Inter-American Institute for Cooperation on Agriculture
IICA-GTZ Project: Agriculture, Natural Resources and Sustainable Development

EVALUATION OF THE IICA-GTZ WINDOWS OF SUSTAINABILITY MODEL IN JAMAICA: THE RIO COBRE WATERSHED

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ACRONYMS

BBT	Best Bet Technologies
CARD	Caribbean Agricultural and Research Development Institute
CATIE	Center for Tropical Agricultural Research and Education
CIB	Coffee Industry Board
CIDA	Canadian International Development Agency
EFJ	Environmental Foundation of Jamaica
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Community
FACT	Farmer Action Committee Team
FAO	Food and Agricultural Organization
FD	Forestry Department
GIS	Geographic Information System
GTZ	German Agency for Cooperation
HASP	Hillside Agricultural Sub-Project
IDB	Inter-American Development Bank
IDRC	International Development Research Center
IICA	Inter-American Institute for Cooperation on Agriculture
JAS	Jamaican Agriculture Society
JGBA	Jamaica Goat Breeders Association
LMC	Local Management Committee
MINAG	Ministry of Agriculture
MYADP	Morant Yallahs Agricultural Development Project
NGO	Non-Government Organizations
NRCA	Natural Resources Conservation Authority
OFAR	On Farm Adaptive Research
OPM	Office of the Prime Minister
PIOJ	Planning Institute of Jamaica
RADA	Rural Agricultural Development Authority
RCGBA	Rio Cobre Goat Breeders Association
USAID	United States Agency for International Development
WB	World Bank
WRA	Water Resources Authority
WS	Windows of Sustainability

EXECUTIVE SUMMARY

This report is an evaluation of the Windows of Sustainability (WS) model which was implemented by IICA and GTZ in 1997 in Jamaica. The Terms of Reference (TOR) for the evaluation were: (i) to analyze, evaluate outcomes and identify major experiences of the WS model since its establishment in 1997 up to June 2000; (ii) conduct a systematic analysis of the model to identify and analyze its social, economic and environmental impacts and changes within the policy, institutional and political setting; (iii) Find out lessons learned and experiences gained after 3 years of development in order to strengthen the model towards sustainability; and (iv) prepare an input-output matrix of the activities of the model.

The evaluation team comprised a representative each from IICA's Technical Consortium and the IICA-GTZ project from Headquarters, a representative each of the major stakeholder institutions and the beneficiary group and personnel from the IICA Office in Jamaica. The evaluation method comprised a series of steps to review, collect, organize and analyze relevant data and information on the implementation of the WS model. The process included a set of activities involving the participation and interview of key institutional partners, beneficiaries and other stakeholders and a one-week field work last September.

The evaluation was constrained by three major factors: (i) the limited data available for evaluating the various impacts of the model; (ii) the short time during which the model was executed was considered not to be sufficient to assess its medium and longer-term impacts; and (iii) changes in the IICA representation and leadership in the project which affected continuity of project activities and information availability.

The WS model was implemented in the Rio Cobre watershed area of St. Catherine parish which is considered one of the most important watersheds in the country. The decision to execute the model was also made after extensive consultations with the key institutions involved in watershed management, hillside agriculture and rural development, as well as with various farmers' groups located in the watershed. The main co-financiers of its implementation were the IICA office in Jamaica (JCA) and the IICA-GTZ project from Headquarters. Other contributors included the Ministry of Agriculture (MINAG), the Rural Agricultural Development Authority (RADA), the Environmental Foundation of Jamaica (EFJ), the Coffee Industry Board (CIB) and the Peace Corps. Technical support was provided mainly by IICA and GTZ in collaboration with various national institutions.

The model's general objective was to produce a tangible, practical case of sustainable rural development including hillside agriculture and integrated watershed management. The general WS model seeks to address five major objectives and produce four major results: (a) establish policy guidelines and their implementation; (b) measure the productivity of the production factors – labor, land and capital on a sustainable basis; (c) attain participation of the target group; and (d) prepare an Environmental Management Plan.

The beneficiaries targeted were national institutions (including NGOs and community organizations) involved in sustainable rural development and natural resource conservation and farmers located in the upper, middle and lower levels of the watershed. The strategy for implementing the model included a multi-institutional, inter-disciplinary approach to approach the problems of hillside degradation, agricultural production, low farm income, community development and sustainable rural development. Training, technical assistance, technology

transfer and information dissemination using participatory approaches were the main instruments used.

There were four major sets of outputs and activities of the model: (i) problem identification, diagnosis and planning; (ii) conservation activities; (iii) training and capacity building; and (iv) introduction of a goat agroforestry production system (GAPS). In most of the activities, the WS model adopted a participatory approach in which the beneficiaries and other stakeholders (local institutions) were integrally involved in the diagnosis of problems, identification of solutions, planning and development of strategies to address priorities and needs of the watershed.

The first set of activities provided useful information on watershed management policy in Jamaica, identification of the main problems of farmers, their socio-economic situation and institutional and environmental problems and provided training on problem identification and planning. The second introduced new technologies and approaches to conservation and natural resource management including alternative cropping systems and identification of "best bet" technologies. The third focused on training and capacity building through seminars and workshops which covered themes ranging from planning methodology and micro project development to conservation practices, increasing environmental awareness, goat production technology, formation and strengthening of farmer groups, leadership development and institutional building.

The fourth set of activities introduced and expanded the GAPS which is perhaps the model's major contribution. It is the most visible output, largely because of its participatory approach and widespread acceptance by also women and younger farmers and its increasing adoption both in the Rio Cobre area as well as by other farmers in Jamaica. The GAPS is widely accepted because it combined economic, social, environmental and institutional aspects that were conducive to small farm production. It has the potential to increase farm income, its contribution to environmental preservation and enhancement through less on-farm damages and the use of the vermiculture technology which utilizes various wastes for organic fertilizer production. It facilitated the formation and strengthening of the Rio Cobre Goat Breeders Association (RCGBA) and secured financing (approximately US$ 50,000) through the development of a micro project on the vermicompost technology.

The WS model also had institutional, economic and environmental impacts. The institutional impacts are the most significant because the model brought together (through IICA's initiative and leadership) several national institutions to work together in an effective collaborative network on hillside agriculture and watershed management issues. The model also facilitated greater visibility of IICA and its leadership in these areas. Through the RCGBA, the model increased community participation and awareness in watershed management by making the beneficiaries "owners" of the project. While the model sought to improve the livelihoods of its beneficiaries also, it is too early to determine its economic impacts. Only the adoption of the GAPS provide some indication of positive economic benefits. Regarding the environmental impacts, the model introduced new technologies and environmentally friendly practices such as the use of animal waste and by-products for fertilizer and feed, soil conservation and multi-cropping systems. However, the lack of information and the short period since the model was implemented limit any evaluation of such impacts.

The model's conceptualization and application is considered appropriate to the watershed area and it made contributions institutionally and to capacity building. However, there were several weaknesses and constraints in its implementation. These include the reduced

focus and importance given to activities related improved natural resource and environmental in the last year, the inadequate collection of data on economic and environmental aspects, the lack of capacity of the stakeholder institutions to continue execution of the model in the absence of IICA-GTZ support and the relatively short period during which the model was implemented for it to make any substantial impact on improved watershed management, community development, sustainable rural development and institutional development. With regard to the achievement of the four major results defined by the model, the overall success was not high.

