

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

HAITI

ENNERY-QUINTE AGRICULTURAL INTENSIFICATION PROJECT

(HA-L1009)

ENVIRONMENTAL AND SOCIAL MANAGEMENT REPORT

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HAITI
ENNERY-QUINTE AGRICULTURAL INTENSIFICATION PROJECT
ENVIRONMENTAL AND SOCIAL MANAGEMENT REPORT

I. BACKGROUND

A. Purpose of Report

- 1.1 The purpose of this report is to recommend measures that should be taken to ensure that investments associated with the Haiti Ennery-Quinte Agricultural Intensification Project (HA-L1009) are consistent with the principles of environmental and social sustainability. These measures can then be integrated into the structure, implementation and monitoring of the project so that achievement of the agricultural benefits of project investments will support a broader framework that reinforces the enhancement of environmental quality and social development in Haiti.

II. STRUCTURE OF REPORT

- 2.1 Background to the proposed Haiti Ennery-Quinte Agricultural Intensification Project is presented in Section 2, including a brief description of the project structure, the identification of proposed project activities and a synopsis of the prevailing environmental and social conditions in Haiti, particularly with respect to the region in which the proposed investments will be made. In Section 3 existing agricultural practices are reviewed, and the potential environmental and social impacts of the project are identified together with the environmental management plan to address potential negative impacts of the project. Project criteria are identified in Section 4, with particular reference to environmental criteria related to irrigation investments and social criteria related to overall project design and implementation. Section 5 presents the budget for the environmental and social component of the project. Recommendations for the loan document are contained in Section 6.

A. Project Background

1. Project Objectives And Structure

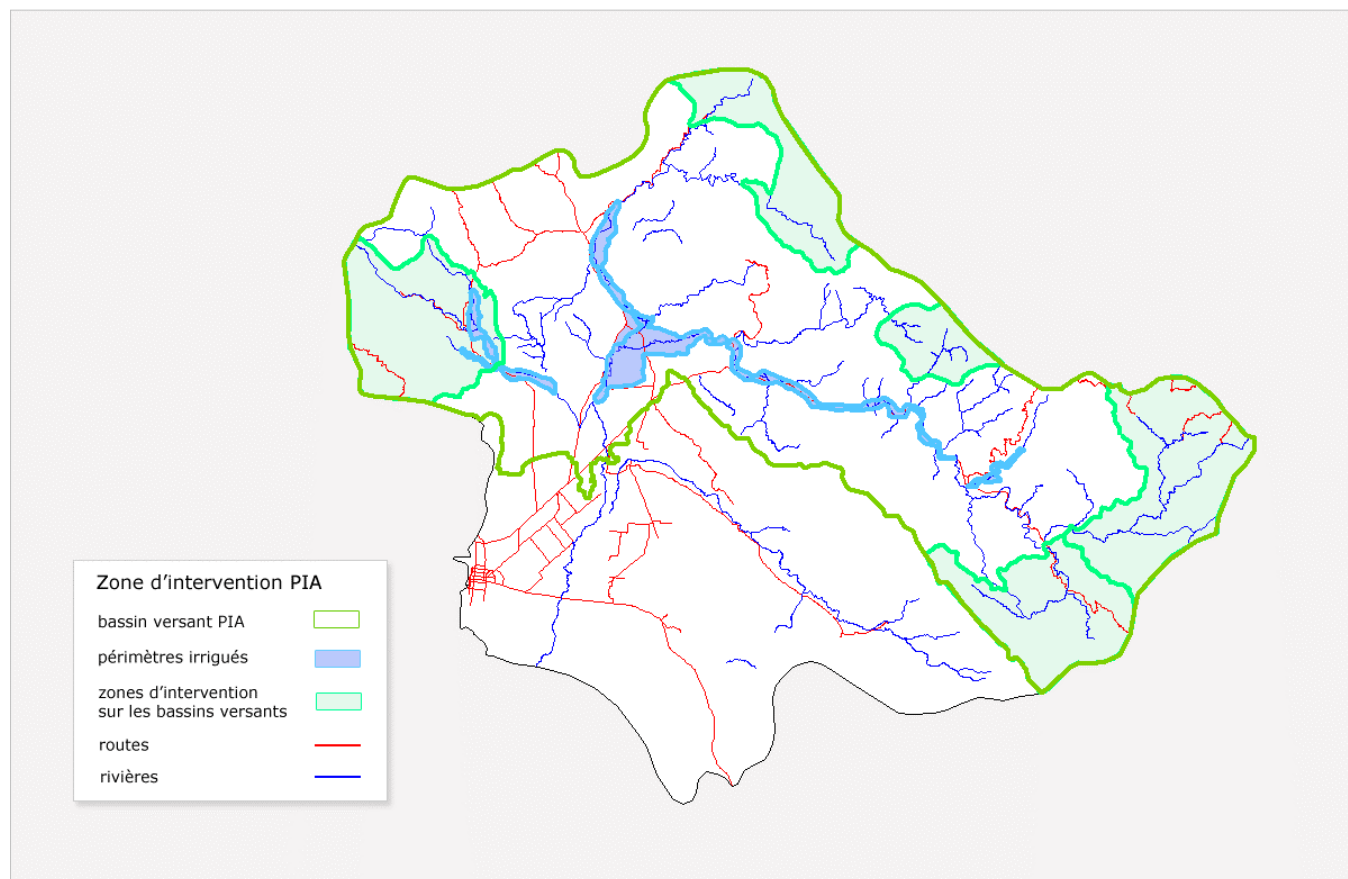
- 2.2 The objective of the Haiti Ennery-Quinte Agricultural Intensification Project is to increase the income and employment of producers and households in the Ennery-Quinte project zone. The project responds to the priority identified by the Ministry of Agriculture, Natural Resources and Rural Development (known as MARNDR after its French language acronym) to intensify agriculture in Haiti.
- 2.3 The project is structured in three components to reflect its objectives. The first concentrates on production and marketing services, the second on watershed management and flood protection, and the third on the rehabilitation of existing small-scale irrigation grids. The sequencing of project activities is based on an approach of progressing to later, more complex activities based on the experience and lessons associated with earlier, less

complex activities. Accordingly, initial project activities have been specified for the intensification of agriculture in the region. Subsequently, intensification activities will be designed and implemented in the region.

2. Description of Proposed Project

- 2.4 The project is designed to be progressively implemented over a five year period. The operation will permit the beneficiaries to intensify their agricultural production in a sustainable manner in the Ennery-Quinte watershed. The investments foreseen will seek to stabilize critical areas of the watershed, to rehabilitate a series of small-scale irrigation systems and to intensify agriculture development through improved marketing, production and water-user group management. The area referred to as the Ennery-Quinte lies in the foothills to the north of the Artibonite Valley some twenty kilometers northwest of Gonaives. Agricultural activities to be undertaken can be grouped into three categories:
- a. Introduction of improved staple crop materials, inputs and practices.
 - b. Expansion of high value crops and market linkage.
 - c. Improvement of tree crops.
 - d. Implementation of small-scale irrigation investment.
- 2.5 These activities will be complemented by a suite of associated activities to ensure that the initiatives undertaken meet environmental and social requirements, and to provide for the institutional strengthening necessary to support effective project implementation. Follow-up and evaluation of project activities will be undertaken in support of provision of feedback to assist in on-going refinement of project implementation.
- 2.6 Detailed designs for a second phase of the same activities will subsequently be undertaken for the intensification of agriculture in the area. The precise activities that will be undertaken, and their locations, will be defined according to selection criteria but will include activities that fall into either or both of the first two of the above types of agricultural activity, and may also include the rehabilitation and/or reparation of small-scale irrigation zones. A series of complementary activities will be identified in parallel with the identification of agricultural activities to ensure that intensification initiatives are responsive to environmental and social priorities; additional necessary institutional strengthening needs will also be identified.

FIGURE 1



B. Synopsis of Environmental and Social Conditions

- 2.7 **Environmental Context.** Haiti occupies the eastern third of the island of Hispaniola, lying between 18°N and 20°N and 71° 30' W and 74° 30' W. The country covers 27,000 km² and is bounded to the north, west and south by ocean; the Dominican Republic borders Haiti to the east. Numerous offshore islands fall within Haitian territory.
- 2.8 Haiti is among the most mountainous countries in the Caribbean region. Within the project zone, mountain ridges generally rise in the range of 1000 m. to 1500 m above sea level. Rainfall in Haiti varies widely and is highly influenced by relief. In the high mountains of the southwest, rainfall is in excess of 4,000 mm per year. Rainfall in the lowland areas is generally less than 1000 mm annually, and falls to less than 500 mm annually in parts of the northwest. Elsewhere in the project area, rainfall ranges to 2000 mm annually. Rain falls very largely during the April to November period. However, rainfall often occurs in the form of short, heavy storms, which are followed by periods of high temperature and high evapotranspiration. Rainfall events may also be highly irregular, resulting in wide variation above or below mean rainfall values in any given

- year. Relief and coastal proximity moderate temperatures, which range to mid-30°C daytime values year round in the inland plains.
- 2.9 Sedimentary deposits, generally limestone, make up much of the superficial and near-surface geology of Haiti. Many limestone areas in the project zone have high potential for significant groundwater reserves and in some areas groundwater is used to supply drinking water and water for irrigation. Throughout Haiti, there are areas of exposed igneous (primarily basaltic) rocks which may offer the most promising terrain for intensified agriculture, particularly in upland areas.
- 2.10 Deforestation has occurred throughout the project zone. The reasons for this are discussed below. Deforestation represents a major threat to valley and lowland agriculture as flash floods erode fertile soils from farmland, deposit sands and gravels in their place, and clog irrigation and other works. It is estimated that 10,000 - 15,000 hectares per year are rendered sterile or of reduced productivity as a result of erosion. Declining agricultural production is linked to deforestation and to erosion/ degradation of soils (as well as other factors such as availability of credit, access to markets and availability/quality of inputs) requiring that agricultural intensification be defined in ways that address deforestation and soil erosion/degradation in order to be sustainable over the long term.
- 2.11 **Socio-Economic Context.** Haiti is a primarily rural country with a population estimated to be in excess of 7 million people and growing, according to various estimates, at 1.6 - 2 percent per year, implying a doubling of the population within approximately 30 years. Approximately 30 percent of the population lives in the capital, Port-au-Prince. In the discussion that follows, conditions described for the country apply equally in the project region, unless otherwise noted.
- 2.12 Economic conditions in Haiti have shown signs of improvement in the past three years and annual growth has been forecast by the IMF into the next century. However, economic progress in recent years has not yet been sufficient to make up for the previous decline, and inflation and unemployment grew. GDP is currently estimated to be approximately US\$438 per person per year; this compares with a GDP of approximately US\$1600 per person in the neighboring Dominican Republic. Haiti is generally regarded as the poorest country in the western hemisphere and 75 percent of the population lives below the poverty line.
- 2.13 Agriculture has declined relative to other sectors of the economy, accounting for 40 percent of GDP in 1984, but only 30 percent of GDP (estimated) today notwithstanding that estimates indicate that at least 60 percent of the population are employed in the agricultural sector. The sector is characterized by farm units averaging 0.5 - 0.75 hectares in size and by primitive, undercapitalized agricultural practices. Annual per capita income varies from US\$800 in larger farms in irrigated areas to less than US\$40 in some upland communities.
- 2.14 Social services are provided in all rural areas of the country, but the extent to which they are available or used by rural residents varies widely. A large majority of children of

primary school age may attend school, but few continue into secondary schools; one study suggests that while 70 percent of primary school age children attend school on at least a part time basis, only 12 percent may attend secondary school. Likewise, medical services are provided in all areas of the country, but may not be adequately used by, or may not reach, large numbers of people; in the northwest, for example, years may pass between visits of medical personnel to rural villages. Literacy rates may be taken as a measure of education; in most areas of the country, literacy varies between 40-50%. Measures of health include child mortality, nutrition and life expectancy; mortality before the age of 5 is over 100 per thousand in most rural areas of the country, children in all rural areas often exhibit growth patterns associated with nutritional deficiency, and life expectancy at birth is 55 years.

