation using water of a high salinity, the lack of a drainage system in irrigated areas, the elevation of groundwater table in soils rich in salts;
- **Loss of organic material and nutrients**, caused by unsustainable cropping practices including slash and burn, leading to erosion and leaching; and
- **Deforestation** caused by the increased pressure on land for pasture or subsistence agriculture, which is also leading to a reduction in the fallow periods (shifting agriculture); during this transition process from forest into agricultural land, forest biomass is removed for use as fuelwood (smallholdings) and charcoal (the deforestation of the semi-arid is 1% per year, corresponding to an annual loss of 9,000 km²).

¹ This value does not include preparation resources, i.e. GEF Block B and co-financing from FAO and GM.

6. Inadequate farming practices that produce land degradation are clearly identified in the semi-arid region. However, they are a result of complex mechanisms. The following **constraints** are interfering with achieving progress leading to the adoption of improved cross-sectoral approaches that address the aforementioned issues and lead to sustainable land management:

- i) Limited human and institutional capacity to create an enabling environment needed to support sustainable land management and to combat desertification;
- ii) Barriers to adoption of more sustainable land use practices are significant, and include particularly knowledge barriers, which can be addressed through capacity building, and input and labour costs in switching to the new practice and possible loss of income in the transition period (in this case, upfront incentive payments are needed);
- iii) Lack of compensation mechanisms for the environmental services provided by farmers but enjoyed by other local and global users;
- iv) Limited or inexistent adoption of successful and replicable pilot experiences that turn into future permanent public policies to support sustainable development in the semi-arid Sertão;
- v) Absence of a continuous monitoring and evaluation system, which tracks policy and institutional failures that may drive further land degradation, and which facilitates the refinement and adoption of innovative sustainable land management practices and technologies to create new livelihood opportunities;
- vi) Lack of data and information necessary for decision-makers to incorporate sustainable land management considerations into production activities; and
- vii) The need to capitalise on the existing (though limited) cross-sectoral approaches which have been introduced in the Semi-arid in the last few years, such as those adopted by the on-going baseline PDHC programme on sustainable development of agrarian reform settlements in the Semi-arid Northeast (see baseline programs below).

7. There is a need for decision-makers to incorporate elements of sustainable land management into farming activities. Therefore, in order to promote sustainable land management, it is vital for all actors to develop a clear perception of the causes of land degradation and of its consequences, as well as of the benefits related to practices which reduce land degradation.

2. Baseline

8. Baseline calculations were based upon a selection of programmes underway that are relevant to the proposed project, estimated to be implemented over the next 4-5 years (see Attachment A of this Appendix). After being identified, their relevance was evaluated with respect to each component component of the proposed project. Only the costs of baseline programme components or activities previously identified as being relevant to the objectives of the proposed GEF Sertão project components were considered for inclusion in the baseline. The baseline cost estimates are limited to the estimated investments by these programs in the areas area covered by the proposed project. All identified projects/programmes are implemented by public institutions with vast experience in the agrarian development and family farming sectors, mainly the Ministry for Agrarian Development, and national NGOs (such as PDHC's Executing Partners - PEDs). The identified financial support included those coming from: (i) public funds (national); (ii) external funds; and (iii) farmers who are beneficiaries of the programmes:

Table 1. Baseline Activities per Project Component

Program and Project Baseline	Project Proposed Components				
	Sources of Funds	Capacity Building and Environmental Education	Environmental Incentives	Project Monitoring and Evaluation	Project Management and Information Dissemination
Dom Helder Camara Project (PDHC)	Brazilian Government, IFAD, BNB, and Beneficiaries	X	X	X	X
PRONAF (Credit and Infra-Structure)	Brazilian Government (FAT / OGU) (*)	X	X	-	X
National Land-Tenure Credit Program	Brazilian Government and World Bank	X	X	-	-

(*) FAT – Workers’ National Support Fund; OGU – Federal Budget / Treasury.

Summary of Baseline Costs and Benefits

9. **Baseline Costs.** In the absence of incremental GEF co-funding, the implementation of the above mentioned baseline programs and activities will contribute to some extent to the project objective. Costs are estimated in US\$ 88.1 million (see Matrix 1). Baseline sources of funds include the Brazilian Government (Federal Treasury), IFAD, Northeast Brazil Bank (BNB), World Bank, and family farmers.

10. **Baseline Benefits.** Baseline programs and activities will predominantly produce national benefits that will contribute to the sustainable economic development of both the northeast and the country. These include: i) basic education; ii) the strengthening of local, participatory processes for the social development of the settlers and smallholder farmers partnering with the organizations involved in territorial development; iii) improved farm productivity and diversification, with a consequent growth in income levels and jobs; iv) access to land for farmers with little or no land; v) improved social infrastructure, (vi) increased access to markets; and vi) improved coordination of public policies.

11. Although the baseline generates significant socio-economic benefits and, to a certain extent, contributes towards an improved perspective of the semi-arid region’s environmental problems as perceived by the population and decision-makers, it does not ensure effective prevention and control of degradation and desertification of the semi-arid lands. It would not address more far-reaching interventions to guarantee global environmental benefits associated with combating land degradation, in particular through the conservation of biodiversity and the sequestration of carbon. Specifically, the baseline investments would not support necessary interventions such as capacity building and incentive measures for adoption sustainable agricultural and rangeland/pasture management, and the restoration and further protection of degraded vegetation in areas currently used for livestock production, which contribute to these global benefits. Additional investments will be necessary to achieve this level of effectiveness.

3. Justification of GEF Co-Financing

12. The baseline scenario reflects national priorities that address the development-related dimension of land degradation, through supporting the three previously-mentioned programmes which are valuable efforts primarily aimed at promoting sustainable development, poverty alleviation and land tenure security. These programmes provide a sound foundation for

complementary efforts that may address the constraints and negative impacts associated with land degradation on the Caatinga ecosystem and its underlying functions and services. Particularly the PDHC, supported by IFAD, adopts a sound cross-sectoral approach to rural development that integrates the social, cultural and economic dimensions of poverty issues, with effective participation of stakeholders at all stages, including women and Afro-American minorities.

13. Nevertheless, until now, there has been no attempt to integrate an ecological dimension into the PDHC processes, focusing on the prevention and control of land degradation, hence accelerating actions on sustainable land management to protect and restore the Caatinga ecosystem, reduce carbon dioxide emission and stabilise or reduce sediment release into waterbodies. More specifically, the baseline scenario does not plan, design, and implement activities designed to support a cross-sectoral approach to land management that integrate an ecological dimension into the socio-cultural and economic dimension already adopted for example by the PDHC project. This situation is resulting in reduced efficiency and lost opportunities for combating desertification and generating global benefits within the context of sustainable development, such as those related to increased conservation and/or protection of biological diversity and improved carbon sequestration.

14. Reversing this situation and trends will require investments in the development of appropriate strategies that take into account global environmental values and institutional frameworks, including incentives for incorporating global environmental concerns into the actions of public and private stakeholders. It will also require piloting a strong capacity building effort to develop a collective and clear consciousness of the need to combat land degradation in the Semi-arid Sertão, by undertaking educational activities that will facilitate the knowledge generation processes to be implemented through participatory planning, pilot adaptation and adoption of appropriate technical models for smallholders, as well as monitoring and evaluation activities that demonstrate results and benefits to local as well as national and global stakeholders. Information dissemination, institutional coordination and participatory management at the local and national levels will be essential to turn successful and replicable pilot experiences into future permanent public policies to support sustainable development in the semi-arid Sertão.

15. In order to support interventions which specifically address the previously-mentioned social and environmental issues and underlying causes which contribute to land degradation, as well as the *constraints* impeding the implementation of scientifically sound and cross-sectoral approaches in the semi-arid Sertão (complementary to the existing cross-sectoral approach adopted under the baseline scenario), GOB requested IFAD assistance in the preparation of a proposed GEF-financed project to complement the MDA's existing programs, and in particular the PDHC, PRONAF and PNCF. The proposed project (GEF Alternative) would support the achievement of incremental benefits related to these baseline programs. Interest in the protection of some of the country's environmental assets such as the xeric formations of *Sertão* reaches beyond Brazil as these provide positive international externalities (e.g. biodiversity conservation and carbon sequestration).

4. GEF Alternative

16. The GEF Alternative would expand the scope of the baseline, including the financing of incremental costs that contribute to minimise the cause and the negative impact of land degradation on the structure and integrity of *Caatinga* ecosystems, considered to be of global importance, by means of sustainable land management practices, but also by contributing to improve the livelihood of poor family farmers and their economic welfare in a sustainable manner. Such expansion would happen as follows: i) training, planning, experimenting and implementing actions that lead to the adoption of sustainable production systems by the project's target group; ii) establishing and operating an incentive mechanism for the environmental services provision related to sustainable

land use practices, which address land degradation and increase the ecological integrity and productivity of the *Caatinga* system; iii) developing alternative sustainable funding options for selected services; iv) monitoring, evaluating and disseminating project information, aiming to follow-up the progress of the project and the replicability of its outcomes and best practices in the semi-arid region, in other regions of Brazil, and in Latin America; and v) implementing a participatory management model capable of minimising the causes and negative impact of land degradation in the project demonstration areas, to be replicated across PDHC's wider implementation area (Phase II), and in the semi-arid region as a whole.

17. **Costs.** GEF Alternative's total estimated cost is US\$ 103.2 million (see Matrix 1), divided into: (i) US\$ 31.8 million for education, training and experimenting for sustainable system planning and implementation; (ii) US\$ 57.6 million in land access investments, productive and community investments, and environmental incentives; (iii) US\$ 1.9 million in monitoring and evaluation; and (iv) US\$ 11.8 million in community empowerment, participatory management and information dissemination.

18. **Benefits.** In the GEF Alternative, the Brazilian Government will be executing a challenging program that comprises both national and global benefits. **National benefits** would include: (i) improvement of the economic productivity of agricultural production through the adoption of sustainable management practices. As the preliminary studies for the design of the environmental services component indicated, the sustainable land management practices promoted by the project will in most cases be equally or more profitable for farmers than the current degrading practices, and the project will provide important national benefits by reducing the barriers to adopting more profitable and environmentally beneficial systems. (ii) increased economic benefits flowing to rural communities derived from the local ecological "goods and services" associated with improvement of land management, including a reduction in erosion (and consequently in siltation and downstream salinity), improvement in water quality for productive, consumptive and recreational use, and aesthetic improvement of the landscape; (iii) improved management skills at local and national levels; (iv) improvement of institutional and human-resource capacity in order to promote the sustainable use of natural resources; (v) strengthened structure related to political, regulation, and socio-economic incentive aspects, to address rural poverty and their ties with land degradation as a model to be replicated all over the Brazilian semi-arid region; and (vi) an improved policy and planning/institutional framework to support sustainable land management concepts and practices facilitating the adoption of sustainable on-farm practices and off-farm interventions, while improving livelihood opportunities. (vii) increased income from the provision of global environmental goods and services such as carbon sequestration and biodiversity conservation.

19. **Global benefits** will include: i) Sustainable use and protection of biological diversity by adopting sustainable pastoral and agricultural management practices; recovery and increased protection of the degraded *Caatinga* vegetation in areas currently used for animal husbandry, promoting the preservation of the ecosystem integrity and recovery of its functions and services and, concurrently, improving beneficiaries' quality of life; and ii) Increased storage of greenhouse gases in agro-ecosystems, which could be achieved by the adoption of sustainable pastoral and agricultural management practices, and by the restoration and more consistent protection of the degraded vegetation in areas currently used for animal husbandry.

5. Incremental Costs.

20. **The** difference between the costs of GEF Alternative and the Baseline is the Increment, estimated in US\$ 15.1 million (see details in the Incremental Cost Matrix, presented below), split

into: (i) US\$ 6.4 million for training and experimenting for sustainable system planning and implementation (of which US\$ 3.0 million is GEF); (ii) US\$ 5.8 million in environmental incentives (of which US\$ 1.6 million is GEF); (iii) US\$ 0.9 million in monitoring and evaluation ((of which US\$ 0.5 million is GEF); and (iv) US\$ 1.9 million in participatory management, institutional coordination, and information dissemination (of which US\$ 0.8 million is GEF).

Matrix 1. Incremental Cost Matrix

Component	Cost Category	US\$ (Million) (*)	National Benefit	Global Benefit
Comp 1 Building Capacity for Sustainable Land Management and Increasing Envir. awareness	Baseline	US\$ 25.4	Basic education and strengthening of local, participatory processes for social development of settlers and family farmers.	Limited perception of land degradation mechanisms and their consequences.
	GEF Alternative	US\$ 31.8	Family farmers, agrarian reform beneficiaries, rural and Afro-American communities aware of the environmental issues and constraints, and supporting prevention, reversion and arrest of the land degradation process. Improvement of institutional and human-resource capacity in order to promote the sustainable use of natural resources	Clear perception of land degradation mechanisms and their consequences, as well as the benefits of reversing degradation processes, and more willingness of the society to prevent and minimize the cause and the negative impact of land degradation on Caatinga ecosystems.
	Incremental	US\$ 6.4	<i>Note: GEF (US\$ 3.0 million); Government (US\$ 1.9 million); IFAD (US\$ 1.5 million).</i>	
Comp 2 Environmental Incentives	Baseline	US\$ 51.8	Farmers' access to land, increase and diversification of production with consequent growth in income levels and jobs; improved social infrastructure and increased access to markets.	Increase and diversification of production, capable of generating a reduction (although limited) in the environmental pressure on the Caatinga.
	GEF Alternative	US\$ 57.6	Transition from inadequate production systems to sustainable systems, by adapting and adopting new and better practices, improving knowledge and establishing financial incentives linked to environmental services. Improvement of the economic productivity of agricultural production through the adoption of sustainable management practices	Transition to sustainable production systems, minimizing the negative impact of land degradation on the structure and integrity of Caatinga ecosystems. Increased provision of environmental services through protection of biodiversity, carbon sequestration and a reversal of land degradation.
	Incremental	US\$ 5.8	<i>Note GEF (US\$ 1.6 million); Government (US\$ 1.1 million); IFAD (US\$ 3.1 million).</i>	
Comp 3 Project Monitoring and Evaluation	Baseline	US\$ 1.0	Monitoring of socio-economic impact and limited follow-up of the environmental impact; M&E skills developed.	
	GEF Alternative	US\$ 1.9	Instruments in place to measure progress in attaining socio-economic and national environmental benefits	Instruments in place to measure progress in attaining global environmental benefits
	Incremental	US\$ 0.9	<i>Note: GEF (US\$ 0.5 million); Government (US\$ 0.1 million); IFAD (US\$ 0.3 million).</i>	
Comp 4 Project Management and Information Dissemination	Baseline	US\$ 9.9	Strengthened social capital and management capacity.	Limited global benefit associated with improved though limited capacity for land management
	GEF Alternative	US\$ 11.8	Implemented participatory management, capable of assuring the attainment of both national and global objectives of the project. Improved management skills at local and national levels	Participatory management capacity for implementing integrated and cross-sectoral approaches to sustainable land management
	Incremental	US\$ 1.9	<i>Note: GEF (US\$ 0.8 million); Government (US\$ 1.0 million); IFAD (US\$ 0.1 million).</i>	
Total (**)	Baseline	US\$ 88.1		
	GEF Alternative	US\$ 103.2		
	Incremental	US\$ 15.08	<i>Note: GEF (US\$ 5.94 million); Government (US\$ 4.34 million); IFAD (US\$ 4.74 million); project beneficiaries (US\$ 0.06 million)</i>	

(*) Kindly note minor differences in totals are due to rounding error;

(**) These values do not include preparation resources, i.e.(GEF Block B and co-financing from FAO and GM).

Appendix 1 - Attachment A

Baseline Scenario – Profile of the Selected Programs and Projects

1. **PDHC Project Camara.** This project will strengthen local, participatory and solidary processes of social construction, of the settlers and family farmers partnering with organizations involved in territorial development, in the perspective of living along with the semi-arid region, managing social, political, environmental, cultural, economic and technological resources. Its main *purposes* are: i) to ensure training and basic education; ii) to improve the production development and marketing achieved; iii) to make available rural credit and financial services; iv) to strengthen social capital and management capacity; and v) to ensure gender equity and generational relations.
2. **PRONAF.** This program will be building a pattern of sustainable development for family farmers and their families, aiming to increase and diversify production, leading to growth in income level and jobs, providing social welfare and quality of life. Its main *purposes* are: i) to support public infra-structure services for the development of family farming; ii) to offer financial support for family farmers to develop production activities; and iii) to develop rural outreach programs, to promote vocational training programs for farmers and their families, provide to capacity building to the technicians involved, and financial support to research on family farming.
3. **National Land-Tenure Credit Program.** This program will finance land access to farmers with little or no land available (tenants, partners, share croppers, possessors, mini-property farmers, and others), who meet the eligibility conditions for acquiring land tenure credit, as well as the necessary investments for the organization of their production units, and technical advice. Its main *purposes* are: i) to effective the financing of small family farmers for land acquisition; ii) to carry out investments in capacity building and technical advice; and, iii) to carry out investments in productive and community activities.

Appendix 2. Project Logical Framework

Project Objectives	Impact Indicators	Means of Verification	Assumptions
<p>Development Objective To contribute to an increase in the sustainable development and the quality of life of communities affected by land degradation in Brazil's semi-arid northeast, through promoting a cross-sectoral approach in support of productive activities and poverty reduction.</p> <p>Global Objective To minimise the causes and negative impacts of land degradation on the integrity of the Caatinga biome ecosystems in Brazil's semi-arid northeast, through the implementation of sustainable land use systems</p>	<ul style="list-style-type: none"> Incidence of poverty reduced in the six territories with Project activities – with income levels on FISP Ecológico sites associated with sustainable land practices improved by at least 10% (by PY6) Sustainable agricultural and rangeland/pasture management practices adopted by 1,000 farmers on 8,000 ha of agricultural productive land by PY6 (2,000 ha by PY3) By PY6, functional and structural integrity of the Caatinga agro-ecosystems ensured across 20,000 ha, thereby reversing land degradation, enhancing soil structure stability, conserving biodiversity and increasing carbon sequestration, as measured by: <ul style="list-style-type: none"> 10% increase in Caatinga plant species diversity in land management systems (including rangeland/pasture management, agroforestry, agrosilvopastoral and annual crop systems) reduction of at least 10% in sediment concentration downstream plots where sustainable land management options have been adopted Additional carbon sequestered on project demonstration sites (tons of carbon/area/year) as a result of adoption of sustainable land management practices (incremental amount of sequestration to be estimated in PY1, after completion of baseline studies) By PY6, improved capacity to facilitate and implement sustainable land management, including governmental institutions (at least 30), NGOs (30), community leaders (150) and young smallholding farmers (150) By PY6, greater awareness among 200 rural communities (7,000 families), 120 rural schools and by society at large (90,000 inhabitants) of land degradation and the potential contribution of sustainable land management to improved livelihoods in the project area By PY6, level of satisfaction (80%) with the innovations promoted by the Project and continued adoption of sustainable land management practices by farmers (70%) By PY5, the establishment or strengthening of commodity market-based incentives for sustainable agricultural production, as measured by a 10% increase in the number of market outlets for native and organic products By PY5 the establishment or strengthening of commodity market-based incentives for sustainable agricultural production, as measured by a 10% increase in the number of market outlets for native and organic products 	<p>Project progress reports</p> <p>National Statistics (IBGE)</p> <p>Mid-term and ex-post evaluation reports</p> <p>Structured interviews</p> <p>Field surveys</p>	<p>Long-term policy agreements and financial support at the Federal level to arrest land degradation in the semi-arid Sertão</p>

Outcome, Outputs and Activities from each component	Impact/Outcome/Output Indicators	Means of Verification	Critical Assumptions
<p>Component 1: Building Capacity for Sustainable Land Management and Increasing Environmental Awareness</p> <p>Outcome 1: Development of a collective vision or “culture” for the protection of natural resources and fight against land degradation in the semi-arid Sertão</p>	<ul style="list-style-type: none"> By PY6, improved capacity to implement sustainable land management, including governmental institutions (30 municipalities, MDA, INCRA, 6 States), NGOs (30), community leaders (150) and young smallholding farmers (150) Increased awareness in 200 rural communities, 120 rural schools and by society at large (60,000 rural and 30,000 urban inhabitants) of the importance of sustainable land management 	<p>Project progress reports</p> <p>Structured interviews</p> <p>Mid-term Review</p> <p>Final Evaluation</p>	<p>Smallholders interested and motivated in modifying their current farming behaviour and practices which are leading to environmental degradation</p>
<p><u>Subcomponent 1.1. Capacity Building and Environmental Education</u></p> <p><u>Activity 1.1.1 Training of facilitators</u></p> <p><u>Output.</u> Facilitators with the capabilities to encourage the process of handling knowledge in the service of sustainable land management.</p>	<ul style="list-style-type: none"> By PY6, 24 training events/sessions aimed at 150 project technical staff, 150 community leaders and 150 young farmers, including preparation sessions on i) raising project awareness and ii) implementing the environmental education program in the communities (12 events by PY2) Training events for the generation of distance-learning by 50 technical staff, 50 community leaders and 50 social mobilizers. By PY6, 20 training sessions to implement the environmental education program in rural schools targeted on 600 rural school teachers (400 teachers by PY3). By PY6 the methodological tools and teaching materials in SLM will be fully used and mainstreamed into school curricula 	<p>Training reports</p> <p>Project progress reports</p> <p>Structured interviews</p> <p>Mid-term Review</p> <p>Final Evaluation</p>	<p>Continuity of governmental actions</p>
<p><u>Activity 1.1.2: Environmental Education</u></p> <p><u>Output.</u> Perception of land degradation issues by all stakeholders and partners in the six territories</p>	<ul style="list-style-type: none"> By PY6, environmental education activities will have taken place in 120 schools (60 by PY3) By PY6, 80% of students and trainees apply their knowledge in SLM By PY3 80% of the persons living in the settlements and neighbouring communities of the 6 territories under the project will be targeted Holding environmental education sessions in 200 rural communities by PY6 (100 by PY3) Holding environmental education sessions in 30 municipalities by PY6 (15 by PY3) 	<p>Project Reports</p> <p>Instruction Manual for environmental education</p>	<p>Smallholders interested and motivated in modifying their farming behaviour practices</p>
<p><u>Activity 1.1.3. Production of methods and didactic materials.</u></p> <p><u>Output.</u> A full set of didactic materials being made available, constructed jointly to replicate experiments in drawing up sustainable production systems.</p>	<ul style="list-style-type: none"> 5 booklets, 2 videos and 3 CDs on land degradation produced by PY6, 100 reference booklets on the farmer field trials undertaken in demonstration sites by PY6 (40 by PY3) 3 manuals produced by PY1, for facilitators (on knowledge generation and environ. education) and rural schools teachers (on environ. education) 3 environmental education manuals for pupils will be produced by PY3 (one each year) 	<p>Project progress reports</p> <p>Publications/materials</p>	

Outcome, Outputs and Activities from each component	Impact/Outcome/Output Indicators	Means of Verification	Critical Assumptions
	<ul style="list-style-type: none"> A set of materials produced and broadcasted for 10 radio stations throughout life of project 		
<p><i>Sub-component 1.2. Participatory Planning and Support to Adaptive Land Management Practices</i></p> <p><i>Activity 1.2.1. Technical training in support of implementing practices of sustainable land management.</i></p> <p><i>Output.</i> Facilitators trained to give technical guidance on field trials at the ecosystem/agro-ecosystem level</p>	<ul style="list-style-type: none"> By PY3 60% (100% by PY6) of the facilitators/animators fully trained in sustainable land management practices and able to give technical guidance on field trials at the ecosystem/agro-ecosystem level 720 exchange visits by PY6 (144 visits by PY2) 720 field days undertaken inside each entry at the end of PY6 (144 by PY2) A program for spreading knowledge drawn up and tested by the end of PY1. Information dissemination program among farmers within and across territories undertaken throughout the life of project 	<p>Project progress reports</p> <p>Mid-term Review</p>	<p>The process of training in participatory research creates the conditions for implementing and managing experiments.</p> <p>Continuity of governmental actions, in particular with reference to the technical assistance institutions</p>
<p><i>Activity 1.2.2. Planning for sustainable land management.</i></p> <p><i>Output.</i> A plan for sustainable land management in the five territories with PDHC activity.</p>	<ul style="list-style-type: none"> 50 sustainable land management plans prepared and implemented with communities by PY3. Agenda of priorities, commitments and actions built up, negotiated, monitored and updated with interest groups (LMIGs) between PY2 and PY6. 60 smallholders involved in planning actions for field trials by PY2 (150 by PY6) 50 demonstration projects/sites receiving support from environmental incentives component by PY4 (10 by PY2). 	<p>Diagnostic reports and plans</p> <p>Site visits</p> <p>Mid-term Review</p> <p>Final Evaluation</p>	<p>Coordination between the different levels of decision-makers create favourable conditions for collective planning</p> <p>Innovative actions in accordance with environmental legislation</p>
<p><i>Activity 1.2.3. Development of sustainable production systems.</i></p> <p><i>Output.</i> Practices for the sustainable land use duly implemented and working and serving as concrete reference points for improving the lives of families in the area where the project has activity.</p>	<ul style="list-style-type: none"> By PY6, five seminars held (1 per year) to exchange experiences between the LMIGs in participatory on-farm and agro-ecological trials 150 on-farm and agro-ecological trials implemented (involving 1,000 smallholders) by the end of PY4 using sustainable land management practices 2,100 persons/day of technical specialists recruited for the implementation and monitoring of participatory field trials by PY6 	<p>Report on the No of groups formed per year</p> <p>Report on the No and nature of trials</p> <p>Mid-term evaluation report</p> <p>Final Evaluation</p>	<p>Small-holders use project resources for field trails, as a lever for developing sustainable production systems</p> <p>Sustainable production systems made viable based on natural resources and using low inputs.</p>
<p>Component 2: Environmental Incentives</p> <p>Outcome 2. Environmental services provided by sustainable land use increased in the project area and likely to be sustainable</p>	<ul style="list-style-type: none"> Sustainable land use practices adopted on 8,000 ha by PY6 (2000 ha by PY3). Farmers income level FISP Ecológico sites improved by at least 10% (by PY6) Pilot schemes for payment of environmental services related to watershed protection established in two watersheds in the project area by PY6. 	<p>Project Progress Reports</p> <p>Baseline and final evaluation</p> <p>FISP M&E reports</p>	<p>No radical changes in economic conditions affecting agricultural production</p> <p>No major climatic or environmental incidents that disrupt agricultural production</p> <p>Implementation of water</p>

Outcome, Outputs and Activities from each component	Impact/Outcome/Output Indicators	Means of Verification	Critical Assumptions
			resources legislation and institutional framework progresses sufficiently to permit PES development in project area
<p><u>Subcomponent 2.1 . Providing incentives for environmental services provision from sustainable land use</u></p> <p><u>Output.</u> Farmers adopt sustainable land use practices as a result of payments for related environmental services provision from the FISP Ecológico</p>	<ul style="list-style-type: none"> FISP Ecológico established by year PY2 and disbursing payments for environmental services to farmers By PY1, a monitoring and verification system will be established to measure changes in biodiversity, carbon sequestration and erosion in FISP Ecológico Farmers receive payments to adopt sustainable land use practices leading to an increase in environmental services provision on at least 8,000 ha (2,000 ha by PY3). 	Project Progress Reports	Outreach to farmers through education and experimentation component is sufficient to generate proposals to implement land use changes which can be considered under the FISP Ecológico
<p><u>Subcomponent 2.2 .Developing payment mechanisms for environmental services including watershed protection services and carbon sequestration initiatives</u></p> <p><u>Output.</u> Markets for watershed protection services and carbon sequestration developed in project area</p>	<ul style="list-style-type: none"> By PY3 technical studies will be prepared to assess the true potential for PES in selected watersheds (1 overview study PY1, 2 watershed specific studies in PY2 and PY3) By PY3 at least 2 watershed committees and executing agencies trained on payments for watershed services building on international best practices. By PY6 pilot schemes for payment of environmental services related to watershed protection established in two watersheds in the project area. Capacity of 20 NGOs built to support farmers in accessing the developing carbon market By PY6, 2 carbon projects will be prepared in line with potential buyers' guidelines 	Project Progress Reports Mid-Term Review Final Evaluation	Implementation of water resources legislation and institutional framework progresses sufficiently to permit PES development in project area Carbon market development will provide sufficient demand for carbon credits from sequestration
<p><u>Subcomponent 2.3 Developing commodity markets for indigenous and organic products</u></p> <p><u>Output.</u> Farmers in the project area produce and sell indigenous and organic products</p>	<ul style="list-style-type: none"> By PY1, a market assessment study is prepared with a strategy for project participants to supply existing and new markets for indigenous products including private sector By PY6, 200 farmers producing and selling indigenous fruits or crop varieties (50 farmers by PY3) By PY1, a study is prepared to assess the possibilities for the project to support organic production by interested farmers By PY6, 150 farmers producing and selling organic products (30 farmers adopted organic farming practices by PY3) 	Project Progress Reports Mid-Term Review Final Evaluation	Local and regional markets for indigenous and organic products can be identified which provide sufficient returns to farmers Expertise available in the project area to provide high quality capacity building to technical advisory staff and farmers
<p>Component 3: Project Monitoring and Evaluation</p> <p>Outcome 3. A M&E system implemented, with a view to monitor project progress and track the</p>	<ul style="list-style-type: none"> Instruments in place to measure progress in attaining global benefits in PY1, and functioning throughout the project Geo-referenced data bank and management information system working throughout 	Project progress reports	Focus on participatory monitoring and integration with other GEF projects and with PDHC will generate new

Outcome, Outputs and Activities from each component	Impact/Outcome/Output Indicators	Means of Verification	Critical Assumptions
impact on people livelihoods and the ecosystem, and to support replication of lessons learned and successes in other regions of Brazil and Latin America	the project		M&E experiences
<p><u>Subcomponent 3.1: Monitoring</u></p> <p><i>Output.</i> A monitoring system for the project implemented, measuring project results and impacts on the generation of national and global benefits, and providing adequate project performance reports</p>	<ul style="list-style-type: none"> During PY1a Management and Information System will be established and functioning including setting up a monitoring network which will be operational throughout the project life At least two areas (microwatersheds) with environmental monitoring (from PY 2) At least 5 initial inventories and 5 final ones on carbon sequestration in 5 areas among the 50 foreseen project demonstration sites (first in PY2 and final in PY6) At least 10% of the project demonstration sites (including FISP Ecológico pilots) being monitored in the socio-economic and environmental dimension (from PY3); other areas, to complete the 50 sites, will have simplified monitoring using participatory evaluation tools Local and regional events presenting project monitoring results (at least 1 per year) 	<p>Project progress reports</p> <p>Demonstration site visits</p> <p>Maps</p>	Resources provided in accordance with the chronogram and the guarantee of minimum monitoring infrastructure, associated with joint actions with other projects and the effective involvement of the community (e.g. use of DRP tools) will guarantee a less expensive and at the same time effective monitoring system
<p><u>Activity 3.2: Evaluation of the Project</u></p> <p><i>Output.</i> Ex-ant (baseline study), mid-term and final (ex-post) external evaluations carried out to assess results and impacts of GEF-supported activities</p>	<ul style="list-style-type: none"> Baseline study carried out in PY01 External mid-term evaluation carried out in PY03 Final (ex-post) evaluation carried out in PY06 	<p>Baseline study report</p> <p>Evaluation reports</p> <p>IFAD Supervision reports</p>	Definition of easy-to-measure parameters and correct sample sizing, as well as the use of participatory tools for data collection will guarantee more efficient outputs
<p>Component 4: Project Management and Information Dissemination</p> <p>Outcome 4. A model for participatory management implemented capable of ensuring the achievement of the projects objectives and goals</p>	<ul style="list-style-type: none"> Participatory management structure working at the regional, state and territorial/local levels from PY1 PMU established and functioning, building on existing PDHC's PMU (PY01) Collaboration and exchange of experiences held in a systematic way, including other relevant national GEF programs and projects in Brazil working on project and/or in the Caatinga Develop webpage, media campaigns and materials to disseminate the project at local, national and international levels (from PY01) 	<p>Project progress reports</p> <p>Mid-Term Review</p> <p>Final Evaluation</p>	<p>Continuity of policy as adopted by the current government throughout the project</p> <p>Effective liaison between the different decision-making levels.</p>
<p><u>Subcomponent 4.1. Project Management and Institutional Coordination</u></p> <p><i>Outputs:</i> (i) a participatory management structure in place, able to ensure the achievement of the project objectives and goals; (ii) network of partners widened</p>	<ul style="list-style-type: none"> PMU established and functioning, building on existing PDHC's PMU (PY01) Participatory management structure working at the regional, state and territorial/local level from PY1 Greater number of governmental and non-governmental stakeholders active in the 	<p>Project Annual Report.</p> <p>Report on activities and terms of cooperation agreements</p>	<p>Continuity of policy as adopted by the current government throughout the project</p> <p>The processes for formulating</p>

Outcome, Outputs and Activities from each component	Impact/Outcome/Output Indicators	Means of Verification	Critical Assumptions
and consistent with actions coordinated and functional in the territories; (iii) MDA and partner institutions better trained to support multi-sectorial actions which promote the poverty alleviation while prevent and control land degradation; (iv) Sertão Project collaborating with other relevant GEF Projects in Brazil	<p>widened network of partners, by PY05 30% more, by PY03 15% more.</p> <ul style="list-style-type: none"> ▪ More investments in public policies by governmental Organizations in the territories by PY6. ▪ Project reports prepared and submitted to IFAD and to the project management committees and chambers, in a systematic way, throughout the life of project. ▪ Annual Operative Plans and procurement and disbursement plans drawn up in a systematic way throughout the life of project ▪ Sertão Project activities (5%) undertaken jointly with other GEF projects 		<p>proposals passes to small-holders families thus placing the proposals under the communities' supervision</p> <p>Relevant projects have continuity and identify areas of common interest for cooperation</p>
<p><u>Subcomponent 4.2. Project Information Dissemination</u></p> <p><i>Outputs.</i> (i) Lessons learned systematized and project information disseminated nationally and internationally.; (ii) target public sufficiently informed and participatory management exercised; (iii) relevant rural development institutions well versed about the Project; (iv) collaboration among relevant national programs and GEF projects relevant to poverty reduction and natural resources management in the Caatinga; (iv) lessons shared with other GEF projects in Brazil and abroad.</p>	<ul style="list-style-type: none"> ▪ Number and nature of best practices disseminated throughout the project ▪ Booklets produced on the outcomes of M&E (print run of 10,000 copies in PY6; 4,000 by PY3) and at least 2 folders about the Project (10,000 by PY1) • Project webpage developed in the first 6 moths from project initiation and regular updated information • Number of visitors to the project webpage increased as of FY1 • Calendar with information about land degradation and best practices) (print run of 6 thousand – from PY2) • At least one media campaign undertaken at the state and national level (by PY6) • Material produced available in the different circles of dissemination (didactic and technical material drawn up by Component 1 and informative material and project experiences in general) (by PY6) • Publicity events held (6 events at the end of PY1 – base-line and 12 events from PY3 – one per territory in PY3 and in PY6) • Two seminars for the exchange of experiences between teams from GEF Projects (PY3 e PY6). 	<p>Reports of the M&E system</p> <p>IFAD supervision reports</p> <p>Visit webpage</p>	<p>Information flows among the various intervention levels of the Project and allows the lessons learned to be systematized and disseminated</p>

Appendix 3. Response to Project Reviews

ANNEX C: RESPONSE TO PROJECT REVIEWS

A) STAP EXPERT REVIEW AND RESPONSE TO STAP COMMENTS BY THE PROJECT TEAM

The project team is grateful to the STAP reviewer for comments and constructive suggestions to strengthen the contents and presentation of this proposal. Below is a description of specific actions taken in response to the STAP comments which were provided in two separate rounds (answers in *italic* following the original STAP comment).