Several recommendations were made to make the model more effective and its impacts sustainable. These include the need to improve data collection, build on the strong areas (inter-agency collaboration, farmers organization, the GAPS model, vermicompost technology, etc.), greater focus on natural resource and environmental management aspects, continued strengthening of local organizational capability, mobilization of local resources (both human and financial) and greater commitment by local institutions, commercialization of activities of the GAPS and the need for longer term, strategic business planning by the RCGBA. Technical assistance and funding will be required in the medium term for the model to have significant positive impacts in the longer term.

CHAPTER I
INTRODUCTION

1.1 Background

For over a decade the IICA office in Jamaica has collaborated with various national institutions in the execution of projects on hillside areas. These were funded by, among others, international agencies such as the Inter-American Development Bank (IDB), the International Development Research Center (IDRC), United States Agency for International Development (USAID) and most recently by the European Community (EU). These projects largely focused on cropping systems research of annual and perennial food crops on hillside areas to address two major problems – to generate additional income for small farmers and the introduction of tree crops in the farming system to prevent soil degradation. The experiences were obtained through what is known as "On Farm Adaptive Research" (OFAR), which meant working directly with institutions involved in agricultural research and extension on the one hand, and with small, hillside farmers on the other. From these project experiences, IICA published several studies on hillside agriculture in Jamaica.

In the past five years, efforts that were directed to address cropping systems research included variables on aspects of sustainability such as social organizations, economic viability of cropping systems, marketing and natural resource conservation within the context of watershed management. Since 1996, IICA and CARDI have been conducting OFAR in the Morant Yallahs Agricultural Development Project (MYADP) financed by the EU. This project with small farmers included the above-mentioned variables of sustainability, along with other components.

One approach that was considered appropriate to address the economic, social, environmental and institutional issues simultaneously was the "Window of Sustainability" (WS) model. The WS concept was jointly developed since 1996 by the German Cooperation for Development (GTZ) and IICA. It basically seeks to implement actions to increase income and improve the life quality in the rural sector.[1] The model promotes sustainable development as a balance between economic efficiency, social responsibility and environmental management and conservation, within the policy framework of a selected area (see Annex 1). The model provides not only a systematic approach to define sustainable cropping systems that include tree crops, but also allows an integral analysis of economic and social variables within a given organizational and institutional setting.

Preliminary efforts to introduce the WS model in Jamaica started in 1992-93 when IICA, CATIE and GTZ initiated an action to extend studies on small farmers and the factors that affect the sustainability of their land use system. The contacts were renewed in 1996 when the IICA Office in Jamaica approached GTZ with a proposal to initiate a watershed management project. This followed a fact-finding mission to Jamaica by GTZ technicians in August 1996 to look at IICA's work there and explore possibilities to implement such a project.

Several meetings and a workshop with various organizations (IICA, GTZ, RADA, CIB, NRCA, EFJ, etc.) engaged in rural development and watershed management and farmers in the Rio Cobre and Morant Yallahs watersheds were held to discuss Jamaica's experiences on farming systems and watershed management, along with the WS concept and the two WS

[1] Presently the WS model is being implemented in four places - the Rio Reventado Watershed, Costa Rica, the Puriscal sub-region, Costa Rica, Chiapas, Mexico and the Rio Cobre Watershed, Jamaica.

experiences in Costa Rica. There were consultations also with the donors group on watershed management (such as the IDB, World Bank, EU, etc.). Thereafter, an agreement was reached to execute a WS model in the Rio Cobre watershed.2 IICA and GTZ executed the model in collaboration with various national institutions and farmers.

1.2 Purpose of the Evaluation

The WS model was implemented in 1997 with funding and technical support from GTZ and IICA. GTZ's funding for the model ended on October 31, 2000. As a result, GTZ is in the process of evaluating its WS activities in the various countries including Jamaica. The Terms of Reference (TOR) for the evaluation were prepared by GTZ in collaboration with the IICA office in Jamaica and other institutions. The TOR (see **Annex 1** for details) were to:

(i) Analyze and evaluate outcomes of the WS model since its establishment in 1997 up to June 2000, in order to identify major experiences and to make recommendations for the promotion of changes among actors involved.

(ii) Conduct a systematic analysis of the advances of the Windows of Sustainability model in order to identify and analyze its social, economic and environmental impacts and changes within the policy, institutional and political setting.

(iii) Find out lessons learned and experiences gained after 3 years of development in order to strengthen the model towards sustainability.

(iv) Prepare an input-output matrix of the activities of the model.

In addition, the evaluation should try to answer the following issues:

(a) To what extent has the methodology to develop the WS model been appropriate and which are its strengths, limitations and learned lessons?

(b) What are the available alternatives in the model's internal organization, for achieving more participation and self- management? How can dependence on external support be reduced?

(c) What external opportunities can be identified for strengthening the development process in the medium and longer terms?

1.3 Evaluation Team and Responsibilities

The evaluation team comprised a representative each from IICA's Technical Consortium and the IICA-GTZ project from Headquarters and a representative each of the major stakeholder institutions and the beneficiary group. The team included the following:

Dowlat Budhram	CEPPI, IICA Headquarters and Coordinator of the Team
Martin Carnap	Coordinator of the IICA-GTZ cooperation project

[2] The agreement for establishing a WS model was communicated to IICA's Regional Director in the Caribbean (memo A2/JM-709/96 dated September 3, 1996).

Dave Bailey	Data Bank and Evaluation Division, Representative of the Ministry of Agriculture
Joseph Pennant	Assistant Hydrologist and Representative of the Jamaica Water Resources Authority
Derrick Gayle	Project Officer, Environmental Foundation of Jamaica

Several resource persons directly involved in the model supported the team. They were:

Chelston Brathwaite	IICA Representative, Jamaica
Carlos Reiche	Specialist in Management and Conservation of Natural Resources, IICA-GTZ Project, IICA Headquarters
Zithroy Annikie	Coordinator of the IICA-GTZ model
Franklyn Brown	President of the Rio Cobre Goat Breeders Association and Farmer
Anthony White	Parish Manager, RADA, St. Catherine Parish
Lennox Hemans	Extension Officer, RADA, Riversdale
Chris Smith	US Peace Corps/IICA
Lenmore Jones	NRCA
Leslie Simpson	CARDI

The team was expected to act as a facilitator in the evaluation process, as well as in the identification and analysis of the corresponding impact indicators (resulting from the effects of the mid- and long term impacts) and prepare a set of recommendations. The evaluation work in the field was done from September 04, 2000 to September 09, 2000 (see schedule in **Annex** 2).

1.4 Evaluation Methodology

The evaluation method comprised a series of steps to review, collect, organize and analyze relevant data and information of the WS model. The process included a set of activities involving the participation of key institutional partners, beneficiaries and other stakeholders (see **Annex 3**). These included the following activities at IICA Headquarters and during the mission in Jamaica:

- Planning and preparation for the mission was done jointly by the IICA Office in Jamaica, GTZ and the main stakeholders (local institutions, government authorities, local organizations and farmers).

- Prior to the commencement of the mission to Jamaica, a review was done of all the documents available on the model that are in the GTZ office at IICA's Headquarters in Costa Rica. Based on this, a draft document of the four input-output matrices was prepared. These were sent to the IICA office in Jamaica for review and adjustment prior to the commencement of the mission.