- 2.15 Food security is a continuing priority for rural - and other - populations in Haiti. Half the population is estimated to have a average daily intake of less than 1700 calories per day and almost 40 percent of the population receives less than 75 percent of the recommended daily consumption of protein. Poor food security results from a combination of technical, social, financial and environmental factors. In addition, the rural labour pool is larger than can be absorbed by gainful rural activity.
- 2.16 The fragility of the rural economy has had two broad consequences with respect to Haitian development. The first of these has been a migration to domestic (e.g. Port-au-Prince) and foreign (e.g. Miami, New York, Montreal) urban centers. In many cases, urban migration has been undertaken by male heads of household in order to provide remittances to the rural family. Although remittances contribute to household income, the security of basic human needs may still require the maintenance of agricultural activities. This has serious social consequences beyond simply the absence of the male head of household for extended periods of time. Agricultural activities must either be undertaken by the female head of household or the children, or through shared arrangements with other male heads of household. The need to contribute to household well-being is a primary reason for high drop out levels of students between primary and secondary school.
- 2.17 Living conditions are particularly difficult for women and children. Women head Sixty percent of households, a circumstance that causes great hardship in rural areas where women heads of household may also farm the land and sell crops as well as raise families that average 5-6 children. Childcare arrangements are ad-hoc and rely on an informal network of friends and relatives. Access to credit may not be as readily accessible to women as to men, resulting in difficulty for women heads of household in financing agricultural activities; this can be particularly significant in an agricultural intensification project, where the participation of individuals may depend on access to credit. In addition, cultural barriers and time required to complete domestic and child-rearing tasks may result in restricted access for women to agricultural training opportunities. Female children average 2 years of schooling, and 10 percent of the female population aged 5-9 years old is economically active, rising to 33 percent of 10-14 year olds.
- 2.18 The second consequence of the fragile rural economy has been the deforestation of Haiti, to which both a dependency on charcoal as a fuel has contributed together with the

continuing and pressing need for the agricultural poor to generate immediate cash income through cutting trees for charcoal in order to survive. An estimated 2 percent of Haiti's original forest remains. Cleared lands in mountainous areas are generally not suitable for agriculture. In the absence of adequate vegetative cover the heavy storms that are typical of the Haitian climate have resulted in the widespread erosion of soil, a condition that continues to be one of the most serious environmental and economic problems facing the country today.

- 2.19 The Government of Haiti is responding to these environmental and social pressures with a National Environmental Action Plan (NEAP) that seeks to coordinate the activities, in particular, of the Ministry of Planning and External Cooperation, the Ministry of Public Works, Transportation and Communication, the Ministry of Agriculture, Natural Resources and Rural Development and the Ministry of the Environment. The NEAP identifies sustainable development as the key approach to alleviating the environmental and social pressures of the country. The implementation of the recommendations of this document will ensure that the Haiti Ennery-Quinte Agricultural Intensification Project is consistent with the objectives and methods proposed by the draft NEAP.

III. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

- 3.1 As indicated above, the project will be implemented in the project region. Initial project design and assessment has therefore focused on implementation in the area. Consequently the environmental and social analysis in this section focuses on issues in the project region. A brief synopsis is first provided of the existing agricultural systems in the project region, and problems associated with existing systems are defined. Proposed intensification initiatives are then identified. The potential environmental and social impacts associated with the proposed initiatives are then presented and an Environmental And Social Management Plan is identified for the mitigation of potential negative impacts and for the overall management of the environmental and social component of the project.

A. Existing Agricultural Practices in the Project Region

- 3.2 The project region includes the valley and adjacent upland and tributary areas of the Ennery and Branle rivers, together with approximately 1 kilometer of the Quinte river valley, which is formed by the confluence of the Ennery and Branle. In total, the project area encompasses approximately 500 square kilometers. The hills and mountains in the area rise steeply to approximately 1100 m. above sea level and the river valleys are located between 50 m and 200 m above sea level.
- 3.3 Agriculture is concentrated in the river valleys, which are flat bottomed, vary in width up to a few hundred meters across and are made up of well drained, fertile soils. Within the river valleys, agriculture is heavily concentrated in 9 defined irrigation zones of which the smallest is 72 hectares (net) and the largest is 515 hectares (net). These zones are farmed by between 135 farmers in the smallest zone and 749 farmers in the largest zone; throughout the area, the area farmed by an individual averages between 0.55-0.65

hectares. Assuming 5 individuals per household, approximately 16,000 people depend directly on farming in these zones.

- 3.4 Tree crops and field crops are both grown in the project area. Tree crops include mango, avocado, banana and plantain. Land ownership patterns result in a fragmented approach to tree crops since a large number of farmers may all grow a small number of tree crops and some crops, such as mango, are a function of where a tree happens to be growing rather than any purposeful effort to create a crop. This is particularly the case in the upland watershed, where high value mango varieties may be the only tree crop, other tree species and low value mango varieties having been cut for charcoal.
- 3.5 Major field crops include maize, sorghum, peas, and beans. Smaller quantities of a wide variety of other crops are grown including, for example rice, shallots, sugar cane and garlic. Virtually all-available arable land in the river valleys is farmed, especially in the irrigated areas that comprise a majority of the agricultural land in the river valleys. In many cases, farmers try to achieve three harvests per year. Crop production levels are generally poor, however, for the following reasons:
 - a. Cultivation techniques are primitive.
 - b. Fertilizers are only rarely used and biocides are not used in the project area; neither is reliably available locally.
 - c. Maintenance of soil organic matter and nutrients are not integral to the agricultural system. The prevalence of legumes assists in this regard, but the widespread burning of organic matter following a harvest results in a net loss of organic matter from the ground.
 - d. Crop varieties are those that have traditionally been planted; advances in seed and variety quality have not been widely applied in the project area.
 - e. Water shortages during parts of the year limit cultivation opportunities. In part, water shortage is a function of climate. However, the widespread erosion of the upland watershed has resulted in the deposition of sediments in irrigation works, reducing the effectiveness of irrigation systems.
 - f. Poor irrigation efficiency abounds. It is estimated that only about 35 percent of the water entering irrigation system in the project area is actually available to crops and irrigation networks in many cases are not capable of delivering water throughout the year to all areas of an irrigation zone.
 - g. Land tenure and sharecropping practices may not support investment in long-term agricultural improvement.
 - h. Crop storage is primitive and is only poorly effective in preventing loss of crop to insects, rodents and dogs.
- 3.6 Markets for field and most tree crops are generally local. Mangos, however, are transported away from the local area to markets in Port-au-Prince and for export. In the extreme upper reaches of the watershed coffee has previously commanded a sufficient

price to justify export away from the region, but has declined in importance during the mid-1990s.

B. Proposed Project Initiatives

3.7 The following agricultural initiatives are proposed in the region:

- a. Provision and application of improved seed.
- b. Provision and application of fertilizers and biocides.
- c. Rehabilitation of small-scale irrigation systems (i.e. under approximately 500 hectares).
- d. Awareness and training activities in all aspects of agricultural production, including maintenance of soil structure and fertility, cropping practices, application of fertilizers and biocides, crop storage and the marketing and sale of agricultural products.

3.8 The application of these measures will be supported by a range of technical assistance initiatives necessary to properly define/design specific interventions and to provide for the sustainable implementation of the proposed interventions.

3.9 It is estimated that the application of these initiatives will result in unit increases of productivity of at least 200 percent, depending on the crop.

C. Potential Environmental and Social Impacts

3.10 The potential environmental and social impacts associated with the project are detailed in Appendix A. Potential impacts have been identified according to whether they are: (i) positive or negative; (ii) social or environmental; and (iii) direct or indirect.

3.11 A wide variety of potential impacts have been identified. Within the project region, which has been the focus of project preparation work to date, the greatest positive project impacts will be felt in the lowland valley areas. These areas are currently where agriculture is practiced most intensively, and they will be the primary recipients and beneficiaries of project investments. Positive benefits will include increased food security, income enhancement, improved local social cohesion, enhanced regional and national economic integration and enhanced protection of scarce land and water resources and improved security of land access for tenant farmers and sharecroppers.

3.12 Within the project region the greatest potential negative project impacts are environmental in nature and will be felt in the lowland valley and alluvial plain areas. It is not clear that adequate water resources are available to meet irrigation demands throughout the project region. Further, the extent to which additional available water can be used for irrigation without causing significant negative impacts to existing users in the alluvial plain is not clear. Finally, there is clear and continuing potential for the environment to impact the project through the siltation of irrigation works as a result of

sediments washed from the mountains and deposited in the lowland areas during the flood events that may follow heavy storms.

- 3.13 Measures are available to sufficiently mitigate potential negative impacts, as identified in Appendix A. However, additional work is required to provide a basis for establishing: (i) the availability of water to support proposed irrigation investments; and (ii) the extent to which utilization of increased quantities of water in the project region will cause negative impacts on downstream users. An Environmental And Social Management Plan, presented following, has been developed as the tool to ensure that the data requirements and mitigation measures identified by the environmental and social impact analysis are implemented in a coordinated and effective manner.

D. Environmental And Social Management Plan (ESMP)

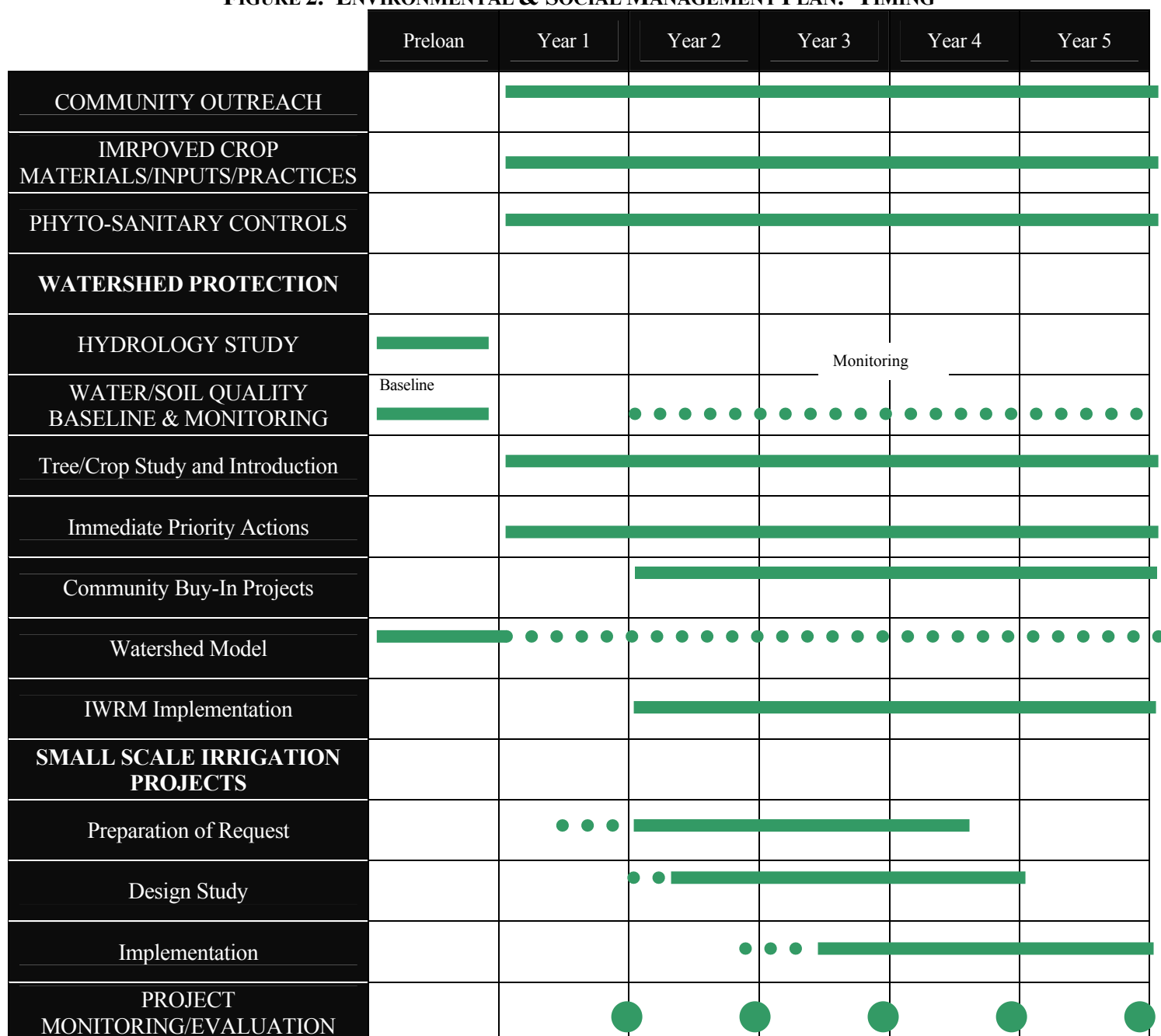
- 3.14 The project Environmental And Social Management plan (ESMP) identified in this section has been developed based on the analysis of impacts presented in the previous section. The ESMP will be the tool for ensuring that environmental and social inputs are provided as necessary to: (i) maximize the positive impacts of the project; and (ii) to mitigate potential negative impacts associated with the project. The ESMP is presented in greater detail in Appendix B.