Project reviewer: B. L. Turner II, Director & Higgins Professor of Environment and Society, Graduate School of Geography, Clark University

STAP REVIEW #2 OF: Sustainable Land Management in the Semi-Arid Sertão Project

My first or draft review noted what I thought were the major strengths and weaknesses of the project in question. I offered it as a draft only in regard to questions of overstepping my charge or raising issues that were outside the expectations of the award in question. The comments offered here, review #2, represent my responses to the changes and amplifications in the project proposal made in response to review one. I do not reiterate in any detail the comments made in review #1 but list a few that were not addressed in the second document sent to me. That any of the comments in review #1 remain cogent, I refer the reader to the initial review.

I also emphasize that the detail of my critiques must be understood in light of the overall quality of the proposal. It is precisely its attention to detail in its many domains that permits the various critiques. The last are not intended to detract the proposal but to guide it to the means a making it even stronger.

Overall assessment

I am much impressed with this proposal. As noted previously, it is “an exhaustive programmatic treatment of an environment-development project building upon sustained work in semi-arid reaches of northeastern Brazil, an area of considerable poverty and apparent land degradation, and according to the proposal, one in which the ecological dimensions have been underappreciated [but see linked projects below]. Its programmatic-administrative architecture is tight, and once past the paucity of consideration about ‘what land uses are sustainable and economical’, not much is missed in terms of base understanding of the area, its people, land degradation dynamics, and the need for a fully integrated, participatory effort to seek to improve the environment and the economic outcomes of its use.”

The project appears committed to addressing several reservations that I expressed, although the answers remain less than I would like. I list the major issues below.

1. Comment: What are the global environmental connections?

I asked for a justification and substantive documentation that the region is a priority one for biodiversity loss and, perhaps, carbon—the two justification themes. The biodiversity one has been answered via the Dinerstein citation. I am not sure that this references addresses carbon, however, and I am not certain that the area in question is high on carbon source-sink list globally. The case for watershed protection rings true but as noted in round one, no documentation is provided.

Despite the various additions, such as the claims added to page 1, little documentation is provided. As an example, a claim is added to paragraph 3, page that land degrading activities may be leading to desertification

(I assume this means reduced precipitation) in a way that is more pronounced than that suspected from global climate change. Work by IGBPs BHAC program, including that in Brazil, makes me take this claim seriously. However, not one wit of evidence is provided as support, nor is recall to BHAC offered as a rationale for this supposition.

Response by the project team: Additional information on the potential for carbon sequestration has been added to Project Brief (PB) Section I.A (para.6). It should be pointed out that the per hectare carbon storage potential in the Caatinga as in all drylands is moderate to marginal in comparison with tropical humid forests. However the vast expansion of drylands open up the potential that even small marginal changes if scaled up over large areas, can have significant impacts. The GEF project will attempt to provide demonstration impacts which lead to scaling up well outside the project area.

Regarding the importance of watershed protection: In all project states, watershed committees have been established, in particular in critical, degraded watersheds and in irrigation areas, recognizing the need for more comprehensive and collaborative approaches to watershed management between users and watershed stewards. This demonstrates the importance of watershed protection measures in the project area.

Regarding the degradation/desertification, the reviewer's point is taken and the document has been adjusted (mainly in para.3 of PB, Section I.A).

2. Comment: Throughout, the document relies on internal reports and various NGO documents almost all of which are not readily available to community at large and have not been vetted through the critical eye of the research community. In one sense, use of these materials demonstrates hands-on, local attention and knowledge; in another, it places the reviewer in a difficult circumstance, asking the reviewer to accept claims absent recall to the basic foundation of science—peer-reviewed evidence and arguments. Adding a few references here and there does not reconcile this problem. (I note, however, that this proposal differs little from others I have read and thus may be consistent with the programs demands.)

Response by the project team: Point taken. The team would like to emphasize that, from the viewpoint of development literature, internal reports (e.g. from the Brazilian Ministry of Environment) or NGO working papers discussing program progress and lessons have in many cases been the only documentation available to support project preparation. Grey literature in the biological, agricultural and social sciences relevant to land degradation in the Sertão includes documents produced by government agencies, professional organizations, research centers, universities, public institutions, special interest groups, and associations and societies whose goal is to disseminate current information to a wide audience. In addition, although this grey literature cannot be found easily through conventional channels such as publishers, it is frequently original, highly relevant and usually recent. Where directly relevant academically vetted literature was available to support the preparation analysis, this has been used, but the team has tried to build upon the most relevant study and research results from all possible sources and in all formats.

3. Comment: I challenged the project to demonstrate that it understands the distinctions between the issues its addresses and desertification narrowly defined, and to recognize the huge critique of the UN's use of this term.

Sufficient changes in the word desertification to "land degradation" and a sentence or two noting that the fundamental issue in the area is arid land degradation indicate that some of the proposal's authors understand the issues at play here.

(Note to officials. I am not attempting to be petty. The UN undertook the desertification convention on legitimate grounds; legitimacy and best science, however, don't always coincide.)

Response by the project team: Point is taken and the document has been adjusted (most changes are in Section I.A, para. 3).

5. Comment: The proposal is long on administrative organization and template design for development implementation (e.g., participation efforts, pan-project links), and short on the documentation of the scale-magnitude of environment degradation and of the best practice production systems that might offer some sort of win-win (lessen environmental degradation and provided improved income). This lacuna is interesting given the amount of funds expended for development projects in greater region. (see that listed under #6 below)

Small disconnects exist in the document such as the claims about degradation processes and implied links to small-holders given the proposals orientation to bring the impoverished small-holder into sustainable practices. For example, “extensive cattle” and “salinization” imply large holder ranches and upscale irrigation.

Response by the project team: The team is aware that there the report is short on the documentation of the scale-magnitude of environment degradation. Indeed a significant amount of information was collected during preparation, but it was not included in the proposal in view of discrepancies among data provided (in comparison with other well-referenced or known sources of information) and, in some cases, lack or insufficient reference to the source of information. This problem related to scarcity of hard data and discrepancy is stressed in the recently presented UNCCD NAP (Ministry of Environment, August 2004). To illustrate, some of the information quoted mostly in informal documents of the Ministry of Environment, which was not included in the project brief: i) Desertification studies carried out in Brazil indicate estimate that 20% of the total semi-arid Sertão land area of North-East Brazil (i.e. 197,897 km²) is already affected by desertification (at different degrees of severity), threatening directly or indirectly the livelihood of about 15 million people (i.e. 78% of the semi-arid population); An estimated 10% of the total semi-arid land area (i.e. 98,595 km²) is affected by high desertification levels; 8.3% (i.e. 81,870 Km²) is affected by very high desertification levels; iii) an estimated 30% of the irrigated land area (i.e. 180,000 ha) is affected by salinization, water erosion and soil compaction; iv) An estimate of the accompanying economic costs associated with desertification is US\$ 300 million per year.

With respect to the best practice production systems, see our response to comment 6 below and to comment 2 above, concerning grey literature and internal reports. Further, the practices listed in Table 2 of PB Appendix 8 and the related analysis on the 68 existing (mostly degrading) and potential/improved production systems (see Table 2 of PB Appendix 8) were put together by a project team member who has written more than 150 scientific publications on the theme of sustainable farming practices in the Caatinga/Sertao region. Some of these references are now quoted in PB Appendix 8.

Regarding disconnects in the document such as the claims about degradation processes and implied links to small-holders, we have addressed this in PB Section I.B; Section I.A of the document refers to major types and causes of land degradation associated with agriculture, both small- and large-scale farming. However, in Section I.B (particularly in para.16, sub-section I.B2), specific references are made to small-holder activities and implied links to land degradation.

6. Comment: Various observations are made about “known” degrading practices and “best management” practices that guide the administration of this effort. Very few concrete examples are provided however, and in some cases, apparent discrepancies exist in the rationale offered. This rephrasing of my original concern has been dealt with in some cases but not others.

[i] On page 16 we are told that those practices that generate land degradation are understood. I have no reason to believe that they are not known but few specifics are given other than a passing comment about, for example, plowing against as opposed to with the contour. Also note on page 6 (bullet 6) we are told that

there is a “lack [probably insufficient rather than lack] of data and information necessary for decision-makers to incorporate sustainable land management considerations into production activities! This implies that best practices are not known.

[ii] In this same vein, the questions about salinization and elevated groundwater table have not been answered. On page 22 (appendix 8), Oliveria (1996) is cited as stating that *there is little data on the importance of salinization in the area!* I note, however, this section presents the issue in much more problematic way than does the text of proposal, indicating a serious group of researchers seeking honest answers.

Is this problem, should it prove to be important, created by small-holders—the identified subject of this proposal. Or, is it generated by medium and larger holders? If the last, will this project really address the problem?

[iii] The report is strong on identifying the general qualities of what sustainable, smallholder practices might look like across the landscape, such as those bulleted at the top of page 17. Here, however, we are told there must be wiggle room for quasi-subsistence producers (fine), although how does this mesh with statements elsewhere about increasing market presence? We are told that risks must be reduced with nary a word about how the mere increase in participation in the market increases risk while increasing opportunity for increased income. And, what does it mean to give “value” to existing production? I assume this means “creating” product markets that don’t currently exist or are very thin.

[iv] Permit me a specific example of non-specificity. In another well known development effort beyond Brazil, much attention has been given to subsidizing the use of nescafe (a ground cover legume) as a best practice known to enhance local production. In reality, not one wit of real evidence exists to demonstrate that nescafe use, over the long haul, is superior to any other crop combination for sustained cultivation and reduced environmental impacts. Similarly, it is difficult to assess the claim on page 22, citing an internal document, that known (but non-specified) land practices increase profitability. I did search the web page address given as back up material, but it provided nothing by way of analysis on sisal and nothing on the fruits (or the other 44 spp.). On page 22 of the annex, references are provided (although I do not have access to them). They seem to demonstrate that there is hope of markets for the species in question. One wonders, however, if a market exist, why is it apparently so thin? Competition from other areas?

[v] I find the idea about organic production interesting, potentially offering a market niche. Again, no details are provided, however. The appendix adds a few additional sentences, but nothing in detail.

[vi] On page 27 (middle), real-world objectives are given: environmentally friendly practices that “yield greater returns per hectare” and once adopted will continue to be used because they are more profitable. This is precisely the correct metric to be used. Can a skeptic, however, be persuaded that such systems, and that they can be identified and implemented successfully over the long term? My argument throughout is that a reviewer would be far more comfortable answering in the affirmative if recall to establish examples (peer-reviewed outlets) were provided as support.

It is also noteworthy that the document avoids the issue of winner and losers in the development of any such agenda. Again, I could provide a list of projects and areas that have been successful (e.g., Machakos, Kenya) in the sense that highly degraded landscapes have been brought under reasonable control by most any environmental metric (e.g., enhanced NDVI, lessened runoff, etc). More so, many farm households have experienced increased income and stability. But also, many former farm households have ceased to exist. That is: more benign use of the environment and increased well being of people required that many people cease to use the land directly. I suspect this will be the case for true sustainable development in northeastern Brazil.

[vii] Little information is given on what can be done for watershed protection. Indeed, on page 22 of annex the wording is: “The watershed protection services which are *likely* to be ...”. This implies that, in fact, no research has yet to pinpoint the watershed linkages or prioritized them. Importantly, I suspect that such services will require landscape level answers as much as individual farmer’s decisions.

Summarizing comment #6: My comments about the paucity of specific information remain applicable, although some information has been added. Given the amount of work in northeast Brazil and related development and environmental programs so well documented in this document and linked to by the proposed project, it is surprising that more cannot be said about the specific land practices causing “degradation” (as in the case of the increasing frequency of cut-burn of same plot) and the “sustainability” of alternatives. Does degradation rest primarily with the increasing frequency of cultivation for subsistence absent correct inputs? If so, what alternatives exist that, given the relatively low labor and capital inputs to this system, will yield as much staple or commercial products? Why don’t we know more about the actual land practice causes and solutions? This is the single largest concern I have.

Response by the project team: The team agrees with the reviewer’s comment that the reviewed draft did not contain sufficient specific information on existing degrading and potentially sustainable alternative practices. The specific practices reviewed in the preparatory analysis, including improved technologies which would be promoted by the project, are listed in Table 2, Appendix 8. Additional information summarising the key elements of the main sustainable land management practices to be promoted by the project has been included in Project Brief Section B.1: Smallholder Agriculture Profile (paras.12-14).

Regarding organic production and production of indigenous products: A anecdotal evidence suggests that local and regional markets for organic produce especially in urban centres are growing and that there is potential for increased supply of organic produce from the project area. Some additional information regarding existing market data and promotion programmes for organic production and indigenous products has been added to PB Appendix 4 (para.37). However, detailed market information was not readily available at preparation stage, therefore the project plans to undertake two thorough assessment studies of the market situation and opportunities for organic and indigenous products respectively in Year 1 prior to engaging in specific training and market promotion activities. The assessment will also consider ongoing activities of other projects supporting organic production and indigenous products in the area, in order to ensure that GEF activities are complementary.

With respect to the absence of peer reviewed literature quoted on profitability of farming practices: Peer reviewed published information on the profitability of different degrading and improved land management practices in the project area is not readily available. It is precisely for this reason that this analysis was included in the Terms of References for the preparation report to assess the potential and best options for the development of payment mechanisms for environmental services.

As far as watershed protection is concerned, the project team agrees with the reviewer’s comment that such services require landscape level answers. It is precisely for this reason that the project aims to support selected watershed management committees in defining a watershed protection approach based upon incentives for land managers – predominantly in critical watershed areas. In watersheds where active land management covers a significant part of the watershed area, the landscape level solutions will require actions by individual land managers, for instance to increase vegetative cover to aid infiltration, control run off and reduce erosion and downstream sedimentation (the exact appropriate technologies will be site specific). Restoration of riparian vegetation will play an important role in watershed rehabilitation and the protection of aquatic biodiversity, including through the establishment of agroforestry systems in riparian zones.

7. First review comments not addressed.

[i] On sustainable practices. p.21: The proposal does not overtly recognize problems of the use of financial incentives to promote sustainable land practices. Studies elsewhere demonstrate that once these incentives are gone (e.g., direct payments or subsidies), the practice stops and that direct payments designated for one environmental issue are used in a perverse way, such as the use PROCAMPO monies in Yucatán designated for agricultural intensification on extant lands for deforestation and investment in pasture.

Klepeis, P. and C. Vance (2003). "Neoliberal Policy and Deforestation in Southeastern Mexico: An Assessment of the PROCAMPO Program." *Economic Geography* 79(3): 221–240.

Response of the project team: The project team is aware that there are examples where the discontinuation of incentive payments has led also to a discontinuation of the incentivised practice. However, this critically depends upon whether the practice adopted, once barriers of adoption are overcome, is more or less profitable and acceptable to the farmer than other practices. The preparation report on the design of the economic incentive programme highlighted that most improved practices will be at least as or more profitable to farmers in the medium to long run. In that case the danger of reversal to “old habits” is greatly reduced. Positive experiences with short term incentives leading to long term adoption can be quoted from the Southern Brazilian No-Till programmes (for example World Bank loan in Santa Catarina), where one-off per hectare payments for adoption of no-till practices have led to continued and growing adoption of these technologies.

[ii] p. 22 and elsewhere. I applaud attempts to pay farmers for the ecological services that they yield (in this case, water protection), but what do we really know about the willingness of the state to support this or the pros-cons of the practice. What lessons have been learned from, for example, G. Daily’s book on payment for these services.

Response of the project team: As for the state willingness to support such payments for environmental services schemes, the Brazilian government is committed to introducing such approaches, for example through the national PROAMBIENTE programme, as well as through the “Produtor de Água” programme started by the National Water Agency (ANA), which will provide incentives for rural producers who increase water infiltration and/or reduce downstream sedimentation and water turbidity. As in the case of PROAMBIENTE, the services will be certified by a third party institution and the programme costs are expected to be shared with the State governments, water utilities and producers.

Other issues

The document remains oddly phrased in parts which I cannot document in detail here. As an example on page 4 (bottom): “.... the small-holder farmers recognize they have difficulty in changing acquired habitats.” This phrasing implies that practice is path-dependent in the sense that agents are reluctant to change what they have done in the past, even in the face new knowledge. While history does matter, I think the proposal intends to say that “the conditions in which small-holders operate make it difficult for them to consider alternatives.” Again on page 4 top we are told that “periodic” slash-and-burn is creating problems of subdividing plots and so on. I think the proposal means that there is an “increase frequency” in slashing and burning owing to land pressures. Again on page 5 near the top: “New production systems ...have proven to be less aggressive to the environment”? I think the meaning is “more benign” or “less damaging.”

Minor comment: The implications of the evapo-transpiration figures would be improved with basic annual precipitation information or the number of months in which potential evapo-transpiration exceeds precipitation.

Response of the project team: Points are taken. The project team has tried to address these in the text.

Final comment. I reiterate that the overall objectives of this proposal are well developed as is the design-architecture of the program to be followed. Clearly much work and clear thinking has gone into its development. My comments are intended to drive home the missing details that, if provided, would make the case a smashing one.

B) RESPONSE TO GEF SECRETARIAT COMMENTS AT PIPELINE ENTRY

1. Country Ownership

Country Drivenness:

Expected at work program inclusion: It has to be described how the proposed project responds to the priorities in the identified government frameworks.

Response by the project team: Relevant priority programs, projects, policies and plans were identified and information provided in Section I.C of the Project Brief.

2. Program and Policy Conformity

Program Designation and Conformity:

Expected at work program inclusion: It has to be explained how this project fits the SP1 and 2 of the Land Degradation FA.

Response by the project team: This is described in the Executive Summary, Section 3.C (also in Section VII.A of the Project Brief).

Project design:

Expected at work program inclusion: It has to be presented how this design was discussed and agreed on with the WB and UNDP. The IFAD proposal has to show complementarity to the UNDP project in implementation and WB project in preparation. Both projects target the Caatinga Biome.

Response by the project team: Through a series of electronic mails, working meetings and discussions agreements were made with the Local Teams of both projects (i.e. Preparation Team of the WB Project and PMU of UNDP Project) during preparation of this proposal, in order to ensure complementarity. These are summarised in Section 4.B of the Executive Summary (also in Section IX.B of the Project Brief). Minutes of meetings, aide memoires and original copy of agreements are available in the Project file. In addition, Tables 2 and 3 of Project Brief's Appendix 9 (Documents in the Project File and Record of Consultations and Agreements) includes a list of points included in the first set of agreements with these projects [including participation in the project steering committees – for this, see also PB Section VII.D (Stakeholder Involvement, para.152) and Figure 2 of PB Section IX.C (Project Management Structure, page41)]. Collaboration among the teams is expected to continue before appraisal and during implementation, in order to fine-tune the points agreed so far and discuss additional points that may arise during future meetings. Communications and meetings with the WB Task Manager and UNDP Staff responsible for their Project in Brazil are also documented in the project file (and referred in Table 1 of Project Brief's Appendix 9).

Sustainability:

Expected at work program inclusion: Concrete measures should be defined how to ensure the sustainability of the project impact after completion. This includes the financial sustainability.

Response by the project team: Please see: Section 3.B of the Executive Summary; Section VIII.B of the Project Brief (paras. 132-138); Project Brief's Appendix 8 (Background and Additional Considerations for the Establishment of Payments for Environmental Services Schemes in the Project Area) and response to STAP Reviewer Comments # 6 and 7[i] .

Replicability:

Expected at work program inclusion: The project had to develop a replication strategy for the best practices to be developed during the project. Means of and tools for the dissemination have to be identified.

Response by the project team: Please see Section 3.C of this Executive Summary (and Section VII.C of the Project Brief, paras.139-144)).

Stakeholder Involvement:

Expected at work program inclusion: A stakeholder involvement plan for the project implementation has to be presented. Information on stakeholder consultations has to be presented.

Response by the project team: Information has been provided in the Project Brief and Executive Summary on how the identified stakeholder groups have been engaged in the project preparation, and how their participation is foreseen at all levels during project implementation. Please see: Sections 3.D (Stakeholder Involvement) and 4.C (Implementation Arrangements) of this Executive Summary; Sections VII.D (Stakeholder Involvement) and IX.C (Project Management and Implementation Arrangements) of the Project Brief; and Project Brief's Appendix 9 (Documents in the Project File and Record of Consultations and Agreements).

Monitoring and Evaluation:

Expected at work program inclusion: A M&E system based on the logical framework has to be presented. Impact indicators have to be identified at goal/objective and outcome level. Indicators have to track the impact on people's livelihoods and the structure and integrity of the ecosystem; Risks identified have to be monitored and the project has to have a risk management strategy (e.g. regarding droughts)

Response by the project team: For information on the proposed project M&E system based on the logical framework, please see Section 3.e and Annex B of this Executive Summary (and Section VII.E of the Project Brief). For more detailed information, see description of Component 3(on M&E) in Project Brief's Appendix 4. Regarding risk management, please see potential risks and mitigations measures in Section V.B. (Assumptions and Risks, pages 26-28) of the Project Brief (see also Section I.B of this Executive Summary). With respect to a strategy regarding droughts, the team would like to express that the whole project has been designed to cope with droughts, adopting an approach for managing environmental aspects of droughts within the context of a broader integrated framework for coping with a semi-arid climate. This framework involves some central themes: i) reversing the process of land degradation, as it affects water availability for productive activities (to be measured through project Component3); ii) re-planning the agro-economic spaces (project Subcomponent 1.2); iii) change in land use to adopt appropriate practices and technologies (project Components 1 and 2); and iv) market development for products obtained from resilient native species (project Component 2, with support from and complementary to the PDHC Component on Marketing Development). Promotion of coping strategies is not an innovation of the project, as this is recognized by the majority of the government (e.g. <http://www.ana.gov.br/gestaoRecHidricos/UsosMultiplos/seca2.asp>) and non-government organizations throughout the semi-arid Sertão to be the most appropriate approach to address droughts.

C) RESPONSE TO GEF SECRETARIAT COMMENTS AT WORK PROGRAM INCLUSION (Review Sheet of September 20, 2004)

The project team held a bilateral project review meeting with GEFSEC. During the meeting, all the points raised in the Secretariat Concept Agreement Review Sheet were clarified (each comment and the team's response to it is presented below). This Executive Summary and new Project Brief respond to those comments.

1. Country Ownership

No comments.

2. Program and Policy Conformity

Project design:

GEFSEC Comment: The project is well designed. The defined components and subcomponents address well the identified barriers to SLM. Innovative financial mechanisms will be piloted such as the PES. There are, however, some issues that are of concern and need to be addressed:

1.-Timeframe. Currently, the project will be implemented in period of 5 years. Based on experience from other initiatives in dryland areas, these efforts need a realistic time frame (7-10 years). It would be useful to briefly discuss the timeframe also in the context of measurable impacts.

2.-Global Environmental Benefits/Indicators. The proposal seems to struggle with the clear definition of the GEB of this project that will be tracked through appropriate impact indicators. In the logframe the indicator at objective level says: "functional integrity of the Caatinga agro-ecosystems across 20000 ha is ensured". This is an outcome and not an indicator.

The project rational, second para, defines appropriately main environmental services provided. It is recommended to formulate indicators at objective level around these services to maintain coherence in the presentation and to give a solid basis for the global environmental benefits.

3.-National benefits. It is recommended to add a paragraph on the expected national/local benefits of this project - currently, there is only a paragraph on global benefits. In projects under OP 15, great importance is also given to the national/local benefits although (GEF will not provide funding for them).

Response by the project team:

1. Timeframe: the implementation period has been changed to 6 years, with ex-post evaluation to be undertaken eventually in the 7th year. The team proposes 6 years (and not more) due to two facts: i) two years of implementation of the associated IFAD loan (PDHC) has created an enabling environment in terms of institutional and organizational structure and community participation to support the GEF intervention. The team believes that this has saved at least one year of GEF project implementation; and ii) experience with NRM projects in Brazil involving transition to more sustainable land use practices has shown that the timeframe needed to measure impacts is 5-7 years.

2. Global Environmental Benefits/Indicators:

New indicators for Global Environmental Benefits (associated with the outcome "functional integrity of the Caatinga agro-ecosystems across 20000 ha is ensured" have been added to the logframe (at objective level). They are:

❖ *By PY6, functional and structural integrity of the Caatinga agro-ecosystems ensured across 20,000 ha, thereby reversing land degradation, enhancing soil structure stability, conserving biodiversity and increasing carbon sequestration, as measured by:*

- *Reduction of at least 10% in sediment concentration downstream plots where sustainable land management options have been adopted*
- *10% increase in Caatinga plant species diversity in land management systems (including rangeland/pasture management, agroforestry, agrosilvopastoral and annual crop systems)*
- *Additional carbon sequestered on project demonstration sites (tons of carbon/area/year) as a result of adoption of sustainable land management practices (incremental amount of carbon to be estimated in PY1, after completion of baseline studies)*

❖ *By PY5 the establishment or strengthening of commodity market-based incentives for sustainable agricultural production, as measured by a 10% increase in the number of market outlets for native and organic products.*

The above quantitative indicator for reduction in sediment load is a conservative estimate which could be revised upwards after project year one when more detailed technical information is available. In the case of the specific quantitative measure for the indicators on carbon and wild biodiversity (Caatinga plant species diversity), the technical studies to be carried out in the first year in the context of the FISP Ecológico will provide better information to ensure that the quantitative target is ambitious but remains feasible. If a quantitative measure has to be indicated for these two indicators before the project becomes effective, the team would aim to provide an estimate by appraisal, which may have to be revised at Mid Term Review in line with the results of the technical studies and implementation experience.

3. National benefits. A paragraph on the expected national/local benefits has been added at the Executive Summary's project rationale section (and at Project Brief, para. 89).

Monitoring and Evaluation:

GEFSEC Comment: The logframe is well developed and follows a clear logic. A budget is allocated to M&E activities. As already mentioned, however, work is needed on the indicators for the GEB. See also comments under project design. Information is also needed on the status of the collection of baseline data and information. This data and information will be necessary to monitor progress during project implementation.

Response by the project team: *For the response to the point on indicators for the GEB, see the team response to the previous comment on Global Environmental Benefits/Indicators. Regarding to the needed on the status of the collection of baseline data, the loan is currently conducting studies which are going to be used as part of the baseline information. It is basically on socio-economic data. Preliminary information on agro-biodiversity markets (particularly for native fruits) has also been collected during PDF B phase. The remaining baseline information will be undertaken during PY1. In addition, the M&E report prepared by the national consultant includes the methodology agreed with the Government for conducting baseline studies. This includes major features of the baseline plan to be completed after an inception Workshop scheduled for the first semester of project implementation. A para. on this has been added at the Executive Summary M&E section.*

3. Financing

Financing Plan

The proposed financing plan differs significantly from the proposed plan at concept/PDF-B stage. This discrepancy needs a satisfactory explanation. Now, the budget is US\$15.546mio (initial plan: US\$56.55) of which US\$5.943 mio will be requested from the GEF (initially US\$6mio). The GoB and IFAD will provide contributions in the amounts of US\$4.3mio and US\$4.7mio respectively. Other cofinancing entities will be FAO, the GM and the beneficiaries.

Response by the project team: This discrepancy/difference is attributable to the team's attempt to reconcile the original estimates with the new GEF Guidelines (GEF working document GEF/C.20/6/Rev.1 on Co-financing) on identification and consistent reporting of co-financing for baseline activities. Subsequent to the issuing of the guidelines (and following its clear definition of "associated financing") , we realized that US\$ 41.56 mio out of the original US\$ 56.55 mio included the "associated financing" for activities of the IFAD-supported project (with 50% contribution from IFAD loan and 50% from GOB counterpart for the loan) that are related to the GEF project but are not essential for the project's successful implementation. The project preparation team took care in identifying, negotiating and confirming levels of co-finance consistent with the aforementioned co-financing guidelines. This is reflected in the calculations of US \$-based co-financing for baseline activities (i.e., the IFAD loan/PDHC project), which totals US\$ 8.44 mio (US\$ 4.74 mio from IFAD and US\$ 3.70 million from GOB, the latter as counterpart to the loan for undertaking these activities). This amount was limited to financing specific activities only directly relevant to achieving GEF objectives. This in turn led to a further reduction in co-financing to US\$ 9.226 million, including US\$ 4.74 from IFAD, US\$ 4.34 mio from GOB, and US\$ 0.14 from other entities (GM, FAO, Beneficiaries). After following this conservative strategy, estimates still result in a co-financing ratio of 1 : 2.5.