➢ In Jamaica, the following activities were executed:

- At the commencement of the mission, a briefing of the purpose, objectives and activities of the evaluation was done with members of the IICA office, the evaluation team and resource persons.
- A review of the profile document on the model and other documents prepared since the model was implemented.
- A review of the annual operational plans up to August 2000.
- A review of all reports including quarterly and annual project reports, trip reports and other documents.
- Interviews and discussions with national organizations that collaborated directly and indirectly with the model.
- Two field days were spent visiting the model area and interviews and discussions held with key stakeholders including individual farmers and organized groups.
- The team participated in the quarterly meeting of the Rio Cobre Goat Breeders Association (RCGBA).
- Review of financial reports, comprising the different contributions, direct and indirect from national organizations and project partners and expenditures. A draft financial report was prepared.
- At the end of each day during the mission, the team and resource persons engaged in a participatory process of reviewing the information and discussing critical issues.
- At the end of the mission a debriefing was held with the participation of major stakeholders and partners on the evaluation exercise, the major accomplishments of the mission, preliminary perceptions on the evaluation and defining a schedule for completion of the evaluation report.

1.5 Preparation and Organization of Report

The Coordinator of the evaluation team prepared a draft version of the report. This was presented to GTZ, the IICA representation in Jamaica and to other members of the team for comments. The final draft was then completed in Costa Rica and distributed for feedback from GTZ and the IICA office.

The remainder of the report comprises four chapters and several annexes. The second chapter provides a description of the model area, the objectives, beneficiaries and strategy of the model. Chapter III evaluates the impact of the model while Chapter IV provides information on the costs and financing of the project. The final Chapter outlines the principal conclusions and recommendations of the mission.

1.6 Constraints and Limitations

The preparation of the report was constrained by several factors that limited the full extent to which the TOR of the mission could be accomplished. The three most important ones were:

➢ The limited data available for evaluating the various impacts (see **Section 1.2 (ii)** above) of the model, particularly the environmental and socio-economic ones on the beneficiary groups and project area. However, it should be pointed out it is relatively too early to assess

certain impacts of the model, particularly those related to economic, social and environmental ones.

- The short time during which the model was executed was not considered to be sufficient to assess the medium and longer-term impacts of the model.

- Changes in the IICA representation and leadership in the project affected continuity of project activities and the availability of information.

CHAPTER II
DESCRIPTION, OBJECTIVES AND STRATEGY

2.1 Concept, Rationale and Justification

Most of the area covered by Jamaica's thirteen parishes (see **Figure 1**) is mountainous and hilly, has high rainfall and easily erodable soil. The arable land area is relatively small and under pressure from farming and other activities. Many small and medium scale farming is done on hillsides, often in watershed areas. There is evidence of high pollution of water from the heavy use of agro-chemicals and increasing salinisation on the lowlands from agricultural activities. Excessive soil losses are observed in many hillside farming areas, and deforestation is increasing for industrial and agricultural purposes or from just encroachment on marginal lands and forest edges. Externalities such as pollution and eutrophycation processes in the river are observed downstream in the watersheds. Programs to address these problems are urgent and compensatory mechanisms be established for farmers who adopt or use positive measures to arrest resource degradation.

The Rio Cobre Basin where the WS model was implemented comprises mainly the parish of St. Catherine in southern Jamaica. It has an area of 1,250 km^2 comprising 537 km^2 in the upper sub-basin and 713 km^2 in the lower sub basin (see **Figure 2**). Of the total area, 90% lies in the parish of St. Catherine with less than 10% in the parish of St. Andrew. The Basin is located on the water deficient south coast of the island (there is a reduced rainfall on the island's south coast which leads to this water deficit). Despite this restriction, this basin has the highest water demand in the island, based on the high level of development that occurs across the parish. The demand occurs in the domestic, agricultural and industrial sectors.

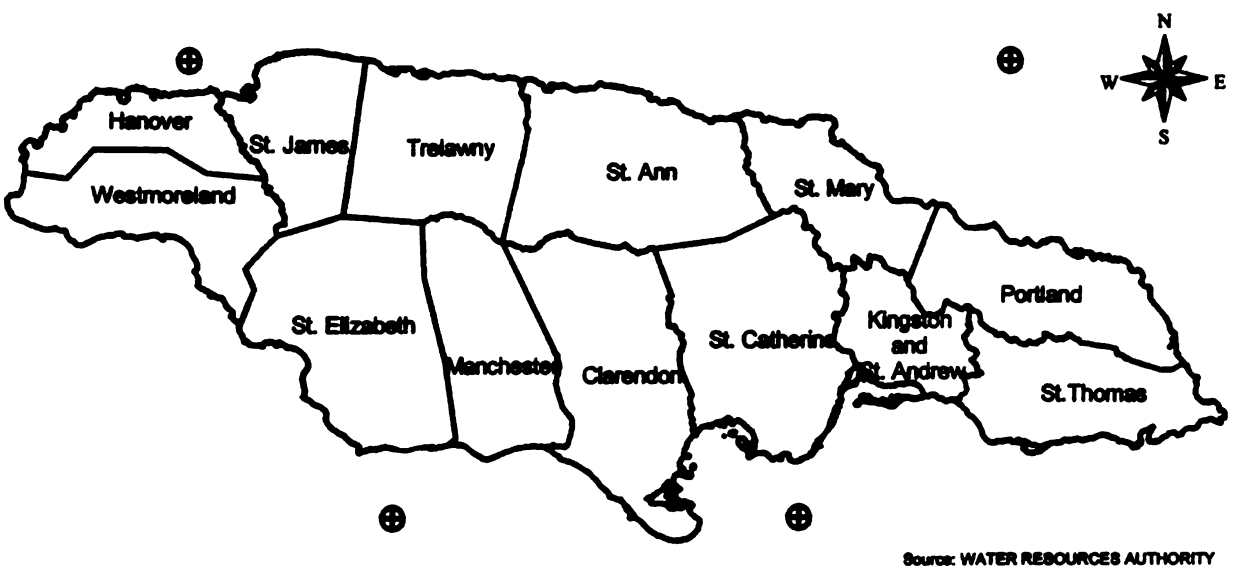


Figure 1: Jamaica Parish Map

The Rio Cobre Basin is of great importance due to its extensive reach and impacts in the country. This fact as well as the demand for water across the Basin have led to it being studied extensively. Agriculture, agro-industry and bauxite/aluminum production compete for the water, in addition to domestic uses. It is home to two of the fastest growing areas in Jamaica; Greater

The WS model was implemented in the Rio Cobre watershed area of St. Catherine parish, approximately 40 kilometers from the country's capital, Kingston. It covers approximately 64,000 hectares with a population density of less than 3 persons per hectare. This watershed is considered one of the most important in the country. As a result, several donors have funded various projects in order to maintain and enhance the environmental conditions of the watershed. The choice for the WS model to be implemented in this watershed was based on policy priorities, institutional, socio-economic and the environmental situation of the watershed.

Prior to the decision to execute the model, consultations and discussions took place between IICA-GTZ project, farmers groups and the major national institutions (RADA, WRA, NRCA, EFJ, PIOJ, MINAG and the FD) working on hillside agriculture and watershed management in the country to identify potential opportunities for introducing a WS model in the Rio Cobre watershed. These consultations generated a consensus on the selection of the Rio Cobre Watershed for the WS model. The various institutions also expressed the compatibility of the model with their respective objectives in watershed management as well as its objectives being consistent with the overall policy of the government. Furthermore, the MINAG (through the Permanent Secretary) expressed general concerns about the need for defining policy guidelines on watershed management and identified the Rio Cobre watershed as an appropriate case study to address this issue.