- 3.15 The ESMP comprises the following initiatives:

- a. *Community Outreach* Community outreach activities will be undertaken in support of all components of the ESMP to ensure on-going interaction between the project and the communities impacted by project activities and interventions, and to ensure that project activities are appropriately focused. In addition, community outreach will provide for user group strengthening to include the following, designed to build a sustainable locally-based framework for implementation of all aspects of agricultural intensification: (i) verification that farmers are desirous of managing their own irrigation networks; (ii) creation of committees necessary to manage and maintain irrigation networks; (iii) the development of a manual on the management and maintenance of irrigation networks and the use of biocides and fertilizers.
- b. *Environmental And Social Aspects Of Improved Crop Materials, Inputs And Farming Practices* Training will be undertaken to ensure that improved crop materials, inputs such as biocides and fertilizer and improved farming practices are applied: (i) in ways that are effectively available to both men and women; and (ii) in a manner that is protective of the environment.
- c. *Land Management* Measures will be taken to encourage investment in improved soil maintenance/building by farmers.
- d. *Environmental and Social Aspects Of Small-Scale Irrigation Initiatives* Environmental and social impact assessments will be conducted in association with proposed small-scale irrigation works according to the scale and scope of the proposed investments.

- e. *Follow-up And Evaluation* Soil and groundwater quality will be monitored, together with water availability. Specific monitoring requirements associated with small-scale irrigation works will have been defined as part of the work to prepare for the works and this monitoring will also be undertaken.
- 3.16 **ESMP Timing** Figure 2 identifies the timing of the ESMP. Two overall considerations have guided the development of the timing of the activities identified in the figure: (i) baseline data regarding environmental conditions should be assembled prior to project effectiveness; and (ii) activities should build from those that are relatively simple and non-interventionist (in an environmental and social sense) to those that are more complex and that may involve either greater modification of the environment or a greater level of social change. Accordingly:
- a. The on-going hydrology study, the identification of surface water and soil baseline quality, and the establishment of the watershed model should all be completed as soon as possible.
 - b. Initial project activities will include: (i) the introduction of community outreach activities; (ii) the introduction of improved crop materials, inputs and farming practices; (iii) the development and application of land management mechanisms; (iv) the identification and application of erosion control works in immediate priority areas; and (vii) the maintenance and upgrading of the watershed model.
 - c. By the beginning of project year 2, it will be possible to initiate: (i) community buy-in watershed management initiatives; (ii) integrated water resource management (IWRM) activities to coordinate water use among competing users, consistent with the anticipated effectiveness of legislation governing IWRM in 1999; and (iii) project monitoring and evaluation. It should also be possible to commence the preliminary design studies for small scale irrigation works by the beginning of Year 2. It may be possible to commence this work earlier in the case of smaller systems to be rehabilitated, subject to the findings of the watershed model and provided acceptable support for rehabilitated irrigation systems is forthcoming from the community.

FIGURE 2. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN: TIMING



NOTE: Solid Line Indicates Continual Activity; Dotted Line Indicates Intermittent Activity
IWRM = Indicates Integrated Water Resources Management

- 3.17 Table 1 summarizes the various entities that will participate in the implementation of the ESMP, and summarizes the goal of the various activities to be undertaken by the ESMP. As indicated in the table, there are a wide variety of entities with whom the ESMP will interact and who will participate in various components of the ESMP, as follows:
- a. The Bank will proceed to contract the hydrology study, and will collaborate with the MARNDR to establish the baseline surface water and soil quality, and the contracting of the preparation of the watershed model. IDB will also monitor the progress of the project according to environmental, social and other conditions associated with the loan.
 - b. Program Coordinating Unit in MARNDR, will review and approve annual activities and will be the Haitian entity responsible to IDB for the effective execution of the project.
 - c. A Project Management Unit (BCP) will be responsible for all aspects of the day-to-day implementation of the project and will lead all aspects of ESMP implementation.
 - d. Local groups will participate in many aspects of the ESMP, in general in response to, and providing input to, initiatives that will be led by the BCP.
 - e. The Ministry of Agriculture (MARNDR) will be the lead Haitian ministry in all aspects of the project bearing directly on agricultural or agronomic project initiatives.

<p>Table 1 Summary Of Responsibilities For Implementation Of Haiti Ennery-Quinte Agricultural Intensification Project Environmental And Social Management Plan (ESMP)</p>									
ACTIVITY	IDB ⁽¹⁾	EXECUTIVE COMMITTEE ⁽²⁾	BCP ⁽³⁾	LOCAL GROUPS ⁽⁴⁾	MARNDR ⁽⁵⁾		IWRM COMMITTEE ⁽⁷⁾		GOAL
Project Monitoring/ Evaluation	Monitor goal achievement and conditionalities	Review/approve annual activities Monitor progress Liaise with IDB	Report progress to Executive Committee						Ensure project conditionalities and goals are met
Community Outreach			Design/implement activities	Input into/ participate in activities					Ensure (i) project meets community requirements; (ii) appropriate community/ individual response to project initiatives
Improved Crop Materials, Inputs and Practices			Implement seed, crop, pesticide, fertilizer initiatives Liaise with MARNDR	Develop organizational structure adopt new practices	Participate as appropriate Liaise with BCP Apply practices in other areas				Increased agricultural outputs through improved farm practices
Small Scale Irrigation Projects									
1. Project Request			Prepare environmental and social impact statement as part of Project Request	Provide input into design options					Integrate environmental and social considerations into preliminary design recommendations
2. Design Study			Integrate environmental and social considerations into detailed design	Provide input into detailed designs					Integrate environmental and social considerations into detailed designs
3. Implementation			Incorporate environmental and social considerations in	Incorporate environmental and					Environmentally and socially sustainable irrigation

Table 1
Summary Of Responsibilities For Implementation Of Haiti
Ennery-Quinte Agricultural Intensification Project Environmental And Social Management Plan (ESMP)

ACTIVITY	IDB ⁽¹⁾	EXECUTIVE COMMITTEE ⁽²⁾	BCP ⁽³⁾	LOCAL GROUPS ⁽⁴⁾	MARNDR ⁽⁵⁾		IWRM COMMITTEE ⁽⁷⁾		GOAL
			construction and maintenance	social considerations in irrigation practice and management					

Notes: 1."IDB" means Inter-American Development Bank; 2."Executive Committee" will be a multistakeholder entity responsible for the strategic direction of the project; 3."BCP" is Project Management Unit; 4."Local Groups" will be producer/water/other local groups in the project zone; 5."MARNDR" is the French language acronym for Ministry of Agriculture, Natural Resources and Rural Development; 6."IWRM Committee" is the acronym for an existing integrated water resources management committee comprised of MARNDR, MDE, Ministry of Public Works, Ministry of Public Health and potable water agencies; the mandate of the IWRM Committee will be defined in a law anticipated to come into effect in 1999

IV. SELECTION CRITERIA

- 4.1 The Haiti Ennery-Quinte Agricultural Intensification Project will involve two types of investment: (i) investment in enhanced agricultural practices throughout each the region; and (ii) investment in specific irrigation infrastructure and works. Criteria for the commitment of monies in support of the first type of investment can appropriately be defined as conditions of the loan document consistent with the ESMP proposed for the project and are identified in Section 6. However, investments in specific irrigation infrastructure and works will be demand driven and will in any event be defined by planning and design studies. Selection criteria are necessary to clearly identify the appropriateness of proceeding with a proposed irrigation investment from an environmental and social perspective.
- 4.2 The selection criteria identified below respond to the environmental and social issues associated with the project that have been presented in Section 2 and Section 3 of this document. The following selection criteria should be applied:
- a. Water availability.
 - b. Completion of Environmental And Social Impact Assessment (ESIA).
 - c. Acceptable integration of ESIA recommendations into implementation of works and subsequent follow-up.
 - d. Monitoring and evaluation.
- 4.3 **Water Availability** As recommended elsewhere in this document, work should be undertaken to develop baseline data on the hydrology of the watersheds in which the project is active and, as part of the work to prepare the watershed model, the quantification of existing and projected future uses of water in the upland, valley lowland and alluvial plain zones of the watersheds in which the project is active. In addition, the watershed model proposed in the ESMP (see Section 3) should be used to inform decision-making concerning the impact of withdrawing additional amounts of water from one zone of the watershed on the availability of water for current and future projected use in downstream zones of the watershed. The outputs of the hydrology and watershed model initiatives should be key inputs to: (i) the selection of areas for consideration of irrigation investment; and (ii) the design of irrigation investments in those areas that are selected.
- 4.4 **Completion Of Environmental And Social Impact Assessment (ESIA)** All irrigation initiatives selected for investment under the project should be required to have satisfactorily completed an ESIA following the methodology identified in Appendix C as a component of the preliminary design study in support of the proposed irrigation initiative. The ESIA should identify:
- a. The positive impacts of the proposed investment and their relative magnitude.

- b. The potential negative impacts of the investment, their potential magnitude, measures proposed to mitigate potential negative impacts and the relative magnitude of the potential negative impact after the application of mitigation measures. In particular, the water budget of the area over which the proposed irrigation investment will be implemented should be identified, and the extent of its consistency with the requirements of other upstream and downstream users should be identified based on the data available from the watershed model. Proposed irrigation investments that have potential, after the application of mitigation measures, to significantly impact water requirements projected for other users should not proceed until the water budget of the proposed investment corresponds sufficiently with other user requirements, either as a result of reducing water use in the proposed irrigation investment area or through other users reducing their demand for the water. The application of integrated water resource management principles may assist in resolving water allocation conflicts, as may be measured to reflect the "true cost" of water to the various user groups.
- c. Identification should be undertaken of social groups in the area to be served by the proposed irrigation investment who are disadvantaged with respect to effective ability to participate in the distribution of agricultural benefits of the project, the nature of the disadvantage experienced by those groups and the measures that should be undertaken to provide individuals in those groups with opportunities to share more fully in the benefits of the project.
- d. ESIA's in support of proposed irrigation investments should make specific reference to the status of land management in the area and should include the specification of land management measures to be undertaken in accordance with the methodology identified in Appendix C.
- e. Recommendations should be included in ESIA's regarding provisions for user group strengthening with regard to use of biocides and fertilizers, maintenance of irrigation works, management/use of water and community outreach in support of the construction and subsequent implementation of the irrigation investment.
- f. Monitoring and evaluation criteria specific to the proposed irrigation investment project should be identified in the ESIA, together with identification of who will assume what roles in the application of monitoring and evaluation.

4.5 Integration Of ESIA Recommendations Into Implementation Of Works And Subsequent Follow-up The ESIA recommendations in support of a proposed irrigation investment should, in the event it is decided to proceed to the next stage of works design, be reflected in the Design Study document, or in documents prepared in parallel to the design study. Although the design study is primarily a design document, it should identify all the environmental and social requirements identified in the ESIA and should integrate these into the timing and execution of technical and works activities so as to present an integrated irrigation investment proposal. All environmental and social initiatives associated with the proposed project should be costed and supported with detailed implementation plans that reflect the monitoring and evaluation criteria

identified by the ESIA. Works should not be initiated until the environmental and social recommendations contained in the project request have been adequately reflected in the design study or parallel documents.

- 4.6 Land management issues should be addressed during the time that the design study is being prepared. An inventory of land holdings and tenure/sharecropping relationships and agreements should be developed during this period and a protocol should be developed and accepted by the community. Failure by a community to commit to and undertake these actions should be grounds for not proceeding with a proposed irrigation investment.
- 4.7 **Monitoring and Evaluation** The ESIA's associated with proposed irrigation initiatives should include a recommended environmental and social monitoring program that identifies the following: (i) the parameters to be monitored as indicators of success; (ii) the method(s) by which the parameters should be monitored; (iii) responsibilities for implementation of the monitoring and subsequent evaluation activities; (iv) monitoring and evaluation budget; (v) anticipated outcomes against which monitoring data should be evaluated.