Appendix 4: Detailed Description of Components

1. The project **development objective** is to contribute to the sustainable development and the quality of life of communities affected by the land degradation in Brazil's semi-arid northeast, through a cross-sectoral approach to the support of productive activities and poverty reduction.
2. The **global objective** is to minimise the causes and negative impacts of land degradation on the integrity of the Caatinga biome ecosystems in Brazil's semi-arid northeast, through the implementation of sustainable land use systems.
3. The proposed project will cover an area that consists of six **territories**² under Dom Helder Câmara Project's current implementation phase, which includes six territories in the northeast semi-arid region, located in Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco and Sergipe. In these territories, the work area covers approximately 150 family farming communities, and Agrarian Reform settlement areas spread over these territories. These six territories are (see **Map 1**): São João do Piauí (Piauí), Sertão Central (Ceará), Sertão do Apodi (Rio Grande do Norte), Cariri Paraibano (Paraíba), Sertão do Pajeú (Pernambuco) and Sertão Sergipano do São Francisco (Sergipe).
4. To achieve these objectives, the proposed Project will be implemented over five years by means of four components:

Component 1: Building Capacity for Sustainable Land Management and Increasing Environmental Awareness

Sub-components:

- 1.1 Capacity Building and Environmental Education
- 1.2. Participatory Planning and Support to Adaptive Management Practices

Component 2: Environmental Incentives

Sub-components:

- 2.1. Providing Incentives for Environmental Services Provision from Sustainable Land Use
- 2.2. Developing Payment Mechanisms for Environmental Services
- 2.3. Developing Commodity Markets for Indigenous and Organic Products

Component 3: Project Monitoring and Evaluation

Sub-components:

- 3.1: Project Monitoring
- 3.2: Project Evaluation

Component 4: Project Management and Information Dissemination

Sub-components:

- 4.1. Project Management and Institutional Coordination
- 4.2. Project Information Dissemination

²The concept of **territory** adopted by the Project is the one defined and adopted by the Ministry of Agrarian Development (MDA), where territories are clusters of municipalities largely defined on cultural and socio-economic similarities. In the project area, in average, each Territory is made up of 7 municipalities.

5. The detailed description of each one of these components follows herein.

Component 1: Building Capacity for Sustainable Land Management and Increasing Environmental Awareness (Total: US\$ 6.4 million, GEF US\$ 3.0 million)

6. The purpose of this component is to develop a collective vision or “culture” for the protection of natural resources and the prevention and control of land degradation in the semi-arid Sertão. “Culture” is understood as a clear consciousness of the need to combat land degradation, which is supported by a set of adapted practices or technologies and actions that are capable of influencing public policies.

7. The component will be implemented through two strongly-related sub-components: 1.1) Capacity Building and Environmental Education; and 1.2) Participatory Planning and Support to Adaptive Land Management Practices. The education-related Subcomponent 1.1. will facilitate the actions foreseen for implementation under the knowledge generation Sub-component 1.2., and will also capitalize on the outcomes of this Subcomponent 1.2 for the execution of environmental education activities.

Sub-component 1.1. Capacity Building and Environmental Education (Total: US\$3.2 million, GEF US\$ 1.7 million)

8. This sub-component is intended to i) facilitate the knowledge generation process to be implemented under sub-component 1.2, through the provision of theoretical knowledge, methodological tools and teaching materials needed to conduct the aforementioned process; ii) organize the outcomes of this knowledge generation process; and iii) disseminate these outcomes by means of an environmental education program.

In order to achieve these objectives, the following actions will be necessary: generating favourable conditions for the knowledge generation process, as a justification of its importance for the population as a whole; building the capacity of technicians and leaders both in terms of methodology (as facilitators of the process), and in the acquisition of technical, managerial and institutional skills; designing the methodological tools to be used, and systematizing the outcomes; and disseminating the outcomes through environmental education.

9. *Expected Outcomes:* (i) establishment of a group of facilitators capable of stimulating the process of knowledge management for sustainable land use; (ii) availability of knowledge generation processes; (iii) increased awareness of the land degradation mechanisms by the different stakeholders at the local/territory level; (iv) availability of a number of teaching materials jointly prepared for the replication of experiences in adapting and adopting sustainable production systems.

10. *Target Groups:* animators/facilitators (around 150 technicians, 150 community leaders, and 140 young “social-mobilizer” farmers); farmers/experimenters (1,000) from agrarian reform settlements and small farmers communities engaged in experimental processes (i.e. in participatory planning and on-farm or agro-ecosystem trials); 600 teachers and 120 rural schools; the students of those schools; other farming families and the whole society living in the project area.

11. Facilitators will be trained to animate the process of knowledge generation, in partnership with farmers. Facilitators and teachers will be trained to promote environmental education both in rural schools (students) and in communities, and along with other segments of the population. In putting the work forward, capacity building may involve other targets. For example, as it renders the coordination of the various initiatives a more important role in a broader territorial scale, support (by means of capacity building) to the incorporation of global concerns in the existing local policy negotiation and coordination instances can be provided (e.g. to the Municipal Rural Development Councils).

12. *Activity 1.1.1 Capacity building of facilitators and teachers.* This activity will include the training of facilitators, be they technicians, leaders, social mobilizers, or teachers of rural schools. The first training effort (similar to an information “campaign”) will reach all facilitators working in the 170 settlements communities

currently covered by the PDHC Project (that will coincide with the proposed project target group), in order to increase their awareness of the project's objectives, opportunities and procedures. The second training effort will be devoted to a portion of these facilitators that will support around 50 "Land Management Interest Groups" (LMIGs) involved in the knowledge generation process. These LMIGs would be formed on a demand-driven basis, coming out of the above-mentioned 170 rural settlements and communities invited to participate in project activities (each LMIG would have about 25 people, including 1 technician (from local partner NGO or PED), 1 community leader, 1 young "social-mobilizer" farmers and around 20 farmers). Other training efforts will be delivered to the facilitators of LMIGs in order to favour the outcome of the dissemination process. Rural school teachers would also be trained towards the implementation of an environmental education program.

13. *Activity 1.1.2: Environmental Education.* This project activity will include: i) the design of environmental educational programs, in rural schools and communities, respectively; ii) the implementation of the program in rural schools (and provision of pedagogical support to its implementation); and iii) the implementation the program in communities of the six project territories (also including pedagogical support), covering all rural settlements and communities, and part of the urban population living in these territories. The outcomes of participatory planning and farmers-field trials promoted under sub-component 1.2. will support these two environmental education programs. In schools, it will bring together the teaching in the rural schools with the reality of the agrarian reform settlements, where the students live, promoting these links (it will cover 80 % of the rural municipal schools located in the six project-supported territories). In communities, it will support environmental education events (associated e.g. with cultural activities) and visits of the demonstration units (including sites to be implemented under subcomponent 1.2, and possibly other relevant pilot sites to be implemented by other GEF projects in the region), to broaden the dissemination of the outcomes generated at those sites (these activities intend to cover 80 % of persons living in the settlements and rural communities within the six territories under the Project). It will also organize study visits to the project-supported sites from other complementary projects (including GEF projects), whenever requested.

14. *Activity 1.1.3. Production of Methods and Teaching Materials.* This activity will include the design, accomplishment and publication of a series of learning materials. The production of this material will be based on: i) the use and adaptation of materials available in existing experiments and programs throughout the semi-arid Sertão; ii) the respect for the outcomes of the knowledge management process (in this perspective, the importance of tracking, producing and organizing references must be emphasized, respecting successful or unsuccessful experiments, reviewing and presenting them so they can serve as support to the learning process that contributes to development dynamics); iii) technical, but always contextualized innovation; iv) properties and real life stories; and v) the process of learning, and social organization. The learning materials (printed materials, posters, videos, CDs) will be meant for the end beneficiaries (farmers, students). "Manuals for facilitators" with pedagogic and methodological content will also be produced. In this case, the content will be more biased towards pedagogical and methodological procedures. Its goal will be to provide facilitators with all the guidelines they need to carry out the project activities.

Sub-component 1.2. Participatory Planning and Support to Adaptive Land Management Practices (Total: US\$3.1 million, GEF US\$ 1.2 million)

15. The component objective is to promote and encourage local participatory territorial planning (at the ecosystem or agro-ecosystem level), adaptive research (on-farm and agro-ecosystem level trials) and dissemination of sustainable land management practices within the six territories target by the proposed project.

16. *Expected Outcomes:* (i) sustainable land management practices planned, adapted to the agro-ecological conditions of the Semi-arid Sertão and adopted by farmers representing 50 LMIGs; and (ii) properly trained animators and facilitators who can provide technical assistance on the on-farm and agro-

ecosystem level trials; (iii) best practices adopted and disseminated within the six territories/areas target by the proposed project.

17. *Target Group.* Experimenter farmers and partner NGOs, comprising the 50 LMIGs trained under subcomponent 1.1.; as mentioned above, each LMIG would be made up of 20 farmers and 3 facilitators (one technician, one leader, and one young farmer or “social mobilizer”).

18. *Activity 1.2.1. Technical training in Support of Sustainable Land Management.* This activity will support a technical training program to facilitators and animators of LMIGs. It will be complementary to the capacity building program supported under subcomponent 1.1, being specific for the execution of applied research efforts (see activity 1.2.3. below), covering technical and practical aspects of biodiversity/agrobiodiversity, soil and water conservation and management. Illustrative training themes would include e.g. adoption of conservation agriculture in croplands, enhancement of Caatinga range management systems and introduction of indigenous crop/fruit varieties.

19. *So*, the formulation and execution of this technical and thematic training program for LMIGs’ animators and facilitators will enable them to provide technical guidance to the experiments that require a specialized technical knowledge. The main tools of this training program are exchange visits and training in field practices, as well as the monitoring and evaluating the experiments (i.e. on-farm and ecosystem level trials).

20. *Activity 1.2.2. Participatory Planning for sustainable land management.* This is intended to prepare plans for sustainable land management in demonstration sites selected by the 50 LMIGs within the six benefited territories, at the ecosystem or agro-ecosystem level. Plan preparation will start with an analysis of the state of land degradation (diagnosis) in the local environment (from the individual plot/farm to the agro-ecosystem level), focussing on the community main problems. The expected outcome comprises a better understanding of the land degradation problems and potentialities for sustainable land management. The planning (and re-planning) of activities would consist of a process, and it would occupy the team and their partners throughout the project life. Based on lessons learned, this participatory planning process will contribute to a territorial reflection on conveying results and encouraging debate. Since the degradation of resources is a problem for everyone, not just for the farmers but for society as a whole, there should be a partnership between the different stakeholders (individual farmers, organized civil society, institutions and state projects) in the fight against degradation and this can be successful, if the territorial social dynamics for working together can be reinforced and properly exploited.

21. *Activity 1.2.3. Development of Sustainable Productive Systems.* This activity will support the adaptation of existing soil management practices and/or adequate technological solutions to unsustainable land use issues identified by 50 LMIGs at the agro-ecosystem level during the preparation of sustainable land management plans (1.2.2), within the six project-supported territories. Applied research efforts would be realized in direct co-operation with farmers (e.g. on-farm and agro-ecosystem level trials), in order to adapt and validate the existing technology to their agroecological and socio-economic circumstances. These groups of farmers/facilitator will exchange information and knowledge that is useful for sustainable management, having carried out adaptive research/trials in demonstration units, inspired in the FAO Farmers Field-School methodology. In addition to undertaking adaptive research proposed under their planning process, and based on the priorities identified in such planning, each LMIG will prepare a proposal for sustainable land management projects (consisting of previously adapted practices, or practices and technologies already known by trained farmers) to be submitted for possible financing under the Environmental Incentives Component 2, particularly under the FISP Ecológico (see activity 2.1.2 below). In full coordination with the interventions supported under Components 2 (and also Component 3 on M&E), the activity would promote the adoption of more sustainable land use practices which would in turn contribute to restoring and maintaining the ecosystems integrity and at the same time increase the provision of specific environmental services.

22. Adaptive research demonstration units (on-farm and agro-ecosystem level trials) will be the foundation for discussion and reflection with a broader target public, including other settlers/members of the same communities, but not involved in the experiment, and settlers from other communities. In order to ensure the technical soundness of the trials implementation process, the sub-component will finance the hiring of experts to provide advice and technical support (as necessary) during the implementation of the trials (this activity will be combined with training foreseen under 1.2.1). Priority will be given to the adoption of methodologies that favor gradual learning and participatory and collective construction of knowledge, when developing sustainable production systems in conjunction with the communities and settlements. This way, the learning processes should only lead to reflection based upon the practical living experience of the families, in their day-to-day, with the proposals under light.

23. A fundamental methodological procedure for successfully developing sustainable land-use system is that performing discrete/isolated events should be avoided, such as courses and/or workshops that are not part of a broader project activity with a well-defined, medium and long-term operational strategy³.

Component 2: Environmental Incentives (Total US\$ 5.8 million, GEF US\$ 1.5 million)

24. The component objective is to establish and operate an incentive mechanism for environmental services provision related to sustainable land use practices, which increase the ecological integrity and productivity of the Caatinga system, and to develop alternative sustainable funding options for selected services.

Expected Results

25. The expected results from Component II are the following:

- FISP Ecológico established by year PY2 and disbursing payments for environmental services to farmers
- Monitoring and verification system established to measure changes in erosion, biodiversity and carbon sequestration in the FISP Ecológico (Environmental Fund)
- Sustainable land use practices adopted on 8000 ha by PY6 (2000 ha by PY3)
- Income levels on FISP Ecológico sites improved by at least 10% (by PY6)
- At least 2 watershed committees and executing agencies trained on payments for watershed services (all by PY3)
- Pilot schemes for payment of environmental services related to watershed protection established in two watersheds in the project area by PY6
- Capacity of 20 NGOs built to support farmers in accessing the developing carbon market.
- 2 carbon projects prepared in line with potential buyers' guidelines by PY 5
- 200 farmers producing and selling indigenous fruits or crop varieties (50 farmers planted by PY3)
- 150 farmers producing and selling organic produce (30 farmers adopted organic farming practices by PY3)

26. *Geographical Coverage.* The component activities target the whole project areas, but different sub-components will intervene in different areas:

³ For example, instead of holding an individual course or seminar on organic gardening and hope that the community mobilizes and adopt this proposal, it would be wiser to have a more ongoing and integral work such as: meetings and exchange visits for awareness building purposes, a workshop to share the outcomes of the visit, so that, in case there is a real interest to adopt the proposal, the implementation of a demonstration organic garden, in the form of a demonstration unit can be done. The same procedure should be adopted in other untested proposals (or not fully tested).

- *Providing incentives for environmental services provision:* The FISP Ecológico mechanism will be piloted in demonstration sites selected – following a demand-driven process - under Component I for adoption of improved land use systems. Targeting these areas where a critical group of landowners will undertake a land use change towards more sustainable practices will create a greater aggregate impact of individual land use changes in a specific area and therefore also facilitate the observation of an overall impact on environmental services provision.
- *Developing payments mechanisms for environmental services:* The activities to foster payment mechanisms for watershed protection services will be focussed on critical and high potential watersheds to be identified during project implementation. The support to the development of carbon projects will be provided in response to specific demands.
- *Developing commodity markets for products with special environmental characteristics.* Capacity building and market support for organic and indigenous products will be provided in response to demands, taking into consideration the production and market access possibilities of specific proposed sites.

27. *Target Group.* The main target group of the component are the 1000 farm households, whose decisions to adopt more sustainable land use practices will be encouraged through the provision of specific incentives, which will contribute to address the causes of land degradation. These incentives could take the form of direct payments to farmers through the FISP Ecológico or future payment mechanisms for watershed services and carbon on the one hand, or through market prices paid for organic or special local products. The component will also provide capacity building to facilitators and technicians who will act as intermediaries between the farmers and the FISP as well as other environmental services payment mechanisms. Sub-component 2.2 on developing payment mechanisms for environmental services will also target stakeholders and decision-makers in field of water resources management.

Sub-component 2.1. Providing incentives for environmental services provision from sustainable land use (Total US\$ 5.6 million, GEF US\$ 1.4 million)

28. The aim of this sub-component is to provide financial incentives to farmers to adopt more sustainable land use practices which contribute restoring and maintaining the structural and functional integrity of ecosystems and at the same time increase the provision of specific environmental services, in particular erosion control, biodiversity conservation and carbon sequestration. The incentives to be provided will be related to indicators which measure the changes in the provision of these services. While a preliminary assessment indicated that many improved land use practices which generate increased environmental services are equally or even more profitable to the farmer⁴, there are significant barriers to adoption related to knowledge and up-front investments in inputs and labour. Financial incentives can tip the balance for farmers to overcome these barriers to adopting practices that are financially and environmentally more sustainable.

29. *Designing, reviewing and evaluating the FISP Ecológico (2.1.1.)* A new environmental fund, the FISP Ecológico, will be the project mechanism to disburse financial incentives related to the level of environmental services provided by sustainable land use practices which address land degradation. The FISP Ecológico will be established as a separate window with particular funding criteria and rules under the FISP operated by the PDHC, which currently has funding windows for productive and social investments requested by participating communities.

30. The specific operational mechanism of the FISP Ecológico, to be summarised in the FISP Ecológico manual, will be established in PY1. The design of the FISP will build upon lessons from the operation of payments for environmental services schemes in other Latin American countries, and upon the

⁴ Estudo e Desenho do Programa de Incentivos Ambientais, Relatório Preliminar, UFPE, Sampaio, Y, Tavora, Lamartine, Ramos, F., Estimates do not include family labour costs

implementation experience of the existing FISP operated by the Dom Helder project. The preferred option is to establish a payment system that is directly linked to specific indicators of environmental services provision, in particular erosion control biodiversity conservation and carbon sequestration. Technical and economic studies will be carried out to provide the basis to establish environmental services indicators, which will be validated in expert workshops, and to set appropriate levels of payments sufficient to overcome barriers to adoption. The technical studies will also highlight the supply potential for environmental services from the various land uses and identify specific locations where the greatest potential exists. FISP Ecológico design proposals will also be discussed with project participants to ensure that the mechanism will be a useful tool in assisting their adoption of sustainable land use practices. A monitoring and verification system will be designed to assess the impacts of changes in land use practice on the farm economy, as well as on the provision of environmental services. The methodologies established and data collected will also provide important sources of information and demonstration value for the development of future payment mechanisms for environmental services, in particular for watershed protection services and carbon projects. The manual and monitoring/verification system would be revised in line with recommendations by the Mid Term Review. A final evaluation of the FISP Ecológico will be carried out in PY6.

31. The sub-component will finance 3 team members to undertake a study tour at the start of the project to countries in Central America to understand the operational requirements, benefits and applicability of payments for environmental services systems already in operation. The project team will in particular learn from the initial implementation experiences of the GEF Project Integrated Silvopastoral Approaches to Ecosystem Management in Colombia, Costa Rica and Nicaragua. The sub-component will also finance regional workshops within Brazil with representatives from other projects in Brazil and Latin America which are piloting incentives and payment systems for environmental services, to support the formulation of the FISP design and to review implementation experience. Project staff will also participate in selected international conferences to present project experience and to learn from best practice in the region and internationally. These national and international exchanges will improve not just the establishment and running of the FISP Ecológico but also the development of payments mechanisms for watershed protection and carbon as well as markets for indigenous and organic products.

32. *Providing incentives for land use practices which generate environmental services (2.1.2.).* The FISP Ecológico will disburse financial incentives for the adoption of sustainable land use practices by farmers who are participating in the demonstration sites (50 sites, approximately 1000 farmers) established under Component 1. Component 1 will cover the costs of experimenting with new improved technologies within these demonstration sites and train farmers to provide them with the necessary skills to adopt improved practices. Project proposals for demonstration sites would only be submitted to FISP if consisting of previously adapted practices, or practices and technologies already known by trained farmers. Moreover, a condition for financing these projects would be the linkage with the priorities identified in sustainable land management plans (1.2.2). Targeting these sites will ensure that a significant change in land use will be promoted within a limited area thereby contributing to address land degradation issues in the semi-arid Sertao. It will also facilitate the measurement of changes in environmental services provision. This strategy also ensures that smallholders will benefit from the FISP Ecológico. Practices will include pasture and cropping technologies as well as restoration of Caatinga, riparian vegetation and spring protection. The technical training provided to technical facilitators and participating farmers under Components I is essential to ensure a successful transition to more sustainable land uses which generate higher levels of environmental services. The financial incentives or payments provided by the FISP Ecológico will reflect the level of environmental service provision associated with the particular land use adopted. FISP Ecológico payments will also cover the costs of monitoring and verification of land uses and associated environmental services in line with the established guidelines. The overall level of funding available to support sustainable land use practices by the FISP is \$ 5,000,000, out of which \$4,000,000 (GOB and IFAD financed) will be disbursed as counterpart funding through the existing Dom Helder FISP windows and \$1,000,000 will go through the newly established FISP Ecológico window.

Sub-Component 2.2. Developing payment mechanisms for environmental services (Total US\$ 0.07 million, GEF US\$0.06 million)

33. This sub-component aims to develop payment mechanisms for selected environmental services, which are funded by sources outside the project and which will continue beyond project closure. Two specific mechanisms to explore in the project are payments for watershed protection services and for carbon.

34. *Developing payment mechanisms for watershed protection services (2.2.1).* Recent legal and institutional developments in water and watershed management provide promising opportunities for the development of payments for environmental services (PES) schemes. The sub-component will finance a thorough review of this context to identify specific entry points and geographical areas where PES may be developed in the watershed context. The watershed protection services which are likely to be of greatest importance are reduction of downstream sedimentation and flood control, but the importance of each of these varies across watersheds. Once identified, the component will finance capacity building of the respective watershed committees and their executive agencies in the concepts of PES. Capacity building will include reviews of specific experience in payments for watershed services piloted in other Latin American countries. Following specific expressions of interest by these entities, the component would fund detailed technical studies and modelling to determine the physical linkages which could form the basis for PES development. If clear linkages are developed, the project would support the design of specific pilot PES schemes in at least 2 watersheds. The process of designing specific PES schemes will build upon the lessons from existing pilot initiatives in other Latin American countries.

35. *Developing carbon projects (2.2.2).* Brazil has been an active participant in the carbon market since its development, but so far projects related to sustainable land use practices have not featured prominently nor has there been significant activity in the North-East. Within the current set of rules of the Kyoto compliant carbon market, there will only be limited opportunities for carbon project development related to sustainable land management activities in the project area. However, the international carbon market is still undergoing a rapid evolution and other important other niche opportunities may emerge. The sub-component will finance capacity building for intermediary NGOs to become facilitators of carbon projects by rural communities. It will also establish a project preparation facility which can support the preparation of selected carbon projects on a demand driven basis, in line with preparation guidelines of the potential carbon buyer. Under this sub-component the project team will liaison with the Brazilian National Development Bank (BNDES) which is the primary Brazilian agency for the implementation of the Clean Development Mechanism (CDM).⁵

Sub-Component 2.3 Developing commodity markets for indigenous and organic products (Total US\$ 0.11 million, GEF US\$ 0.10 million)

36. This sub-component aims to develop commodity markets for products which are associated with environmental service provision, either in their own right as a contribution to the agrobiodiversity in the case of indigenous crops, or as a result of their production methods in the case of organic products.

37. *Developing commodity markets for indigenous products (2.3.1).* The subcomponent will aim to develop local and regional markets for specific indigenous products which have market potential and contribute to the conservation of agrobiodiversity⁶. Specific products include native fruit species, local

⁵ Assigned by the Interministerial Climate Change Commission (CIMGC), the Designated National Authority for CDM in Brazil

⁶The market potential for drought resistant and indigenous products is indicated by a number of successful production and marketing experiences. For example: (i) niche markets for natural fibers (produced in the most arid area of the state of Bahia), including handicrafts produced from natural fibers of sisal and two native species caroá (*Neoglaziovia variegata*, Bromeliaceae) and ariri (*Diplothemium campestre*, Arecaceae) have been exploited largely through export to the USA and Europe, and new initiatives in other states of Northeast Brazil are starting to emulate this experience (<http://www.apaeb.com.br/>); (ii) out of the large pool of native fruits of the Sertão (44 species identified in Paraíba and 57 species in Pernambuco) at least six species have economic potential. Available

varieties of maize and beans, native fibre plants and plants for medicinal use. The subcomponent will finance an interdisciplinary study to assess the market potential and possible market outlets for the main indigenous products, including raw produce as well as processed products. The study will also review the existing technical work on production, utilisation and processing of the main identified products and map the activities of specific actors, including research organisations, NGOs and private companies who are actively involved in the promotion of these markets. The study will issue recommendations on specific project interventions to support market development. It is expected that a key line of intervention will be the capacity building of technical facilitators to provide them the necessary skills to assist farmers in the production, processing and marketing of identified high potential products. The component will also finance the continuing support of these facilitators to selected farmers, who express interests in producing and selling these products. Close relations will be established with research organisations (including Embrapa) and NGOs working in this area.

38. *Developing commodity markets for organic product. (2.3.2)* The sub-component will finance a study to assess the possibilities for the project to support organic production by interested farmers in the target group.⁷ Organic production methods can provide environmental services, in particular by eliminating the application of chemical fertilisers, pesticides and herbicides and thereby reducing downstream water contamination. The study will highlight promising market outlets and identify high potential production areas to supply these markets. As under 3.3.1., facilitators would on a demand driven basis provide training to selected farmers to allow them to produce for and sell in the identified markets. The sub-component activities will be carried out in co-operation and co-ordination with other programmes promoting organic production, including the Ministry of Agrarian Development (MDA).

Implementation strategy

39. The overall approach of the component is to finance enabling activities to develop payment mechanisms for environmental services and markets for products contributing to the conservation of agrobiodiversity. The actual implementation of these mechanisms depends upon specific demands made by the producers to access these various markets. The level of demand by farmers will depend upon the relative costs and benefits associated with the specific land use or production practices. Benefits include the direct benefits in terms of productivity and farm economy, as well as on the level of payments received from the FISP Ecológico or watershed and carbon markets respectively. The FISP Ecológico implementation experience will be monitored closely and amendments to payment levels can be made if it is observed that the initial payment levels are not sufficient to allow farmers to overcome barriers of adoption. Preliminary project targets will have to be revised in line with demonstrated demand.

data on commercialization of the wild fruits in the Central Market of Pernambuco showed that in a series of eight years these fruits were consistently marketed. Moreover, the wild fruits reached higher prices than commercially cultivated varieties of pineapple, banana, papaya and passion fruit. Caju, another native fruit is cultivated on a large scale. References: 1) Gamarra-Rojas, G. at al. Native fruits – from hunger food to delicacy. LEISA Magazine, The Netherlands. March, 2004; and 2) Gamarra-Rojas, G.; Gamarra-Rojas, C.F.L. Conservação e uso de frutíferas nativas de Pernambuco. In: Tabarelli, M.; Silva, J.M.C. da (orgs). Diagnóstico da biodiversidade de Pernambuco. Recife, PE : Secretaria de Ciência, Tecnologia e Meio Ambiente, Editora Massangana, 2002. v.2, cap.41, p.661-673; and (iii) secondary compounds of the native flora, which result from an evolutionary response to natural climatic and physical pressures, and which can have important toxic and medicinal qualities are interesting targets for bioprospecting. The Instituto do Milênio do Semi-árido Project (www.imsear.org.br) is already exploring this market potential.

⁷ Anecdotal evidence suggests that local and regional markets for organic produce are growing in the project area. Agro-ecological fairs (for products from organic and socially responsible production methods) have been started in Pernambuco in 1997 where up to 50 products are sold. In Recife about 150 different products are on sale produced by around 100 families. Nearly 200 families in Pernambuco and Ceará have been involved in the production of agroecological cotton. The federal government is supporting organic production by smallholder farmers through paying a 30% increment over the market value in its National Food Purchase Programme. Further MDA supports organic agriculture through a targeted credit line in PRONAF. Other institutions involved in organic production in the project area with whom the project will seek to collaborate are ESPLAR in Ceará and Centro Sabia and Diaconia in Pernambuco.

40. The component activities will be co-ordinated by an Environmental Incentives Coordinator (EIC) who, within the context of the existing PDHC project management structure, will be based in the Sustainable Production and Marketing Development Unit. The EIC will work closely with the Co-ordinator of component 1 in the design of sensitisation and capacity building programmes and in the selection of demonstration sites. All component activities will build upon the capacity building and organisational strengthening activities financed by the Dom Helder project, which play an important role in facilitating the participation of smallholder farmers in payments for environmental services schemes. The design of the FISP Ecológico and of other service payment schemes will build upon the experience of the existing FISP and on international best practice in payments for environmental services schemes. The EIC will also establish close working relationships with other programmes piloting PES, including – amongst others - the GEF projects in Rio de Janeiro and Sao Paulo, and the Ministry of Environment's PROAMBIENTE programme. Detailed implementation modalities of the FISP Ecológico will be developed during PY 1 and detailed in the manual.

Strategy to ensure systematic learning and scaling up of successful experiences

41. The main strategic elements to ensure systematic learning and scaling up of successful experiences include:

- Regular monitoring of project activities, outputs and outcomes.
- Visits of project staff to selected best practice projects in payments for environmental services systems to ensure incorporation of up-to-date lessons into FISP and market design.
- Close working relationships with other actors active in the same thematic and geographic areas, including the Ministry of the Environment, the Ministry of Agrarian Development, research organizations and NGOs.
- Exchanges at the regional level through seminars with other projects preparing or piloting payments systems for environmental services.
- Participation of project staff in selected regional and international conferences.
- Establish close links with the universities and encourage students to undertake research on the implementation experience and impacts of the piloted PES schemes.

Component 3: Project Monitoring and Evaluation (Total: US\$ 1.0 million, GEF US\$ 0.5 million)

42. The objective of the component is to implement a Project Monitoring and Evaluation (M&E) System, in order to: (i) track changes towards the project development and global objectives, outputs and inputs, and make changes in the project if necessary during implementation, hence providing a basis for decision-making; (ii) promote accountability for resource use against objectives; (iii) provide and receive feedback from stakeholders, and to generate inputs for dissemination of project results and lessons learned. Progress in the fulfilment of the project objectives and outcomes will be monitored in accordance with GEF procedures and will be based on the project logical framework (cf Appendix 2) as an essential tool that will facilitate results-oriented project implementation and sound M&E .

43. *Expected Outcomes:* a monitoring and evaluation and dissemination system for the project implemented, with a view to track progress of the project and to replicating lessons learned and successes, in the semi-arid and other regions of Brazil and Latin America.

44. Operational monitoring and evaluation will build on the existing PDHC M&E system, with adaptation of M&E practices to meet GEF requirements. The M&E system will use participatory mechanism to enable stakeholders to share their feedback. The PMU would be responsible for coordinating monitoring (see PMU structure in Figure 1 of the Project Brief's main text), with other co-executing institutions (PEDs) and partners providing support and technical assistance as necessary. Key groups of stakeholders, particularly those small

farmers living in the demonstration sites, would also participate actively in data collection and other sampling activities to monitor social and environmental aspects of the project.

45. In addition, the M&E system will include efficient mechanisms for data collection, storage and processing, to be made available for project management and stakeholders. It will also include coordination with other projects (particularly the two the GEF/UNDP and GEF/WB Caatinga projects) as well as incorporate lessons learned from the M&E experiences of PDHC and other relevant IFAD projects (in particular the IFAD-financed Low-Income Family Support Project in the Semi-arid Region of Sergipe State).