Furthermore, the Donor's Group for Watershed Development in Jamaica (IICA is a member) repeatedly expressed the need for improved institutional coordination in projects executed, the strengthening of national institutions in natural resource management and the sustainability of projects after donors' involvement is discontinued. The local communities viewed the WS model as an appropriate instrument to addressing these concerns, as well as establishing greater local ownership in the projects.

In addition, the selection of Jamaica to have a WS model was viewed as a significant step for IICA so as to continue enhancing its technical capability in the area of hillside agriculture and watershed management. It also provided IICA with the opportunity to further its role in strengthening national institutions in the area of sustainable agriculture and to serve as model for other Caribbean countries. In addition, the theme advocated by the model is of common interest to institutions involved in agriculture and natural resource management in the country.

2.2. Objectives

2.2.1 General

Within the framework of activities executed in IICA's member countries and the IICA-GTZ project in collaboration with local partners, the WS model sought to acquire concrete experiences by implementing concepts that promote sustainable rural development that go beyond the strictly theoretical framework. The model's general objective is to practice and produce a tangible, practical case of sustainable rural development based on the concepts and the instruments developed in the IICA-GTZ project in the past. It was designed to serve as a solid foundation for generating information, experiences, for dissemination to other participating entities and provide training opportunities, both for technical staff from cooperating agencies and the target groups.

2.2.2 Specific Objectives

The WS model sought to address five key issues related to hillside agriculture and integrated watershed management:

(i) Elaborate policy guidelines which are relevant to the local watersheds that also articulate the Parish and the National level policies already established.

(ii) Define operational mechanisms that ensure the coordination among national and local NGOs and community based organizations that are relevant to production, processing and marketing.

(iii) Generate a system of agricultural production with an interdisciplinary focus, the objective being to maintain production, productivity and profitability while avoiding negative impacts on the environment.

(iv) Transfer "Best Bet" Technologies (BBT) according to different agro-ecosystems of the watershed area in order to enhance the adoption process and increase income. This is a parallel and complementary activity to item (c) above.

(v) Monitor at the local level with particular reference to major activities (within agriculture resources domain) that have impact on the environment.

The strategy for implementing the model also included work to be done on On-Farm Adaptive Research (OFAR) activities in order to generate information on the bio-diversity of crops and cropping systems (agro-forestry) that contribute to higher farm income and which also conserve the natural resource base in the watershed.

Four major results were identified in the Rio Cobre watershed area:

(i) Establish policy guidelines and their implementation.

(ii) Measure the productivity of the production factors – labor, land and capital on a sustainable basis.

(iii) Increase participation of the target group.

(iv) Prepare an Environmental Management Plan (EMP).

At the operational level the model sought to strengthen national institutions in order to define and implement mechanisms that ensure improved coordination among national and local NGOs and community-based organizations that are involved in production, processing, marketing and environmental issues. Training will also be provided to target groups in order to monitor the impact of their agricultural activities on the environment.

2.3 Beneficiaries

The direct beneficiaries of the project were identified at two levels:

(i) The first level included institutions involved in sustainable development and natural resource conservation. They are RADA, the Forestry Department, the Water Resources Authority, the NRCA and EFJ.

(ii) The second target group were NGOs, Community-based organizations and OFAR farmers located in the upper, middle and lower levels of the watershed. Most of these beneficiaries were identified in the first semester of the model's implementation. Some leaders and farmers were also beneficiaries in the HASP-USAID project (1989-93) executed by IICA.

2.4 Strategy

The model was implemented over a three-year period (1997 to 2000). It was a joint effort by IICA, GTZ, national counterparts (such as NRCA, RADA, etc.) and farmers groups. The strategy for implementing the model was based on the following:

(i) In the initial phase, the IICA office in Jamaica along with the IICA-GTZ project will undertake a problem solving approach on OFAR activities in order to generate information about crop bio-diversity and cropping systems (agro-forestry) that increase farm income, but also conserve the natural resource in the watershed.

(ii) A facilitator with high technical and organizational capabilities will be assigned to the project to serve as a key, direct technical advisor and as liaison between the stakeholders and the major collaborating institutions.

(iii) A bottom-up approach will be used to identify problems and needs, organize farmers, establish priority activities of the model, strengthen local organizational capabilities and establish local ownership of the project. This approach includes the active involvement of national institutions supporting watershed management and rural development in the area. This approach was considered appropriate, given experiences from previous projects and the need to establish a common basis of understanding and addressing the priority problems.

(iv) Farmers were organized at the local level to follow a bottom-up approach and were involved in planning the model's activities. At the same time, inter-agency meetings were held to discuss the main institutional strategies. Implementation of the model's activities were based on the expressed needs and priorities of the stakeholders.

(v) The training of national counterparts was based on activities to ensure institutional continuity with operational commitments of local organizations.

(vi) The activities programmed were intended to provide field experiences that will help formulate a conceptual framework and prepare practical guidelines for other watershed areas in the country.

2.5 Activities

Based on the analysis of the needs, interests and capacity of the stakeholders and national institutions involved in sustainable agricultural development, efforts were made to rationalize the model's activities within the scope and objectives of counterpart institutions and their program of work. Four major activities and sub-activities were identified. Activities for the following year were programmed based on the results achieved in the current year as well as on the needs and priorities of the stakeholders. These included:

(i) Definition of policy guidelines for the Rio Cobre Watershed.

(ii) Measurement of the productivity of factors – labor, land and capital on a sustainable basis. In this regard, the following were programmed:

- Identify and analyze the land use and cropping systems
- Analysis of production parameters
- Analysis of costs, benefits and externalities
- Establish indicators

(iii) Participation of target groups

- Analyze the target group (farmers, NGOs, institutions)
- Execute participatory seminars and workshops
- Record social indicators
- Transfer validated experiences
- Provide support to develop micro projects

(iv) Prepare an Environmental Management Plan (EMP)

- Apply the method of Environmental Impact Assessment (EIA)
- Execution the EIA
- Define and generate information on indicators
- Present information for a Geographic Information System (GIS)

CHAPTER III
ACHIEVEMENTS AND IMPACT

3.1 Activities and Outputs

Implementation of the WS model began in May 1997. Over the period 1997-2000, the model executed several activities to achieve its objectives. These activities involved training, participatory field demonstrations, technology transfer and adaptation, building sustainable institutional capacity and support to community participation for development. The activities can be categorized as focusing on four main areas: problem identification and diagnosis of the watershed; transfer of technology; development of micro projects; and establishment of a goat agro-forestry production system (GAPS).

It is important to note that while the model identified clear objectives at its inception, its annual work plan was largely based on a consensus by the stakeholders on the priority problems and needs to be addressed. The work plan for the following year was then adjusted based on the experiences and achievements of the current year and the priorities of stakeholders. As a result, the model shifted its focus over the three-year period, from addressing broader economic, environmental and institutional issues (as originally intended) to concentrate on the GAPS model (see **Sections 3.1.2 and 3.1.4** below).

A summary of the model's activities and outputs is presented in **Annexes 4, 5 and 6**. The activities, inputs, outputs and constraints for the four major results of the model are presented in the input-output matrix in **Annex 4. Annex 5** is a list of the main training events while **Annex 6** provides information on the various technical documents and reports produced over the period.