V. ENVIRONMENTAL AND SOCIAL COMPONENT COST ESTIMATE

- 5.1 The preparation of an environmentally and socially sustainable agricultural intensification project involves the integration of initiatives to address environmental and social concerns into the design of project activities and investments. This approach ensures that to the greatest degree possible, the inherent impact of the project on the environment and on social structures is minimized without the need to apply environmental and social remedies after the fact to correct shortcomings of project design.
- 5.2 One consequence of this approach is that it can become difficult to precisely discern environmental and social investments as discrete budget items. Instead they may be reflected in decisions regarding how a course of action will be undertaken; for example, in how to introduce biocides and fertilizers to a region in which they are not currently used, or in how to take water from a river in a manner that minimizes environmental impacts of such a disruption, or in how to design proposed irrigation initiatives.
- 5.3 Other budget items, however, may not be accounted for within the core activities of the project. For the most part, these activities comprise either studies that result in integrating environmental and social considerations into implementation activities or the monitoring of environmental and social impacts.
- 5.4 Table 2 summarizes the full range of project investments that will have a direct beneficial environmental and/or social impact. It is projected that expenditures of US\$6.412 – US\$6.837 million will be invested in ways that have direct positive environmental and/or social impacts. Table 3 presents those investments from among those presented in Table 2 that may be considered as "core" environmental and social investments; these investments, totaling US\$1.883 million, will guide the implementation of the project and

ensure that the wider environmental and social benefits associated with the investments reflected in Table 2 are achieved. Detailed estimates in support of those presented in Table 2 and Table 3 are presented in Appendix F.

- 5.5 In all cases, the budgets identified below do not include allocation of administrative and related costs by the BCP, nor do they include costs incurred by government or IDB staff, whose costs are considered to be separately budgeted.

VI. RECOMMENDATIONS FOR THE LOAN DOCUMENT

A. Findings

- 6.1 The agricultural land base in Haiti is limited and is subject to: (i) frequent; and (ii) flash flooding and clogging of rivers and irrigation works. Agricultural practices are primitive and are often not accompanied by management and operational practices that have fostered agricultural growth in other countries. As a consequence, agriculture has experienced a declining proportion of the national economy over the past many years, notwithstanding that: (i) it remains the primary livelihood for the majority of the population; and (ii) the population suffers widespread malnutrition.

Table 2
Haiti Agricultural Intensification Project:
Environmental And Social Component Budget Estimate

ACTIVITY	BUDGET ESTIMATE (\$US)
Community Outreach	115,000
Environmental And Social Aspects Of Inputs And Farming Practices	90,000
Land Management	143,000
Watershed management	3,385,000
Hydrology Study/Monitoring	237,500
Watershed Model/Monitoring	337,500
Water/Soil Quality Monitoring	90,000
Small Scale Irrigation	1.000 - 1.425 million
Preliminary Design - Environmental and Social Component	75,000
Detailed Design - Environmental and Social Component	75,000
Works - Environmental and Social Component	850,000 – 1.275 million
Program Monitoring	Included in BCP Budget Elsewhere N/A
TOTAL	5.398 – 5.823 million

Table 3
Core Environmental And Social Investments

ACTIVITY	BUDGET ESTIMATE (\$US)
Environmental And Social Aspects Of Inputs And Farming Practices (50 percent of budget presented in Table F.2)	45,000
Land Management	143,000
<u>Watershed management</u>	
Hydrology Study/Monitoring	200,000
Watershed Model/Monitoring	
Water/Soil Quality Monitoring	
<u>Small Scale Irrigation</u>	250,000
Preliminary Design - Environmental and Social Component	125,000
Detailed Design - Environmental and Social Component	
TOTAL	1,693,000

- 6.2 Women play key roles in Haitian agriculture. In by far the majority of households, women take prime responsibility for selling agricultural products and may take a primary role in key day-to-day agricultural activities such as seeding and weeding. High proportions of rural households are headed by women who, although they may have legal access to land, may not have effective access to agricultural training and whose need to participate in agricultural production and commercialization competes with child rearing and domestic responsibilities. Women are also primarily responsible for domestic and child-rearing duties - activities which, although they are no less important than agricultural activities, may compete with time required for agricultural activities.
- 6.3 The project will assist in addressing these problems within the project region by providing for increased food security, increased incomes, improved social cohesion, improved integration with the national economy, improved land security and reduced rates of upland soil erosion. Data through which to evaluate several key potential negative impacts associated with the project are not currently available, but can be assembled prior to project effectiveness. However, investment decisions relating to, particularly, irrigation works will be made in response to local demand as part of project implementation. As a consequence, it is necessary to adopt a process for: (i) evaluating environmental and social impacts of specific works proposals as those proposals are developed; and (ii) integrating the recommendations of those evaluations into the design, implementation, operation and maintenance of works financed by the project.
- 6.4 The most important environmental project risks relate to the availability of water to support rehabilitated irrigation systems and the potential for increased water use to cause downstream environmental impacts. The main social risk is that the benefits of the project may not be effectively available to all groups, notably women. Other risks, which may have significant impact at the local - and possibly regional - level, relate to loss of soil quality and deterioration of water quality. Remaining environmental and social risks, including indirect project impacts and those associated with construction, are likely to be minor. Mitigation measures are available to address each of these issues, although

the availability of water may constrain the extent to which new or rehabilitated irrigation systems can be developed.

- 6.5 The ability of the project to successfully address the identified risks, however, will depend critically on the institutional capacity of government agencies that are key to the effective implementation of the environmental and social component of the project, particularly the Ministry of Agriculture and the Ministry of the Environment. With assistance from the international community, these agencies are either undergoing restructuring or are in the process of evolving to the point that they can effectively serve the mandates for which they exist; the successful completion of this process will be necessary in order to ensure the effective implementation of the environmental and social component of the project.

B. Recommendations for the Loan Document

- 6.6 The following recommendations are made for inclusion into the loan document:

- a. As a condition of the loan, the Environmental And Social Management Plan (ESMP) set out in Appendix B should be adopted as the approach by which environmental and social issues will be addressed.
- b. As a condition of the loan, it will be required that community outreach be undertaken in support of the correct use of biocides and fertilizers throughout the project region. The guidelines on design and implementation of community outreach contained in Appendix E should be used to assist in implementation of community outreach activities and the guidelines on user group strengthening contained in "Prise En Charge Par Les Usagers Des Aménagements Hydroagricoles" (see References, below) should be used to guide related training requirements and activities.
- c. As a condition of the disbursement of the loan in the project region studies should have been completed on: (i) hydrology; (ii) the establishment of a watershed model; (iii) the establishment of a water and soil quality baseline.
- d. As a condition of disbursements in support of rehabilitated or new irrigation works, decision-making regarding irrigation investments under the project should be required to be undertaken through an integrated water resources management (IWRM) structure. Such a structure is contemplated to be legally established and effective in 1999. In the event that proposed irrigation investments are sought before a legal IWRM structure becomes effective, decision-making on the proposed irrigation investments should be undertaken through an interim IWRM committee structured to assume the responsibilities of the legal IWRM structure once that structure is legally institutionalized.
- e. As a condition on disbursements in support of rehabilitated or new irrigation works, a protocol for the land management issues should have been developed within the water user groups that will benefit from the proposed irrigation works.

- f. As a condition on disbursements in support of rehabilitated irrigation works, mechanisms should have been developed to ensure: (i) the enforcement of water allocations to an irrigation project as a whole and to individual farmers within an irrigation project; (ii) the generation of revenue sufficient to provide for the maintenance of the irrigation system over the long term; (iii) the creation of local institutional capability sufficient to enforce both water allocations and the generation of revenue in support of maintenance of irrigation systems.

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Meetings and Consultations

Haiti Ennery-Quinte Agricultural Intensification Project Preevaluation Team: John Horton (IDB - Team Leader), Heriberto Suarez (Irrigation Specialist), Sybille Nunninghoff (Country Specialist), Jeff Metzel (Economist), Henri Loze (User Group Strengthening Specialist), Marie-Thérèse Sebrechts (Phytosanitary Specialist), Eliasaint Magloire and Sean Finnigan (Agricultural Specialists). Meetings and interactions 7-17 December, 1997.

Avin-Adrien, D., Coordinator - National Food Security Coordination, Ministry of Agriculture, Natural Resources and Rural Development.

Démétriüs, E., Director General, Ministry of Agriculture, Natural Resources and Rural Development.

Ethéart, B., Director General, Institut National De Reforme Agraire (INARA).

Piard, I., Coordinator, Canadian Cooperation Programme Support Unit

Raymond, J.H., National Coordinator, Water Policy Formulation Program, Ministry of the Environment.

Radstake, F., Consulting Hydrogeologist.

Urban, A-M., Social Impact Specialist, Inter-American Development Bank.

White, A., Project Officer, The World Bank - Port-Au-Prince.

Field Visits

Field visit undertaken to the Gonaïves project region on March 14-18, 2005 and on 12-14 December, 1997. During field visits, meetings held with local Ministry of Agriculture, Natural Resources and Rural Development officials, local community representatives and farmers (male and female).

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Table A-1 summarizes the potential environmental and social impacts of project activities in the region, and identifies the mitigation measures that may be taken to eliminate potential negative impacts or to reduce potential negative impacts to an acceptable level. The table identifies the range of potential environmental and social impacts that might be anticipated with an agricultural intensification initiative of the scale proposed by the present project. Although not all potential impacts identified in Table A-1 are relevant to project initiatives proposed for the region, all may be relevant in the design or application of future project initiatives. In addition, the significance of potential impacts may vary as compared to the significance of impacts noted in Table A-1 for the region.

Table A-1 presents potential environmental and social impacts according to:

1. Whether the impact is the on-going result of the intensification project and its maintenance, or the result of construction activities in support of the intensification project.
2. Whether the impacts are direct or indirect in nature.

The assessment of impacts presented in Table A-1 is semi-quantitative in nature. The extent to which any of the identified potential impacts will in fact be felt will be a function of the way in which the proposed project is designed and implemented. The table therefore presents the relative significance of the various possible positive and negative impacts as a way of prioritizing efforts to maximize positive impacts and to mitigate potential negative impacts.

Positive Impacts The project will have a range of positive environmental and social impacts. Some of these are a function of the objectives of the project, while others are a function of the way in which the project is designed to meet its objectives.

The positive impacts of the project are primarily socio-economic in nature. These include enhanced food security, income enhancement, social cohesion, economic integration with other regions of the country, and land security. Some of these positive impacts are inter-related, but each will result in separate and distinct benefits.

TABLE A-1: SUMMARY OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES: PROJECT AREA

Potential Impact	Potential Zonal Significance Of Impact ⁽¹⁾			Measures To Maximize positive impacts/Mitigate Potential Negative Impacts
	Upland watershed	Lowland Valleys	Alluvial Plain	
1. Implementation/Maintenance Of Agricultural Intensification Project				
Direct Impacts				
Food Security	+	+++		Enhancement of agricultural production, product distribution, product transformation Provide land access security
Income Enhancement	++	+++		Enhancement of agricultural production, product distribution, product transformation Enhanced marketing/access to markets Fiscal measures in support of income growth
Social Cohesion	+++	+++		Direct support/outreach mechanisms for targeting causes of inequity in distribution of project benefits Organization of disadvantaged groups
Economic Integration	++	++		Development of regional/national strategies to build economic opportunities Creation/enhancement of credit availability
Security Of Land Access	++	++		Development/application of project protocols for land management issues Establishment of local land record
Soil Erosion	00 →+++	0 → +	+	Encourage/require agricultural practices that stabilize slopes/ground (e.g. bush/tree crops on slopes) Use retaining structures to control water flow Control route/direction of water flow Use of terraces to minimize erosion of slopes Avoid disturbing vulnerable slopes Plug gullies
Flooding of Soil		0		Regulation of water flow in canals and application on crops Installation/maintenance of drainage system Use of non-permeable materials in canal construction to prevent water loss/infiltration to ground
Salinization of Soils		0		Avoidance of unnecessary flooding/saturation of land Periodic soil washing Cultivation of salt-resistant crops Restricted use of water with high salt levels in areas of poor drainage
Leaching/Loss of Soil Nutrients/Quality	0 → +	000 → ++		Prevention of soil saturation Utilization of organic wastes as nutrients Practice crop rotation Use of fertilizers and fertilizer applications with reduced water solubility Appropriate fertilizer/biocide storage Appropriate use of fertilizers/biocides
Deterioration of Water Quality		0 → 000		Improved agricultural water management, tilling, cropping and other agricultural practices Improved control/reduction of inputs such as fertilizers and biocides Application of surface water quality criteria Prohibition on washing pesticide/fertilizer applicators in canals and streams Appropriate fertilizer/biocide storage Appropriate use of fertilizers/biocides
Water Allocation Conflict		00	000	Application of water allocation methods acceptable to users Compliance actions to ensure water allocation methods equitably applied
Resettlement of Population				Redesign project Prepare resettlement plan, environmental assessment, create acceptable new community
Obstruction/ Sedimentation of Waterways		000		Maintenance program to remove sediments Removal of wastes/debris from waterways/canals Application of erosion control actions (see above) Application of composting/waste management system