46. The M&E system will have a two level structure. At the first level it will allow data to be collected and at the second level that it be stored and processed before being returned to the various M&E users. At level one – collection of data – a performance indicators monitoring network will be maintained which is directly linked to the beneficiary public and to the implementation of the components. At level two – storing and processing of data – the structure will include a spatial storage (data bank) and information management system (MIS) that will make possible to track project progress so that timely decisions might be taken on actions piloted locally, as well as on those concerning project management at the state, regional and national levels.

47. The M&E will cover the project area in its various spheres of intervention and planning: production system, smallholding (family), producer group, settlement, association, community, ecosystem/agro-ecosystem, and territory. More detailed environmental monitoring (erosion, carbon sequestration, etc) will be undertaken in at least two of the six project-supported territories, in areas coinciding with the demonstration sites to be financed through project Components 1 (planning and adaptation) and 2 (adoption through incentives).

48. Monitoring activities will start with the baseline studies to be undertaken during PY1, to target land degradation (on its socio-economic and environmental dimensions) in this early state of project implementation. Project evaluations will include external assessment in three stages (ex-ante/baseline, mid-term and ex-post evaluations).

49. Monitoring of impact indicators presented in the Logframe (Appendix 2) will involve: i) direct measuring of specific parameters or factors such as the number of farmers field trials or number of native fruit species present in existing production systems; and ii) undertaking comprehensive surveys, structured interviews and qualitative approaches to determine change in specific factors such as those related with change in farmers attitudes or erosion levels. For such, the preliminary project M&E plan has included (details available on project files) three classes of parameters:

Behaviour change (attitudes, understanding and awareness) and community involvement, including:

- Change in capacity to facilitate and implement sustainable land management systems, including government institutions (Municipalities, MDA, INCRA, States) and non-government organisations (PEDs and other partners);
- Extent to which rural communities, rural schools and society in general are sensitized on land degradation issues and associated needs for land use change;
- Level of satisfaction with the innovations promoted by the project and the adherence of rural producers to the practices of sustainable land management;

Environmental characteristics (erosion/soil, water and biodiversity, at the landscape level):

- % of vegetation cover in project demonstration sites;
- Change Alterations in the use of soil, characterised by the adoption of sustainable land management practices.
- Impact of project activities on soil quality (physical, chemical and biological);
- Impact of project activities on soil erosion;

- Impact of project activities on agro biodiversity;
- Permanence of rainwater on the production systems and on the drainage network;
- Impact of project activities on water quality and on the drainage systems/network;
- Carbon sequestration (in the soil and in the biomass);

Socio economic aspects, including:

- Increased return (\$/ha) in FISP Ecológico sites, through adoption of improved and sustainable land use systems (and associated changes in income level);
- Increase post-harvest value-added from agricultural products (and associated changes in income level);
- Incidence of poverty reduced in the six territories of Project activity;
- Change in farm productivity and production costs;
- Diversification of the production systems;

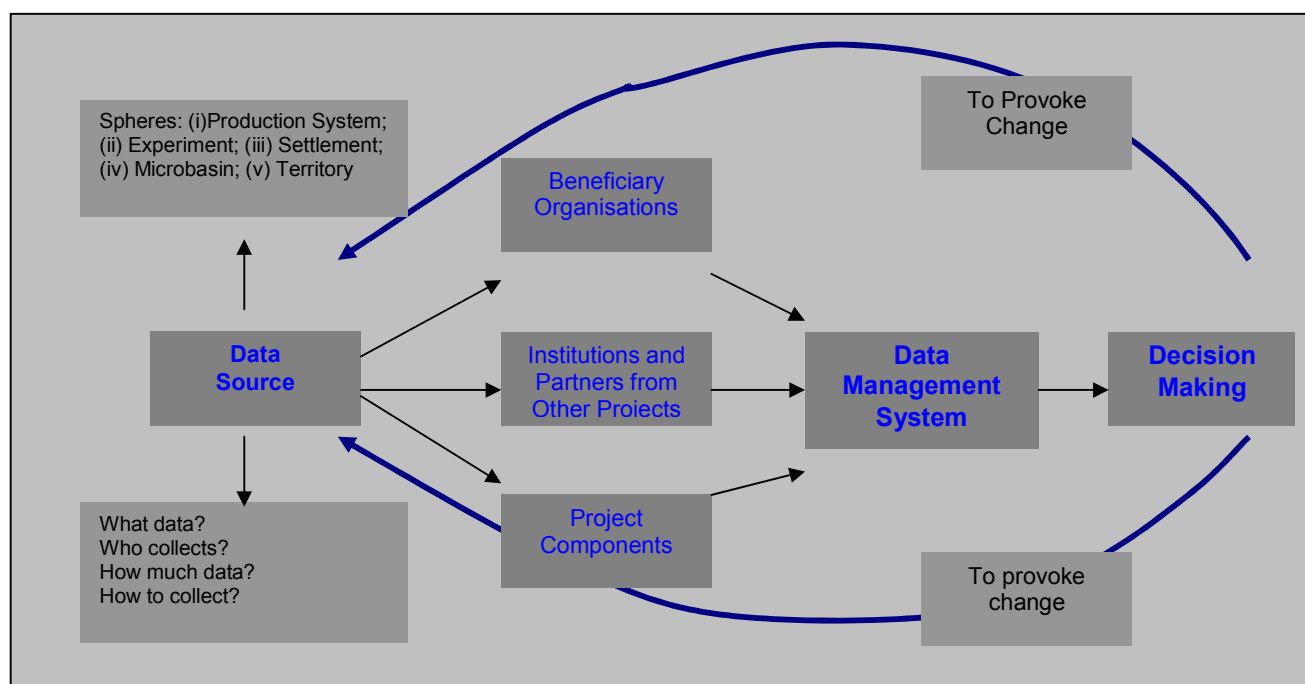
50. The component will be implemented through two sub-components:

51. Sub-component 3.1. Project Monitoring. This subcomponent will cover the following lines of actions: (i) implementing and maintaining a system of physical and financial monitoring (MIS); (ii) monitoring the day-to-day activities of the project based on the selection of indicators and methodologies for the different project dimensions (socioeconomic and environmental) providing periodic reports; and (iii) monitoring project impacts to demonstrate trends in land degradation over the life of project, including environmental, socio-economic, community involvement and behaviour change indicators. All sampling sites will be geo-referenced and indicated in project maps to be produced for each benefited territory. The criteria for selection of sampling sites will take into consideration: (i) the ecosystem's representativeness in the semi-arid Sertão region; (ii) the type of potential environmental service; and (iii) more representative production systems. Monitoring activities will start with the baseline study to be undertaken during PY1, to target land degradation (on its socio-economic and environmental dimensions) in the early state of project implementation.

52. Sub-component 3.2. Project Evaluation. Project impact evaluations will complement the above-mentioned monitoring activities (which would allow the measurement of actual performance with expected performance) by measuring the effectiveness of actual performance (i.e. impact), hence providing feedback and helping improve the effectiveness of the project. It will include: (i) external evaluation in three initial evaluation stages (ex-ante/baseline, PY1), mid-term evaluation (PY3) and final evaluation (ex-post); (ii) participatory evaluation of the activities developed alongside the beneficiary public.

53. The *ex-ante evaluation* (baseline studies) will be based on information obtained in recent baseline studies undertaken for the PDHC, the social and environmental studies carried out during preparation, and other specific surveys TBD during the first year of the project. Baseline information obtained during the early stage of project implementation (ex-ante evaluation) would be compared with progress at a mid-term review and at completion. The *mid-term evaluation* will be based on a two-stage field survey of project territories and respective demonstrations sites, the latter carried out at the ecosystem (e.g. micro-watershed) and agro-ecosystem levels. It will be the first detailed review of progress and a prognosis of the likely effects of the project, and it is intended to identify project design problems and timely solutions. The *ex-post evaluation* will also be based on M&E results and specific surveys (TBD), and it will include a final assessment of the project's effects and their potential sustainability. IFAD supervision missions would review project implementation at least every six months on the basis of field visits, approved annual operating plans and semi-annual progress reports. The content of the progress reports will be agreed at Appraisal and would build on the experiences of the IFAD-supported PDHC and other relevant projects in Northeast Brazil such as the above-mentioned Sergipe project.

54. The following chart provides a general view of the proposed M&E system organizational arrangements:



Component 4. Project Management and Information Dissemination (Total: US\$ 1.9 million, GEF US\$ 0.8 million)

55. The objective of this component is to ensure the politico-institutional and technical-administrative conditions for effective implementation of the project.

56. *Expected Outcomes* include: (i) a participatory management structure in place, able to ensure the achievement of the project's objectives and targets; *specific results*: (ii) the proposed GEF Semi-arid Sertão and the PDHC projects to be fully integrated in their politico-institutional and technical-administrative aspects; (iii) a broader network of partnerships and actions with deeper roots in the project-supported territories; (iv) MDA and partner institutions better trained to support multi-sectorial actions for rural development which promote the reduction of poverty and the prevention and control of land degradation; (v) high degree of ownership by men and women small-holders and actions of the project components implemented in a satisfactory way.

Subcomponent 4.1. Management and Institutional Articulation (Total: US\$ 1.4 million, GEF US\$ 0.4 million)

57. This subcomponent will support technical, administrative and institutional coordination of the project. The project will build on the existing PDHC's management structure, which will be slightly scaled-up for administration (procurement, financial management and reporting) of GEF resources and oversight of GEF-funded activities. As in the current PMU of the PDHC, the proposed PDHC-GEF Sertão joint PMU will: (i) have the role of administration, technical coordination and politico-institutional liaison, and of monitoring and supervising the Project; (ii) be a structure with administrative and financial autonomy to manage the two projects. It should be noted that the model of existing PDHC administration and management is an important and innovative one under the models for public administration in Brazil.

58. Following the PDHC Project model, the political-institutional management structure of the project will take place at three levels (see Figure 2 in Section IX.C of the Project Brief's main text):

i) a *Regional Steering Committee*, to deliberate on the strategic guidelines, the plans of work and any significant alteration to progress in implementing the project, and to act to overcome impasses, via negotiation, with the stakeholders involved in the process;

ii) *State Technical Chambers* (one Chamber per State, currently being created by SDT, and to be affiliated with the State Councils for Sustainable Rural Development), to articulate and monitor programs and actions in the sphere of the strategies for territorial development delineated regionally and to act to give value to the specific circumstances of the State; and

iii) *Territorial/ Local Committees*, to plan, monitor, evaluate and articulate the implementation of the project and respective plans and other actions which seek to develop the territory. It is worthwhile stressing that at the deliberative level in the communities/settlements and territories, the men and women small-holders who are the beneficiaries of the Project have wide representation, with a local social control body being a body of direct democracy in this context.

59. This process of participatory management, associated with M&E and exchange of experiences with other GEF Projects and other development programs will constitute fundamental input in supporting the efficacy of the institutional arrangement for the implementation of project actions. This practice should lead to the systematization of model examples for public action, feeding back the broadening of the capacity to make proposals by the various agents involved in the cross-sectoral process.

Subcomponent 4.2. Project Information Dissemination (Total: US\$ 0.5 million, GEF US\$ 0.4 million)

60. This subcomponent will support project information dissemination, sharing results both within and outside the project, providing the basis for knowledge transfer and, subsequently, increasing the potential for repeating project lessons and transferring experience at state, national and international levels. It would include the sharing of information both within and outside the project, involving those beneficiaries, people, communities and institutions, governmental or not, who are interested in the project and who can learn from and make use of the experience, expanding it and making the idea useful to the public throughout the semi-arid *Sertão* and beyond, particularly to other Latin American countries with similar socio-economic and semi-arid xeric systems. Information dissemination among the producers/communities undertaking on-farm trials (subcomponent 1.2) and the remaining producers/communities of the project area would be supported under Component 1 (activities such as field days and trips have been budget for such). Dissemination and exchange of experiences and best practices on PES would be supported under Component 2.

61. *Expected Outcomes* include: (i) Lessons learned systematized and project information disseminated in the Northeast, and at a national and international level; (ii) Target public sufficiently informed and social control exercised in adequate conditions; (iii) Important institutions and agents for rural development well versed about the Sertão Project, as well as about national programs and projects relevant to GEF in Brazil who work with project themes and/or in the know, collaborate and are linked into the Sertão Project; (iv) Lessons shared with other GEF projects in Brazil and abroad.

Appendix 5. Project Costs (US\$'1,000)

Project Cost By Component/Subcomponent	Total Costs	MDA ^(*)	IFAD ^(**)	Beneficiaries	GEF	%
1. Building Capacity for SLM and Increasing Environmental						
1.1. Capacity Building and Environmental Education						
1.1.1. Training of Facilitators	2,407.5	781.0	646.1	-	980.4	16%
1.1.2. Environmental Education	248.9	-	-	-	248.9	4%
1.1.3. Production of Didactic Material	628.9	100.6	-	-	528.3	9%
<i>Subtotal Capacity Building and Environmental Education</i>	3,285.3	881.6	646.1	-	1,757.5	30%
1.2. Participatory Planning and Support to Adaptive Land Management Practices						
1.2.1. Planning for Sustainable Land Management	2,267.4	1,009.3	807.6	-	450.5	8%
1.2.2. Development of SLM Practices	722.1	45.4	-	-	676.7	11%
1.2.3. Technical Training in Support of SLM Practices	128.9	-	-	-	128.9	2%
<i>Subtotal Participatory Planning and Development of Sustainable Productive Systems</i>	3,118.4	1054.7	807.6	-	1,256.1	21%
Subtotal Building Capacity for SLM and Increasing Environmental	6,403.7	1,936.3	1,453.7	-	3,013.7	51%
2. Environmental Incentives						
2.1. Providing incentives for environmental services provision from sustainable land use	5,649.4	1,088.3	3076.7	61.8	1,422.5	24%
2.2. Developing markets for environmental services	70.6	9.6	-	-	61.0	1%
2.3. Developing commodity markets for indigenous and organic products	111.9	5.9	-	-	106.0	2%
Subtotal Environmental Incentives	5,831.8	1,103.8	3,076.7	61.8	1,589.5	27%
3. Project Monitoring and Evaluation						
Monitoring and Evaluation	960.5	323.3	96.5	-	540.7	9%
Subtotal Monitoring and Evaluation	960.5	323.3	96.5	-	540.7	9%
4. Project Management and Information Dissemination						
4.1. Project Management and Institutional Coordination	1,375.2	825.9	114.4	-	434.9	7%
4.2. Information Dissemination of Project	517.8	153.9	-	-	363.8	6%
Subtotal Project Management and Information Dissemination	1,893.0	979.9	114.4	-	798.7	13%
Total Costs	15,089.0	4,343.3	4,741.3	61.8	5,942.5	100%

(*) Government counterpart (**) Government counterpart (US\$ 3,974,000 in cash)

(**) Co-finance from PHDC (IFAD loan)

Project Cost By Category	Total		For. Exch.	Local (Excl. Taxes)	Duties & Taxes
	Amount	%			
I. Investment Costs					
A. Investment categories					
1. Goods					
Vehicles	124.4	0.8	24.8	18.7	80.9
Equipments	177.6	1.2	17.6	26.6	133.4
Subtotal Goods	302.0	2.0	42.4	45.3	214.3
2. Consulting Services ,Studies and Technical	5,843.8	38.7	-	935.0	4,908.8
3. Incentive Fund (FISP)	5,339.0	35.4	-	-	5,339.0
4. Training and Workshops	2,169.2	14.4	-	-	2,169.2
Total Investment Costs	13,654.1	90.5	42.4	980.3	12,631.4
II. Recurrent Costs					
A. Recurrent costs categories					
1. Salaries	369.4	2.4	-	92.4	277.1
2. Subsistence Allowances	353.8	2.3	-	38.9	314.9
3. O & M	711.7	4.7	-	78.3	633.4
Total Recurrent Costs	1,435.0	9.5	-	209.6	1,225.4
Total PROJECT COSTS	15,089.0	100.0	42.4	1,189.9	13,856.8

Project Cost By Year

	2005	2006	2007	2008	2009	2010	Total
Total PROJECT COSTS	1.487,3	3.043,3	3.170,7	3.209,5	2.886,5	1.291,7	15.089,0
Total Investment Costs	1.346,7	2.760,6	2.885,2	2.921,1	2.595,2	1.145,3	13.654,1
Total Recurrent Costs	140,6	282,7	285,5	288,4	291,3	146,4	1.435,0
Financing Sources	1.487,3	3.043,3	3.170,7	3.209,5	2.886,5	1.291,7	15.089,0
GEF	566,9	1.211,0	1.343,6	1.378,1	1.060,8	382,2	5.942,5
FIDA	469,4	941,2	943,5	948,2	957,7	481,3	4.741,3
MDA	450,9	884,9	868,4	864,7	852,4	422,0	4.343,3
Beneficiários	-	6,1	15,3	18,6	15,6	6,3	61,8
% of total project costs	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
GEF	38,1%	39,8%	42,4%	42,9%	36,8%	29,6%	39,4%
FIDA	31,6%	30,9%	29,8%	29,5%	33,2%	37,3%	31,4%
MDA	30,3%	29,1%	27,4%	26,9%	29,5%	32,7%	28,8%
Beneficiários	0,0%	0,2%	0,5%	0,6%	0,5%	0,5%	0,4%

(*) IFAD loan: PDHC Project

(**) Government counterpart (**) Government counterpart (US\$ 3,974,000 in cash)

Project Cost By Category/Source of Financing

Items	GEF	IFAD (*)	MDA (**)	Beneficiaries	Total	
1. Goods	256.7		45.3		302.0	2.0%
	85.0%		15.0%		100.0%	
2. Consulting Services	1,626.2	1,018.6	1,277.9		3,922.7	26.0%
	41.5%	26.0%	32.6%		100.0%	
3. Training and Workshops	2,656.4	646.1	787.7		4,090.3	27.1%
	64.9%	15.8%	19.3%		100.0%	
4. Incentive Fund (FISP)	1,175.0	3,076.7	1,025.6	61.8	5,339.0	35.4%
	22.0%	57.6%	19.2%	1.2%	100.0%	
5. Recurrent Costs	228.2		1,206.8		1,435.0	9.5%
	15.9%		84.1%		100.0%	
Total PROJECT COSTS	5,942.5	4,741.3	4,343.3	61.8	15,089.0	100.0%
	39.4%	31.4%	28.8%	0.4%	100.0%	

(*) IFAD loan: PDHC Project

(**) Government counterpart (US\$ 3,974,000 in cash)

Appendix 6: Land Degradation and Agricultural Sustainability Issues in the Project Area ⁸

1 - Introduction

1. The proposed Sustainable Land Management in the Semi-Arid Project shall cover the six **territories**⁹ of Dom Helder Câmara Project (PDHC)'s current implementation phase, that includes six states of Brazil's northeast semi-arid region, namely Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco and Sergipe. In each one of these territories, the area of coverage is concentrated in approximately 170 agrarian reform settlements and smallholding communities spread over the group of territories. The six territories are the following (see **Map 1** in the main text of this document): São João do Piauí (State of Piauí), Sertão Central (Ceará), Sertão do Apodi (Rio Grande do Norte), Cariri Paraibano (Paraíba), Sertão do Pajeú (Pernambuco), and Sertão Sergipano do São Francisco (Sergipe).

2. The agricultural sustainability review of these territories was done based on the existing knowledge of those municipalities, on literature data, on the information provided by PDHC Project and during expedite field visits. More detailed fieldwork will be carried out between the current phase and the project appraisal phase. The compiled information is mainly based on: i) municipal statistical data provided by the IBGE (1999); ii) literature data (see endnote references); iii) different mapping and descriptions on where those municipalities are located; iv) information collected and made available by the PDHC Project, including information collected during the preparation phase, and during its two years of operations; and v) during the aforementioned expedite field visits. Data on the six territories are shown on **Tables 1** and **2**, and a summary of the environmental status of these territories is shown on **Table 3**.

3. All six territories include areas framed within a large landscape unit named Depressão Sertaneja (Depression of the *Sertão*), according to the Northeast Agro-ecological Zoning (Silva et al. 1993). This is the most typical unit in the northeast semi-arid region, comprising approximately one third of the region. Characterized by a pediplaned surface, topography ranging from smooth-wavy to wavy with a residual topography that witnesses the intense erosion cycles it has undergone. Clayish, shallow and rocky soils are predominant, but there are also areas of sandy and deep soil. Almost all of it lays on the crystalline shield with little underground water. Satellite images (Miranda and Coutinho, 2004) were used to observe the topography and soil cover in each territory.

4. In addition to the Depression of the Sertão, the territories include part of other large landscape units. In Piauí, it includes part of the Low and Intermediary Plateaus; in Rio Grande do Norte, it includes part of the Carstic Surfaces; in Paraíba and Pernambuco, they include part of the Borborema Plateau and of the Low Hills and Mountain Area. As each one of these other units occurs almost exclusively in one territory, they will be dealt with in their respective descriptions.

2- Degradation of the Semi-Arid Sertão

5. The main **types** and associated **causes of land degradation** which affect the structural and functional integrity of the ecosystems of the Caatinga are:

- **Erosion** caused mainly by i) deforestation of Caatinga for annual cropping or livestock, particularly in hilly areas; ii) overgrazing (pastures and rangeland), and iii) inappropriate agricultural practices;

⁸ Prof. Everardo V.S.B Sampaio & Maria do Socorro B. Araujo

⁹ The concept of **territory** adopted by the Project is the one defined and adopted by the Ministry of Agrarian Development (MDA), where territories are clusters of municipalities largely defined on cultural and socio-economic similarities. In the project area, each territory is made up of an average of 7 municipalities.

erosion is more severe when related to intense rainfall in hilly agricultural areas (during a short annual rainfall period) with low vegetation cover;

- **Elevation of the groundwater table** caused by excessive irrigation from groundwater;
- **Salinization** caused by irrigation using water of a high salinity, the lack of a drainage system in irrigated areas, the elevation of groundwater table in soils rich in salts (an estimated 2.5% of the actual and potential agricultural areas of rural settlements in Northeast Brazil is affected by salinization)¹⁰;
- **Loss of organic material and nutrients**, arising from using them up when raising crops, through erosion, leaching, and slash and burn when preparing for planting; and
- **Deforestation** caused by the increased pressure on land for pasture or subsistence agriculture, leading to a reduction in the fallow periods (shifting agriculture); during this transition process from forest into agricultural land, forest biomass is removed for use as fuelwood (smallholdings) and charcoal.

6. These causes of degradation vary from place to place throughout the vast expanse of the semi-arid (approx. 900,000 km²). One of the ways to approach such variability is to incorporate the main agricultural exploitation systems into landscape modules. Agriculture occupies 10 to 20% of the area and is mostly of the short-cycle shifting cultivation type (maize, beans and cotton) on the slopes and drier upper areas and of permanent or semi-permanent type in the valleys. Permanent crops occurs almost exclusively in the more humid areas of the valleys (banana and other fruit crops), and in the borders of the region where sandy soils are dominant (cashew tree crops). Animal husbandry (predominantly bovines, but also caprines and ovines in the drier areas) covers almost the whole territory. For grazing, the native vegetation, a mix of shrubs and small trees, is used, with more animals than the recommended carrying capacity. Planted pastures occupy a small proportion of the whole semi-arid region, but small plots of fodder grasses and *Opuntia* cactus are common. Animals feed from the harvest leftovers. Native vegetation is a mosaic of plots at different phases of regeneration after slash and burning.

7. **Soil erosion** was measured in only a few places in the northeast. Soil loss in areas covered with native vegetation are quite low (<55 kg ha⁻¹ year⁻¹). The specific erosion in the semi-arid portion of São Francisco river basin was 72 kg ha⁻¹ year⁻¹ (Leprun & Silva 1995). The traditional tillage, down the hills, lead to much greater losses, reaching up to 130 Mg ha⁻¹ year⁻¹; however, with great variation. The adoption of conservative practices tends to reduce losses, but their effect varied depending on the adopted practice.

8. The **loss of organic matter and nutrients** from the soil is a result of the removal of the crops, erosion, leaching, and burning in the shifting cultivation cycle. The soils in the semi-arid region are generally deficient in N and P, and crops respond to fertilization with both of these nutrients, but in a varied manner, interacting with water availability (Sampaio et al., 1995). Other nutrients do not seem to be limiting factors, but, except for K, they have not been further studied. The areas preferentially used for agriculture, such as lowlands and montane areas with higher rainfall, generally have better fertility than the extensive slope areas used in shifting cultivation.

9. **Salinization** and flooding are quite common problems in irrigated areas. They are assumed to be severe problems, but there is little information on their actual importance (Oliveira 1996). Comparing the situation of the semi-arid northeast with Sahelian Africa, Leprun & Silva (1995) concluded that the northeast is quite vulnerable because drainage water increases their Cl and Na concentrations in more than 100 times, and in 10-20 times for other elements, after passing through the 1m superficial layer.

10. Almost no information is available on **crusting and compacting** in the northeast semi-arid. Leprun & Silva (1995) concluded that the status of the soils in the northeast is better than in semi-arid Africanl, due to

¹⁰ Source: MMA, NAP for Brazil, August 2004, referring to Sparovek, G. *A qualidade dos assentamentos da reforma agrária brasileira*. São Paulo: Páginas & Letras Editora e Gráfica, 2003.

their organic matter content (0.5 to 4.0%, but being more common around 2%), their biological activity, permeability (more common from 50 to 100 mm.h⁻¹), height of the imbibition column and fragmentary structure of the surface horizon. In general, they do not tend to form surface crusts, and the formed crusts can be reverted with soil resting. They also tend not to compact and usually do not present high densities, even the heavier ones, usually not exceeding 1.4 g cm⁻³.

11. The **water storage capacity** of the semi-arid soils has not been much investigated, except in some very specific studies, and cannot be directly derived from the soil classes and maps based on them. The simplest available indicator is the rainfall annual average and potential evapotranspiration ratio. Because ETP does not vary too much throughout the semi-arid (1500-2000 mm year⁻¹), precipitation averages have been used both as an indicator of availability, and as an indicator of the delimitation of the area. They vary from approximately 300mm to 800 mm or 1000 mm annually, established as the upper limit for the semi -arid and, as they represent a fraction of the ETP, they indicate deficiency over the year. Therefore, taking only into account the presence of rainfall water and the losses due to ETP, without taking redistributions into account, the plants would have their growth limited because of water deficiencies during most of the year, therefore restricting their agricultural production capacity.

12. Management systems with water redistribution in a neighboring field or neighboring fields can also increase the availability of water in the receiving sites, even if it diminishes in the catchment sites. In arid and semi-arid areas in the world, several systems are used, and the proportion between catchment and reception areas depends on the level of water deficiency and runoff coefficients (Silva & Porto 1982, Reij et al. 1988).

3- Territory area in each State

3.1- São João do Piauí Territory (State of Piauí)

(Brejo do Piauí, Canto do Buriti, Capitão Gervásio Oliveira, Jurema, Pajeú do Piauí, Pedro Laurentino, Ribeira do Piauí, São João do Piauí and São Raimundo Nonato municipalities).

13. The area in the territory presents a relatively low population density and is quite far from the main consumer markets, with difficult access via scanty and poor quality roads. The whole area is located in the sedimentary basin that comprises most of Piauí State. Southbound and eastbound municipalities are in the Depression of the *Sertão*, while those located westbound are part of the Low and Intermediary Plateaus. These plateaus are characterized by forming extensive flat areas surrounded by steep slopes and carved valleys. The Depression, in these municipalities, forms extensive flat areas dotted by residual relieves and crossed by the drainage network.

3.1.1 – Soil, vegetation, precipitation

14. In general the soil is deep, tending to be sandy and of low natural fertility. The soils in the plateaus and in the flat areas are usually Latosols, deep and well drained. In the slopes, Ltholic Neosols, shallow and rocky soils, can be found, or argisols, also shallow, poorly drained and containing impermeable material(fragipans and duripans)). In lower parts of the topography, excessively drained sandy areas can be found. All of them are acidic and of low fertility. In some of the lower parts within the Depression, there are Planosols that are not very deep, poorly drained, and may have average fertility, but also salinity problems.

15. They are covered with a transition vegetation between *caatingas* and *cerrados*. The vegetation is more typical of the *caatingas*. The annual average rainfall is approximately 800 mm, and it tends to grow from east to west. The rainfall season concentrates from October to April. There is underground water availability throughout this sedimentary area, and in many locations it makes up extensive water tables with high discharge rate wells.

3.1.2- Agricultural yield and usage potential

16. Agricultural production concentrates in the extensive raising of bovines, caprines, and ovines on the plateau and flat areas of low water availability, and in the production of maize and beans in the valley areas (Table 1). Among the permanent crops, cashew tree for cashew nut production stands out.

17. The main problems of sustainability of the exploitation are the low soil fertility, and the erosion in the slopes that are cultivated. Low fertility is general, especially phosphorus deficiency and acidity. These can be corrected with fertilizers and *liming*. Appropriate management may help reduce system losses, by having nutrients recycled. In most of the area, both the extensive plateaus and the lower flat areas with well-drained soil, there are no major erosion problems (Table 3). Problems occur on the slopes of the plateaus, where they may become quite severe with the presence of deep gully erosion, and in the valleys, where agriculture extends up to the border of the water streams. In a few lower areas, especially in the planosol areas, salinization problems might occur but, in general, the topography and the soil types favor the draining of waters with low salinity.

3.2- Sertão Central Territory (State of Ceará) (Banabuiú, Chororó, Quixadá and Quixeramobim municipalities)

18. Human occupation of this territory is high, reaching the semi-arid Sertão average. It is an old occupation that started in the early 18th century. The municipalities of the *Sertão Central* Territory are all located in the Depression of the *Sertão*, except for the presence of the Quixadá residual hills, which imprints an irregular topography to the Central Depression area of Ceará. This area shows a low vegetation cover. Getting away from Quixadá hills, the areas are then dissected, extending in the direction of the Quixeramobim and Banabuiú rivers that drain into Jaguaribe river, and of the Choró river that drains into the Atlantic Ocean.

3.2.1 – Soil, vegetation, precipitation

19. Planosols are the dominant soils in the long almost flat platforms – they are shallow and poorly drained with a contrasting sandy texture on the surface layer and clayish texture in the sub-superficial layer. Luvisols – also not very deep, rocky, poorly drained, and of clayish texture - are more common on upper surfaces and high slopes, mixed with Litholics, sometimes of lighter texture in lower slopes. At the bottom of the open valleys there are Fluvic Neosols, usually planosolic. Fluvic Neosols and Planosols may have salinity problems.

20. The vegetation cover is severely degraded, with extensive areas of exposed soil. It is one of the most uncovered areas of the semi-arid region, only similar to the recognized desertification area of Irauçuba, northwest of the very same State, although it is larger. This is a result of the frequent shifting cultivation-related slash and burn activities and the production of fuelwood and charcoal. Erosion has led to the growing siltation of water reservoirs.

21. Precipitation is approximately 750 mm, concentrated from February to May, with significant temporal and spatial variability. The contribution of the three more rainy months to the yearly total is usually high, which indicates a poor distribution over the year. There is also very low availability of underground water. On the other hand, the area contains a considerable number of dams, a few of them among the largest in the region.

3.2.2- Agricultural yield and usage potential

22. The traditional use of the area has been extensive animal husbandry, mainly bovines and ovines, and annual crops, beans and maize, mainly in the valleys (Table 2). Milk production is relatively high, as this is one of the areas that supplies milk to the State. It used to be a perennial cotton production area but

production is negligible now-a-days due to low prices and infestation of bollweevil (*bicudo*). Annual cotton competes with maize and beans in temporary farming (Table 2).

23. The principal sustainability problems are the degradation of pasture with low vegetation cover and excessive animals, the erosion produced by shifting cultivation on the steeper slopes, and the risk of salinization in some areas of the valleys. In order to prevent degradation and recover the soil, a change should be made to animal and pasture management. The animal load should be reduced, and vegetation cover increased. Adopting the usual conservation practices can reduce the risk of erosion.