3.1.1 Problem Identification, Diagnosis and Planning

Prior to the model's execution and during the first year, a diagnosis was done on several aspects of watershed management and rural development to provide information and assess the strengths and weaknesses of previous strategies in order to design a more effective strategy for the WS model. This included a review of watershed policy in Jamaica, previous work that was done on agricultural production and watershed management, identification of the main problems of farmers, their socio-economic situation and institutional and environmental problems. The diagnosis was done in collaboration with farmers and institutions working in the watershed.

The diagnosis provided several useful inputs for the WS model. It identified the main factors that contribute to the watershed degradation and revealed that the major contaminants are medium and large agricultural and non-agricultural enterprises. While some enterprises are aware of the problem, the majority virtually ignores it. The problem is aggravated by non-enforcement of existing legislation, weak institutional capacity and coordination, inadequate education of the community, lack of appropriate technology and incentives for resource conservation.

The diagnosis revealed that several projects were executed over the years to improve small farm agriculture and watershed management. Although there were several national institutions in various aspects of watershed and environmental management, effective

coordination among these and a common strategy to address problems of the watershed were lacking. The institutions include IICA, RADA, NRCA, EFJ, WRA and the CIB. Based on this, it is necessary that any strategy to improve watershed management and contribute to sustainable rural development be planned and executed in collaboration with these institutions.

The diagnosis also provided valuable information for the conceptualization, planning and execution of the model. For example, when the Hillside Agricultural Project (HAP) ended a few years before, it was found that its activities were not sustainable and most of these terminated when the project ended. In addition, the major stakeholders, particularly farmers, were not sufficiently integrated into the project and did not see themselves as "owners" of it during its execution and even when it came to an end. For these reasons, considerable time was spent before and after implementation of the WS model to develop an alliance among the key stakeholders (through meetings and workshops), build a consensus and strengthen inter-institutional collaboration for its execution.

A review was also done of the environmental and watershed management policy in Jamaica and a three-year Environmental Management Plan (EMP) was proposed to protect the natural resource base and increase water quantity and quality. This is to be done through silviculture management (reforestation, management of artificial and natural forests, etc.), organic farming (use of natural pesticides) and introduction of a practical and acceptable system of agro-forestry. A policy guideline document on factors affecting the development of the watershed was prepared also during the first year to guide future actions of the model.

Within the above framework, the WS model used a participatory approach (using the ZOPP and SWAP methodologies) to identify options for improving watershed management in the Rio Cobre area. The approach involved farmers as well as various institutions working in the watershed. The consensus was that there are several potential activities that could contribute to alleviating the socio-economic status of farmers while also contributing to improved watershed management and arrest resource degradation. The options include the use of the GAPS model, production of pesticides using locally grown materials, introduction of Velvet beans (Mucuna) to address soil nutrient problems, re-introduction of a cash crop (peanut) in the cropping system, adoption of soil conservation barriers, systematic inter-cropping and developing of micro projects to increase income and employment of farm families and women.

3.1.2 Conservation Activities

As indicated above, the model focused most of its activities during the first year to strengthen relations between farmers and the institutions working in the watershed area so as to identify specific problems and find common solutions to these. Through this collaborative effort the "best bet" technologies on sustainable cropping systems were identified, selected and promoted on various farms by in collaboration with RADA. The selection of the cropping systems took into account the agro-ecological characteristics of the watershed, as well as the socio-economic objective of the farmers, which is to minimize risks, stabilize and increase farm income and protect (food security and cash flow) their household. In this regard, factors such as cash flow, investment requirements, land tenure, labor availability and knowledge and preference for particular crops were strongly considered.

Trials were done in 1997 and 1998 with several crops including peanuts, pineapples and the erection of pineapple barriers, coffee and coconut production systems. In addition to these cropping trails, the model conducted trials involving plantain farming in a citrus orchard and

utilized Macuna for mulching, weed control and enhancing soil fertility. Gully plugging demonstrations were done on a few farms to provide training on reducing soil loss.

While improved natural resource and environmental management remained an important objective of the model, the activities related to this (use of appropriate cropping systems and conservation methods) that started in the first two years became less important as the focus shifted more to development of micro projects and the GAPS model (see below). In large part, farmers did not have a high preference to adopt more sustainable cropping systems because the existing farming system in the watershed area (multiple cropping system with permanent trees) already contributed to soil preservation and good environmental management. In addition, the adoption of alternative cropping systems and soil conservation measures was a low priority because the average age of farmers was high, labor was scarce, capital investment was required and farmers perceived that the economic returns in the short term were marginal.

3.1.3 Training And Capacity Building

Training and a local capacity building were a major focus of the model during the three-year period. These were done in collaboration with various national institutions and farmers groups (see **Annex 5**). The areas covered in the seminars and workshops ranged from planning methodology and micro project development to conservation practices, increasing environmental awareness and goat production technology. The training also included formation and strengthening of farmer groups, leadership development and institutional building. The principal training activities are discussed below.

(i) In the first year, training focused on problem identification and project preparation using the ZOPP and SWAP methodologies. In addition to the participation of national institutions (RADA, EFJ, etc.) in these, farmers from several villages in the watershed area including Riversdale, Troja, Crawle, Top Mountain, Facey, Redwood, Jubilee Town, Hampshire and Kendal benefited.

(ii) The model formed new interest groups (building on the FACT groups of the previous IICA-USAID-MINAG project). Group participation in the training workshops and bi-monthly meetings on planning and project formulation include 21 representatives of farmers' groups and 16 female leaders from four women's groups.

(iii) After the first year, there were several workshops to train farmers on preparation of micro projects. Profiles were prepared on agro-ecotourism, waste and water management, goat and chicken production, sewing, reforestation, organic agriculture, goat production and the transfer and adaptation of the vermiculture technology. The latter two micro projects were combined and modified to form the Rio Cobre Goat and Vermicomposting Project.

(iv) The training activities contributed to increasing environmental awareness, the concept of sustainable development and the need to adopt more sustainable farming practices among small farmers, particularly in the middle and upper areas of the Rio Cobre watershed. Farmers also became increasingly that they have a larger developmental role and that they need to be organized to address the problems of the watershed and their communities. Field demonstrations were held to train farmers on the use of conservation barriers (pineapple barriers), environmental impacts of farming practices, forest management, organic farming, improved goat production technology, production

and use of organic fertilizers and natural pesticides and the development of an integrated system of agro-forestry.

(v) The model facilitated a few farmers to visit Costa Rica to look at the goat production system there and the possibility of producing cheese from goat's milk.

(vi) At the institutional level, technical staff of IICA and the IICA-GTZ project trained personnel from the collaborating institutions (RADA, EFJ, etc.) on problem diagnosis, Environmental Impact Assessment and development of indicators of sustainability for watershed management.

3.1.4 Goat Agroforestry Production System

The development of a goat agroforestry system (GAPS model) is perhaps the major contribution of the model, particularly in the last two years.[3] It is the most visible output of the model, largely because of its participatory approach and widespread acceptance and its increasing adoption both in the Rio Cobre area as well as by other farmers in Jamaica. Of all the technologies introduced by the model, the GAPS generated the most interest among farmers including women and younger farmers and is in demand by goat farmers from other areas in Jamaica and other Caribbean countries.

The GAPS model was identified as a high priority for the watershed for several reasons. First, goat production was already a component of the farming system and farmers were knowledgeable of this type of livestock. Second, production was severely affected by the slaughter of goats by dogs as well as by praedal larceny. Third, there is a large demand for mutton in the country and Jamaica is a net importer of this meat. Fourth, goat meat was considered a specialty among the various foods in Jamaica and local demand for it for special occasions is high. Fifth, there was a need to improve the goat production system while at the same time contributing to reducing the on-farm damages by goats and preservation of the environment. Sixth, an improved production system would contribute to higher farm income.