Potential Impact	Potential Zonal Significance Of Impact ⁽¹⁾			Measures To Maximize positive impacts/Mitigate Potential Negative Impacts
	Upland watershed	Lowland Valleys	Alluvial Plain	
Increased Pest/Disease Incidence (Human and Plant)	0 (Plant)	0 (Plant)		<u>Human Disease</u> Minimize water surface areas Apply enhanced hygiene/health protection and awareness practices Prevention of standing water outside of necessary impoundments Periodic cleaning of irrigation and/or drainage channels Use/composting/removal of waste <u>Plant</u> Report pest/disease problems immediately Application of integrated pest management techniques Use of pest/disease resistant crop varieties Strengthen border quarantine/inspection controls to ensure protection against exotic diseases/pests
<i>Indirect Impacts</i>				
Overpumping of Connected Aquifer			000	Develop model of watershed/aquifer hydraulic relationship Ensure rate of aquifer groundwater extraction does not exceed rate of recharge
Migration of People to Area		0		Integration of agricultural intensification with other development plans Creation of alternative opportunities for people Policies to manage migration of people to project area
Increased Pressure on Land	0	00		Integration of agricultural intensification with other development plans Creation of alternative opportunities for people Policies to manage migration of people to project area
2. Construction Of Agricultural Intensification Works/Expansion Of Agricultural Land Use				
<i>Direct Impacts</i>				
Threat to cultural resources				Design to ensure preservation of cultural resources Relocation or redesign of project
Reduction in Stream/River Flow		0	0	Scheduling of works at times to minimize disruption of stream/river flow Relocation or redesign of project or project works Creation of temporary stream/river flow channels Payment of compensation/provision of alternative water to affected users
Closure of Footpaths/Roads		0		Provision of permanent or temporary alternative footpaths/roads and signage
Flooding of/ Expansion into Ecologically Valuable Areas				Relocation of works/redesign of project Protection of ecologically valuable areas Restocking/rehabilitation of affected flora/fauna Provision of corridors for wildlife movement Maintenance of minimum habitat conditions for survival of biodiversity
<i>Indirect Impacts</i>				
Influx of migrant workers				Provision of board and lodging facilities for workers Provision of temporary infrastructure to accommodate temporary increase in population
Change in land use in construction area				Planning and policy initiatives to accommodate change
Note: 1. Positive impacts identified in this table reflect the goals of the project and the outputs to be achieved through the project. Potential negative impacts reflect possible negative consequences of the actions proposed to be undertaken in the absence of mitigation measures; these potential negative impacts can be reduced or eliminated through appropriate application of the mitigation measures identified. The greater the potential negative impact, the more important the effective application of identified mitigation measure(s). The following symbols are used: + to +++ indicates increasingly positive impact; 0 to 000 indicates increasingly negative potential impact.				

Enhanced food security will result from improved crop yields and the benefits will be felt by both the local farming population and, because of increased quantities of food available for sale, local off-farm populations. Income enhancement to local populations will accrue through increased opportunity for the sale of produce to local, national and international markets. Both of these factors will result in increased social cohesion by addressing two principal reasons - lack of food security and need to generate income - that drive the exodus of male, in particular, heads of household from rural communities. Enhanced economic integration with other regions of the country will occur as a result of: (i) the creation of new and increased markets for superior seed quality, fertilizer, and biocides; and (ii) increased sale of products to national and international markets; these factors can help drive additional investments in the local area and so contribute to broader, market-driven economic development.

The project will foster improved land security as a function of intensification investments, particularly those related to irrigation system rehabilitation. This will occur as a result of project support for those who invest in agricultural improvements associated with intensification to have sufficient security of the land they farm to benefit from the cost of the investments that are made.

The project will have a beneficial impact on soil quality to the extent that it incorporates and promotes practices for maintaining soil quality, particularly the conservation and replacement of organic matter in soils. As discussed below, however, other aspects of the project have potential to cause negative environmental impacts with respect to soil quality which will require appropriate project design and execution to address.

Within the project region the positive socio-economic impacts of the project will be felt primarily in the valley lowlands in which current agricultural activities are concentrated and in which project initiatives will be focused.

Potential Negative Impacts And Mitigation Measures The project has potential to result in significant direct and indirect negative environmental impacts in the project region, as summarized in Table A-1. Potential negative impacts identified in Table A-1 are those that may be caused by the project unless appropriate mitigation measures are included in the design and/or execution of initiatives.

The introduction/intensification of fertilizer and biocide use to the project region has potential to cause severe negative impact on soil quality. Farmers in the project region are not experienced in the use of these types of inputs. Experience from other regions indicates that initial beneficial results of fertilizers and biocides may lead to overuse of these inputs in an inappropriate attempt by local farmers to achieve even greater improvements. Inappropriate storage and/or use of fertilizers and biocides can result in loss of soil quality, which will reduce or outweigh benefits associated with other aspects of the project. The selection of appropriate fertilizers and biocides, their appropriate application and the application of integrated pest management and soil building practices (e.g. crop rotation and the reutilization of organic wastes) will be necessary to ensure that negative impacts to soil quality do not occur.

The introduction of fertilizers and biocides has potential to cause a deterioration in water quality in the valley lowlands as a result of contaminants being washed from fields into rivers or as result of the direct introduction of contaminants into rivers from, for example, the washing of

fertilizer/biocide applicators. Poor tilling, cropping and other on-farm practices can also result in negative impacts on water quality. The appropriate application of fertilizers and biocides, care in the maintenance of fertilizer and biocide applicators and appropriate tilling and cropping practices will be important in ensuring that project activities do not cause negative impacts on water quality.

The allocation on a watershed basis of water between agricultural and other users, and between different agricultural users requires definition. The rehabilitation of existing irrigation systems may result in utilizing a greater amount of surface water than is currently used. The extent to which sufficient water resources are available in the project region to meet the water demands of rehabilitated irrigation infrastructure throughout the project region has not been sufficiently established. Further, it is not clear how much additional surface water can be taken from the project region without causing a shortage of water to other users in the alluvial plain downstream from the project region. It is possible that the use of additional water for irrigation in the project region would reduce the amount of water available to users in the alluvial plain to the point that additional pumping of groundwater would be undertaken to meet drinking water and agricultural demands in that area over at least parts of the year. In this event, overpumping of the aquifer may lead to saltwater intrusions, resulting in long term loss of groundwater resources and costly technology requirements to manage. Studies of the hydrology and hydrogeology of water resources in the watershed will need to be undertaken in order to define these uncertainties and to provide a basis for defining selection criteria for project investments in rehabilitated infrastructure.

A variety of lesser potential negative impacts are anticipated in the project region. Some of these relate to construction associated with the rehabilitation of irrigation works. However, the irrigation works are anticipated to have only a small potential for negative environmental impact for two reasons: (i) they involve the rehabilitation of existing irrigation systems and water diversion structures rather than the creation of new systems or water diversion structures; and (ii) the in-stream component of the works can be scheduled at times of low water level. These potential negative impacts can be addressed through the contract performance requirements and through the appropriate scheduling of works.

Potential for a low level of negative impact also exists with respect to salinization of soils and flooding of soils in the valley lowland zone. Soils are naturally well-drained and this combined with a focus on good water management practices will help ensure neither of these problems arises. In some cases the rehabilitation of irrigation systems may correct periodic flooding events caused by the poor state of the existing irrigation system.

With respect to potential indirect environmental and social impacts, it is possible that the effective implementation of the project will result in a migration of people to the project area. This is considered a small potential negative impact because although the intensification project will improve living standards for those in the project area it will not be of sufficient magnitude to create demand - or the perception of demand - sufficient to draw significant numbers of people into the area. Nevertheless, measures should be undertaken at national and regional levels to ensure the integration of the project into broader development initiatives and policy as part of the overall effort to decentralize the development of the Haitian economy and to ensure that the benefits of development are spread throughout the country.

A more significant potential negative impact is the cumulative effect of the project on the capability of the land to support the population. Increased crop production and income may result in lower levels of out-migration from the project area, resulting in increased local populations seeking to earn a living in farming communities. It is not clear to what extent the results of the project can support increased population, and this issue should be addressed through similar policy measures to those described above.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) identified in Section 3 of this report is elaborated in this Appendix. The ESMP will comprise of the following activities, which are detailed below:

1. Community Outreach
2. Environmental And Social Aspects Of Improved Crop Materials, Inputs And Farming Practices
3. Land Management
4. Environmental and Social Aspects Of Small-Scale Irrigation Initiatives
5. Follow-up And Evaluation

Community Outreach The introduction of a community outreach program will be important to support the implementation of all project activities and to ensure that project activities are appropriately focused. In addition, the community outreach program should include: (i) verification that farmers are desirous of managing their own irrigation networks; (ii) creation of committees necessary to manage and maintain irrigation networks; (iii) the development of a manual on the management and maintenance of irrigation networks and the use of biocides and fertilizers.

Community outreach initiatives in response to each of these requirements should be designed according to the requirements of the specific communities and specific project activities. Guidelines for the design of community outreach are contained in Appendix E.

Environmental And Social Aspects Of Improved Crop Materials, Inputs And Farming Practices The introduction of new inputs and farming practices requires extensive training and other activities that ensures that: (i) training in the use of inputs with potential to cause negative environmental and health impacts is provided; and (ii) opportunities to benefit from training are equally available to women as to men. This training should be linked to the community outreach activities described above. The following actions should be undertaken:

1. The project should require that synthetic fertilizers and biocides that are introduced to project areas are neither banned nor restricted in North America.
2. The introduction of fertilizers and biocides should be linked to community outreach to convey the following messages:
 - (i) Fertilizers and biocides are effective at levels defined by the manufacturer.
 - (ii) Use of fertilizers and biocides at levels in excess of those recommended may result in increased purchase cost, loss of soil fertility/quality and contamination of ground and/or surface water without increased effectiveness or increased crop production.
 - (iii) Fertilizers and biocides are hazardous materials if stored, handled or applied inappropriately and can cause severe health impacts including death.
3. The introduction of fertilizers and biocides should be accompanied by training on:
 - (i) The appropriate use of fertilizers and biocides.
 - (ii) The calibration of fertilizer and biocide applicators.
 - (iii) The calculation of dilution factors for a correct concentration of fertilizer/biocide.

- (iv) The correct operation of applicators.
 - (v) Appropriate care and maintenance of applicators and containers, including how and where applicators and containers should be washed.
 - (vi) Appropriate storage of fertilizers and biocides.
 - (vii) Appropriate management of used fertilizer and biocide containers.
4. A refundable deposit should be required to be charged at the point of purchase on all non-biodegradable fertilizer or biocide containers, including metal, plastic and other non-biodegradable containers. The deposit should be refunded to the purchaser upon the return to the point of purchase of containers **that have been rinsed**. Vendors of fertilizers and pesticides should be required to accept rinsed, used containers and to refund the deposit, and should be responsible for arranging for the management of the used containers at a waste disposal facility or through a recycling system; reuse of the containers should be prohibited.
 5. Community outreach and training should provide opportunities for participation by women, whose ability to participate in the absence of particular considerations may be constrained by non-agricultural, but socially vital, responsibilities. Community-based child care opportunities and options should be reviewed and implemented where such action would facilitate the participation of women in training activities. This action should be used to inform the implementation of broader community-based child care to facilitate the participation of women in intensified agricultural and related activities (e.g. commercialization of crops).

Land Management Clarity of access to land is important for two reasons in ensuring that project investments yield maximum benefits: (i) disputes over right of access to land will inhibit the implementation of project investments; and (ii) long term enhancements as a result of the project (e.g. building soil quality and proper application of inputs) require that tenants and sharecroppers, in particular, have access to land over sufficient periods of time that it is in their self interest not to mistreat the land in an attempt to simply maximize output over a single year. Consequently, the project should:

1. Require that any area that will benefit from the rehabilitation or creation of an irrigation system prepare an inventory that identifies the ownership of all land to the extent possible that will be served by the rehabilitated/new irrigation system, together with the names of the individuals with the right to farm each property and the period of time over which individuals other than the owner(s) have right of access to farm the land.
2. Develop a protocol acceptable to the community that establishes, within the context of the legal land tenure framework, a procedure for the settlement of any disputes that may arise over land ownership or access to the land for farming.
3. Communicate to landowners the advantages of tenant and sharecropper agreements that provide tenants and sharecroppers with access to land for periods longer than the single year or crop season that is currently common.

Inventories, agreements and protocols that are developed through these actions should not be inconsistent with the legal rights of individuals, nor should they be viewed in any way as a substitute for the legal rights of individuals. Rather, they should be seen as pragmatic, project-specific initiatives consistent with the existing legal framework and put in place as a way facilitating the implementation of, and the flow of benefits from, the project.

Watershed Management: The ESMP includes 7 actions that should be taken to ensure proper management of water resources in the watershed.