3.3- Apodi Territory (State of Rio Grande do Norte) (Apodi, Caraúbas, Felipe Guerra, Gov.Dix Sept Rosado, Umarizal and Upanema municipalities).

24. This was an area of low human occupation up to some years ago. A recent growing occupation has resulted in major devastation of the native vegetation. The exposure is similar to that of the Sertão Central Territory (Ceará), only comparable to the recognized desertification area of Irauçuba. Most of Apodi Territory municipalities are framed within the Carstic Surfaces of the Apodi plateau, of limestone origin with, a flat to smooth-wavy topography.

3.3.1 – Soil, vegetation, precipitation

25. The carstic formation originates soils that are highly fertile and have good physical characteristics, usually deep and well drained Latosols of average texture in the flatter areas; sometimes there are also Argisols in the more wavy topographies, and Fluvic Neosols that are moderately drained at the bottom of open valleys. There are also Cambisols – shallower than the preceding classes and of a more clayish texture, also in the flatter areas – and Vertisols on the borders of the open valleys. In some locations, deep, excessively drained, acid and naturally low fertility sandy soils accumulate.

26. The dominant vegetation cover is the *caatinga*, which is quite degraded as a result of the intensive extraction of fuelwood (Tables 1 and 2).

27. Precipitation is approximately 550 mm, going from January to June. As usual in the limestone areas, the river network is little organized. Apodi and Carmo rivers drain the area. Underground water is available in localized water aquifers, sometimes with heavy waters. There are few surface reservoirs.

3.3.2- Agricultural yield and usage potential

28. The dominant activity is extensive animal husbandry, mainly caprines, bovines and ovines, integrated with maize and bean crops (Table 2). There is also some production of annual cotton and cashew nuts. There is a reasonable production of bee honey, for which the presence of native vegetation is important (Table 2). The degradation of the vegetation, including that in the areas used for grazing, is the top threat to exploitation sustainability. The presence of fertile soils facilitate the establishment of recovery programs. Underground water is a potential to be exploited.

3.4- Cariri Territory (State of Paraíba) (Camalaú, Coxixola, Monteiro, Prata, São Sebastião do Umbuzeiro, Soledade and Sumé municipalities).

29. The territory is moderately populated, and the population is more concentrated in the urban area. Most of the municipalities of Cariri Territory are framed within the Depression of the *Sertão* in the border of Pernambuco. Westbound municipalities also extend through the Low Hills and Mountain Areas, and those eastbound and northbound extend through Borborema Plateau, the eastbound ones being intensely dissected. In this part of the Depression of the Sertão, flat surfaces of an undulated topography with residual elevations can be found. Soledade municipality is fully located in the Borborema Plateau, located in the western Curimataú micro-region, and far from the other municipalities in the territory. This municipality has an

extensive area of Halomorphc Planosol, which is typical for this area, with a number of restrictions regarding cultivation and problems related to water use.

3.4.1 – Soil, vegetation, precipitation

30. Luvisols are the dominant soils – they are shallow, moderately drained, with a clayish texture, rocky and of high natural fertility, associated with Litholic Neosols, which are also shallow, of a median sandy texture, rocky and of natural average fertility. Fluvic Neosols occur in the bottom of the valleys – they are moderately drained, of indiscriminate texture and average/high natural fertility.

31. Most of the area is covered with native *caatinga*, which is relatively dense, but predominantly composed of shrubs and small trees. Although it is also logged for fuelwood and shifting cultivation, it has a good soil cover.

32. The average annual precipitation in the region varies from 400 mm to 750 mm, extending from January to May. There is little underground water availability, and the water is usually saline. There are several variable-sized dams in the area.

3.4.2- Agricultural yield and usage potential

33. Regarding soil use, extensive animal husbandry - bovines, caprines and ovines – are predominant, but there is also some short-cycle crop exploitation such as maize and beans (Table 1). It is a low to medium potential area with a rocky, shallow soil, subject to erosion. The lack of water imposes many limitations.

3.5- Sertão do Pajeú Territory (State of Pernambuco)

(Afogados da Ingazeira, Caraíbas, Flores, Igaraci, Ingazeira, Quixaba, Santa Teresinha, São José do Egito, Serra Talhada, Sertânia, Solidão, Tabira, Triunfo, and Tuparetama municipalities).

34. Human occupation is the greatest among the territories and evenly distributed between rural and urban areas. The municipalities of *Sertão do Pajeú* Territory stretch from the Low Hills and Mountain Areas that border Paraíba state on the north, east and west, at the cul-de-sac of the upper Pajeú and Moxotó river basins. From its steep contour limits, altitudes reaching 800 m, the territory stretches south until Depression of the *Sertão* – area of less rugged topography, although rarely flat.

3.5.1 – Soil, vegetation, precipitation

35. Luvisols are the dominant soils, which are of variable depth, usually shallow, tending to Litholic Neosols, which are even shallower, rocky and pebblish. There are also Regolithic Neosols, of variable texture and depth, usually sandy and shallow. In the higher altitudes Latosol patches can be found; usually of an eutrophic nature, mixed with Argisols. Spatial variation is the greatest among territories.

36. Most of the area is covered with native *caatinga* (Table 1), which supports extensive animal husbandry. Vegetation is more abundant on the east side of the territory, where most of the municipalities are located, rather than on the west side.

37. Precipitation tends to decline from the higher to the lower areas, values declining from 1000 mm to 500 mm. The topography and the drainage net promote the existence of a number of small and big dams that perennialize the big rivers. Underground water is scarce and usually saline. Dammed up water allows irrigation in the valleys.

3.5.2- Agricultural yield and usage potential

38. The economy of the region is diversified, but mainly concentrates in extensive livestock production – bovines, caprines and ovines (Table 2). Another growing animal husbandry activity is poultry, which is more frequent in São José do Egito. Short-cycle farming stands out, especially maize and bean crops (Table 2). Among the territories, this is the one that presents the greatest diversity of permanent crops (cashew, banana, guava), although these occupy a small proportion of the municipal areas.

39. This area presents several sustainability problems. Erosion is strong in the more inclined places. There is a risk of salinization in the areas irrigated with dam water. Soil fertility has declined with the ongoing use of agriculture, including burnings and losses due to erosion (Table 3). Watershed silting is a fact recognized by the local population.

3.6- Sertão Sergipano Territory (State of Sergipe)

(Canindé de São Francisco, Gararu, Monte Alegre de Sergipe, Nossa Senhora da Glória, Poço Redondo, and Porto da Folha municipalities).

40. Human occupation of the territory is similar to that of most of the semi-arid region. All municipalities are located in the Depression of the *Sertão*. The topography of the area goes from almost flat on the west side to more undulated on the east side.

3.6.1- Soils, vegetation and precipitation

41. The soils are highly diversified. On the east side, there is an enormous patch of heavy, clay 2:1, Luvisols and Vertisols, the depth of which goes from shallow to medium. Most of Projeto California (California Project) was deployed on these soils. Eastwards, patches of sandy soils are found – generally Regolith soils interspersed with Litholic Neosols, with rocky outcrops. On the far east there are also pebbly and rocky soils. The contrasting soils also display contrasting characteristics of fertility and tendency to salinization. Irrigation of the clayish soils has to be carefully monitored, not to preclude their future production. In the sandy soils, fertility and tendency to salinization are low.

42. This is an area of low native vegetation cover of shrubs and trees. Part of the original cover was replaced with herbaceous vegetation that serves as pasture for dairy animals. Imported grass was planted in another portion of it. A significant proportion of these native and planted grazing areas is degraded, but the soil coverage seems to be reasonable. From the original strip of riparian vegetation along the São Francisco river, very little is still left.

43. Precipitation is approximately 500 mm annually, and it tends to grow from west to east. Rainfall season goes mainly from March through July with reasonable distribution over these months, but there are also some showers outside this period of time, except in very dry years. Rainwater drain into the São Francisco river, which delimits the northern area. Small dams are common, but medium- and large-sized dams are infrequent. Underground water is scarce. Properties along São Francisco river count on this permanent source of excellent quality water for irrigation purposes.

3.6.2- Agricultural yield and usage potential

44. Properties in the area stand out for their high proportion of planted grass, contrasting with the low proportion of shrubby and arboreal native vegetation. Buffel grass (*Cenchrus* sp. *C. ciliaris*) is predominant in the planted pastures. This area has been traditionally devoted to cattle raising for milk production (Table 1). Currently, most of the herd is composed of good quality half breeds of black and white Holstein Frisians and Indian cattle.

45. Environmental problems occur more on a localized than in a general fashion. Erosion tends to be minor in most of the flat areas, but areas of degraded pasture, even in not very significant slopes, show signs of surface erosion, and there are farming areas with slopes exceeding 50%. Irrigation of the heavy soils in Luvisol zones tends to produce salinization and soil compaction. These problems tend not to occur in most of

the areas. On the other hand, fertility is high in these heavy soils, and low in several patches of very sandy soils. The recovery of pasture degradation is the main task to improve the environmental status, including the expansion of the tree cover and the reduction of animal density. An incentive to fodder production for the dry periods – either planting *Opuntia indica* cactus or producing hay or silage – would place less pressure on the grazing areas.

Bibliography

Cavalcanti, A.C.; Silva, F.H.B.B.; Silva, A.B.; Araújo Filho, J.C.; Leite, A.P. Zoneamento Agroecológico do Nordeste, - Diagnóstico do Quadro Natural e Agrossocioeconômico. Vol. 2. Documentos Número 80. EMBRAPA/CPATSA/ORSTOM-CIRAD. 1993. 387p.

IBGE – Instituto Brasileiro de Geografia e Estatística - Produção da Pecuária Municipal 1999; Produção Agrícola Municipal 1999; Produção da Extração Vegetal e da Silvicultura 1999; Malha municipal digital do Brasil: situação em 1997. Rio de Janeiro: IBGE, 1999. Available at <http://www.ibge.gov.br/cidadesat/default.php>

Leprun, J.C. & Silva, F.B.R. Les dégradations des sols en régions semi-arides au Brésil et en Afrique de l'Ouest. Comparaison et conséquences. Suggestions sur leurs réhabilitations respectives. In: Pontanier, R.; M'Hiri, A.; Akrimi, N.; Aronson, J.; Le Floch, E. L'homme peut-il refaire ce qu'il a défait? Paris, John Libbey Eurotext. 1995. p. 267-291.

Ministry of Environment (Secretariat of Water Resources). National Action Program to Combat Desertification in Brazil (UNCCD NAP for Brazil). *Programa de Ação Nacional de Combate à Desertificação PAN-Brasil*. Brazil, MMA, August 2004, 2004. 225 p.

Miranda, E. E.; Coutinho, A. C. (Coord.). Brasil Visto do Espaço. Campinas: Embrapa Monitoramento por Satélite, 2004. Available at <<http://www.cdbrasil.cnpm.embrapa.br>>. Accessed on 22 jun. 2004.

Oliveira, L.B. Avaliação da salinização dos solos sob caatinga no nordeste do Brasil. In: Alvarez V., V.H.; Fontes, L.E.F.; Fontes, M.P.F. O solo nos grandes domínios morfoclimáticos do Brasil e o desenvolvimento sustentado. Viçosa, SBCS - UFV. 1996. p.113-123.

Reij, C.; Mulder, P.; Begemann, L. 1988. Water harvesting for plant production. Washington, The World Bank. 123p. (Technical Paper 91).

Sampaio, E.V.S.B.; Salcedo, I.H.; Silva, F.B.R. Fertilidade de solos do semi-árido do Nordeste. Reunião Brasileira de Fertilidade dos Solos e Nutrição das Plantas, 21, Petrolina, 1994. Anais do Simpósio: Fertilizantes: insumo básico para a agricultura e combate à fome. Petrolina, EMBRAPA-CPATSA/SBCS. 1995. p.51-71.

Silva, A.S. & Porto, E.R. Utilização e conservação dos recursos hídricos em áreas rurais do trópico semi-árido do Brasil. Tecnologias de baixo custo. Petrolina, EMBRAPA-CPATSA. 128P. 1982. Documentos 14.

Silva, F.B.R.; Riché, G.R.; Tonneau, J.P.; Souza Neto, N.C.; Brito, L.T.L.; Correia, R.C.;

Table 1. Areas of permanent agriculture, short cycle agriculture, fallow, native pasture, planted pasture, native forest and rural properties in the territories included in the current implementation phase of the PDHC

Territory	Area (km²)	Project area: rural settlements and communities (ha)	permanent agriculture (ha)	short cycle agriculture (ha)	fallow (ha)	native pasture (ha)	planted pasture (ha)	native forest (ha)	rural properties (ha) (*)
São João do Piauí	16,303	139,557	14,519	36,030	13,273	128,152	16,916	287,415	507,445
Sertão Central	7,354	44,005	3,212	37,375	33.384	129.016	5.487	154.258	437.410
Apodi	5,290	48,007	14.225	39.088	16.697	120.673	1.669	158.486	329.659
Cariri Paraibano	3,877	31,349	733	24.271	8.371	127.381	17.336	74.341	298.209
Sertão do Pajeú	10,264	32,556	6.391	105.448	33.797	155.304	55.929	230.064	697.502
Sertão Sergipano	3,932	15,550	330	60.815	7.224	133.447	98.430	66.238	387.626
Total	47,020	311,024	39,410	303,027	112,746	793,973	195,767	970,802	2,657,851

(*) this data refer to the properties/farms in the total area of the territory (area supported under PDHC is 311,024 ha comprising of rural settlements and communities, as shown in the 3rd column)

Table 2. Areas of permanent agriculture, short cycle agriculture, extractive activities and animal husbandry in the territories included in the current implementation phase of PDHC

Territory	Agriculture					Extractive activities			Animal husbandry							
	cashew	rice	herbaceous cotton	beans	maize	fuelwood	timber	charcoal	bovines	swine	chicken	caprine	ovine	milk	egg	honey
	-----ha-----					-----m ³ -----		Ton	head					1,000 l	dozen x 1,000	kg
São João do Piauí	19,776	1,676		10,516	17,828	99,419	6,959	-	72,283	52,170	242,345	97,211	62,263	3,536	-	98,255
Sertão Central	1,498	-	12,805	19,545	20,700	97,300	10,690	-	119,800	-	2,297,450	-	78,000	26,140	3,220	-
Apodi	9,350	-	5,800	5,850	5,400	218,893	6,787	-	39,211	-	308,180	93,394	31,717	-	-	91,650
Cariri Paraibano	-	-	-	6,450	6,765	14,570	-	443	36,914	-	145,338	101,787	42,408	2,586	-	-
Sertão do Pajeú	853	-	-	55,000	51,700	79,450	-	3,255	115,005	-	1,992,290	115,656	65,455	11,524	2,455	-
Sertão Sergipano	-	-	-	20,580	23,700	79,900	-	1,083	180,700	-	334,200	-	15,870	47,479	833	-
Total	31,477.	1,676.	18,605.	117,941	126,093	589,532	24,436	4,781	563,913	52,170	5,319,803	408,048	295,713	91,265	6,508	189,905

Table 3. Environmental features of the six territories proposed for project intervention

Territory	rainfall	soils			water availability			erosion risk	conservation area	desertification severity
	mm	texture	depth	fertility	river	dam	groundwater			
São João do Piauí -PI	800	medium to sandy	depth to shallow	low to high	Itaueiras and Piauí	few	plenty	low	S. Capivara (100.000 ha)	moderate
Sertão Central - CE	750	medium to clayish	shallow	low to medium	Banabuiú, Quixeramobim and Choró	many	little	medium to high	Private reserve (300 ha)	low to extremely high
Apodi - RN	550	medium to clayish	deep	medium to high	Apodi and do Carmo	few	plenty and localized	low to medium	none	high to extremely high
Cariri -PB	400 to 750	medium to clayish	shallow	high	Paraíba	many	scarce	low	none	mostly low (though high on steep slopes)
Sertão do Pajeú - PE	500 to 1000	sandy to clayish	shallow to medium	low to medium	Pajeú and Moxotó	many	scarce	medium to high	none	low to high
Sertão Sergipano- SE	500	sandy to clayish	shallow to medium	low to medium	São Francisco	few	scarce	low	Reserve (4300 ha)	very high

Appendix 7. Socio-Economic Diagnostic Study the Project Area

Summary

1. The proposed Sustainable Land Management in the Semi-Arid Project (**Project**) shall cover the six **territories**¹¹ of Dom Helder Câmara Project (PDHC)'s current implementation phase, located in six states of Brazil's northeast semi-arid region (**Sertão**). The Northeast Region of Brazil is the most undeveloped of the country, with family income profiles similar to the poorest regions of Latin America. This situation is more severe in the rural areas of the semi-arid Sertão sub-region, particularly in six project territories proposed for project support. Social indicators are located below the national average with above average unemployment and under employment rates. In addition, income levels are extremely low and living conditions are determined by precarious sanitation and other public services and increasing dependence on government transfers. Moreover, these areas are affected by desertification as a result of fragile ecosystems, climate variations, inadequate ecosystem management and inappropriate production systems, the latter associated with the extreme poverty situation which leads people to focus on meeting short-term economic needs, to the detriment of the environment. And the importance of an eminently family farming approach becomes evident in these areas, due to recent investment cuts made by tenant farming.

2. Although a growing level of social and political organization can be seen, in addition to some degree of diversification of the production activities, the mode of existence focuses on inadequate production systems, in which subsistence farming and extractive activities complement animal breeding, in addition to other sources of employment and income outside their places.

3. *Limitations.* Under this social mode of existence, small family farmers more and more have to cope with major limitations regarding (a) land availability and, therefore, their ability to expand production and ensure subsistence from the farming activity, (b) crop productivity and the technology level of their production systems, and (c) market integration.

4. In this kind of economy, there is a strong correlation between the profitability of households, their market integration capacity, the diversified degree of their agricultural activities, their level of poverty, and land availability. This dependency relationship, in turn, is a result of the traditionally predominant production system, and the economic rationality that is justifiable in areas of shallow soil and extreme vulnerability to climate conditions. A vicious cycle is created, in which the dominant traditional production system, the pressure of land tenure (outside rural settlements), and the lack of non-agricultural alternatives to generate income place the younger population under great migration pressure and place the fragile ecosystem resources under the pressure of accelerated degradation processes.

5. Reverting this social and economic setting that contributes to increased poverty and environmental degradation depends on the ability to introduce new policies associated with support to more efficient and less aggressive production systems, as far as the ecosystems are concerned. It also depends on recognizing the rationality of the attitude of small rural farmers in dealing with the economic risks involved in the processes of testing other farming techniques and technology innovation, and whatever is necessary for them to master – namely: learning how to value their knowledge and feedback; the certainty of positive outcomes; the availability of investment credit; the urgency of their needs, and the strengthening of their representative organizations as protagonists of local actions.

¹¹ The concept of **territory** adopted by the Project is the one defined and adopted by the Ministry of Agrarian Development (MDA), where territories are clusters of municipalities largely defined on cultural and socio-economic similarities. In the project area, each territory is made up of an average of 7 municipalities.

6. The purpose of this document is to present a summary of the most relevant socio-economic characteristics of the six Territories, emphasizing the Territories of *Sertão do Pajeú* and *Sertão do Apodi*, where a more detailed field work was carried out, and where first-hand data were collected from interviews with dwellers of settlement areas, peasant communities, and technicians of some Non-Governmental Organizations that operate in those areas (detailed reports for each Territory are available in the Project files). More detailed fieldwork on the remaining Territories (*São João do Piauí*, *Sertão Central*, and *Sertão Sergipano*) will be carried out between the current phase and Appraisal. The collected information is mainly based on: i) national statistical data (IBGE); ii) literature data (see endnote references); and iii) diagnostic studies and information collected by the PDHC project; and iv) aforementioned field visits.

Location, Population and Target Groups

7. The Territories comprise 6 states and 46 municipalities – a 47,000 Km²-wide area, and over 800,000 inhabitants. The Project area is located among these municipalities, covering a population of approximately 7,000 families (33,000 inhabitants) living in approximately 170 agrarian reform settlements and rural communities covered by the PDHC Project (400,000 ha). The direct beneficiaries of the Project comprise 1,000 farmer families, covering approximately 20,000 ha.

8. The Territories differ as to the size of the areas, population, and population density, but one of their common features is that they are small municipalities (just 3 of them have more than 50,000 inhabitants) and the fact that the universe of their demographic, social, cultural and economic aspects is eminently rural.

TERRITÓRY (State)	Área (Km ²)	Territories (urban +rural)			Project Area	
		Population (rural + urban)	habitants/ Km ²	Urbani- zation rate (%)	Nº of settlements and neighbouring communities	Nº families
São João do Piauí (Piauí)	16,303	83,172	5.17	51,6	32	2.153
Sertão Central (Ceará)	7,354	157.063	21.67	56,0	23	1.102
Sertão do Apodi (Rio Grande do Norte)	5,290	92,373	17.65	56,0	29	1.194
Cariri Paraibano (Paraíba)	3,877	68,040	17.62	63,2	13	1.200
Sertão do Pajeú (Pernambuco)	10,264	289,135	28.22	57,8	56	1,254
Sertão Sergipano do São Francisco (Sergipe)	3,932	119,300	31.45	42,7	15	632
Total	47,020	809,083 (200.000 families)	17.21	54.8	168 (~310.000 Ha)	7,565

Characterization of the Target Group

9. The Project target group (7,000 families or 33,000 inhabitants) living in approximately 170 agrarian reform settlements or communities comprises the groups of family farmers living in those Territories, be them agrarian reform settlers, be them peasant families living in the traditional communities existing in the territories. Actually, these are groups with a substantial degree of social heterogeneity, as a result of (a) their different experiences in life, as small rural farmers – including the owners and the settlers, their children and aggregates, tenants, partners, share croppers, possessors, wage-paid rural workers (temporary and/or

permanent) – and (b) the way they started to share a society that is still organized around very strict rules of work division by gender, and of a process of ranking social players according to their age and gender.¹²

10. However, and although their heterogeneity never shows, they are also a group with many similarities, as a result of their common experiences in a social universe where the different processes of access to land consist of a) mechanisms of social identification to which the distinct definition of vision, values and beliefs is clearly associated, b) different sources of power and prestige, and c) an essential economic resource for livelihood and social reproduction strategies, built from the exploration of extraction and agropastoral activities in a Territory where these activities are characterized: 1) by being profoundly affected by climate variations, 2) by low levels of productivity, incorporation of new technologies, access to markets, value adding to products, and ability to generate monetary income, 3) by the intensive use of family work and labour (as the most abundant resource), 4) by the importance of farming for family consumption, and 5) by the established asymmetrical power relations as far as access to land and water, which end up permeating all their social life, in order to reproduce the “convenient” schemes of a social and political organization.

11. Even among inhabitants of traditional peasant communities and inhabitants of agrarian reform settlement areas, there are major cultural, social and behavioural similarities, because i) the vast majority of the settled population comes from a rural origin, ii) they were born in the same state where the settlement is located, and they already lived in the rural area of that very same region before moving to the settlement, but iii) most of those in charge of the lots carried out some activity linked to agriculture before being settled and, essentially, iv) the settlements reproduce a mini-land tenure system, which is dominant in the northeast semi-arid family farming practices and production systems, the limitations imposed by their social reproduction and the pressures they place on the ecosystem.¹³

Demographic Dynamics¹⁴

12. Over the last decade of the 20th century, the Brazilian population had an average annual growth rate of 1.52% – in the year 2000, Brazil had approximately 169.8 million inhabitants. The country’s urbanization rate increased 7.5%, reaching 81.2% in the year 2000. The northeast region grew at a slower pace (1.23% per year), hosting 28.1% of the Brazilian population in 2001 (approximately 48 million inhabitants) – 69.1% of the regional population living in urban areas and only 30.9% remaining in the rural areas. Literacy rates are lower in the region, when compared to the national average (75.4% of the population aged 10 years-old or more), and major disparities were found between the urban (literacy rate of 81.7%) and rural (60.5%) areas. The average population growth rate in the six Territories is lower than the regional rate. The population of the Territories (809,000 inh.) increased 6.3% over that period. But the rural population decreased approximately 8.8% (compared to the urbanization rate, it increased 15.9%, reaching 54.8% in the year 2000).

13. Females are slightly more numerous in the whole population (50.4%). Some indicators show that these Territories are socio-economically even more vulnerable than the northeast region, where they are located: 39.6% of the households had a head of family that was uneducated, or who had been educated for less than 1 year, and more than 26.9% had heads of family who had been educated for more than 1 year and less than 3 years; 57.1% of these heads of family had a nominal monthly income equal to or less than 1 minimum salary, and 11.6% had a nominal monthly income equal to or less than ½ minimum salary.

¹² For this purpose, the following should be considered: Carlos Guanziroli (4) and Horácio Martins Carvalho (3).

*Throughout this diagnostic, the stated quotations are referred to by the names of their authors and by a number between brackets that identifies them in the **Bibliography** presented at the end of this text.

¹³ In the northeast, specifically, a significant portion of the settled families comprises individuals who lost their land along their trajectory, and for being children of small property owners, the subdivision of these small properties would end up rendering them unviable as a source of survival and family reproduction (i.e., the “mini property” problem that is one of the causes of rural poverty and ecosystem degradation). Acc. Projeto Dom Hélder Câmara (8), Herédia et al. (6), Bazin et al. (2).

¹⁴ Source: Year 2000 Demographic Census.

Living Conditions in the Territories

14. Most of the municipalities that comprise the Territories are small and poor. As such, they are characterized by (a) their high level of dependency on the State and Federal financial (constitutional) contributions, (b) their poor ability to invest their own resources, and (c) the high level of costing pledged to the administration apparatus (especially with the payroll). In spite of this, over the last decade of the 20th century, they have followed the national and regional improvement trends of the quality of life of their populations, and this had an impact on the positive variation expressed by the Municipal Human Development Index (*Índice de Desenvolvimento Humano Municipal* - IDH-M), but these were neither sufficient to eliminate the major regional differences existing in the country, nor to reduce the gap between the living conditions in each region's rural and urban areas.

15. In 1991, 18 municipalities (39.1%) of the Territories were ranked *low human development* (IDH-M less than 0.500), and the remaining municipalities were ranked *average human development* (IDH-M between 0.500 and 0.800); in 2000, none of them was deemed low human development, but also none of them would overcome the upper limit and be part of the high human development municipalities in the northeast region.

16. The northeast region displays the worst results in the whole country as far as education, health and living conditions are concerned, and the municipalities of the project territories displays even more precarious conditions. In the year 2000, the performance of most of these municipalities was worse than the regional average in all those areas. When compared to the regional average, the *illiteracy* rate exceeds 96% in the municipalities of the Territories, and the *school attendance gross rate* is lower in 67% of them; the performance of 65% of the municipalities in the Territories is worse regarding *below 5-years-old mortality rate*, and in 67% of them the *below 1-year-old mortality rate* is worse, and in 70% it is worse regarding *life expectation at birth*, and in 63% of them it is worse as far as the IDHM-L is concerned. The Territories also continued to display indicators that are worse than the region's and the country's in all three types of basic services, and in the hinterlands there was still a huge gap between urban and rural areas, expressed, within the studied areas, in poor garbage collection services, in precarious forms of water supply for human and animal consumption (most of them depend on climate changes and on irregular winter rainfalls).

17. As far as vulnerability and income indicators, from 1991 to 2000, the Territories presented similar trends as compared to what happened at regional level: (a) more than 50% of their family income comes from government contributions, and this reached 23% of the population;¹⁵ (b) the growth of the *per capita* income, but in such a way that it ended up favouring especially the one fifth richest persons of the population (53% growth rate over the period), and did not reach the one fifth poorest who, actually, had a loss of approximately 27% in their *per capita* income; (c) an increase in the indicators of concentration and inequality of the income distribution (Gini's index grew 10%, and Theil's L index grew 7%); (d) a 22% reduction of the percentage of persons living with a *per capita* income less than ¼ of the minimum salary (poverty line), and 16% reduction of the percentage of persons living with a *per capita* income less than ½ minimum salary (poverty line); (e) a slight decrease of *poverty intensity* (3%), but a significant increase of *indigence intensity* (19%).¹⁶

18. So, at the end of the 20th century, the Territories presented an even more intense concentration of poverty than that displayed by the regional average. The maximum *per capita* income of its population was still lower than the average of the *per capita* income for the states of the region. The poorer population strata among the poor population became even poorer, and did not take part in the progress achieved by the less poor layers of the poor population and, despite the decline in the number of persons living under conditions of poverty and indigence, the latter has become even more pronounced, and the income conditions of the poorest

¹⁵ Refers to a portion of family income from retirement plans, pensions and official aid programs such as the *renda mínima* (minimum income), *bolsa-escola* (school grant), *seguro-desemprego* (unemployment insurance), etc.

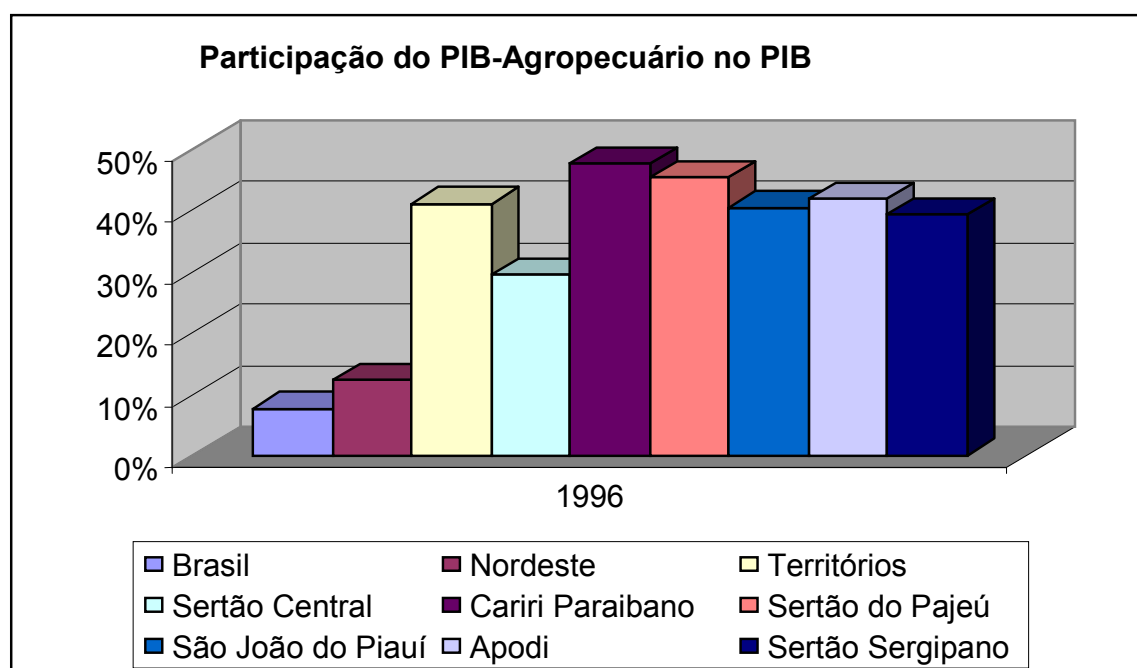
¹⁶ Indigence intensity is understood as the gap between the average *per capita* household income of indigent individuals and the value of the line of indigence; poverty intensity is the gap between the average *per capita* household income of poor individuals and the value of the line of poverty (acc. UNDP, Human Development Atlas of Brazil, www.pnud.org.br).

one fifth of the population is even more precarious. As a result, none of the municipalities in the Territories presents IDHM-Income equal to or greater than the average of the northeast region states, and only 11% of them have a rate that exceeds the minimum value found among those states.