The GAPS model was considered to be appropriate to the farming system and addressing the many problems of the traditional production system. It combined economic, social, environmental and institutional aspects that were conducive to small farm production in the area. The characteristics of the model are:

- Goats are held in confinement in a goat house and a small fenced area, which protect them from dogs and parasites and also prevent damage to nearby crops. This provided a significant advantage over the traditional open production system in which goats are often attacked by dogs and they destroy crops within and surrounding farms through open grazing.

- The goat house is constructed from rustic and available local materials, such as bamboo and other timber which can easily be found in the watershed area at minimal cost. Farmers, their families and friends provide labor in an organized, participatory manner.

- An agro-forestry plot is established on the farm to supply feed (fodder bank) to the goats in which leguminous bush forage, morera (merus Alba), Hibiscus (hibiscus rosasinensis)

[3] In this regard, the focus of the WS model shifted to concentrating more on this activity and less on policy, environmental and institutional issues.

and/or pastures of king grass (pennisetum purpureum x P. Typhoides) are produced. In addition, grass is easily available in the watershed area at minimal cost.

- The vermiculture technology (earthworm technology) was introduced to complement the goat production system. The California Red Worm is used to break down farm waste, agro-processed waste (such as coffee pulp) and goat waste into environmentally friendly organic fertilizer for on-farm use. This technology was introduced at the Bog Walk Coffee Factory as a joint project between the CIB and IICA project to validate its use in the break down of waste coffee pulp. The worms ingest and pass out the waste (casting), which is a refined material that is rich in plant nutrients and can be used as an excellent organic fertilizer.

- The model facilitated the adoption of a new breed of goat that produces more of both meat and milk.

- During the last year, the WS model focused largely on introducing and expanding the GAPs model through:

  - The formation and strengthening of Rio Cobre Goat Breeders Association (RCGBA);
  - supply of technical assistance for the preparation of micro projects for external funding;
  - establishing new GAPS within and outside the watershed area and construction of improved goat houses;
  - upgrading current GAPS;
  - researching on the possibilities to produce organic pesticides from local plants;
  - train farmers and technicians in sustainable agricultural practices, particularly conservation practices and the integration of the GAPS into the overall farming system;
  - acquire funding for and implement the Goat and Organic Fertilizer Project; and
  - production of a manual on the GAPS.

The widespread acceptance of the GAPS model resulted in the approval (in mid-2000) and funding of the Rio Cobre Goat and Vermicomposting Project (a micro project) by the EFJ. The EFJ is providing J$2.1 million (approximately US$ 50,000) as a revolving fund over a three-year period to support goat production and the production of organic fertilizer using the vermicomposting technology. The RCGBA manages the Fund for its members who are interested in adopting the GAPS model.

In this micro project, J$5,000 is available to assist farmers to build goat houses as well as to cover costs related to goat house construction and fencing. Farmers are required to provide their labor in a cooperative effort to build goat houses (every Monday) of other RCGBA members. Funding (as a grant) is also provided for the purchase of up to 5 goats for farmers. However, each beneficiary farmer must return two female goats to the Association over a two-year period to be distributed to other farmers.

In addition, the fund will finance the establishment of a Vermicomposting processing plant. This plant will use goat, agro industry and various farm waste to produce organic fertilizer that the Goat Breeders Association can then sell to farms and garden stores. This project is considered very important for the farmers as it serves as a catalyst for future development of goat and organic fertilizer production.

3.2 Institutional Impact

Besides the introduction of the GAPS model, the institutional impacts are perhaps the other major achievements of the WS model in Jamaica. It has made several contributions in this area.

3.2.1 Institutional Collaboration and Coordination

The WS model brought together several national institutions to work together in an effective collaborative network on hillside agriculture and watershed management issues. These include RADA, EFJ, CIB, MINAG, NRCA, CARDI as well as IICA. These institutions have worked individually for several years on these issues and occasionally collaborated on some projects. However, the WS model provided greater effectiveness in forging inter-agency collaboration. Besides the model's impact on stronger institutional collaboration, the model promoted and demonstrated the need for stronger coordination of actions and a joint approach to address the complex problems of hillside agriculture, small farmer development and watershed management.

From the inception of the WS model in Jamaica, a working agreement was signed by the major institutions that basically stated that they will continue to work together to preserve the watershed. The continued participation of farmers and the extensive consultation and discussions among the institutions reflect the important role the model has brought to institutional collaboration. While IICA and the IICA-GTZ project provides administrative, logistic and technical support to the activities, the Institute was able to bring together the various institutions to collectively focus their agenda and mobilize their limited resources for watershed development. This institutional model is now seen as an appropriate one for replication in other watersheds and in the overall agricultural and rural sector in Jamaica.

The WS model is an important component of IICA's strategy to contribute to sustainable rural development and improved watershed management in a country where land degradation is high. IICA has a long history of working with hillside farmers. The activities of the model are seen as contributing to the conservation of the natural resource base and the preservation of diversity, which are both critical priorities of national policy and watershed areas. IICA brought together several key institutions working in this area and has been very effective to forge a strategic alliance and linkages between them. Now IICA is regarded as a key non-national institution for information and with good organizational capabilities for coordinating and bringing together institutions involved in watershed management.

3.2.2 Community Participation and Awareness

The model adopted a bottom-up rather than a top-down approach to planning and project development in the watershed. This is unlike previous projects in which the major beneficiaries, the farmers and the community did not see themselves as major stakeholders and "owners". Through various workshops and training activities, farmers and the support institutions were mobilized and brought together to identifying development problems of the community, find alternative solutions to these and design a strategy to implement the activities. Unlike previous projects, the role of the support institutions including IICA in this model was basically one of providing information, technical assistance and facilitating the process.

Given weak community organization and the "individual" behavior of farmers, the model contributed to increased awareness among them on development issues and sustainability in the watershed area and the importance of their role to resolve their problems. The GAPS model provides an organizational presence, which is critical to its success and contributes to community involvement in specific developmental activities. Farmers have bought the concept and are integrally involved in the WS model. Their integral involvement and the dissemination of information and communication are key to its success so far.

The formation of the RCGBA is a major step in organizing the community and rebuilding effective cooperative relationships among farmers. They collaborate voluntarily to build goat houses, share information and network in the community. In addition, the Association is seen as a major source of information, training and technical assistance not only in the Rio Cobre area but also for farmers in other parts of the country.

3.2.3 Capacity Building

The WS model has facilitated and has been an important vehicle for capacity building in the watershed area. Through training and field demonstrations, both farmers and support institutions such as RADA, NRCA, etc. have increased their knowledge and skills in methodologies on diagnosis, planning, project formulation and the use of alternative technologies for hillside farming and environmental preservation. In addition, farmers have increased their awareness of the importance of the watershed in the country and the impacts of their activities on areas beyond the Rio Cobre area. Although various national agencies do promote such awareness, the synergy from the institutional collaboration in this model has been more effective.

3.3 Economic Impact

Although one objective of the WS model is to contribute to improved livelihood and economic life of the beneficiaries, it is too early to determine the economic impact of its implementation. The major achievements of the model include protection of hillsides through use of appropriate technology – tree crops, contouring, pineapple barriers and the introduction of the GAPS model. However, little information has been generated on the impact of these activities on income and economic life of the beneficiaries.