Hydrology Study and Monitoring The existing hydrology database for the project region is insufficient as a basis for decisions regarding the availability/utilization of increased surface water in support of intensification activities. A hydrology study was recommended in the initial project preparation work as an essential element in the identification of appropriate irrigation investments in this project area. The results of the project should be used as inputs into the planning of small-scale irrigation investments, discussed below as a separate element of the ESMP, and as an input into the broader modeling of the hydrogeology of the watershed.

Similar hydrology studies in other project region will also need to be undertaken as project initiatives in these areas are defined.

Permanent hydrology monitoring will be undertaken to ensure the maintenance of the database and to assist in the planning and maintenance of irrigation systems.

Water And Soil Quality Baseline And Monitoring Data on current surface water and soil quality should be gathered that can serve as baseline against which water and soil quality can be measured as the project is implemented. The parameters for which quality data should be developed should be finalised by water resources and soils specialists but may include, at a minimum, total suspended solids (water quality only), pH, total Kjeldahl nitrogen, ammonia, nitrate, electrical conductivity, sodium absorption ratio, selenium, boron, and total heavy metals. The establishment of the soil and water quality baseline should be undertaken in conjunction with the preparation of the watershed model, discussed below. Monitoring procedures and frequency for parameters for which baseline data are collected should be specified as an output of the work that will establish the water and soil quality baseline.

Adequate capability to analyze for pesticide residue has not been identified in Haiti. The installation of this capability within the MARNDR should be a priority within the context of agricultural development in the country; monitoring in the project region for commonly used pesticide residue in soil and water should be undertaken once capability to monitor for such residues has been established.

Watershed Model The selection of irrigation rehabilitation investments should be sensitive to the impact of changing the water budget in one part of a watershed on users in another part of a watershed. For each watershed in which the project is implemented, work should therefore be undertaken to create a model of the impacts of rehabilitating irrigation systems on the availability of water to downstream users for all watersheds in which the project undertakes irrigation investments. The work to prepare this model should incorporate the collection of data regarding the current and projected future uses of water in the watershed, together with information on the source of supply for these uses (surface water or groundwater). This will be particularly important in determining the significance of rehabilitating irrigation systems in project region on downstream water users. It will also contribute to determining the number and scale of irrigation rehabilitation investments that are feasible from the perspective of water supply throughout a watershed.

The Terms of Reference for preparing this model should include a component that provides for sampling and analysis of surface water and soil quality in order to establish the baseline conditions of both for use in on-going monitoring. In addition, the Terms of Reference should include components that provide for monitoring: (i) soil and water quality over the life of the project; and (ii) overall water availability in the watershed.

Integrated Water Resources Management In an environment where water is a limiting factor to many environmental and economic processes and activities, a balanced approach to the management of water resources is essential if the requirements of the various user groups and the natural environment are to be met and if conflicts over water allocation and use are to be avoided. Within the project region, the most evident potentials for conflict in this regard are: (i) in the allocation of water among different potential irrigation rehabilitation initiatives; and (ii) between agricultural users in the upper and mid watershed and the agricultural and urban users on the alluvial plain downstream of the project region. The Government of Haiti is considering the application of integrated water resource management and has established an inter-ministerial committee to formulate and guide policy in this regard; the legislative basis for the work of this committee is expected to take effect soon. Recommendations on project investments in the rehabilitation or creation of new irrigation systems, the amounts of water involved and the impacts of rehabilitated irrigation systems on water availability to downstream users should be discussed with this committee and should be approved by the committee consistent with the range of water needs identified in the watershed. The activities of the committee should be informed by the watershed model identified above, and by annual monitoring and updating of the model to ensure it remains current.

Small Scale Irrigation Investments The selection of small scale irrigation investments will be undertaken according to a demand-driven strategy in which organized local groups will first request irrigation investments. Implementation of irrigation investments will then take place according to the recommendations of feasibility and design studies, and with input from local communities. Environmental criteria should be included in the preparation of the studies and in the application of study recommendations according to the process identified in Appendix C.

Project Monitoring And Evaluation Separate actions are recommended for project monitoring and evaluation:

Monitoring Monitoring of environmental and social initiatives should be undertaken consistent with the environmental and social requirements of the loan document, as recommended in Section 6. This will involve the following activities:

- **Monitoring of Soil And Water Quality and Water Availability** Monitoring of soil and water quality should be undertaken in accordance with monitoring recommendations contained in the monitoring component of the work to create a watershed model, as identified above.

Water availability for competing users should be monitored according to the monitoring program recommended in the work to establish the watershed model. This monitoring will be a critical input into both: (i) the ongoing allocation of water between potentially competing

existing users; and (ii) the application of integrated water resource planning in the future allocation of water.

- **Monitoring of Environmental and Social Impacts of Small Scale Irrigation Works** The methodology identified in Appendix C for the consideration of environmental and social impacts associated with proposed small scale irrigation works includes the identification of monitoring criteria associated with the works. Monitoring should be undertaken consistent with requirements in this regard.

Evaluation In all cases, analysis should be undertaken of monitoring data and results. Based on these data, opportunities for improved project performance should be identified and defined, and actions should be recommended for project modification or action to achieve the identified/defined improvements.

CRITERIA FOR THE PERFORMANCE OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

The performance of the ESIA will be an integral component of the preparation of irrigation investments conducted in support of the Haiti Agricultural Intensification Project. ESIA's should be undertaken as a component of the *avant project sommaire* (preliminary design or project request after its French language acronym) of small scale irrigation systems. In the case of small scale irrigation initiatives that are taken forward to detailed design (*avant project détaillé* or design study), the ESIA from the project request analyses should be summarized in the design study and additional detail should be added as necessary to address specific issues at the design study level of detail.

The process for conducting an ESIA is set out below and represents the process that should be adopted for defining and resolving environmental and social issues associated with proposed irrigation investments. ESIA's undertaken in support proposed irrigation investments under the Haiti Ennery-Quinte Agricultural Intensification Project should include the following at a minimum:

1. **Determination Of Water Supply Requirements** This will be undertaken as part of the engineering design of projects, but is a first and critical input into the environmental component, since the quantity of water required: (i) may have a significant impact on subsequent environmental analyses associated with the proposed irrigation project; and (ii) will determine the extent to which the ESIA will need to address potential impacts on downstream users and integrated waste resource management issues.
2. **Alternative Approaches To Meeting Water Requirements** Alternative approaches to meeting water requirements should be made explicit and should be explicitly assessed. The assessment of alternatives should include at a minimum:
 - (i) Assessment of water availability options. This should include an overview of water availability, quality and competing uses/demands. The general quality of water sources that might be utilized for irrigation should be determined, if necessary through a sampling/analysis program. Existing and projected future uses of water from these sources should be identified, including those downstream from the proposed irrigation project. The net impact of utilization of these sources on the natural environment should be identified together with the impact of utilizing these sources on other downstream users.
 - (ii) Based on the overall assessment of options for the supply of water, specific preferred sources of water should be identified and assessed. Existing and planned uses for the water from these sources should be determined to the extent that it differs in substance or degree from the actual/planned use profile that will have been completed in 1 (i), above.
 - (iii) For projects to rehabilitate irrigation systems, it is expected that existing canals and infrastructure will be replaced.
 - (iv) Based on the above analysis the preferred alternative for meeting irrigation requirements should be identified.

3. Assemble Environmental Components Of An Application For Right To Abstract Water

Obtaining the right to abstract the required amount of water for the proposed new or rehabilitated irrigation system will be key to the long term viability of the system. As part of the ESIA, the environmental components of an application to obtain the necessary water rights should be assembled. Using data gathered during completion of (1), above, supplemented as necessary by additional data, the following should be gathered:

- (i) Amount of water that will be abstracted and the source(s) from which it will be abstracted;
- (ii) Identified existing and planned uses of this water at the point of proposed abstraction, upstream/upgradient of the proposed point of abstraction, and downstream/down gradient from the point of abstraction;
- (iii) Projected impact of proposed abstraction on existing and planned uses, and the natural environment;
- (iv) New requirements/obligations that need to be placed on existing or planned future users of water or others in order to maintain the quality/quantity of water required for the rehabilitated irrigation system (e.g. use of upstream water, or the application of fertilizers/pesticides adjacent to water to be used for the potable water system)

Discussions should be held with the various agencies and others involved in water management and utilization during which the information available from completion of points 2(i)-(iv), above, would be communicated. As indicated elsewhere in this document, there is a critical and on-going need to implement integrated water resources management in Haiti. Institutional structures for integrated water resources management are embryonic in Haiti at this time but discussions should be held with existing structures, such as the Comité de Liaison pour l'Environnement et le Développement Durable, and other appropriate structures that may be developed over time. The output of this task will be the information required to obtain the necessary water abstraction rights in a manner consistent with integrated water resources management even though a formal integrated water resources management framework may not exist in the country at the time of project preparation.

4. Assess Upland Impacts On Proposed Irrigation Investment The impact of upland soil erosion on the area proposed for irrigation investments should be assessed. Current impacts associated with erosion should be described, measures currently being undertaken to control upland soil erosion (if any) in areas relevant to the proposed irrigation investment should be identified and the adequacy of these measures to adequately address soil erosion from the perspective of the proposed irrigation investment should be assessed. Additional specific actions should be recommended and costed, as necessary to ensure that the proposed irrigation investments can be efficiently and effectively operated and maintained. Measures proposed should be consistent with the overall approaches for control of soil erosion and soil stabilization identified in this document. For each specific action recommended, it should also be identified as to:

- (i) Which will be the organization responsible for implementation. If the community is recommended to undertake the action as "community buy-in action", there should be initial agreement on the part of the community to the roles that are identified for it.

- (ii) What the timing of implementation of the action should be relative to the overall irrigation investment.
 - (iii) What the maintenance requirements of the action will be, and who will be responsible for such actions.
 - (iv) Whether and what training or institutional arrangements are required to ensure the recommended actions are effectively undertaken and maintained.
 - (v) What will be the consequences on the proposed irrigation investment if the recommended actions are not undertaken.
5. **Assess Social And Land Tenure/Security Issues** The potential social impacts associated with the proposed irrigation investment should be assessed. This should be undertaken with specific reference to:
- (i) The ability of women to effectively participate in the outreach, training and other activities of the project relevant to their roles in local agricultural systems.
 - (ii) The impacts that increased levels of food and income may be anticipated to have on social cohesion, particularly with respect to the distribution of benefits associated with the project and hindrances to benefits from being felt at all levels of society.
 - (iii) Identification of any impacts that the project may have on local or regional population migration trends.
 - (iv) Patterns of land ownership, tenure and other forms of access to land by local residents with specific reference to any current or anticipated conflicts associated with local land ownership, tenure or other forms of access.
 - (v) Issues that will need to be addressed in the preparation of a local inventory of land ownership, tenure and other forms of access to land, and with respect to the preparation of a local protocol for resolving issues that may arise following the preparation of such an inventory.
6. **Identify Direct/Indirect Impacts Of Proposed Project; Identify Mitigation Measures** The environmental and social impacts of a proposed irrigation project should be assessed and mitigation measures should be identified. An assessment of the potential direct and indirect positive and negative environmental impacts of the proposed project should be undertaken. The parameters that should be evaluated in this manner should, at a minimum, be those included Table A-1 in Appendix A. Details should be gathered on the nature of potential positive and negative impacts that are identified, so that recommendations can be designed to:
- (i) Enhance potential positive impacts.
 - (ii) Mitigate potential negative impacts so as to remove the potential negative impact entirely (e.g. through re-routing a canal) or reducing the degree of harm associated with an unavoidable potential negative impact to a degree considered acceptable (e.g. scheduling of works to minimize disruption to stream flow).

The table format used in Table A-1 in Appendix A may be used to summarize the positive and negative impacts that are anticipated, together with the mitigation measures proposed for application.

7. Identify Procedures For Management Of Water Use And Water Quality Standards Procedures for the management of water use should be identified. These should be based on periodic monitoring of:

- (i) The amount of water taken to supply the irrigation project.
- (ii) The amount of water available to recharge aquifers and streams/rivers.
- (iii) The quality of water at the point of abstraction.
- (iv) The quality of water at a point defined by the ESIA immediately downstream from the proposed irrigation project.

This monitoring system will provide a basis for defining overall irrigation system efficiency, monitoring of the impact of fertilizer and pesticide use on water quality and defining actions that are required to either increase irrigation system efficiency or to reduce fertilizer/pesticide impacts.

8. Identify Institutional Arrangements For Management of Environmental/Social Component Institutional arrangements for managing the environmental/social component of an irrigation investment should be defined within the overall institutional structure for the management of the environmental/social component of the project. This should include identification of institutional and procedural mechanisms for enforcing the allocated abstraction of water for irrigation purposes. In addition, institutional arrangements should be identified for collecting monies necessary for the maintenance of the irrigation system and for enforcing the provision of funds sufficient to ensure the maintenance of the irrigation system.