The Territories' Rural Economy

19. The economy of the group of Territories is characterized by the importance of the agricultural industry. When the Gross Domestic Product (GDP) and its sectoral composition are considered, they clearly express characteristics and trends that are contrary to what is predominant at regional and national levels. So, from 1970 to 2000, the share of the agricultural GDP in the composition of the Brazilian GNP and of the GDP of the northeast region gradually decreased, and even more remarkably at regional level than at national level, although its performance has displayed two different moments: a period of growth from 1970 to 1985, and a subsequent period of decline.

20. Contrasting with those national and regional trends in 1996, the agricultural GDP accounted for 41% of the GDP of the municipalities that are part of the group of Territories. Therefore, the territory economy remains mainly rural, but where the rural population decreased between 1970 and 1996, the number of agricultural establishments declined 3%, and the area under agricultural activity exploration underwent a 33% reduction.



21. The Territories have an economy that is eminently rural and, in 1996, continues to be characterized by:

- The high number of mini properties (less than 10 ha) and small properties (from 10 ha to less than 100 ha) sharing room with a small number of large properties that are explored by tenant farming where a growing absenteeism is observed on the part of land owners, as well as an investment reduction (as a result of agriculture's loss of attractiveness due to a decline in land prices, extinction of government's indiscriminate subsidies, cotton culture crisis and extinction of inflation), the replacement of agricultural activities with extensive cattle raising, which is less labor-intensive, and a reduction in the number of traditional agreements of land cession to partners and tenants that, altogether, define a scenario that increases the occupation and land use limitations that small family farmers have to deal with.

- Great property concentration, although occurring less intensely than in the rest of the country and in the northeast region, because in the Territories mini and small properties account for 92.7% of the rural establishments, and cover 34.7% of the agricultural area.
- A high percentage of settlers (1.8 times higher than in the northeast, and 2.3 times higher than in the country), however expressing great variation among the Territories.
- The dominant use of land for temporary farming (31%) and grazing (20% for natural or planted pasture).
- Less availability of agricultural mechanization equipment than in the region and in the country (each tractor existing in the Territories should cover a 1.4 times larger area, and a 1.2 times higher number of establishments than each tractor in the region, and a 4.4 times larger area, and an 8 times higher number of establishments than each tractor in the country).
- The great contribution of family labor in the composition of the number of persons occupied with farming activities (84.9%, which is more than the regional and national averages).
- The prevalence of family farming establishments, totaling almost 58 thousand (i.e., 90.1% of the agricultural establishments of the Territories), accounting for 85.8% of the occupations in farming activities, and 54.6% of the farming production gross value, although these cover only 50.7% of the farmable areas.
- The conditions of existence and operation of family farming establishments are far more precarious at territory and regional level, than at national level; therefore, compliant with the rural poverty indicators that characterize the region and the Territories. It should then be pointed out that family farming in the Territories is characterized by:
 - a. A high percentage of *low income* (18%) and *almost no-income* (52%) establishments concentrating in the strata of establishments of small farming areas ;¹⁷
 - b. Low productivity and profitability of the farming activity;
 - c. The access to technology and forms of collective organization on a much higher limit than those prevailing in the group of the northeast region, nevertheless lower to national level family farming; and,
 - d. The importance of livelihood production in the context of family farming, expressed by: i) a significant dependence of these establishments regarding non-monetary incomes; ii) the predominance of establishments that are loosely integrated to the market (59% of the total) among family establishments, and particularly among the lower income ones, and the fact that this integration usually occurs via *middlemen* and in a process of negotiation where farmers has very little bargaining power, due to their subsistence needs to be met immediately, and also due to their limited warehousing capacity;⁸ iii) the predominance of establishments with some degree of diversification in their agricultural activities (78% could be classified as diversified, 5% are very specialized, and 17% are very diversified); ⁸ and, iv) the concentration of higher income establishments among the relatively diversified agricultural establishments, and that make a more efficient use and combination of livelihood agricultural crops, animal husbandry activities, and trading of the surplus or of specific cultures, if they become more integrated to the market.

22. Therefore, these small-holdings make use of a mode of existence which shares five complementary elements which guarantee alternative sources of income in two distinct seasons of the year – the winter rainy season and the dry summer period. These elements are as follows:

- Subsistence farming, either shifting agriculture or not, but always dependent on climatic variations and the seasons of the year;
- Animal breeding predominantly in extensive systems, less vulnerable to the climatic variations, fulfilling the additional function of “savings account”;

¹⁷ Source: Guanziroli and Cardim (5).

- Extractive activities: wood – for the production of firewood, poles, and charcoal either for domestic use or for commercialization and generation of income¹⁸ – and non-timber products);
- Taking advantage of the few opportunities for temporary work in farming activities (hired hands) which still arise in the large farms located in the surroundings of small-holdings; these are generally related to the felling of forest/Caatinga areas to create new areas for pasture and for the production of firewood and charcoal; and
- Seasonal migrations which offer complementary alternative jobs and generate income during the dry summer period for a portion of the economically active population who head for urban areas.

23. On this production and reproduction mode of family farming in the semi-arid, the use of *caatinga* areas as extensive grazing fields and supplementary source of income through vegetation extraction, the cyclic clearing of new areas for agricultural exploration, the wood-boring beetles, and the periodical burning of the same farmable areas that are gradually smaller because of the splitting of the already small properties and by the reduction of areas obtained through the traditional partnership and leasing systems, the reduction of the land resting time and the over sizing of the herds become, more and more, generalized activities and contribute to reduce the accumulated fertility of the soil, weakens the ecosystem and produces, in varied degrees of intensity, the degradation of the environmental resources and, therefore, desertification.

24. In this context, the experimental introduction of new and less aggressive production techniques for the ecosystem (such as organic farming and minimal tillage) and natural resource management (such as the scrubbing of the *caatinga* in order to expand its fodder capacity) emerge selectively as an outcome of the action of governmental and non-governmental organization projects, but it faces the economic rationality that guides traditional and predominant production systems, the set of beliefs and accumulated knowledge of the local population, the risks that these innovations might represent for their survival, their distrust regarding government projects and policies regarding the “knowledge from the books” unlinked from any concrete examples that can be observed, copied and followed.¹⁹

The Society in the Northeast *Sertão*: Processes of Social Change, Cultural Values and Constraints

25. Northeast’s semi-arid rural universe and its peasant society seem to continue replicating cultural values, forms of a social, political and economic organization, a vision of the world and a traditional *ethos*, that not even the deployment of a significant number of agrarian reform settlement areas is capable of radically changing. However, and in spite of the capacity to replicate traditional cultural models, the peasant society of the northeast semi-arid is not a separate universe.

26. Traditionally, the peasant society of the northeastern semi-arid region was characterized by cultural patterns that include a clear gender splitting in both social and labor universes, the roots of which are found in the Mediterranean tradition (the complex of honor and shame) that provides a deeply hierarchical character to the relations of men and women within the family universe itself. Due to this gender split of the social universe, as a home space – the house and the backyard where small animals are raised – constitute the female domain, while the male domain consists of the cleared ground, the woods and the public areas. By virtue of it, in spite of the intensive daily work hours worked by women (involving the raising of small animals, honey

¹⁸ According to the socio-economic studies carried out during PDF B phase, in the 1990s, the production of vegetal charcoal in the six territories of the proposed project area decreased 87%, firewood 52% and logging 49%, but, in 1996, 3.2% of the income of rural small-holdings still came from Caatinga vegetation extraction activities which occupied 10.4% of the area used for farming activities. The continuity of these extractive activities associated with the expansion of the farmed area has resulted in higher pressure on natural resources caused in turn by the poverty conditions.

¹⁹ As a young farmer in the *Areias* Settlement (*Sertão do Apodi*) teaches us: “We have here a 1ha demonstration unit of a caatinga enriched with *gramão* grass (*Cynodon dactylon*), hay and fodder. These demonstration units are important because they bring innovation in, and the farmer brings the culture of their parents, and they will quite likely not believe if you just tell them. With the demonstration units we can see the outcomes and start replicating.”

production, vegetable gardens and medicinal plants, and non-farming activities linked to handicraft), the women of the peasant communities are found in a situation of submission.

27. Generally speaking, although not universal, they (a) neither manage the family money, nor the portion of the family income they have the right to as a result of their farming activities; (b) they neither have access to credit, nor to land tenure titles (to which civil rights are associated); (c) they earn less than men; (d) the productive work they do is socially undervalued and little visible, and (e) they continue to be excluded from decision-making participatory processes as far as settlements are concerned, so that their growing participation in social and political organizations does not translate into direction positions or functions, where they shall continue to be under-represented. Regarding gender relations, agrarian reform settlements seem to replicate the traditional and cultural patterns that prevail in the societies of the *Sertão*, which seem to preserve their hierarchical nature. However, new organization patterns of the family universe and gender relations are emerging.²⁰

28. Peasant societies of the northeast semi-arid are equally featured by a rooted age-related hierarchy and by a family farming social reproduction strategy that includes the migration of some of the younger members of the family as a way (a) of reducing the process of further fragmenting the small family property, and (b) to obtain, by means of the *remittance* practices, other sources of income to sustain their family unit. Also, within the scope of the relations between generations, an intense process of socio-cultural change is observed. The *Sertão* community social universe now identifies with the desire of the youngsters to stay in their original communities, and because of their concern when realizing the big structural hurdles ahead of them, preventing their achievement.²¹

29. This vision does not distinguish between settlement areas and traditional peasant communities in the Territories, and seems to be further reinforced on the Territory Development Plans designed by PDHC Project, and on the first-hand feedback compiled in the field visits to prepare the Socio-Economic Appraisal of Pajeú and Apodi Territories. In both sources, concerns emerge and stand out regarding (a) the status of the "aggregates", (b) their lack of participation at decision-making time on community interest issues, and their indifference regarding community life, (c) the lack of a light in the end of their tunnel regarding their occupation in traditional farming activities, and their lack of skills or training in order to perform non-farming activities, which, if not making it unviable, it at least somewhat hinders the traditional solution of migration for jobs, and (d) the search of alternative jobs and sources of income for the youth.

30. From the feedback compilation based on the ethnographic assessment, an ambivalence was verified in the vision of the youth. A substantial part of them express their desire to stay in agriculture, reaffirm a positive view of both the farming activity and the rural universe, emphasize the difficulties and risks of living in big cities, and list a number of examples in the lives of other youth who migrated or left their communities to carry out seasonal activities, but came back home disappointed and in a more precarious condition than when they had left. Another substantial portion still emphasize the lack of opportunities of education and work in the rural area, and the hard nature of farming activities, proposing future projects that focus on the hope of achieving income security in some non-farming activity.

²⁰ For this purpose, take into account the following dialog that took place during a meeting of the dwellers of *Palheiros* Settlement (*Sertão do Apodi*) that simply reveals the power of the traditional patterns of gender relations, and the emergence of new forms of relationship:

– "If women are to take on their responsibility, they cannot do what they have to do at home, because they work quite hard at home.
– Little said, but greatly said!...
– But the work will only be hard if the family is disorganized, as there are many families who think the mother has to take care of everything. Not only for the husband, but also for all. But there are families that have fixed this, and now have split their home work.
– If I get home and my wife is not there, I leave right away. The house is empty! Because I work very hard, too.
– There are very few left just like Manoel. There are several *macho-men* now washing the dishes."

²¹ Unavailable land, lack of non-farming occupation in the rural area, difficult access to higher levels of schooling, embarrassing image widely associated to the character of the farmer and to life in the rural universe, lack of youth interest on farming activities, etc.

31. But the *Sertão* community comprises a complex universe of vertical relations (between social groups occupying different positions in the social hierarchy and sharing opposite life experiences between large-scale and small properties, between the landlord and the client, between the rural elites and the peasant population) and horizontal relations (among equals) of mutual trust, solidarity and collaboration. Traditionally, it is a society permeated with social hierarchies and political and economic domination relations. In this context, local elites have always used government as an apparatus of the processes in which they base the reproduction of their hegemony. (a) the reproduction of the social ties (marked by both relations of obedience and violence, and relations of protection and solidarity) they build with portions of the peasant population (*clienteles*), and (b) the weakening of the horizontal relations of identification that occur in the core of the peasant population and their participation as protagonists of their civil life. But, traditionally, they are a society of abundance, among the member of the layers of excluded and subordinates, of other forms of solidarity and collaboration, confidence nets and mutual help, which are all collective actions that set stage on several dimensions of social life, but they had traditionally excluded the domain of society x government relations.

32. However, in recent years this scenario has undergone major changes. The social movements have become more active in the *Sertão*; the number of settlements with their extraordinary experiences of mobilization and organization for land conquest has expanded and completely changed the local political setting because of the emergence of new leaders, because of an increase in the demands from the public power, and because of an increase in the modes of peasant organization,²² the government opened its doors to policies involving more decentralized, representative and participatory decision-making mechanisms on the processes of community action and development, encouraging the multiplication of community associations, municipal councils and other arenas of participation and collective action on the part of this new set of social players.

33. It is obvious that in such a short period of time these new social players have neither managed to get rid of the “clientelistic” organization models, nor developed their organizational, representative and executing capabilities to an optimal level. However, the reviews that convict them for their lack of originality are not even reasonable, as they are artificial, as they are arenas of coerced participation, the only mission of whom is the conquest of immediate objectives, therefore their members “have no clear idea of how an association is or how it should work”.²³ What seems more reasonable is the interpretation that evidences a historical process of transformation of these associations encouraged by government programs, from an initial moment predominantly marked by artificiality, to the current moment that watches the significant growth of the social legitimacy of those entities.²⁴

34. In any case, the outcome of the ethnographic survey suggests that the Territories have witnessed a number of rural community representative associations setting up a relevant and dense network of small rural farmer organizations; there was an increase in the participation of these associations in the domain of decentralized decision-making and exercise of social control on public policies; there was also an increase in their articulation seeking greater capacity to solve common interest issues, and provide more representativeness to their interests (empowerment process) in the scope of the constituted powers. Although these organizations are greatly heterogeneous, as in this context we can find from totally artificial entities regarding the interests and effective participation of family farmers, absolutely manipulated by local political elites, to socially legitimate organizations, they represent a new social and political player whose existence cannot and must not be neglected by any government development project or policy based on participatory principles.

35. One way to express this new social protagonism on the part of the poorer populations in the semi-arid *Sertão*, with the increase of both social and human capital, can be found in their attitude on the projects and

²² PDHC PROJECT (8), Navarro (7), Guanziroli (4) and Herédia et al. (6).

²³ Horácio Martins (3), Zander Navarro (7), Bazin et al. (2).

²⁴ Buainain and Fonseca (1), Rizvi and Costa (9), and Rizvi and Costa (10).

policies locally implemented by governmental and non-governmental organizations as far as the official policies on credit for agriculture are concerned. For this purpose, the survey carried out in order to offer a socio-economic appraisal strikingly reveals that:

- The sluggishness of the legal channels for community projects to be financed by governmental programs is a factor which not only discourages communities from taking part in participatory planning activities but also increases their already traditional (and reasonably justified) lack of trust with regard to the State and governmental policies, giving weight to the decision of many not to participate;
- Training and technical assistance are widely recognized as necessary by rural people, but they question the value of these activities *per se*. Amongst those interviewed, a vision prevails that values them essentially when linked to effective on-the-ground investments in concrete projects in the community (training which can be put into practice, technical assistance which is given for activities which are really implemented) and that criticizes them when perceived as an initiative that only allows for the reproduction and widening of the market activities of agencies (governmental or non-governmental) which provide training and technical assistance services;
- Innovative practices and on-farm trials are equally much more easily accepted and reproduced when they are coupled to (a) demonstration units, in which their results can be concretely evaluated, when their techniques are incorporated in learning and reproduced by copying and (b) investment sources which make their replicability viable, thus minimizing the risks which the culture of rural people associate with the introduction of changes in their production systems and which they alone have to live with;
- Policies on agricultural credit have historically been the object of severe restrictions to the poorest farmers, to the extent that: (a) pre-defined eligibility criteria are established by local financial institutions without consulting those who are most interested (those who receive small loans); (b) they regard them with distrust and as incapable of dealing with funded resources; (c) they impose limitations on their market activity (they do not transfer resources to their hands, they demand collective purchases which favour the middlemen and the large farmers, etc.); and, (d) they cause them losses to the extent that they make better financial agreements unviable²⁵.

Bibliography

1. Antônio Buainain and Rinaldo Fonseca. *Estudo de Avaliação de Impactos do Programa Cédula da Terra*. Campinas, UNICAMP, 2003.
2. Frédéric Bazin et al. *Plano de Desenvolvimento Sustentável do Cariri Paraibano*. Campinas, INCRA/FAO, 2003. www.incra.gov.br/fao.
3. Horácio Martins Carvalho. *Formas de Associativismo Vivenciadas Pelos Trabalhadores Rurais nas Áreas Oficiais da Reforma Agrária no Brasil*, www.nead.gov.br.
4. Carlos Guanziroli. *Reforma Agrária e Globalização da Economia – O Caso do Brasil*, www.nead.gov.br.
5. Carlos Guanziroli and Sílvia Cardim. *Novo Retrato da Agricultura Familiar: O Brasil Redescoberto* (www.incra.gov.br/sade).
6. Herédia et al.. *Os Impactos Regionais Da Reforma Agrária: Um Estudo Sobre Áreas Seleccionadas*. CPDA-UFRRJ/NUAP/PPGAS/MN/UFRJ, 2002. Covenant: REDES/ NEAD-IICA. www.nead.gov.br.
7. Zander Navarro. *O Projeto-Piloto Cédula da Terra: Comentário Sobre as Condições Sociais e Político-Institucionais de seu Desenvolvimento Recente*, www.nead.gov.br.
8. Projeto Dom Hélder Câmara. *Documento de Trabajo 3: La Pobreza Rural En El Semiárido*.
9. Andréa Ryan Rizvi and Alberto Costa. “Can community driven infrastructure programs contribute to social capital? Findings from the Rural North East of Brazil,” May 12, 2003, Brown Bag Lunch, The World Bank.
10. Andréa Ryan Rizvi and Alberto Costa. “O Programa de Combate à Pobreza Rural e o Capital Social no Espaço Rural do Nordeste Brasileiro”, Seminar Capital Social 3: Medindo Capital Social para o Desenvolvimento, The World Bank Institute, 29 June 2003.

²⁵ As spelled out by the small-holders themselves: “The bank seeks to enslave us. You can buy a goat anywhere but the bank won’t hand us money. It says we all have to buy together. But who on earth has 300 or 500 head to sell at one go? Just the big guy. That is why he sets any price he likes. It’s because of the bank that there is the middleman who buys in the south, and who sells a beast which is not suited to these parts. We have been buying under the “slave”/barracão system... i.e. we are now buying with little hope, in absence of choice. (Maravilha Settlement, Sertão do Apodi)

Appendix 8 Background and Additional Considerations for the Establishment of Payments for Environmental Services Schemes in the Project Area

1. This Appendix provides additional information related to the Environmental Incentives Component of the proposed project.

The concept of environmental services

2. Ecosystem dynamics generate environmental services which are enjoyed and consumed not only by those who take on the role of protecting the ecosystem, but also by other producers and consumers. The concept of environmental services is closely associated with that of *externalities*. Externalities are impacts created, for example, by a specific land use, which affect not the user of this particular plot of land, but others which may or may not be located within the vicinity. Who is affected depends upon the specific externality. Externalities can be positive or negative – and they have an impact either upon the welfare of others directly or indirectly by affecting their production. Environmental services are either positive externalities or the prevention of negative externalities.

3. Three main environmental services of importance in the project area, for which payment systems may be established, are biodiversity protection, carbon sequestration, and protection of water resources:

4. **Biodiversity Protection:** Different land-uses and management systems affect the habitat for wild and agricultural biodiversity, which may be valued per se and as an input to pharmaceutical or tourism development amongst others. Availability of feed and of refuge will influence the presence and persistence of a diversity of flora and fauna in a specific area. The key characteristics which will influence biodiversity are land-use, location, size and interaction with the surrounding area. Biodiversity may be valued in its own right, because of its impacts on ecosystem stability, pollination, or as a source for the development of commercial pharmaceutical or cosmetic products, amongst others. In the project area, the biodiversity protection service mainly relates to the conservation of the unique Caatinga biome with its exceptional levels of species endemism, as a value per se. There is also some limited potential for extractive use of indigenous fruits and medicinal plants.

5. **Carbon Sequestration:** Land use affects the rate of sequestration and release of carbon both below and above ground. Tilling land, for example releases carbon stored in the soil, as does burning. Greater biomass accumulation usually leads to greater carbon sequestration. Carbon is one of the greenhouse gases, which impact on global warming. Carbon sequestration potential in native Caatinga is estimated at approximately 55 tC/ha, including above and below ground carbon. If converted to annual cropping in the traditional migrant agriculture/slash and burn system, it is estimated that there is no permanent storage of carbon either below or above ground. Between these extremes lie a number of different land use systems, including, for example grassland pasture systems which may store up to 16 tC/ha.²⁶

6. **Protection of Water Resources:** Protection of water resources in watersheds sums up a variety of specific services. Vegetation management influences the *regulation of the quantity* of water by affecting capture, infiltration and run-off (including flooding) of water. Water availability and regulation of floods is valued by downstream water users. Land use upstream will also influence the *quality of water* downstream. Decreasing the rate of erosion will reduce sedimentation of downstream infrastructure, and lower maintenance and treatment costs. Reducing chemical applications in agricultural fields will similarly improve water quality downstream, which is valued both as an input to production and for consumption. In the project area, the main water related services are likely to be the reduction in sedimentation in dams and of salinity downstream, in particular in the states of Ceará and Pernambuco, where dams have faced increased siltation problems and

²⁶ Sampaio, E, UFPE, *Considerations regarding Land Use Systems and their Indices*, unpublished, project preparation document

some irrigation projects had to be closed owing to the level of salinity. In addition, flood control is an important service to consider. While the prolific creation of dams funded predominantly by government resources, has helped to control flooding, the recent bursting of dams, for instance in Paraiba, points to the importance of considering the upstream contribution of land use to flood control.

Payments for Environmental Services

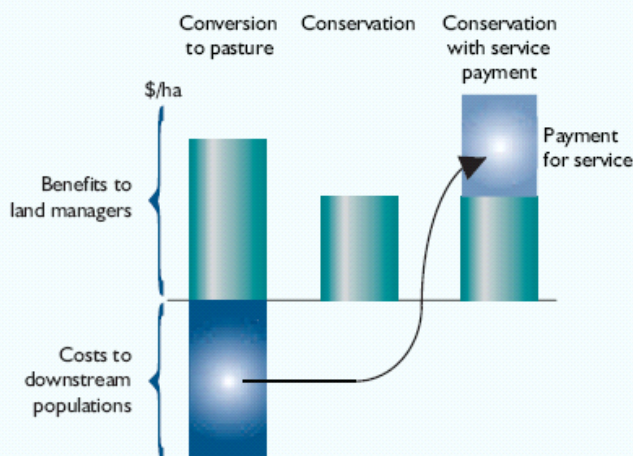
7. Payments for Environmental Services (PES) have been piloted and even established on a national scale in several countries, first and foremost in Latin America. Costa Rica, probably the pioneer in PES, has developed a nationwide PES programme, in which land users receive payments for specific land uses, including new plantations and the conservation of national forests. The scheme is partly funded by receipts from carbon credits. Mexico recently created a national PES scheme for hydrological environmental services, which uses revenues from water charges to pay for the conservation of forests in hydrologically critical watersheds. El Salvador is preparing a national PES programme which targets agricultural landscapes, rather than forests. Many smaller level initiatives exist for water services – amongst others - Colombia, Ecuador and Costa Rica, and for carbon sequestration all over Latin America. IFAD, in collaboration with ICRAF, is supporting a regional initiative in Asia, Rewarding the Upland Poor for Environmental Services (RUPES), which aims to develop PES schemes with specific poverty benefits. The World Bank, often financed by GEF resources, has been supporting PES development in Costa Rica, Guatemala, Venezuela, Mexico, Dominican Republic, Ecuador, El Salvador and South Africa. A project which will be of particular relevance for learning is the Regional Integrated Silvopastoral Ecosystem Management Project (RISEMP), funded by the GEF and supported by the World Bank in Colombia, Costa Rica and Nicaragua. The project is piloting the use of PES for biodiversity conservation and carbon sequestration. Payments are related to the adoption of specific land uses, each of which is associated with a particular indicator reflecting its impact on biodiversity conservation and carbon sequestration.

8. The rationale behind payments for environmental services schemes is that PES, if designed appropriately, can achieve an outcome whereby both the providers and the consumers of environmental services are better off. Environmental services such as biodiversity conservation, carbon sequestration and erosion control are mostly externalities to the producer. The value of these services does not accrue to the producer but instead to other users downstream, for example irrigation or dam users who benefit from reduction in sedimentation and thereby reduced maintenance costs, or globally to those who attribute significant value to biodiversity conservation and to the prevention of climate instability. If the producer does not receive the full value of the service, he or she will tend to under-produce the service. This in turn makes the users of the services worse off, because a service they value is not provided. Wherever the value of the increased service provision to the users is greater than the cost of producing the services to the service provider, there will be potential for PES systems to make both providers and users better off. Box 1 illustrates this picture with respect to services related to forest conservation.

9. In Brazil, the Ministry of Environment is pioneering PES through the PROAMBIENTE programme, the Socio-Environmental Development Programme for Smallholder Agriculture. This programme, which is starting operations in the Amazon region, but has a vision for nationwide roll-out, will provide incentives for sustainable use of natural resources, in particular the adoption of technologies which mitigate negative environmental impacts. The key environmental services funded are reduction in deforestation, carbon sequestration, water conservation, soil conservation, biodiversity conservation and reduction of fire risk. **PROAMBIENTE** is developing direct and indirect indicators to measure and certify the provision of environmental services.

BOX 1. THE SIMPLE LOGIC OF PAYMENTS FOR ENVIRONMENTAL SERVICES

As the figure shows, land users receive few benefits from forest conservation—often, less than the benefits they would receive from alternative land uses, such as conversion to pasture. But deforestation can impose costs on downstream populations, who no longer receive the benefits of ecological services such as water filtration.



A payment by the downstream beneficiaries can help make conservation the more attractive option for land users. The payment must obviously be more than the additional benefit to land users of the alternative land use (or they would not change their behavior) and less than the value of the benefit to downstream populations (or they would not be willing to pay for it).

Pagiola, S, and Platais, G., Payments for Environmental Services, Environmental Strategy Note 3, World Bank, 2002

Paying regularly or paying once

10. If the service in question is provided on a regular basis, it can be argued that the payment should also be regular as long as it is provided and the value of the service to the user is no less than the payment. However, there are two cases in which a one-off payment or non-regular payments may be relevant:

- a) *paying the full value of the service up front:* From an economic point of view, there is no difference as to whether the payment is issued regularly over a specific period, or whether the total discounted value of these payments is paid once, for example, up-front. As land use change often requires significant investment up-front, this may be an attractive option for the service provider, especially if the service provider does not have access to other resources or credit. Adequate precaution or insurance will have to accompany such an arrangement in order to assure the permanence of the land use change and service provided over the entire period.
- b) *Compensating for the costs of the land-use change:* If the targeted land use is actually more profitable for the land-user, even in the absence of specific payments for the environmental services enjoyed by others, but the change requires up-front investment, which the land-user is either unwilling or unable to undertake, then it is possible to secure these environmental services by arranging for an up-front payment to overcome the barrier to adoption. As long as the payment allows the land-user to adopt the new technology or management system, both the service users and the service providers will be better off.

11. Sampaio, Y et. al, estimate that in most cases more sustainable practices which increase environmental service provision will also increase the profitability to the farmer.²⁷ However, barriers to adoption of many of the practices are significant, in particular knowledge barriers (which will be addressed by training provided under component I), input and labour costs in switching to the new land use practice and possible loss of income in the transition period. In this case, an upfront payment to overcome barriers to adoption is a very relevant proposal, which would be well within the scope of the proposed FISP Ecológico. There are, however, a number of exceptions to the rule that profitability increases with more sustainable land use. The most important exception to this is the transformation of annual crops, in particular on steep slopes, to a sustainable land use system, which from an ecological point of view should be restoration of original vegetation. This implies considerable losses to the producer. Either the upfront payment will have to be sufficiently high to reflect the full discounted future profits from annual cropping use, or alternative continuing funding mechanisms have to be identified.

Paying directly or indirectly

12. There are many different ways in which providers of environmental services can be compensated. They range from a direct financial payment to indirect benefits.

- *Direct payments:* A payment linked directly to the quantity and quality of service can give clear incentives to the service provider to produce the right amount of the service. The level of payment must be high enough to at least compensate the provider for the costs incurred in providing the service and no higher than the value attributed to the service by its users, and the price offered by an alternative provider. An example of direct payments for one particular service is payment for carbon credits, or schemes where land-users receive a direct regular payment related to an index which measures the different environmental services produced by that particular land use, the preferred option to be considered for the FISP.
- *Prices of commodities:* Some products which are produced in a manner that enhances or safeguards environmental services attract premium prices. The difference between these prices and the prices paid for the same commodity from conventional production sites represents a payment for the environmental services. An example is biodiversity-friendly coffee, or organic products (which may however, also be valued predominantly for their consumptive rather than the production characteristics).
- *Payments for rights to exploitation of a certain service:* In cases where the environmental service has a specific use, which can be exclusive, users may pay a fee to access this (part of the) service. An example is bio-prospecting rights.
- *Indirect benefits:* Indirect benefits are not strictly compensation for a service provided but may act as incentives to adopt a specific land use. Examples include tenure security, investment support for activities that produce environmental services (for example free tree seedlings), or social investments (schools, healthcare). These types of benefits may offer incentives, yet where the exact link between the level of payment or benefit and the service provided is not explicit, the incentive to the service provider to continue to provide exactly the level of services desired by the users, is lost.

13. In this project, the adoption of a reward system in forms of payments for environmental services is the preferred option in order to ensure that GEF resources will generate the greatest possible quantity of environmental services of global importance related to combating the underlying causes of land degradation which threaten the ecological integrity of the Caatinga ecosystem.

²⁷ Estudo e Desenho do Programa de Incentivos Ambientais, Relatório Preliminar, UFPE, Sampaio, Y, Tavora, Lamartine, Ramos, F., Project Preparation Document, unpublished, 2004. Estimates do not include family labour.

14. A difficulty with all payment schemes linked to the quantity of services provided is that unless strict monitoring is in place prior to the scheme, perverse incentives may lead land-users to switch to a more degrading management practice just prior to the scheme's start in order to receive payments to switch back to their original practice. In some schemes, the solution has been to adopt a system whereby not just changes to more sustainable practices are rewarded but also existing sustainable land use which is continued. This approach eliminates the perverse incentives and ensures that those farmers who have been good resource managers all along are not losing out compared to others who adopted degrading practices over many years and now receive financial rewards in order to reverse this degradation.

Can environmental service payments benefit the poor?

15. Whether or not the poor can provide environmental services and be compensated for them depends on the one hand on their land use and other activities which produce environmental services and on the other on the institutional mechanisms which manage the payment system. The poor often live in areas of high biodiversity and in the upper watersheds, where their land use practices impact on water related services.

16. In general, the poor face a number of constraints with respect to environmental service payments:

- *Small scale production:* This means that it is unlikely that one producer has a significant impact on any specific service in question. Collective action therefore becomes imperative.
- *Investment constraints:* The poor tend to have greater difficulties to move to a new technology or management system which requires up-front investment. Payments for environmental services must therefore be at least partially up-front.
- *Property rights:* Many poor farmers do not hold formal title or other tenure over the land they farm. In some cases this excludes them formally from participating in Payments for Environmental Services schemes (for example the Costa Rica FONAFIFO scheme). In all cases it is a hindrance as it increases risks related with the PES transaction.
- *Information disadvantages:* The poor tend to be affected more by literacy and other educational challenges, as well as lack of access to information resources. They will be less likely to learn quickly about innovative management approaches and to initiate concerted action to take advantage of new opportunities. The poor also struggle with a lack of voice at the local and national level and hence do not have a strong bargaining position.