Nevertheless, the positive response of the beneficiaries to the introduction of the GAPS does indicate that farmers perceive there are positive economic and financial benefits to be derived. So far, 16 GAPS were developed with other farmers indicating an interest to adopt the technology, not only in the Rio Cobre area but also in other parts of Jamaica (the technology has already been adopted elsewhere in the country). The likely, positive economic impacts of the GAPS model are reflected in the following:

(i) Goat production is expanding and farmers indicated their interests to acquire additional land or to make more use of their current land space. The model facilitates farmers to help themselves, make their economic activities more sustainable and reduce their need and dependence on "handouts" as was done in previous projects. It's demand driven.

(ii) The model has increased farmers' expectations on the potential financial returns to goat production by providing a solution to the problem of stealing and killing of goats by dogs and augmenting their surplus of goats for sale in the community and elsewhere. In

addition, goats are an easily cashable asset for farmers, compared to other livestock and farm assets.

(iii) Farmers perceive goat production as a more profitable activity compared to other livestock activities.

(iv) The technology is not financially burdensome. It's cost effective, sustainable and goats are no longer a menace to neighbors.

(v) The technology is attracting younger persons and women into goat production.

(vi) The WS model is viewed as making a contribution to livestock development in the community.

Farmers indicated that before the WS project, not enough was done to provide technical support to farm activities - crop or livestock. Funding was lacking to continue the activities started under the previous HAP project and to expand RADA's technical assistance. Training was also lacking to increase farm productivity. With the model, there has been increased technical assistance and support for production activities.

The model has tried to develop various micro projects to increase income generation of the beneficiaries. These include two micro projects – one on sewing and embroidery for women and the second on vermicomposting of goat waste. Only the latter has been developed to date (see below). The Rio Cobre Goat and Vermicomposting Project was funded by EFJ this year. One of the most important components of this project is the establishment of a wermi-composting processing plant that will utilize goat, agroindustry and farm waste to make organic fertilizer that the RCGBA can then sell to farms and garden stores. This project is very important for the farmers since it serves to boost future development of goat farming and organic fertilizer production.

3.4 Environmental Impact

The WS model is designed to make a significant contribution to environmental preservation and conservation through training, the adoption of more effective production technology and environmentally friendly practices and the use of animal waste and by-products for fertilizer and feed. The model's activities included field demonstrations and training for soil conservation, multi-cropping systems and provided training for a more orderly and systematic manner for conservation of the natural resource base. However, the lack of information and the short period since the model was implemented limit an evaluation of its environmental impacts. Nevertheless, some activities provide protection and contribute environmental benefits to the watershed area. These include the following:

(i) The adoption and promotion of conservation-oriented production systems - tree crop planting, contouring and pineapple barriers contribute to erosion reduction, enhance soil fertility and reduce degradation of the hillsides. Unfortunately, the adoption of these practices has not been widespread enough to indicate substantial positive impacts on the environment.

(ii) Sensitization and training of farmers in environmentally friendly production systems has increased awareness among the farming community on the need to conserve the

environment and develop greater consciousness of the importance of preserving the watershed because of its importance to the wider community. This will have positive impacts only in the longer term and only if there is a change in farmers' attitude and continued adoption of environmentally-friendly production systems as well as continued institutional support to the communities.

(iii) The GAPS model makes positive contributions to the preservation and enhancement of the environment in several ways.

- Maximization of the economic returns from hillside agriculture while contributing to environmental enhancement. The model is regarded as promoting environmentally friendly technologies while contributing to value added economic activities.

- While the technology contributes to increased goat production, it facilitates improved management and control of the movement of animals, thereby reducing the free ranging goats that contribute to degradation of the environment.

- The development of fodder banks for feed production contributes to improved pasture cultivation on the slopes of the hillside.

- The vermicompost technology recycles animal waste and other by-products into organic fertilizer, which is used for crop production. Given that fertilizer is a constraint (due to its cost), the vermiculture compost is a cheaper cost alternative for farmers that is also environmentally friendly. This type of fertilizer improves the structure of the soil and its capacity to hold water. Organic matter provides benefits to tropical soils through the improvement of nutrient storage capacity and its slow release to plants. The limited use of the goat manure on vegetables have so far produced good results and makes farmer rely less on imported inputs.

- While the model attracts more farmers in goat production, it is a useful instrument for training and increasing awareness of both farmers and students on the environment and watershed conservation.

CHAPTER IV
COSTS AND FINANCING

The main co-financiers of the model's implementation in Jamaica were the IICA office in Jamaica (JCA) and the IICA-GTZ project from Headquarters. Other contributors included the Ministry of Agriculture (MINAG), the Rural Agricultural Development Authority (RADA), the Environmental Foundation of Jamaica (EFJ), the Coffee Industry Board (CIB) and the Peace Corps. **Tables 1 and 2** provide a summary of the expenditure on and institutional contribution to the WS model.

Between April 1997 and August 2000, the total amount expended by the model was approximately $308,583 (**Table 1**). Of this sum, IICA contributed 43%, GTZ 32%, the EFJ 18% and the Peace Corps 2%. The financial contributions of RADA, the MINAG and the CIB amounted to less than 1% each.

The total sum expended does not accurately reflect the total contribution to the model. There were substantial in-kind contributions by the major stakeholder institutions through the provision of technical assistance, training, meetings, etc., which are not fully accounted for in the tables. In the last two years, the Peace Corps' contribution has been through the attachment of a Peace Corps volunteer to the project.

The contributions (both direct and indirect) of the various institutions provide some important lessons from the experiences derived this activity as well as for future projects. These lessons are useful for policy makers, as well as stakeholders and other beneficiaries.

(i) Their collaborative efforts reflect a high level of commitment to work together to address problems of the watershed. IICA has made a major contribution in this regard, particularly in providing effective leadership in bringing the institutions together, developing a common strategy and mobilizing the limited financial and human resources available.

(ii) The sharing of resources and responsibilities among the collaborating institutions and beneficiaries strengthens the view that a multi-institutional approach is required to address the problems of watershed management and rural development in Jamaica.

(iii) Resource mobilization from local sources (both from institutions and beneficiaries) is critical to the success of such projects. This is largely so because it reduces dependency on external support and indicates the extent of the commitment and "ownership" of the project by local institutions and beneficiary groups.

(iv) IICA and GTZ provided seed funding and facilitated the initiation and execution of the model which has been in operation in the last three years. Its longer-term impacts can only be realized by continued financial and technical support and leadership from local institutions.