Roles and responsibilities for the management of the environmental/social component of the project are identified in Table 1 of this document. Management and implementation requirements associated with a specific new or rehabilitation irrigation investment should be defined consistent with the roles and responsibilities identified in Table 1 and should be confirmed with the individuals who will be responsible for their implementation.

9. Community Consultation Community consultation differs from community outreach in that community consultation is undertaken in support of identifying potential impacts associated with a proposed irrigation investment. Community consultation is integral to the execution of an ESIA and should achieve the following objectives in support of the preparation of small-scale irrigation projects:

- (i) Provide information to affected communities on the project that is being developed, the ways in which it will impact the communities and the mitigation measures that are planned.
- (ii) Gather local environmental and community information which may not be available from other sources, such as community agricultural priorities, data/information on disadvantaged groups within a community, and community input on: (a) initiatives the project should undertake to ensure the effective availability of training opportunities to disadvantaged groups; and (b) the barriers

- within the community to participation in the project by disadvantaged groups and initiatives the project should undertake to remove these barriers.
- (iii) Encourage community input into the planning of the project.
- (iv) Encourage identification of community roles in project implementation.

A Community Liaison Committee (CLC) should be established in each area in which new or rehabilitated irrigation works are undertaken. The CLC should assist the project to achieve the above objectives and may be the principle instrument through which the project dialogues with a community.

Community consultation as a component of an ESIA in support of small scale irrigation works should include the preparation of information on the project in a format and language (i.e. Creole) that is readily understood by the local people. This information can be disseminated through the offices of local officials, individuals within a local community and through the local CLC. Consideration can be given to school presentations. All communications should identify a local person from whom more information is available and who can respond to questions. At the level of prefeasibility analysis of medium scale irrigation projects, the information necessary to meet objectives (i) - (iv), above, can be gathered from local community and government officials.

At least one community meeting should be held in support of the analysis of environmental and social impacts of proposed small scale irrigation projects so that local people can interact with project personnel. Information should be available at the meeting so that people can learn about the irrigation project. There should be ample time/opportunity for people to ask questions. Responses to questions should be straightforward and readily understandable.

10. **Identification Of Environmental And Other Training Requirements** Environmental training requirements for contractors, local authorities, local user groups and others should be identified to ensure the environmentally effective and efficient management and operation of the project. Measures should be recommended to ensure that women and other disadvantaged groups have effective access to training initiatives.
11. **Identify Community Outreach Program** In the event that an ESIA concludes that a proposed irrigation project may proceed from an environmental and social perspective, a community outreach program should be identified to communicate:
 - (i) Day-to-day actions and behaviors that are conducive to maintaining rehabilitated and new irrigation systems in good working condition.
 - (ii) Awareness, training and social initiatives available to the community for ensuring environmentally appropriate use of inputs used to maximize the agricultural potential of the irrigation project.
 - (iii) Disruptions that may occur during the construction of a project

Appendix E presents guidelines that should be used to design an appropriate community outreach program. Initial components of a community outreach program associated with small scale irrigation investments will have been implemented prior to the preparation of an

ESIA. This will occur because communities will come forward to express interest in hosting an irrigation investment as a prior condition to the preparation of an ESIA associated with proposed irrigation investments. Consequently, the design of a community outreach program as a component of these ESIA's should focus on those aspects of community outreach associated with implementation of a proposed irrigation investment. Consideration should be given in the design of the community outreach program to the utilization of structures or processes (e.g. a CLC) that have been useful in the community consultation phase of the ESIA in order to maintain continuity with effective communication mechanisms in the community.

The completion of the above tasks at the level of small-scale irrigation project design will ensure that all environmental and social aspects of the project have been considered and recommendations prepared for how environmental and social issues and requirements should be addressed.

IMMEDIATE AND STRATEGIC USE OF SPECIES FOR EROSION CONTROL/ SOIL STABILIZATION

The following species may be considered for use in erosion control and soil stabilization initiatives. The English name is given together with the French name (where they are known) and the Latin name.

<u>Grasses</u>	Guinea grass	l'herbe de Guinée	Panicum maximum	
	Guatamala grass		l'herbe de Guatémala	Tripsacum laxum
	Elephant grass		l'herbe éléphant	Pennisetum purpureum
	Citronella		la citronelle	Cymbopogon citratus
	Vetiver	le vétiver		Vetiveria zizanioides
	Sugar cane		la canne à sucre	Saccharum officinarum
<u>Trees/Shrubs</u>		Leucaena		le leucaena Leucaena leucocephala
	Calliander		le calliandre	Calliandra calothyrsus
			le lilas étranger	Gliricidia sepium
	Pineapple		l'ananas	Ananas comosus
	Passion fruit		le fruit de passion	Passiflora edulis
	Mahogany		l'acajou	Swietenia spp
	"Oak"		le chêne	Macrocatalpa longissima
	Saman		le saman	Samanea saman
	Avocado		l'avocatier	Persea americana
	Orange		l'oranger	Citrus spp
	Chadeque		le chadéquier	Citrus grandis/Citrus maxima
	Mango		le mangier	Mangifera spp
	Cocoa		le cacao	Theobroma cacao
	Screw pine			Pandanus utilis
	Guava			Psidium guajava
	Soursop		le corazol	Annona muricata
	Sweet apple			Annona squamosa
	Custard apple			Annona reticulata
	Gumbo limbo			Bursera simaruba
	Silk cotton tree	le mapou		Ceiba pentandra
	Sea island cotton	le cotonier		Gossypium barbadense
	Tamarind		le tamarin	Tamarindus indica
	Calabash		le calebassier/le calbas	Crescentia cujete
	Castor bean			Ricinus communis
	Coffee		le café	Arabica spp
	Bamboo		le bambou	Bambusa spp

Each of the species identified above has potential to stabilize soils, each has commercial value in the Caribbean region and each is grown in topographic and climatic conditions similar to those of the project region or in the region themselves. The planting of these species, particularly in upland watershed areas, affords the opportunity to control erosion and stabilize soils while at the same time generating income for the rural population and, to the extent that these species may not currently been commercially grown in Haiti, diversifying the agricultural economy.

Undoubtedly there are many other species grown elsewhere in the Caribbean - but not particularly or not at all in Haiti - that combine utility in control of soil erosion/soil stabilization with commercial productivity. No studies have been identified in the present project preparation that identify the range of species that may be suitable for both control of soil erosion and commercial productivity in Haiti, nor has a national strategy for linking agricultural productivity in, particularly,

upland areas with control of soil erosion been elaborated. The high levels of interest in grafting high-value mangoes onto low-value mango trees, invigorating the agricultural sector generally, controlling erosion in upland areas and reforesting hillsides suggest a convergence of focus that would make such a study a valuable undertaking. Such an initiative might take the form of a pre-feasibility analysis and might include:

1. Development of a comprehensive identification of the species that might be both commercially grown in Haiti and be desirable for soil erosion control. This should include the identification of crops grown commercially in other Caribbean countries but not in Haiti.
2. Identification of the range of Haitian conditions in which each species might best be cultivated, with particular focus on species that might be successful in upland regions.
3. Identification of the domestic, regional and international market opportunities that might exist for the products of each species.
4. Development of an action plan and strategy for the sustainable development of new crops in Haiti that will contribute to arresting soil erosion, stabilize vulnerable soils and achieve reforestation objectives.
5. Development of environmental, social, economic, financial, institutional and training projections and requirements for the implementation of the action plan.

TERMS OF REFERENCE FOR A COMMUNITY OUTREACH PROGRAM

This Appendix presents Terms of Reference for the implementation of community outreach programs in support of the Haiti Ennery-Quinte Agricultural Intensification Program. Community outreach is an integral component of the program since it is the way by which the program communicates with individuals and organizations whose actions affect the implementation and performance of program initiatives. The Terms of Reference are presented with respect to:

1. Objectives of the community outreach program.
2. Audiences that the community outreach program should reach.
3. Framework and media for the design of community outreach programs for each identified audience.
4. Timing of community outreach initiatives.
5. Organization of community outreach initiatives.

These Terms of Reference are generic in the sense that they provide direction for the preparation and delivery of all community outreach initiatives developed through the program.

Objective Of The Community Outreach Program

The objective of the community outreach program is to build support for:

1. Day-to-day actions and behaviours that are conducive to maintaining rehabilitated and new irrigation systems in good working condition.
2. Awareness, training and social initiatives available to the community for ensuring environmentally appropriate use of inputs used to maximize the agricultural potential of the irrigation project.
3. Disruptions that may occur during the construction of a project.

The achievement of these objectives will result in maximizing both the long term value of funds invested in agricultural intensification investments, including those related to the control of erosion and soil stability.

Audiences

The achievement of the objectives of the community outreach program will require outreach activities targeted at the various individuals whose actions will affect the implementation and performance of the agricultural intensification project. These individuals fall into four groups:

1. Individuals who farm land that will benefit from investments in new or rehabilitated irrigation systems.
2. Individuals that will benefit from the availability of new inputs such as improved seed, fertilizers and biocides.
3. Individuals responsible for the maintenance of irrigation systems.
4. Individuals whose actions are important to prevent upland erosion.

Each of these groups of individuals represents a specific audience that the community outreach program must communicate with effectively if the program is to achieve its objectives. In some cases, the messages and information to be communicated are similar to two or all of these

audiences; in other cases messages and information are important to communicate to one group but not to others.

Particular focus should be placed on community outreach effectively reaching women. As identified elsewhere in this document women play key roles in agricultural systems in the project region. However, the integration of women into project activities may be particularly difficult given that they are also the primary care-givers and managers of the household. Community outreach initiatives in support of the objectives identified above should therefore consider the inclusion initiatives to provide women with time to participate in project activities. A variety of possibilities in this regard may be defined at the community-specific level; the organization of community-based child care to complement the ad hoc arrangements that may currently be made in communities should be specifically considered.

Framework Of Community Outreach For Users Of Rehabilitated Irrigation

1. *Individuals that farm land that will benefit from investments in rehabilitated irrigation systems.* Community input and organization will be essential first steps to defining which communities will benefit from investments in irrigation systems. Initial community outreach should therefore focus on:
 - (i) Identification of the opportunity for communities to benefit from irrigation investments.
 - (ii) Identification of the environmental, social, technical and financial selection criteria that will be used in deciding where and how investments in irrigation systems will be made.
 - (iii) Actions that communities should take to demonstrate their desire to benefit from irrigation investments and their capability to manage and implement community responsibilities (e.g. preparation of land ownership/use agreement record, collection of water use fees, maintenance of infrastructure etc.)
 - (iv) How and to whom communities should express interest in participating in irrigation investments.

Following a decision to implement an irrigation investment, messages and information to be communicated to this audience should address the following:

- (i) The benefits that the irrigation investment will bring to individuals and to the community.
 - (ii) The timing of works carried out to under the investment.
 - (iii) The inconveniences that residents should expect from irrigation work.
 - (iv) The actions that will be taken to minimize inconveniences to residents.
 - (v) How people can obtain more information regarding the works project.
2. *Individuals that will benefit from the availability of new inputs such as improved seed, fertilizers and biocides.* Messages and information for this audience should:
 - (i) Communicate the benefits of improved seed with reference to the specific benefits that farmers will achieve, such as improved yield, improved resistance to insects/disease/ drought, higher value per unit output etc.

- (ii) Communicate correct use of fertilizers and biocides, correct use/maintenance/cleaning of fertilizer and biocide applicators, benefits that can be anticipated from correct application of fertilizers/biocides and proper management of used fertilizer/biocide containers. Focus should be placed on educating farmers that use of fertilizer and biocides at concentrations above those recommended will not result in commensurate increases in crop yield, will damage the soil and will result in longer term declines in soil fertility and crop yield. Focus should also be placed on communicating the need to store fertilizer and biocides safely away from where children, dogs or other individuals or animals might have access to them.
- (iii) Communicate that the use of new seed varieties and fertilizers/pesticides should be integrated with other "good farming practices" such as crop rotation, integrated pest management and actions to build the organic content of the soil.
- (iv) Communicate the importance of maintaining erosion control and soil stability structures and plantings in order to maximize the benefits of seed, fertilizer and biocide inputs.