17. All of these constraints increase the *transaction costs* of establishing and running a PES scheme. In order to allow the poor to participate in PES schemes and to reduce transaction costs, the services of *intermediaries* (producer organisations, NGOs, local research organisations etc.) will therefore be required to bridge the information gap, assist in the bundling of service providers for PES and negotiate with or on behalf of the poor environmental service providers.

18. This project is well placed to overcome many of these constraints. Most of the project participants own their land, mostly in land reform resettlement areas. Property rights are therefore not problematic. Social mobilisation and literacy campaigns promoted by the Dom Helder project have strengthened the learning and innovation potential of poor project participants. The existing organisational structures established through the Dom Helder project are well placed to overcome small scale production issues through collective action and negotiation. Targeting the demonstration sites where a minimum of 1,000 ha each are expected to be converted to more sustainable land use practices addressing land degradation and at the same time generating environmental services, will further bundle service providers, and will also ensure that poor participants benefit from the proposed FISP Ecológico payment scheme.

Potential for PES for watershed services

19. PES markets for watershed services are an attractive proposition to further the objective of combating land degradation in the project area as they open up the possibility to establish continuous funding mechanisms for sustainable land use, including by poor landowners in critical locations in the watershed. A recent Regional Forum on Payments for Environmental Services in Watersheds, which took place in the context of the Third Latin-American Congress on Watershed Management (Arequipa, Peru, June 2003), discussed watershed PES experiences from Guatemala, Peru, Costa Rica, Ecuador, Dominican Republic, Honduras, El Salvador, Panama, Mexico and Cuba.²⁸

20. A number of specific advantages and opportunities of PES in water were highlighted. The experience in Latin America so far shows that PES schemes can a) serve as an instrument to educate the population about the value of natural resources, b) facilitate the resolution of conflicts and reaching of consensus among land and water users, c) enhance efficiency in the allocation of natural, social and economic resources, d) generate new sources of funding for the conservation, restoration and valuation of natural resources, e) create indicators for the relative importance of natural resources by means of the valuation of environmental services; and f) allow the transfer of resources to socio-economically vulnerable sectors providing environmental services.

21. At the same time, PES schemes also face difficulties. The main issues highlighted by the Latin American experience are that a) some PES schemes are based upon generalisations, which have not been verified by empirical studies about the relation between land use and the water-related service, b) some PES schemes are not the most cost effective method to attain the objectives of guaranteeing the delivery of environmental services, c) in some cases, providers, users and the service itself are not well identified, d) some PES schemes have been executed without a monitoring or control mechanism, e) in some cases, the cause-effect model and the cost of the service have been politically imposed and are not based upon actual demand or economic valuation of the service, f) in some cases, PES design has not been based upon socio-economic and biophysical studies because of high costs. The design and implementation of a PES system may involve high transaction costs if the design is complicated, g) some PES schemes in watersheds may have perverse incentives, such as unsustainable exploitation of resources in areas not included in the scheme, or increase in the rate of deforestation prior to PES establishment in order to increase the potential future payments for restoration, h) some PES schemes are highly dependent upon external financial resources, threatening long-term sustainability, and i) PES programmes and activities have some times been poorly disseminated among the local population.

22. The project's planned support to the establishment of watershed PES schemes in selected watersheds in the project area based upon specific demands made by the watershed management committees, will take these potential and constraints into consideration when assessing the potential for and eventually developing PES models. The Forum's report also contains specific considerations on the design of PES in watersheds to avoid some of the pitfall and capitalise on the potential. These recommendations, amongst others, will be useful guidelines for the potential establishment of PES in watersheds in the project area.

23. The Brazilian legal and institutional context provides a fertile environment for PES development. The 1998 constitution calls for the establishment of Watershed Committees, composed of water users, public officials and civil society, and the executive organs, the Watershed Agencies. The establishment of these institutions is at various stages all over the country, and in the project area it is only few watersheds which have already institutionalised the new structures (Ceará is one example). Once in place these institutions become the primary managers of water resources and watersheds. The legislation envisages the development of masterplans for water resources in watersheds, which will include action plans for improvement of water

²⁸ Payment Schemes for Environmental Services in Watersheds, Land and Water Discussion Paper Nr. 3, FAO, Rome 2004. (Conference Proceedings). Download available at www.fao.org

use, restoration of the watershed and water pricing amongst others. The National Water Law of 1997 recognises water as an economic good and establishes the foundation for water pricing. A licensing process for water users is being rolled out, but so far it is mostly the large water users who operate under license. The legislative and institutional framework would make it possible for some of the revenues earned through water pricing to be used for watershed restoration activities. These activities could be undertaken by individual land owners, thereby opening an interesting window for PES development. The Environmental Incentives Coordinator will assess the broad potential for PES development in specific watersheds in the project area. Promising potential entry points are those watersheds where there is evidence and data on the link between upstream land management and downstream services, including the protection of water quality and water flow, and where the progress has been made on establishing the watershed committees and agencies. Ceará may be a particularly promising region to consider for PES development in watershed services, given the advanced stage of institutional development and the recognised siltation problems in downstream dams related to upland land use.

Potential for PES for carbon services

24. Accessing the the carbon market could potentially bring in additional, mostly international, funds into the project area which can support activities which arrest land degradation. Carbon sequestration potential differs greatly according to the specific land use in the project area. Native Caatinga is estimated to store approximately 55 tC/ha, including above and below ground carbon. If converted to annual cropping in the traditional migrant agriculture/slash and burn system, it is estimated that there is no permanent storage or carbon either below or above ground. Between these extremes lie a number of different land use systems, including, for example grassland pasture systems which may store up to 16 tC/ha.²⁹

25. The international carbon market is growing steadily. In 2004, the total transactions are expected to double the 78 million metric tons of CO₂ equivalent exchanged in 2003. The lion share of these are project-based transactions intended for compliance with the Kyoto Protocol. About half of the transactions over the last year were attributed to two technologies only – HFC₂₃ destruction and landfill gas to energy projects. Asia has overtaken Latin America as the largest supplier of emission reductions. On the buyer side, Japan has emerged as the largest player followed by the World Bank Carbon Finance Business and the Government of the Netherlands. These three players account for over 90% of the demand for emission reductions in 2003-2004. Prices range from an average of \$1.34 \$/t of CO₂ for non-Kyoto compliant emission reductions to \$5.52 for Kyoto compliant credits where the seller takes on the registration risk, i.e. when the buyer has the right to cancel the contract if the project fails to get registered within the realm of the Kyoto Protocol.³⁰

26. While the growing and developing market should be watched carefully by the project to identify possible entry points for project development, there are two main points of caution:

- the continuing uncertainty regarding the validity of project-based emission reductions beyond 2012 entails the danger that the window of opportunity for developing Kyoto compliant projects is closing rapidly, given the lead time required between project preparation and the generation of the emission reductions;
- the market for land use based emission reduction projects – Kyoto compliant or not – remains very small.

27. Current Kyoto eligibility rules restrict carbon sequestration projects to afforestation and reforestation projects, which would only cover a few of the possible land use changes to be promoted under the project. Restoration of Caatinga and establishment of dense silvopasture establishment on previously degraded lands may be eligible. The main source of funding for non-Kyoto compliant carbon sequestration projects at this stage is the BioCarbon Fund managed by the World Bank, which has two windows. The main window targets Kyoto compliant credits, and a smaller one explores non-Kyoto compliant carbon credits including from restoration of degraded lands through improved forest management, rehabilitation of grazing lands and control of wild fires in natural vegetation. The BioCarbon Fund currently pays around \$3-4/t of CO₂, and projects are

²⁹ Sampaio, E, UFPE, *Considerations regarding Land Use Systems and their Indices*, unpublished, project preparation document.

³⁰ State and Trends of the Carbon Market 2004, Lecocq, F., World Bank, 2004

expected to deliver between 400,000 and 800,000 t of CO₂ over 10-15 years, which may be a challenging size for the project area.

28. While this context should lead to some caution in expecting easy potential for accessing the carbon market in the project area, it is nonetheless appropriate to strengthen the capacity for project development in the area and to set aside limited funds to support project development. There are some existing avenues, the market is growing and the rules are in a state of flux, not least given the uncertainty surrounding the coming into force of the Kyoto Protocol. It is also expected that the methodologies for carbon monitoring and verification to be established in the context of the FISP Ecológico (see below) will be a useful tools in carbon project development.

29. An additional avenue to explore in addition to project development based primarily on carbon sequestration, is the development of for bioenergy projects, such as more sustainable forest management practices in wood production for energy use, building upon the good practice guidance being developed under the UNDP Caatinga project. By working closely with other actors in Brazil, in particular the National Development Bank (BNDES) which is the primary Brazilian agency for the implementation of the Clean Development Mechanism (CDM)³¹, the project will closely follow market developments and opportunities.

Considerations for the Design of the FISP Ecológico

30. The design of the FISP Ecológico and its detailed operational procedures will be carried out during the first year of project operation. An important starting point will be the concrete learning from on-going PES schemes. In particular, the component co-ordinator and two colleagues will be undertaking a study tour to understand the detailed operational procedures and merits of PES schemes currently under pilot. The team is expected to learn, in particular, from the relevant experience of the RISEMP, which has established land use related indicators for biodiversity and carbon sequestration upon which a payment system to farmers is based. Details of the RISEMP's approach to PES can be found on www.virtualcentre.org/silvopastoral.

31. During the project preparation phase, preliminary analysis has been carried out to establish indicators for current and potential improved land use systems, to which payments could be linked directly. **Table 1** provides a summary of the estimated environmental service indicators related to existing (mostly degrading) and potential improved and sustainable land use systems. Changes in land use are possible within specific land use categories (i.e. annual crops) as well as between categories, for example between annual and perennial cropping systems, or between annual crops and Caatinga silvopasture.

32. The preferred option for the FISP Ecológico would be to establish a payment system that reflects these indicators, or a weighted indicator that incorporates these various service specific indicators. Thereby a farmer switching land use from a practice which has a lower total indicator value towards one with a higher indicator would receive a payment that is proportional to the change in the indicator.

33. There are, however, a number of limitations to the analysis that could be carried out during the preparation phase. During the preliminary analysis, not all new possible technologies were reflected. Additional promising opportunities exist, for example in the adaptation and adoption of agroforestry systems. Further, restoration of riparian vegetation and spring protection are not currently reflected in this table, but are expected to be eligible for FISP Ecológico payments. The ranges of indicators somewhat mask the full potential for changes in environmental service provision by switching from a degrading to a sustainable practice within a specific land use category. For the most part, existing land uses will be associated with the lower end of the indicator range quoted in the table. For instance, most of the annual cropping systems will be closer to 0.0 on the erosion indicators. It is only in few exceptional areas where cropping is carried out on very flat land on sand with deep soils that few losses are observed.

³¹ Assigned by the Interministerial Climate Change Commission (CIMGC), the Designated National Authority for CDM in Brazil

Table 1: Environmental Service Indicators for Main Current and Potential Land Use Practices

Land Use Practice	Classification (for details, see Table 2 below)	Approx. % of total land use						Environmental Services Indicators				Return
		PI	CE	RN	PB	PE	SE	Carbon (soil)	Carbon (veg)	Bio- diversity	Erosion Control	R\$/ha
Caatinga Silvopasture	2.1.1.2 (1-4)	50	50	45	45	35	15	0.6-0.7	0.4-0.5	0.4-0.8	0.6-0.7	7 - 22
- improved practices	2.1.1.2 (5-9)							0.7-0.8	0.4-0.8	0.6-0.8	0.5-0.8	14 - 23
Native Grassland Pasture	2.1.1.1 (4-6)	20	20	20	25	15	20	0.5	0	0.1-0.6	0.1-0.6	5 - 46
- improved practices	2.1.1.1 (7-12)							0.5	0	0.3-0.8	0.3-0.8	5 - 56
Native Caatinga	4.1	20	20	20	20	20	20	n.a.	n.a.	n.a.	n.a.	-
- restored	4.1 (improved)							1.0	1.0	1.0	1.0	-
Annual Crops	1.1.1. (1.1,1.2, 2.1,2.1,3.1,3.2)	6	8	13	10	17	20	0	0	0	0.0-0.7	300
- improved practices	1.1.1. (1.3, 1.4, 2.3,2.4,3.3,3.4)							0	0	0	0.3-0.7	434
Perennial Crops	1.1.2.1.1, 1.1.2.2.1	4	2	2	-	3		0.8	0.8	0	0.4-0.8	290
- improved practices	1.1.2.1.2, 1.1.2.2.2							0.8	0.8	0	0.6-0.8	290
Planted Pasture	2.1.2.1 (1,3)	-	-	-	-	10	25	0.7	0	0	0.4-0.5	540
- improved practices	2.1.2.1 (2,4)							0.7	0	0	0.5-0.7	540
<p>- Abbreviations of States: PI: Piauí, CE: Ceará, RN: Rio Grande do Norte, PB: Paraíba, PE: Pernambuco, SE: Sergipe</p> <p>- Land Use Classification: Refers to Systems identified by Ambrosio/Sampaio – Draft: Land Use Systems, unpublished, project preparation document</p> <p>- Environmental Services Indicators: Established on linear scale from 0 to 1 (maximum): Soil carbon: 1=38 tC/ha; Carbon (vegetation): 1=15 tC/ha; Biodiversity (plant species diversity): 80 species; Erosion: 0=30t/ha/yr, 1=0t/ha/yr, based upon Sampaio, E, UFPE, <i>Considerations regarding Land Use Systems and their Indices</i>, unpublished, project preparation document</p> <p>- Native Caatinga: native caatinga is assumed to be equal to the 20% legal reserve established by Brazilian law. However, in practice, much of the Caatinga in these reserve areas is highly degraded. No estimates are available regarding the degree of degradation in the project area on these lands, but it is expected that restoration of Caatinga in the reserve areas would have significant impacts on environmental services provision.</p> <p>- Pasture systems: the use of pasture varies greatly across and within the different states, in particular dairy cows, beef cattle, goat and sheep raising. The figures presented indicate the range of values, but these will differ significantly between the different pasture use systems.</p> <p>- Annual returns from land use: Estimates exclude the cost of family labour. <i>Estudo e Desenho do Programa de Incentivos Ambientais, Relatório Preliminar</i>, UFPE, Sampaio, Y, Tavora, L, Ramos, F.</p>												

34. There are also additional improvements in environmental service provision related to more sustainable practices, which are not currently reflected in the table: a move towards more sustainable annual cropping systems would increase intensification and thereby reduce encroachment of Caatinga areas, which would otherwise be cleared and burnt to open up new agricultural land as the fertility on the previous plot plummets. These indirect impacts in avoiding the reduction of environmental services provision from existing Caatinga

35. All data provided in the table on indicators for environmental services and for returns to land are static. They reflect the estimated level once the new system has been fully established. However, in the conceptualization of PES systems, the rate of change in these indicators can be crucial. This is particularly important for processes which may take a long time to reach the new equilibrium. Taking the example of carbon sequestration, a faster rate of sequestration is of higher value, and should be reflected through a higher payment. Considering the returns to land, the table indicates that in most cases switching within a certain land use category from more degrading to more sustainable practices also increases returns to the farmer. However, the farmers may face a transition phase of reduced returns while they invest in changing the land use and possibly forego income before the new system is fully operational. These transition costs can be barriers to adoption which the FISP Ecológico payment would be targeted to overcome.

36. During the first year of project implementation, in the process of developing the FISP Ecológico design, it is therefore necessary to carry out additional technical and economic studies to provide a more in-depth assessment of the supply potential for environmental services in the project area.

37. Some specific steps of analysis to consider in establishing a payment system under the FISP:

- Carry out a detailed inventory of data on land degradation, slope/topography, various indicators of soil quality, land cover, biodiversity, erosion etc. which could support the assessment of environmental services
- Build upon the preliminary, detailed classification of land uses to come up with a simplified list of current and improved land uses, and identify “best bet” land use changes which address land degradation and which will have a significant impact on erosion, carbon and biodiversity.
- Identify specific geographical “hotspots” where potential exists to increase environmental services provision significantly by switching to more sustainable land uses
- Refine the indicators for biodiversity conservation, carbon sequestration and erosion related to each land use: Additional technical studies will be carried out to collect sufficient information to establish the indicators with a greater degree of confidence. Indicators should also be validated in expert workshops to establish broad consensus and ensure that they reflect the best information available.
- Include indicators for rates of change in environmental service provision from changes in land use as well as final equilibria levels.
- Assess whether it is possible to reflect the impact of avoided encroachment of Caatinga from more sustainable, intensive agriculture in the land use indicators.
- Assess and quantify barriers to adoption of main improved land uses and set a level of payment related to the environmental services indicators which would be sufficient to allow producers to overcome these barriers. Refine the assessment of changes in returns from improved land use practices. Assess “minimum willingness to accept” by farmers to adopt improved technology, and the appropriate timing of payments to induce the change.
- Establish monitoring methodology to assess the impact of observed land use changes on environmental services provision. The use and benefits of this monitoring methodology will reach beyond FISP implementation as tools to support other environmental services markets.

Table 2 – Current and Potential Land Use Practices (*)

Classification No. of Land Use Practices	Description
1.	Agricultural Systems
1.1.	Rainfed Agricultural Systems
1.1.1	<i>Annual Crops Systems (subsistence and cash crops)</i>
1.1.1.1.1	- Annual Crop (maize, beans, herbaceous cotton, etc), commercial varieties, declivity (d) > 20%, shallow soil and of medium to low permeability; not irrigated, no improved practices.
1.1.1.1.2	- Annual Crop (maize, beans, herbaceous cotton, etc), local varieties, d > 20%, shallow soil and of medium to low permeability; not irrigated, no improved practices
1.1.1.1.3	- Annual Crop (maize, beans, herbaceous cotton, etc), commercial varieties, d > 20%, shallow soil and of medium to low permeability; not irrigated, improved practices
1.1.2	<i>Perennial Crops Systems</i>
1.1.2.1.1	- Perennial crop of low diversity (cashew, coffee, fruits; one to two species), d > 45%, not irrigated, no improved practices.
1.1.2.1.2	- Perennial crop of low diversity (cashew, coffee, fruits; one to two species), d > 45%, not irrigated, improved practices.
1.1.2.2.1	- Perennial crop of low diversity (cashew, coffee, fruits; one to two species), d ≤ 45%, not irrigated, no improved practices.
1.1.2.2.2	- Perennial crop of low diversity (cashew, coffee, fruits; one to two species), d ≤ 45%, not irrigated, improved practices.
1.1.2.3.1	- Perennial crop of high diversity (cashew, coffee, fruits; more than two species), d > 45%, not irrigated, no improved practices.
1.1.2.3.2	- Perennial crop of high diversity (cashew, coffee, fruits; more than two species), d > 45%, not irrigated, improved practices.
1.1.2.4.1	- Perennial crop of high diversity (cashew, coffee, fruits; more than two species), d ≤ 45%, not irrigated, no improved practices.
1.1.2.4.2	- Perennial crop of high diversity (cashew, coffee, fruits; more than two species), d ≤ 45%, not irrigated, improved practices.
1.2.	Irrigated Agricultural Systems (small irrigation)
1.2.1	<i>Annual Crops Systems (subsistence and cash crops)</i>
1.2.1.1.1	- Annual Crop (maize, beans, herbaceous cotton, etc), commercial varieties, d ≤ 20%, shallow soil and of medium to low permeability; irrigated, no improved practices.
1.2.1.1.2	- Annual Crop (maize, beans, herbaceous cotton, etc), commercial varieties, d ≤ 20%, shallow soil and of medium to low permeability; irrigated, improved practices.
1.2.1.2.1	- Annual Crop (maize, beans, herbaceous cotton, etc), commercial varieties, d ≤ 20%, sandy soil; irrigated, no improved practices.
1.2.1.2.2	- Annual Crop (maize, beans, herbaceous cotton, etc), commercial varieties, d ≤ 20%, sandy soil; irrigated, improved practices
1.2.2	<i>Perennial Crops Systems (home gardens)</i>
1.2.2.1.1	- Perennial crop of low diversity (banana, fruits; one to two species), irrigated, no improved practices.
1.2.2.1.2	- Perennial crop of low diversity (banana, fruits; one to two species), irrigated, improved practices.
1.2.2.2.1	- Perennial crop of high diversity (banana, fruits; more than two species), irrigated, no improved practices.
1.2.2.2.2	- Perennial crop of high diversity (banana, fruits; more than two species), irrigated, improved practices.
1.2.2.3.1	- Low diversity crop (tomato, vegetables), irrigated, no improved practices.
1.2.2.3.2	- Low diversity crop (tomato, vegetables), irrigated, improved practices.
1.2.2.4.1	- High diversity crop (tomato, vegetables), irrigated, no improved practices.
1.2.2.4.2	- High diversity crop (tomato, vegetables), irrigated, improved practices.
2.	Animal Husbandry Systems
2.1	Animal Husbandry Systems
2.1.1	<i>Native Pasture/Rangeland (Caatinga)</i>
2.1.1.1.1.1	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d > 20%, bovine for meat.
2.1.1.1.1.2	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d > 20%, bovine for milk.
2.1.1.1.2	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d > 20%, caprine
2.1.1.1.3	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d > 20%, ovine.
2.1.1.1.4.1	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d ≤ 20%, bovine for meat
2.1.1.1.4.2	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d ≤ 20%, bovine for milk.
2.1.1.1.5	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d ≤ 20%, caprine.
2.1.1.1.6	- Degraded herbaceous native pasture (low soil cover), few trees (<4 ha ⁻¹), d ≤ 20%, ovine.
2.1.1.1.7.1	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d > 20%, bovine for meat.
2.1.1.1.7.2	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d > 20%, bovine for milk.
2.1.1.1.8	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d > 20%, caprine.
2.1.1.1.9	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d > 20%, ovine.
2.1.1.1.10.1	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d ≤ 20%, bov. for meat.
2.1.1.1.10.2	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d ≤ 20%, bovine for

2.1.1.1.11	milk.
2.1.1.1.12	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d <=20%, caprine.
2.1.1.2.1	- Not degraded herbaceous native pasture (high soil cover), few trees (<10 ha ⁻¹), d <=20%, ovine.
2.1.1.2.2	- Dense native shrubby pasture, bovine.
2.1.1.2.2	- Dense native shrubby pasture, caprine
2.1.1.2.3	- Dense native shrubby pasture, ovine.
2.1.1.2.4	- Dense native shrubby-arboreal pasture, shallow cut for firewood, bovine.
2.1.1.2.5	- Dense native shrubby-arboreal pasture, shallow cut for firewood, caprine.
2.1.1.2.6	- Dense native shrubby-arboreal pasture, shallow cut for firewood, ovine.
2.1.1.2.7	- Dense native arboreal pasture, shallow cut for firewood, bovine.
2.1.1.2.8	- Dense native arboreal pasture, shallow cut for firewood, caprine.
2.1.1.2.9	- Dense native arboreal pasture, shallow cut for firewood, ovine.
2.1.2.	<i>Planted Pasture</i>
2.1.2.1	- Planted pasture (grasses, one species)
2.1.2.1.1	- Planted pasture, d > 45%, no improved practices.
2.1.2.1.2	- Planted pasture, d > 45%, improved practices.
2.1.2.1.3	- Planted pasture, d <= 45%, no improved practices.
2.1.2.1.4	- Planted pasture, d <= 45%, improved practices.
2.1.2.2	- Prickle pear (<i>Opuntia ficus</i>)
2.1.2.2.1	- <i>Opuntia ficus</i> (perennial), d > 20%, shallow soils with medium to low permeability; not irrigated, no improved practices.
2.1.2.2.2	- <i>Opuntia ficus</i> (perennial), d > 20%, shallow soils with medium to low permeability; not irrigated, improved practices.
2.1.2.2.3	- <i>Opuntia ficus</i> (perennial), d <= 20%, shallow soils with medium to low permeability; not irrigated, no improved practices.
2.1.2.2.4	- <i>Opuntia ficus</i> (perennial), d <= 20%, shallow soils with medium to low permeability; not irrigated, improved practices.
2.1.2.3.1	- Fodder grasses, d <= 20%, not irrigated, no improved practices.
2.1.2.3.2)	- Fodder grasses, d <= 20%, not irrigated, improved practices.
2.2	Irrigated Animal Husbandry Systems
2.2.1	<i>Planted Pasture</i>
2.2.1.1	- Planted Pasture.
2.2.1.1.1	- Planted pasture, d <= 20%, no improved practices.
2.2.1.1.2	- Planted pasture, d <= 20%, improved practices.
2.2.1.2	Fodder grasses
2.2.1.2.1	- Fodder grasses, d <= 20%, irrigated, no improved practices.
2.2.1.2.2	- Fodder grasses, d <= 20%, not irrigated, improved practices
3	Agroforestry Systems
3.1	Silvopastoral Systems
3.1.1	<i>Afforestation</i>
3.1.1.1.1	- Sabiá (<i>Mimosa caesalpiniaefolia</i>) plantations for firewood, fences and consumption of leaves by cattle
3.1.1.1.2	- <i>Prosopis</i> sp. plantations for beans and consumption of leaves by cattle
4.	Forestry
4.1.	Native Caatinga
4.1.1	<i>Preserved arboreal Caatinga</i>
4.1.2	- Preserved shrubby-arboreal Caatinga
4.1.3	- Shrubby-arboreal Caatinga for firewood, no improved practices.
4.1.4	- Shrubby-arboreal Caatinga for firewood, improved practices.

(*) Source of Information for above Table 2:

Articles

PEREIRA, I. M., ANDRADE, L. A., SAMPAIO, E. V. S. B., BARBOSA, M. R. V. Use-history effects on structure and flora of caatinga. . Biotropica. Lawrence: , v.35, n.2, p.154 - 165, 2003.

ARAÚJO FILHO, J. A., SOUZA NETO, M., NEIVA, J. N. M., CAVALCANTE, A. C. R. Desempenho Produtivo de Ovinos da raça Morada Nova em Caatinga Raleada sob Três Taxas de Lotação. Ciência Agrônômica. Fortaleza: , v.33, p.51 - 57, 2002.

LEITE, E. R., CÉSAR, M. F., ARAÚJO FILHO, J. A. Efeitos do Melhoramento da Caatinga sobre os Balanços Protéico e Energético na Dieta de Ovinos. Ciência Animal. Fortaleza: , v.12, n.1, p.67 - 73, 2002.

TIESSEN, H., SAMPAIO, E. V. S. B., SALCEDO, I. H. Organic matter turnover and management in low input agriculture of NE Brazil. *Nutrient Cycling in Agroecosystems*. Amsterdam: , v.61, p.99 - 103, 2001.

ANTONINO, A. C. D., SAMPAIO, E. V. S. B., DALL'OLIO, A., SALCEDO, I. H. Balanço hídrico em solo com cultivos de subsistência no semi-árido do Nordeste do Brasil. *Revista Brasileira de Engenharia Agrícola e Ambiental*. Campina Grande: , v.4, n.1, p.29 - 34, 2000.

ALLKIN, R., SAMPAIO, E. V. S. B. Plantas do Nordeste: Subprogramme for Information, Dissemination and Training (SIDT). *European Tropical Forest Research Network*. Wageningen: , v.31, n.1, p.34 - 36, 2000.

ARAÚJO FILHO, J. A., LEITE, E. R., SILVA, N. L. Contribution Of Woody Species To The Diet Composition Of Goat And Sheep In Caatinga Vegetation. *PASTURAS TROPICALES*. CALI, COLOMBIA: UNIDAD DE ARTES GRAFICAS, CIAT, v.20, n.2, p.41 - 45, 1998.

TIESSEN, H., FELLER, C., SAMPAIO, E. V. S. B., GARIN, P. Carbon Sequestration And Turnover In Semi-arid Savannas And Dry Forests. *CLIMATIC CHANGE*. Holanda: , v.40, p.105- 117, 1998.

SAMPAIO, E. V. S. B., ARAÚJO, E. L., SALCEDO, I. H., TIESSEN, H. Regeneração da Vegetação de Caatinga Após Corte e Queima, Em Serra Talhada, PE. *Pesquisa Agropecuária Brasileira*. BRASILIA: EMBRAPA, v.33, n.5, p.621 - 632, 1998.

SALCEDO, I. H., TIESSEN, H., SAMPAIO, E. V. S. B. Nutrient Availability In Soils From Shifting Cultivation Sites In The Semi-Arid Caatinga Of NE Brazil. *Agriculture, Ecosystems and Environment*. Amsterdam: ELSEVIER, v.65, p.177 - 186, 1997.

LEITE, E. R., ARAÚJO FILHO, J. A., PINTO, F. C. Pastoreio Combinado de Caprinos e Ovinos Em Caatinga Rebaixada: Desempenho da Pastagem e dos Animais. *PESQUISA AGROPECUÁRIA BRASILEIRA*. BRASÍLIA, DF: EMPRESA BRASILEIRA DE PESQUISAS AGROPECUÁRIAS, v.30, n.8, p.1129 - 1134, 1995.

Books

ARAÚJO FILHO, J. A., GADELHA, J. A., TORRES, S. M. S., MACIEL, D. F., CATUNDA, A. G. Estudos de pastagens nativas do Ceará. Fortaleza, Ceará : BNB, 1982, v.1. p.75.

SAMPAIO, E. V. S. B., SAMPAIO, Y., VITAL, T., ARAÚJO, M. S. B., SAMPAIO, G. R. Desertificação no Brasil: conceitos, núcleos e tecnologias de recuperação e convivência. Recife : Editora Universitária UFPE, 2003, v.1. p.202.

Chapters in Books

ARAÚJO FILHO, J. A., CARVALHO, F. C. Sistemas de Produção Agrossilviastoril para o Semi-Árido Nordestino **In:** *Sistemas Agroflorestais Pecuários: Opções de Sustentabilidade para Áreas tropicais e Subtropicais*.1 ed.Brasília : FAO, 2001, v.01, p. 101-110.

ARAÚJO FILHO, J. A., BARBOSA, T. M. L. Manejo Agroflorestal da Caatinga: Uma Proposta de Sistema de Produção **In:** *Agricultura, Sustentabilidade e o Semi-Árido*.1 ed.Fortaleza, CE : Editora Folha de Viçosa, 2000, v.1, p. 47-57.

ARAÚJO FILHO, J. A., MESQUITA, R. C. M., LEITE, E. R. Avaliação de Pastagens Nativas **In:** *UTILIZACION Y MANEJO DE PASTIZALES*.1 ed.MONTIVIDEO, URUGUAI : IICA-PROCISSUR, 1994, v.1, p. 61-70.

LEITE, E. R., ARAÚJO FILHO, J. A., MESQUITA, R. C. M. Forage Resources In Northeast Brazil: Their Value And Management **In:** SHEEP PRODUCTION IN NORTHEASTERN BRAZIL.1 ed.DAVIS, CALIFORNIA, EUA : UNIVERSITY OF CALIFORNIA PRINTING DEPT, 1990, v.1, p. 59-77.

MENEZES, R. S. C., TIESSEN, H., SILVEIRA, L. M., ANDRADE, L. A., SAMPAIO, E. V. S. B., SALCEDO, I. H., SABOURIN, E., PORTO, I., SARMENTO, C. Balanços de nutrientes em unidades de produção familiar no Agreste Paraibano: avaliação e resultados preliminares. **In:** Agricultura familiar e agroecologia no semi-árido: avanços a partir do Agreste da Paraíba ed.Rio de Janeiro : AS-PTA, 2002, p. 235-247.

SAMPAIO, E. V. S. B., MENEZES, R. S. C. Perspectivas de uso do solo no semi-árido nordestino **In:** 500 anos de uso do solo no Brasil ed.Ilhéus : Sociedade Brasileira de Ciência do Solo, 2002, v.1, p. 339-363.

SAMPAIO, E. V. S. B. Usos das plantas da caatinga **In:** Vegetação e flora da caatinga ed.Recife : APNE-CNIP, 2002, v.1, p. 49-90.

MENEZES, R. S. C., SAMPAIO, E. V. S. B. Agricultura sustentável no semi-árido nordestino **In:** Agricultura, sustentabilidade e o semi-árido ed.Fortaleza : DCS - UFC, 2000, p. 20-46.

Appendix 9. Documents in the Project File and Record of Consultations and Agreements

1. Documents Available for Consultation

38. Documents available on the Website for public consultation (www.projedomhelder.gov.br):

- Information notes on the progress and events of the proposed project (in Portuguese)
- Project Concept Note (in Portuguese).
- Project Summary - Draft (in Portuguese)

39. Documents already prepared (and those under preparation – final reports to be made available on the Internet) related to the development of the Project:

- Satellite images of the project area
- Stock taking of existing and potential agricultural practices (in Portuguese)
- Socio-economic diagnostic study in the Project Area (in Portuguese)
- Land Degradation and Agricultural Sustainability Issues in the Project Area (in Portuguese)
- Baseline studies for the design of the environmental incentives component, including background and considerations for the establishment of payments for environmental services schemes in the Project Area Land Degradation and Agricultural Sustainability Issues in the Project Area (in Portuguese)
- Diagnostic on Institutional Factors and Public Policies Land Degradation and Agricultural Sustainability Issues in the Project Area (in Portuguese)
- Institutional Arrangements report Land Degradation and Agricultural Sustainability Issues in the Project Area (in Portuguese)
- Project Brief Draft (in Portuguese and English)
- M&E Report Land Degradation and Agricultural Sustainability Issues in the Project Area (in Portuguese)
- Detailed records of contacts made and participation in events (technical meetings, seminars, workshops) – for summary
- Main report and annexes on the design of Capacity Building Component (in Portuguese)
- Endorsement Letter from National Focal Point
- Draft Executive Summary (in English)
- Draft Project Brief (in Portuguese and English).

2. Summary Record of Project Meetings and Public Events

Table 1. Summary Record of Project Meetings and Networking & Public Events

Date	Event	Place	Objective	Organizers / Participants
02/19-21/02	Meetings to Follow-up of Global Mechanism Mission	Brasília	Inputs to preparation of Concept Note. Liaison meetings with MMA, Ministry for Planning, Budgets & Management – SEAIN and UNDP.	GEF Sertão/PDHC team, MDA, MMA, SEAIN, UNDP
03/4-5/02	Workshop (MDA/PDHC/GM-organized) to launch the Institutional Coordination Platform for the Development of North-East Brazil's Semi-Arid Lands	Jaboatão dos Guararapes Pernambuco	Preparatory meeting to bring together financial, human and infra-structure resources for project set-up in the Sertão. It provided essential inputs to the Concept Note.	MDA/PDHC, MMA, IFAD, Global Mechanism, FAO, UNDP, local and national NGOs, state and federal governments, private sector, trade union and international agencies.
07/10/02	Technical Meeting with UAP-NE of MMA	Natal Rio Grande do Norte	Discussion about complementarities and potential problems of the MDA/GEF Sertão Project with UAP-NE of MMA programmes	MDA/PDHC, MMA/UAP-NE.
07/29 - 30/02	Meeting with the Technical Team of MMA	Brasília	Report to MMA on adjustments to the Concept Note of the MDA/GEF Sertão Project and its protocol in SEAIN.	MDA/PDHC, MMA/ International Cooperation.
May-August 2004	Various local preparation meetings (Concept Note level) in the PDHC-benefited territories	Sertão Central, Sertão do Apodi, Cariri Paraibano, Sertão do Pajeú, Sertão Sergipano	To held various local preparation meetings, interviews and focus groups with communities, local government and NGOs	Local NGOs, Local Governments, Agrarian Reform Settlements and Smallholding Communities
07/08 - 09/03	Participation in MMA Planning Seminar for UNCCD NAP preparation.	Olinda Pernambuco	Discussion on the construction and implementation of NAP.	Organised by NAP with the participation of 38 Organisations including WB, bilateral agencies, NGOS and CSOs.
07/28-29/03	I Seminar: "Sustainable and Cooperative Development for the Caatinga Bioma", MDA-organized	Recife Pernambuco	Discussion on the Bioma of the Caatinga to visualize possible ways on how to make government promote sustainable and cooperative development of the Bioma.	60 participants, including representatives of the Federal Government (MDAPDHC, INCRA, MMA, IBAMA, State Government, Social Movements, Universities, International Cooperation and NGOs.
11/14-15/03	Participation in the 1 st Meeting of NAP Inter-ministerial Group (GT); Workshop: "Strategy for Developing the	Recife Pernambuco	Design strategy for NAP to support the first meeting of the GT. Outcomes: proposal for the scope and structure of NAP, the methodology and steps towards building NAP, and the cooperation	ASA, Instituto Sertão, SEMAR/PI, SEMARH/PB, SIH/MI, MDA/GM, Fundação Grupo Esquel Brasil, UFRN/ADESE, ASPAN-UFRPE, SRH/MMA, GTZ, ASA,

	NAP”.		mechanisms among involved stakeholders and programmes.	MCT/SECIS, CODEVASF, EMBRAPA, IFAD/GM; MDA/GEF Sertão team
11/18-21/03	II Seminar Sustainable and Cooperative development for the Bioma of the Caatinga, MDA-organized	Petrolina Pernambuco	Discussion between Federal and State Governments and Civil Society, Issues: Livelihoods conditions subsistence farmers, water resources, mining, crop production, cattle-raising, work and market, autonomy of actions by various institutions related to sustainable development of the Bioma of the Caatinga.	Representatives of the Federal Government (MDA/PDHC, INCRA, MMA, IBAMA, State Government, Social Movements, Universities, and NGOs.
12/16/03	Working meeting between GEF Sertão and with the MMA technical teams	Brasília	Coordination of the Sustainable Land Management in the Semi-Arid Sertão Project (MDA/GEF Sertão) with MMA, and especially with the Project MMA/UNDP Caatinga.	MDA/GEF Sertão, MMA/UNDP Caatinga.
01/15/04	Meeting with the National Coordination Group of NAP.	Recife	Define coordination plan between NAP's and MDA/GEF Sertão, Goal: Achieve synergy and enable achievements.	MDA/GEF Sertão, MMA/SRH.
02/04/04	Meeting with the coordination unit of EMBRAPA Soils and UEP Recife.	Recife	Liaison meeting between EMBRAPA Solos and the MDA/GEF Sertão Project.	MDA/ GEF Sertão, EMBRAPA.
04/2004	GEF Sertão Project Workshop to Present and Discuss the MDA/GEF Sertão Project (regional level).	Recife Pernambuco	Presentation of progress on project preparation Discussion with governmental and non-governmental agencies to discuss logframe and receive comments on the preliminary project documents/studies	MDA/ GEF Sertão Project/PDHC, UFPE, CIRAD, FETAG's, NGOs, PDHC PEDs, EMBRAPA
04/28/04	Seminar “The Sustainability of the Bioma in the Caatinga”	Juazeiro Bahia	Public relations event to support successful initiatives working on the Bioma of the Caatinga. promoted by MDA and MMA.	MDA/GEF Sertão team, MMA/SECEX, Civil Society.
05/05/04	Technical Meeting between the GEF Sertão and MMA/PNUD/GEF Caatinga Projects.	Recife Pernambuco	Presentation of 1) strategy and linkages between the MDA/GEF Sertão Project, and the Project MMA/UNDP Caatinga, and 2) work out under the Project MMA/UNDPcaatinga with MDA (SRA, SDT and INCRA) for joint actions.	MDA/GEF Sertão, MMA/UNDP Caatinga.
05/13/04	Technical Meeting of Coordination units of PDHC/GEF, MDA, MMA/PNF, and the project	Recife Pernambuco	Presentation of the progress and discussion on strategy and linkage of the MDA/GEF Sertão with the Project MMA/UNDP Caatinga, and with MDA / National Program for	MDA/GEF Sertão, MMA/UNDP Caatinga.

	Caatinga MMA/UNDP Caatinga.		Land Credit – PNCf.	
06/23/04	Technical working meeting MDA/GEF Sertão and the MMA/UNDP Caatinga Projects, at SUDENE.	Recife Pernambuco	Information meeting on the progress of the MDA/GEF Sertão Project, and on initiatives for drawing up management plans for settlement areas of the Project MMA/UNDP Caatinga.	MDA/GEF Sertão, MMA/UNDP Caatinga.
06/29/04	Meeting with MMA/UNDP Caatinga and CE/BA/WB Caatinga to participate in the Prep. Seminar for the MDA/GEF Sertão Project.	Recife Pernambuco	Public discussion with CS to receive comments from Project partners and potential partners of MDA/GEF Sertão.	MMA/UNDP Caatinga and CE/BA/WB Caatinga.
May-June 2004	Various local preparation meetings, interviews and focus groups in six GEF Sertão project territories	São João do Piauí, Sertão Central, Sertão do Apodi, Cariri Paraibano, Sertão do Pajeú, Sertão Sergipano do São Francisco	To held various local preparation meetings, interviews and focus groups with communities, local government and NGOs in six GEF Sertão project territories	Local NGOs, Local Governments, Agrarian Reform Settlements and Smallholding Communities
07/02/04	MDA/GEF Sertão Regional Project Preparation Workshop	Recife Pernambuco	Continued public discussion with Government and Civil Society to receive comments from Project partners and potential partners.	MMA/UNDP Caatinga Project, CE/BA/WB Caatinga Project, Federal (MDA/PDHC, INCRA, MMA, UAP-NE, EMBRAPA, IBAMA, Bank of the North-East) and and state government institutions , Social Movements, Universities, International Cooperation (GTZ) and NGOs
07/02/04	Coordination Meeting of the Project GEF.	Recife Pernambuco	Working meeting to conduct technical analysis and design strategy for interlinking different GEF projects GEF to create synergies.	MMA/UNDP Caatinga, CE/BA/WB Caatinga, MDA/GEF Sertão.
Jun – Jul 04	Various communications via e-mail with the GEF RISEMP Regional Project in Central America (WB as IA)	-	To start collaboration in the methodological approaches RISEMP is using to pay environmental services and to monitor carbon and biodiversity	MDA/GEFSertão and RISEMP teams, copied to WB Task Manager
July 04	Various communications via e-mail and two meetings with GEF CE/BA/WB Caatinga Project	-	Exchange of information and improve collaboration between the MDA/GEF Sertão and CE/BA/WB Caatinga Projects	GEF CE/BA/WB Caatinga, and MDA/GEF Sertão.

07/06/04	Communication (FAX) from the Coordination Unit of the MDA/GEF Sertão.	Recife Pernambuco	Request to the National Secretariat for Resources of the Ministry of the Environment – MMA from MDA/GEF Sertão to present the project proposal at the 1 st South American Conference to Combat Desertification, held from 03 to 06 Aug 2004	MDA/GEF Sertão, National Secretariat for Resources of the Ministry of the Environment (MMA).
07/07/04	Official communication to the Bahia State Secretary of Planning (Coordination Unit of the GEF CE/BA/WB Project)	Recife Pernambuco	Communication to confirm agenda for the working meeting of 15 July 2004 and to thank the Coordination Unit of the Project CE/BA/WB Caatinga for their active participation in the project preparation workshop organized by the MDA/GEF Sertão Project in	The Project CE/BA/WB Caatinga and MDA/GEF Sertão.
07/07/04	Communication via e-mail from the Coordination Unit of the CE/BA/WB Caatinga.	Salvador Bahia	Request a technical meeting between the MDA/GEF Sertão Project and the project CE/BA/WB Caatinga.	MDA/GEF Sertão, CE/BA/WB Caatinga.
07/08/04	Communication via e-mail from the Coordination Unit of the MDA/GEF Sertão Project.	Recife Pernambuco	Summary description of MDA/GEF Sertão Project is send to NAP for inclusion in the final document.	MDA/GEF Sertão, NAP.
07/09/04	Communication via e-mail from of the Coordination Unit of the MDA/GEF Sertão Project.	Recife Pernambuco	Collaboration proposal between MDA/GEF Sertão, CE/BA/WB Caatinga is send out.	MDA/GEF Sertão, CE/BA/WB Caatinga.
August 2004	Communications via phone and e-mail with the Rio de Janeiro IEM North-Northwestern Fluminense (WB as IA) and the Ecosystem Restoration of Riparian Forests in São Paulo (WB as IA) GEF Projects	-	To start collaboration in the methodological approaches the three projects will be using to pay environmental services and to monitor carbon and biodiversity	MDA/GEF Sertão, RJ/WB Rio de Janeiro Northwestern Fluminense and São SP/WB Paulo Riparian Forests Projects
07/09/04	Communication via e-mail from the Coordination Unit of the project CE/BA/WB Caatinga.	Salvador Bahia	Communication exchange to plan the agenda for a joint meeting and structure of the joint meeting between MDA/GEF Sertão, CE/BA/WB Caatinga.	MDA/GEF Sertão, CE/BA/WB Caatinga.
07/12/04	Meeting with the Secretariat for International Affairs (SEAIN).	Brasília	Discussion the modalities of MDA/GEF Sertão aiming at internalizing resources in the budget at the union level.	Secretariat for International Affairs (SEAIN), MDA/GEF Sertão.

07/12/04	Meeting with the Directorate for Biodiversity of the Ministry for the Environment (MMA).	Brasília	Presentation of the MDA/GEF Sertão Project and discussion on possible ways of collaboration	Directorate for Biodiversity of MMA, Coordination Unit of International Cooperation of MMA, MDA/GEF Sertão.
07/12/04	Meeting with the Ministry for Foreign Affairs (MRE)	Brasília	Presentation and discussion about the MDA/GEF Sertão Project, on aspects relevant to MRE affairs as the Political GEF Focal Point	Ministry for Foreign Affairs (MRE), MDA/GEF Sertão.
07/13/04	Meeting with the Directorate for Biodiversity of the Ministry for the Environment (MMA).	Brasília	Presentation and discussion about the MDA/GEF Sertão Project.	Directorate for Biodiversity of MMA, MDA/GEF Sertão.
07/13/04	Meeting with the Brazilian Executive UNCCD Focal Point (at MMA)	Brasília	Follow-up discussions on collaboration between the MDA/GEF Sertão Project and NAP, and discuss the Project participation in the 1 st South American Conference on Combating Desertification	MMA/SRH, MDA/GEF Sertão.
07/14/04	Communication via e-mail from the Coordination Unit of the project the MDA/GEF Sertão Project.	Recife Pernambuco	Socio-economic studies and analysis of the sustainability of agriculture produced by the MDA/GEF Sertão Project are send out to the CE/BA/WB Caatinga Project.	MDA/GEF Sertão, CE/BA/WB Caatinga.
07/15/04	Working meeting with the CE/BA/WB Caatinga Project	Salvador Bahia	To detail collaboration agreement (see summary in table 2)	
07/19/04	Communication via e-mail from the Coordination Unit of the CE/BA/WB Caatinga Project Project	Salvador Bahia	Meeting to confirm collaboration between the MDA/GEF Sertão Project and the CE/BA/WB Caatinga Project.	MDA/GEF Sertão, CE/BA/WB Caatinga.
08/03-06/04	Participation of the MDA/GEF Sertão Project in 1 st South American Conference on Combating Desertification – CCD+10.	Fortaleza Ceará	Participation in the 1 st South American Conference on Combating Desertification - CCD + 10, and presentation of the MDA/GEF Sertão Project	MDA/GEF Sertão, NAP, large number of national and international government and non-government organizations.
08/05/04	Participation of the Coordination Unit of the MDA/GEF Sertão Project, in a technical meeting with MMA and International Agencies.	Fortaleza Ceará	Participation in a meeting to draft Cooperation Agreement between MMA and the International Agencies supporting the implementation of NAP-BRASIL.	MMA, GTZ, IFAD, IICA, UNDP, DED, Dutch Embassy, MDA/GEF Sertão.
8/10/04 and	Meetings with FAO Technical	Rome, Italy	Exchange of information and technical advise from	FAO Investment Centre Office (on behalf of

01/21/04	team for the LADA Project		the LADA (UNEP as IA) technical team	GEF Sertão MDA team) and FAO LADA team (attached to FAO AGLL Service)
08/10/04	Communication via e-mail from the Coordination Unit of the MMA/UNDP Caatinga Project.	Recife Pernambuco	Meeting to confirm collaboration agreement matrix between the MDA/GEF Sertão and the MMA/UNDP Caatinga Projects.	MDA/GEF Sertão, CE/BA/WB Caatinga.
08/10/04	Communications via e-mail from the Coordination Unit of – NAP.	Brasília	Report on the meeting held on 05.08, during the– CCD+10 is send out. The reports highlight the Cooperation Agreement between MMA and the International Agencies supporting the implementation of NAP-BRASIL.	MMA, GTZ, IFAD, IICA, UNDP, DED, Dutch Embassy, MDA/GEF Sertão.
08/11/04	Communication via e-mail from the Coordination Unit of the MDA/GEF Sertão Project.	Recife Pernambuco	Meeting to confirm collaboration between the MDA/GEF Sertão Project and UAP-NE MMA.	MDA/GEF Sertão, Northeast Support Unit of the Ministry for the Environment (UAP-NE MMA).
08/13/04	Communication via e-mail from UAP-NE MMA.	Natal Rio Grande do Norte	Meeting to confirm collaboration between the MDA/GEF Sertão Project and the CE/BA/WB Caatinga Project	(UAP-NE MMA), MDA/GEF Sertão.
08/27/04	Seminar with local stakeholders to follow-up on the MDA/GEF Sertão project preparation.	Recife Pernambuco	Continued public discussion with civil society, to encourage, exchange comments and suggestions with local stakeholders living and working in the territories of the Project.	PDHC Local Supervision Units, PDHC/GEF PEDs, Service Cooperatives, other NGOs.

3. Summary of Collaboration Agreements with the CE/BA/WB Caatinga and the MMA/UNDP Caatinga GEF Projects

See Tables 2 and 3 below.

Table 2. Agreed collaboration between the teams of the GEF/IFAD/MDA Sertão and GEF/WB Caatinga Bahia/Ceará Projects arising from the joint meeting held in Salvador on 15 July 2004 (*)

Area of possible overlapping and common threads in the two Projects	Emphasis of Sertão MDA GEF/IFAD Project	Emphasis of the Caatinga BA/CE GEF/WB Project	Proposal for synergy and collaboration
Target public	<ul style="list-style-type: none"> - Families of farmers from agrarian reform settlements (mostly) and from small-holder communities living in the same territory 	<ul style="list-style-type: none"> - Rural communities of small-scale producers living within or close to well-defined landscape units, such as communities around existing Caatinga Conservation Units and within Microbasins 	<p>During the implementation phase, the two Projects will:</p> <ul style="list-style-type: none"> - Undertake exchange visits in order to exchange experiences among settler communities and small-holding farmers.
Environmental education	<ul style="list-style-type: none"> - Awareness-raising actions for those in the settlements and schools living in areas of Caatinga affected by land degradation. Concept of two environmental education programmes (including pedagogic support): i) in rural schools, and ii) in the settlements and communities. Pedagogic support/training will give special importance to the development of the ability to make good observations (i.e. strengthening analytical capacity) 	<ul style="list-style-type: none"> - Environmental education actions (Component 3) focusing on local ecology, for users of the Caatinga (small farmers, students, small industries/charcoal, etc.). - focus on local ecology (Component 4), directed at primary school students and at the community in general, as a way to give value to the Caatinga, with the aim of a cultural change as to the aspects of how it is currently exploited (in a predatory way) and how to prevent, among other things, the effects of climatic change 	<p>During the implementation phase, the two Projects will:</p> <ul style="list-style-type: none"> - Exchange information and experiences in relation to the methodological process to be adopted, lessons learned and in successful experiences, by promoting exchange visits by the coordinators and rural educators of the environmental education activity of the two projects. - In the specific case of the State of Ceará (CE), the two Projects will create a channel for exchange of environmental education experiences in the Central (Sertão MDA Project sites) and Western (CE/BA Project) regions of the Sertão in CE, including exchange visits between rural schools and communities. - At the moment, information is being systematized by the Sertão Project on some successful environmental education experiences throughout the Semi-arid, which will be passed on to CE and BA, as soon as it is completed, probably, by the end of this year. - The CE/BA Project will pass on the experiences and lessons learned in the education actions of the Pró-Gavião Project

Area of possible overlapping and common threads in the two Projects	Emphasis of Sertão MDA GEF/IFAD Project	Emphasis of the Caatinga BA/CE GEF/WB Project	Proposal for synergy and collaboration
			and in the SEMARH Regular Program for Environmental Education.
Commercialization to improve the income of small-holder farmers	<ul style="list-style-type: none"> - It will take advantage of the intense work which is being undertaken by the Productive and Marketing Development component of the Dom Helder Câmara Project – PDHC (IFAD loan) associated with the Sertão GEF, and will conduct some extra studies in the area of environmental incentives. - The Sertão Project will develop markets for native and organic products, such as fruits. 	<ul style="list-style-type: none"> - Development of alternative production and marketing programs to assure improvements in income for small-holder farmers and the ecological and economic sustainability of current production systems. 	<ul style="list-style-type: none"> - The Dom Helder/PDHC Project will receive visits from staff of the Bahia and Ceará Project to present their accumulated experiences (and lessons learned) in the last 2 years through implementing the Marketing Development component. - The Sertão GEF Project (associated with the PDHC) will make available the market studies on native and organic products (planned for the first and second year of the Project).
Partnership with financial agents	<ul style="list-style-type: none"> - The Financial Services component of the PDHC project is gaining experience in this area, and is seeking to improve access to lines of credit adapted to the socio-economic characteristics of the beneficiaries. 	<ul style="list-style-type: none"> - To establish partnerships with financial and seed-money agents to make lines of credit available for financing productive and social activities which combine the socio-economic use of the biome while preserving and conserving it. 	<ul style="list-style-type: none"> - The experiences undergone in the PDHC Project can be shared with the states of CE and BA. The PDHC has accumulated experience in working together with the Northeast Brazil Bank (BNB), using lines of credit from PRONAF and Land Credit (PNCF), as well as internal liaison in MDA together with the Secretariat of Smallholding Agriculture (SAF) and the Secretariat for Territorial Development (SDT).
Production of didactic material (for training and environmental education)	<ul style="list-style-type: none"> - This will be based on making use of and adapting existing material from current experience, and on giving value to the results of the knowledge generation 	<ul style="list-style-type: none"> - The CE/BA Project will take advantage of current experiences (for example, the Pro-Gavião Project and in the Environmental Education Program of the States). 	While they are being carried out, the two Projects will make didactic and publicity material available (hand-outs, posters, videos, CDs).

Area of possible overlapping and common threads in the two Projects	Emphasis of Sertão MDA GEF/IFAD Project	Emphasis of the Caatinga BA/CE GEF/WB Project	Proposal for synergy and collaboration
Monitoring, Evaluation and Dissemination of best practices	<p>Typical activities of participative monitoring of the socio-enviro. impact of the Project, including in pilot areas:</p> <p><i>Behaviour change:</i></p> <ul style="list-style-type: none"> ▪ Extent to which rural schools, communities, and society in general are sensitized on land degradation issues and associated needs for land use change; ▪ Change in capacity to facilitate and implement sustainable land management systems, including government and non-government organisations; ▪ Adhesion of rural producers to practices for the sustainable management of land; <p><i>Environmental characteristics:</i></p> <ul style="list-style-type: none"> ▪ Erosion/soil, water and biodiversity, vegetation cover and carbon sequestration <p><i>Socio-economic aspects</i></p> <ul style="list-style-type: none"> ▪ Increase in income; ▪ Incidence of poverty reduced in the project area; ▪ Increment /change in farm productivity; ▪ Diversification of production systems; ▪ Systematize and disseminate best practices. 	<ul style="list-style-type: none"> - The project will use socio-economic, environmental and behaviour change impact indicators. - To develop monitoring in which the community will participate and to build up the technical capacity for M&E. - Development of an environmental and bio-ethical data base in selected sites. - To systematize and disseminate best practices and technical guidelines to other states, participants and local governments, with the emphasis on sustainable development. 	<ul style="list-style-type: none"> - Exchange of experiences and information, among the 3 GEF projects for the Caatinga (WB, UNDP and IFAD), on the process of socio–environmental monitoring. Mode of integration: to draw up protocols regarding the standardization of some common indicators, methodologies and instruments for collecting, processing and analyzing data, and existing interfaces between the computerized systems. - The Sertão Project is committed to organize an annual forum which will bring those involved in the GEF Projects in Brazil together in order to exchange experiences on technical and operational matters and to evaluate and monitor results (this activity forms part of the Project Management Component of the Sertão MDA/FIDA/GEF Project). Agencies like IFAD and the World Bank are encouraging this type of activity. - The Sertão Project is undertaking a detailed stocktaking of improved practices (and production costs) and intends to prepare a manual of best practices by the first year of project implementation when it will immediately be made available to the other GEF projects.
Participatory	The Management structure builds on the current structure of PDHC (organogram was provided to CE/BA project during 15 July meeting), to be widened with institutions linked to the environmental theme of the project (sustainable land management).	The management model for the project will be drawn up during the preparatory phase of the Project. Currently the preparatory activities	The participation of the GEF CE/BA Caatinga Project is proposed in the management structure of the Sertão GEF Project, through participation by the State Technical Chambers of the Sertão GEF Projects, affiliated to CEDRS, including the CE/BA/BM Caatinga Project, in Ceará. The State Government

Area of possible overlapping and common threads in the two Projects	Emphasis of Sertão MDA GEF/IFAD Project	Emphasis of the Caatinga BA/CE GEF/WB Project	Proposal for synergy and collaboration
Management	<i>State level of coordination and social control:</i> State Technical Chambers (one Chamber per State, currently being created by MDA/SDT, affiliated to the State Councils for Sustainable Rural Development (CEDRS), to articulate and monitor programs and actions in the sphere of the strategies for territorial development delineated regionally and to act to give value to the specific circumstances of the State. Organizations linked to the theme of the Sertão Project will be incorporated in these chambers.	for the Project have been conducted by an inter-state unit - BA and CE, with the World Bank, which will need to work in an integrated way with the State Councils and Committees, amongst which the State Committees of the Reserve of the Biosphere for the Caatinga.	of Ceará already participates in the existing PDHC Steering Committee, hence will be a member of the joint PDHC/GEF Sertão Steering Committee. It is further suggested that both the Sertão GEF Project and the Caatinga/MMA GEF Project participate in the activities of the Committees of the Reserve of the Biosphere for the Caatinga, as this is a forum for planning and evaluating the actions of the biome.
Type of agriculture to focus on	Rainfed agriculture in semi-arid areas	Baseline presents solid support from the States in the infrastructure for rural development, including irrigation and water supply, which are important baseline interventions in the context of OP15 (this is not being explored either by the Sertão GEF Project or by the Caatinga GEF MMA Projects)	Once the thrust of the CE/BA Caatinga Project has an excellent baseline which includes support for irrigation (including small dams and underground reservoirs in support of small-holder farming), the CE/BA Caatinga Project will further evaluate the need for support with incremental actions associated with irrigated cropland, to control and prevent negative impacts of existing production systems in the stability of the soil structure, or to rehabilitate riparian forest areas adjacent to the irrigation systems (as indicated in paragraphs 46 and 52 of OP15).

(*) This table is a translation of the original version (in Portuguese) agreed with WB counterparts in Brazil (i.e. State Governments of Ceará and Bahia).

Table 3. Summary of Coordination and Collaboration between the MDA/GEF/IFAD Sertão and the MMA/UNDP Caatinga Projects and the Northeast Brazil Support Unit of the Ministry of Environment (UAP-NE MMA)

Thematic area (highlighting collaboration)	Proposal for Synergy and Collaboration between...	
	... the MMA/UNDP Caatinga Project and the Sertão MDA/FIDA/GEF PROJECT	...the UAP-NE MMA and the MDA/IFAD-PDHC/GEF Sertão Project
Sustainable Forest and Agroforestry Management	<ul style="list-style-type: none"> - Despite being in distinct geographical areas, in those states where both projects operate in close vicinity, as in the case of Paraíba (Cariri Paraibano), the Sertão Project will promote joint planning of activities to be implemented, such as media campaigns, exchange of information on diagnostics, and best practices for sustainable agricultural systems. - In distant areas, the Sertão Project is willing to make available the technical and methodological knowledge which has been generated and stored, by providing guidelines (leaflets, manuals, etc) and exchanging experiences and lessons learned. 	<ul style="list-style-type: none"> - Joint implementation of Sustainable Forest Management Plans in the Agrarian Reform Settlements benefited by the GEF Sertão and PDHC projects. - Involvement in the activities of the existing MMA-promoted Network for the Forest Management of the Caatinga.
Environmental education	<ul style="list-style-type: none"> - The Sertão Project will promote interchange visits between the Coordinators of the Education Components of the two Projects. - To promote discussions on the process knowledge generation, aiming at methodological analysis and exchange of experiences, with interchange of methodology. - Exchange visits between groups of farmers, teachers and the technical staff of the partner organizations of the two projects. - To promote the exchange of material based on the exchange of experiences generated by the two organizations/projects. 	<ul style="list-style-type: none"> - Meetings to discuss annual planning of Environmental Education subcomponent of the Sertão Project, aiming at identifying possible interfaces with MMA programs and projects.
Publicity	<ul style="list-style-type: none"> - Depending on the topics and the geographical area where activity is taking place, to seek, when possible, to encourage joint publicity campaigns. - To encourage the exchange of publicity materials based on the information generated by the two Projects. 	<ul style="list-style-type: none"> - To promote the exchange of publicity materials, based on the exchange of information generated by the two Projects.
Evaluation and Monitoring	<ul style="list-style-type: none"> - The Sertão Project commits itself to: i) organize an annual forum at which GEF Projects in 	<ul style="list-style-type: none"> - Exchange of experiences on the process of

Thematic area (highlighting collaboration)	Proposal for Synergy and Collaboration between...	
	... the MMA/UNDP Caatinga Project and the Sertão MDA/FIDA/GEF PROJECT	...the UAP-NE MMA and the MDA/IFAD-PDHC/GEF Sertão Project
	<p>Brazil will meet to exchange experiences on the technical and operational aspects and evaluate and monitor results (this activity is catered for in the Project Management Component of the Sertão Project); and ii) to organize seminars specifically on the theme of environmental services provided by the small-holders (as foreseen in Component 2), at which participation is expected both from the Caatinga Project and other MMA units.</p> <ul style="list-style-type: none"> - The Sertão Project is willing to make information available about its monitoring and evaluation system (in due course, <i>on line</i>). - Access by the Sertão Project, as a user, to the information system of the Caatinga Project, and the data- base to be made available to feed this system. 	<p>evaluation and monitoring.</p> <ul style="list-style-type: none"> - The Sertão Project is committed to organize seminars specifically on the theme of environmental services supplied by small-holders at which the participation is expected of both the Caatinga Project and other MMA units.
Institutional Arrangement	<ul style="list-style-type: none"> - Sharing experiences targeted on consolidating partnerships and institutional arrangements. 	<ul style="list-style-type: none"> - Sharing experiences targeted on consolidating partnerships and institutional arrangements.
Production of support and didactic material	<ul style="list-style-type: none"> - The Sertão Project will make available to the Caatinga Project all didactic and publicity material that it will produce when implementing the Project, such as hand-outs, posters, videos, CDs, etc. 	<ul style="list-style-type: none"> - The Sertão Project will make available to the States all didactic and publicity material that it will produce when implementing the Project, such as hand-outs, posters, videos, CDs.
Project Management	<ul style="list-style-type: none"> - Participation by the Caatinga Project in the Technical Chamber of the Sertão Project 	<ul style="list-style-type: none"> - MMA participation on the Sertão Project Steering Committee, liaison is being carried out within MMA with a view to making this action concrete

(*) This table is a translation of the original version (in Portuguese) agreed with UNDP counterparts in Brazil (i.e. MMA).