3. *Individuals responsible for the maintenance of irrigation systems.* Community outreach should encourage the following actions:

- (i) Controlling animals so that they do not graze in irrigation canals; removal of vegetation on the sides of canals may cause them to erode.
- (ii) Allowing trees adjacent to canals (and elsewhere) to grow in order to control soil erosion.
- (iii) Discarding of debris away from irrigation canals; debris that is discarded into canals can fill and block them.
- (iv) Leaving canals intact; improper diversion of water from canals should be stigmatised as socially unacceptable.
- (v) A regular schedule of maintenance actions designed to keep irrigation systems free of sediment as a necessary requirement to the effective operation of an irrigation system.
- (vi) The identification of actions that the community can undertake or participate in to control upland soil erosion that affects the performance of local irrigation systems.

4. *Individuals whose actions are important to prevent upland erosion.* Community outreach should encourage the following:

- (i) The grafting/growth, as appropriate, of high value crops that are appropriate for erosion control and soil stabilization.
- (ii) The maintenance and extension of existing trees and tree cover in order to provide for the stability of local soils as well as to minimize the impacts of soil erosion downstream.
- (iii) The growth of field crops that are appropriate to maintaining soil structure and stability.
- (iv) Seeding, cropping and other upland agricultural practices conducive to stabilizing soils and controlling erosion.

Timing Of Community Outreach Activities

In the case of community outreach associated with irrigation investments, community outreach should begin in support of the selection of communities that will benefit from such investments. Elsewhere, community outreach activities should begin within project region as the first action following a project intervention decision and well in advance of the undertaking of any works associated with a project decision. Subsequent community outreach activities should be timed so that:

1. In instances where input from the community will assist in reaching a project decision or in formulating a project intervention, the community has time to consider the information that is requested and has time to respond.
2. The community is informed of initiatives in advance of their being undertaken, as well as the timing of initiatives and the individuals/agencies responsible for undertaking the initiatives.

Media For Delivery Of Community Outreach Activities

Community outreach initiatives can utilize a variety of media for communicating information. In all cases, however, it is important for the media selected to be appropriate to the audience. The following can be considered for the Haiti Ennery-Quinte Agricultural Intensification Project:

Print Media Print media include all forms of printed communication. Often, print media use written information supported by graphics. Posters, pamphlets, flyers/leaflets, and newspaper articles are all examples of the application of print media. The application of print media should be sensitive to literacy rates, however; in communities where significant segments of the population are illiterate, print media may be effective only if pictorial forms of communication are adopted. Where words are used, the language of communication should be Creole.

Telecommunications Telecommunications include television and radio. Use of these media on a regional basis may be highly effective not only because of the large number of people that can be reached, but also because of the medium itself. The fact that information on a local/regional initiative is broadcast may be as important to the receptiveness of people to the information as the content of the information itself. To be effective, community outreach initiatives using telecommunications should mention the names of the specific communities where the information will be useful.

Meetings and Presentations Meetings and presentations provide the most direct form of community outreach because they allow discussion between a recipient of information and the provider of the information. Consequently, these forms of outreach allow interaction between people and discussion of issues. Opportunities are available for feedback from individuals and communities that can be used to modify plans/actions and to improve a project as a result. Community meetings, stakeholder workshops and similar events can be planned.

Organization of Community Outreach Initiatives

The Project Management Unit (BCP) should organize and implement community outreach initiatives according to the needs of the project as it is implemented. Although the framework identified above can be used throughout the project region, the application of the framework will need to be implemented with specific reference to local priorities and sensitivities to ensure that

community outreach activities undertaken are relevant to the communities and individuals that they are intended to reach.

In all cases it will be particularly important for outreach activities to specifically target women. Specific additional activities in this regard may be necessary to ensure the participation of women in outreach activities including the organization of community-based child care to complement the social structures of the communities.

Monitoring Of Community Outreach Activities

As part of the design of community outreach activities specific to the different project goals and activities, simple - but representative - monitoring criteria should be defined according to which the effectiveness of community outreach activities can be addressed. The monitoring criteria should include criteria for assessing the effectiveness of community outreach in reaching women.

DETAILED BUDGET ESTIMATES

This Appendix details the budget estimates for the environmental and social component of the Haiti Ennery-Quinte Agricultural Intensification Project. In all cases it is assumed that international consulting expertise will cost \$500/day, local consultants will cost \$350/day, per diem expenses will be \$150 and return flights will cost \$1500 each.

The budgets detailed in this Appendix should be considered indicative of the actual budgets that will be necessary as several aspects of the project remain to be defined. However, it is possible to provide broad estimates of the costs that may be incurred if assumptions are made regarding the final parameters of the project and if these assumptions are clearly identified. In the analyses presented in this Appendix, the basis of all cost estimates is detailed. As aspects of the project are finalized over time, the budget estimates identified in this Appendix can be revisited, actual design and other requirements can be compared with those assumed in this Appendix and adjustments to the budget allocations can be made as necessary.

The preparation of an environmentally and socially sustainable agricultural intensification project involves the integration of initiatives to address environmental and social concerns into the design of project activities and investments. This approach ensures that to the greatest degree possible, the inherent impact of the project on the environment and on social structures is minimized without the need to apply environmental and social remedies after the fact to correct shortcomings of project design.

One consequence of this approach is that it can become difficult to precisely discern environmental and social investments as discrete budget items. Instead they may be reflected in decisions regarding how a course of action will be undertaken; for example, in how to introduce biocides and fertilizers to a region in which they are not currently used, or in how to take water from a river in a manner that minimizes environmental impacts of such a disruption, or in how to design proposed irrigation initiatives.

Other budget items, however, may not be accounted for within the core activities of the project. For the most part, these activities comprise either studies that result in integrating environmental and social considerations into implementation activities or the monitoring of environmental and social impacts.

In this Appendix Tables F.1 - F.8 present the full range of project investments that will have a direct beneficial environmental and/or social impact. Table F.9 presents those investments from among those presented in Tables F.1 - F.8 that may be considered as "core" environmental and social investments; these investments will guide the implementation of the project and ensure that the wider environmental and social benefits associated with the investments reflected in Table F.1 - F.8 are achieved. In all cases, the budgets identified below do not include allocation of administrative and related costs by the BCP, nor do they include costs incurred by government or IDB staff, whose costs are considered to be separately budgeted.

Table F.1 details the community outreach budget. Preparation of the community outreach program will be designed by international and local consultants and will be delivered by local consultants. The manual that will accompany the community outreach program will be produced by international and local consultants. Expenses are budgeted on the basis of the need to cover expenses on all days associated with the preparation and implementation of community outreach activities.

The environmental and social aspects of inputs and farming practices are budgeted in Table F.2. Preparation of the program will be jointly undertaken by international and local consultants. Implementation will be undertaken by local consultants with inputs from an international consultant. The expenses budget includes and allowances materials, international travel and per diems.

Table F.3 details the budget for land management activities. The undertaking of property survey is assumed to be a local cost and it is assumed that the time taken to survey, report, participate in meetings and undertake other project activities is equivalent to 1 hour per property surveyed. Assuming an average of 1000 properties per irrigated area and 5 areas to be subject to irrigation investments, the project costs are as shown in the Table. The development of a protocol for resolving disputes is will be undertaken by international and local consultants. Per diem and international travel costs are allocated.

Table F.1
Community Outreach Budget Estimate

ACTIVITY	BASIS OF BUDGET ESTIMATE	BUDGET ESTIMATE (\$US)
Community Outreach	Program preparation: 10 days @ \$500	5,000
	5 days @ \$350	1,750
	Program delivery: 30 days/yr x 5 yrs = 150 days @ \$350/day	52,500
	Manual preparation: 20 days @ \$500	10,000
	10 days @ \$350	3,500
	Production cost: Lump sum	10,000
	Expenses: 2 flights @ \$1500 each	3,000
	195 per diems @ \$150	29,250
	TOTAL	115,000

Table F.2
**Environmental And Social Aspects Of Inputs
And Farming Practices: Budget Estimate**

ACTIVITY	BASIS OF BUDGET ESTIMATE	BUDGET ESTIMATE (\$US)
Environmental And Social Aspects Of Inputs And Farming Practices	Program preparation: 10 days @ \$500	5,000
	5 days @ \$350	1,750
	Program delivery: 20 days @ \$500	10,000
	100 days @ \$350	35,000
	Expenses: Materials: Lump sum	15,000
	2 flights @ 1500 each	3,000
	135 per diems @ \$150	20,250
	TOTAL	90,000

Table F.3
Land Management: Budget Estimate

ACTIVITY	BASIS OF BUDGET ACTIVITY	BUDGET ESTIMATE (\$US)
Land Management	Land Inventory: \$20/hour to survey 1 property x 1 hour/property x 1000 properties per area to be irrigated x 5 areas to be irrigated	100,000
	20% administration/overhead	20,000
	Protocol Development: 10 days @ \$500	5,000
	30 days @ \$350	10,500
	Expenses: 1 flight @ \$1500	1,500
	40 per diems @ \$150	6,000
	TOTAL	143,000

Table F.5 presents the budget estimate for watershed management measures. The basis for all activities is identified according to whether studies, works or other activities will be undertaken.

In Table F.6, the estimated budget for the environmental and social component of small scale irrigation are presented. It is assumed that investments will be made in 5 irrigation initiatives (either existing or new). The environmental and social component of works is assumed in the absence of having identified specific investments that will be made; however, on the basis of site visits to the project region, and on the typical basis that design costs comprise 10 - 15 percent of the construction costs, the environmental and social component of works is estimated as shown in Table F.6. It is assumed that design costs will be incurred by both international and local consultants, and that works will be undertaken by local contractors.

Project monitoring and evaluation is assumed to be separately budgeted under project management unit and government budgets, and accordingly is not separately detailed in this Appendix.

Table F.5
Watershed management: Budget Estimate

ACTIVITY	BASIS OF BUDGET ESTIMATE	BUDGET ESTIMATE (\$US)
<u>Watershed management</u>		
Hydrology Study/ Monitoring		
Watershed Model Study/Monitoring	Study: Lump Sum - \$100,000 per region for small irrigated areas x 2 region = \$200,000	200,000
Water/Soil Quality Monitoring	Monitoring: Lump sum - \$40,000/year x 5 years = \$200,000	200,000
	Sub-Total	400,000
Tree/Crop Study And Introduction	Study: Lump Sum Introduction: Grafting Production	75,000 830,000 1,500,000
	Sub-Total	2,330,000
Immediate Priority Actions	Definition/design: 20 days per irrigated area x 12 areas = 240 days @ y Works: 200 hours of heavy equipment per irrigated area @ 200 days @ \$25/day labour x 12 areas	120,000 120,000 60,000
	Sub-Total	300,000
Community Buy-In Projects	Definition/design: 10 days per irrigated area x 12 areas = 120 days @ y Works: 50 hours of heavy equipment per irrigated area @	60,000 30,000
	Sub-Total	90,000
Integrated Water Resources Management	Included in "Watershed Model/Monitoring"	
	TOTAL - WATERSHED MANAGEMENT	3,120,000

Table F.6
Environmental And Social Component Of Small Scale Irrigation:
Budget Estimate

ACTIVITY	BASIS FOR BUDGET ESTIMATE	BUDGET ESTIMATE (\$US)
<u>Small Scale Irrigation</u>		
Preliminary Design - Environmental and Social Component	ESIA preparation lump sum: \$75,000 Sub-Total	75,000 75,000
Detailed Design - Environmental and Social Component	Integration of ESIA recommendations into detailed design lump sum: \$15,000 per irrigation investment x 5 investments Sub-Total	75,000 75,000
Works - Environmental and Social Component	Assume preliminary and detailed design comprise 10 - 15% of cost of works Sub-Total	850,000 - 1,275,000
	TOTAL	850,000 - 1,275,000 1,000,000 - 1,425,000

Table F.7
**Environmental And Social Component Of Project Monitoring
And Evaluation: Budget Estimate**

ACTIVITY	BASIS FOR BUDGET ESTIMATE	BUDGET ESTIMATE (\$US)
Project Monitoring and Evaluation - Environmental And Social Component	BCP administrative cost - environmental and social component budget assigned	

Table F.8
Core Environmental And Social Investments

ACTIVITY	BUDGET ESTIMATE (\$US)
Environmental And Social Aspects Of Inputs And Farming Practices (50 percent of budget presented in Table F.2)	45,000
Land Management	143,000
<u>Watershed management</u>	
Hydrology Study/Monitoring	400,000
Watershed Model/Monitoring	
Water/Soil Quality Monitoring	
Tree/Crop Study	75,000
Immediate Priority Actions	300,000
Community Buy-In Projects	90,000
Integrated Water Resources Management	Included in "Watershed Model/Monitoring"
<u>Small Scale Irrigation</u>	250,000
Preliminary Design - Environmental and Social Component	
Detailed Design - Environmental and Social Component	125,000
TOTAL	1,693,000