TABLE 1
JAMAICA: IICA/GTZ WINDOWS OF SUSTAINABILITY PROJECT EXPENDITURE REPORT, SUMMARY EXPENDITURE REPORT
April 1997 - August 2000 (US$)

INSTITUTIONS	1997	1998	1999	2000	TOTAL
Inter-American Institute for Cooperation on Agriculture (IICA)	42.889,00	70.796,55	16.500,00	16.000,00	**146.185,55**
GTZ	26.057,78	24.781,43	26.336,94	20.126,10	**97.302,25**
Ministry of Agriculture (MINAG)	100,00	150,00	150,00	450,00	**850,00**
Rural Agricultural Development Authority (RADA)	540,00	540,00	540,00	540,00	**2.160,00**
Coffee Industry Board (CIB)	-	-	-	1.159,00	**1.159,00**
Environmental Foundation of Jamaica (EFJ)	-	-	-	54.500,00	**54.500,00**
Peace Corps			2.754,00	3.672,00	**6.426,00**
TOTAL	**69.586,78**	**96.267,98**	**46.280,94**	**96.447,10**	**308.582,80**

TABLE 2
JAMAICA: IICA/GTZ WINDOWS OF SUSTAINABILITY PROJECT EXPENDITURE REPORT, CONTRIBUTION FROM OTHER INSTITUTIONS
April 1997 - August 2000 (US$)

INSTITUTIONS	1997	1998	1999	2000	TOTAL
Ministry of Agriculture (MINAG):					
Preparation of soil conservation barriers using	100,00				100,00
A-Frame to make boundaries					
Conducted workshop on pruning of fruit trees		150,00	150,00		300,00
Presentation on pineapple production					
Conducted training/workshop on record keeping			150,00		150,00
Conducted training with farmers on common diseases in goats and goat herd management			300,00		300,00
Rural Agricultural Development Authority (RADA):					
Conducted workshop on preparation of conservation barriers, using bamboo and Pineapple		150,00			150,00
Other Financial Support:					
(For use of office facilities, Secretarial and Technical Supports)	540,00	540,00	540,00	540,00	2.160,00
Environmental Foundation of Jamaica (EFJ):					
(Financial grant for the implementation of goat and vermi-composting project)				54.500,00	54.500,00
Coffee Industry Board (CIB):				1.159,00	1.159,00
(Provided the coffee pulp for the Vermi-composting unit)					
Peace Corps:					
Support Personnel			2.754,00	3.672,00	
TOTAL	**640,00**	**840,00**	**3.894,00**	**59.871,00**	**65.245,00**

Notes: CARDI, WRA, FD - These institutions helped to develop the work programme for 2000

CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The WS model was implemented in the Rio Cobre watershed area of St. Catherine parish which is considered one of the most important watersheds in the country. The choice for this model was based on policy, institutional, socio-economic and environmental criteria. The decision to execute the model was also made after extensive consultations with the key institutions involved in watershed management, hillside agriculture and rural development, as well as with various farmers' groups located in the watershed.

The general objective was to produce a tangible, practical case of sustainable rural development including hillside agriculture and integrated watershed management. The general WS model seeks to address five major objectives and produce four major results: (a) establish policy guidelines and their implementation; (b) measure the productivity of the production factors – labor, land and capital on a sustainable basis; (c) attain participation of the target group; and (d) prepare an Environmental Management Plan. Within this framework, the model sought to improve farming practices consistent with resource conservation, environmental enhancement and increased farm income, strengthen national institutions and community development organizations and improve coordination among these in the areas of agricultural production and watershed management.

The beneficiaries targeted were national institutions (including NGOs and community organizations) involved in sustainable rural development and natural resource conservation and farmers located in the upper, middle and lower levels of the watershed. The strategy for implementing the model included a multi-institutional, inter-disciplinary approach to approach the problems of hillside degradation, agricultural production, low farm income, community development and sustainable rural development. Training, technical assistance, technology transfer and information dissemination using participatory approaches were the main instruments used for implementing the model.

5.1 Principal Conclusions

5.1.1 Model Concept, Design and Implementation

(1) The model's conceptualization, design and objectives are consistent with Jamaica's priorities in the areas of socio-economic development, watershed management, agricultural production, community development and sustainable rural development.

(2) The institutional context (policies, cooperating institutions, etc.) within which the model was conceived and implemented is considered appropriate. The major stakeholders with whom IICA and GTZ developed and executed the model were the most relevant ones in the country and the project area.

(3) Participation of the target groups, particularly in the identification, planning and execution stages was good. Consensus building and commitment were important and this was a major achievement by the project. The model facilitated new and stronger relationships between the farming groups and contributed to improved local leadership in the farming community.

(4) Although counterpart training was an important aspect of the model, there seems to be little evidence that capacity building of the stakeholder institutions was as strong as expected. In the absence of the IICA-GTZ support, the capacity of national institutions to advance the model is very limited. This is due in large part to the short period in which the model was implemented (see (5) below).

(5) The period during which the model was implemented is too short for it to make a substantial impact on improved watershed management, community development, sustainable rural development and institutional development. Conceptually and operationally, the model provides a longer-term solution to these issues and it will need to be executed over several more years (with adjustments in its strategy) before its impacts can be visualized on the watershed.

(6) With regard to the achievement of the four major results defined by the model, the overall success was not high.[4] Besides various discussions on and assimilation of the country's policies on watershed management and development, the model achieved little on the first result. Very little was done to achieve the second result. However, there was much success on the third while some initiatives were taken on the fourth but this was not completed as planned.

(7) In the last year or so, the model focused primarily on the establishment and expansion of the goat production system (GAPS). Other aspects such as improvement of cropping systems, conservation practices, etc. which were initially included and considered important were given less priority and importance. Three main factors contributed to this situation. First, farmers' reluctance to invest to improve their farming system and in conservation practices. Second, the limited institutional capacity (due to the loss of the initial project leader) contributed to this outcome. Third, the frequent changes of the Office Representative provided little continuity to the overall management and direction of the project.

(8) The model promoted and strengthened inter-agency cooperation among institutions working on watershed management. This contributed to the development of a common understanding of the complexity of the issues, the need for a common approach and mobilization of limited resources to addressing the issues on watershed management. In addition, this cooperation served as a good model for joint actions among the institutions in other watersheds.

(9) The model has generally contributed to capacity building in the areas of planning, project formulation, technology transfer and adaptation, leadership and community organization to both groups of beneficiaries - national institutions and farmers.

(10) IICA is recognized for its role as a catalyst in inter-institutional cooperation and its technical support to watershed and natural resource management. It has been able to effectively link farmers/community level with the institutional and policy levels.

[4] Recall that four major results were identified in this model in Jamaica: (i) establish policy guidelines and their implementation; (ii) measure the productivity of the production factors – labor, land and capital on a sustainable basis; (iii) increase participation of the target group; and (iv) prepare an Environmental Management Plan (EMP).

Furthermore, the Institute has been recognized as an important source of information and as a link to other projects in Latin America.

(11) The sharing of resources and responsibilities among the collaborating institutions and beneficiaries strengthens the view that a multi-institutional approach is required to address the problems of watershed management and rural development in Jamaica. Furthermore, resource mobilization from local sources (both from institutions and beneficiaries) is critical to the success of such projects. This is important in order to reduce the dependency on external support and indicates the extent of the commitment and "ownership" of the project by local institutions and beneficiary groups.

5.1.2 Target Groups

Farmers in the project area formed the Rio Cobre Goat Breeders Association (RCGBA) in November 1999. The major strengths of this are:

(1) The RCGBA brought farmers together in a forum where they can exchange ideas and information, benefit from training, marketing, etc.

(2) It has been an important instrument for improving the environmental awareness among farmers and increased their understanding of economic, environmental and social issues affecting the community.

(3) The role of the RCGBA reflects a major effort in community organization in which farmers have recognized their role in contributing to resolving problems. Their regular meetings allow them to collectively identify their needs, determine priorities, make decisions, delegate tasks and plan activities to be executed in a cooperative manner. Their integral involvement in the activities and the dissemination of information and communication are the key factors to its success so far.

(4) The Association (with support from the project) formulated a micro project for the expanding the GAPS model. It was successful to obtain funding for this from the EFJ. It currently manages a bank account through which the funds of the project are dispersed.

(5) The RCGBA is a major source of information and training within the watershed and in other parts of the country. Furthermore, it is an important medium for accessing support services from the various institutions working in the watershed.

5.1.3 Goat Agroforestry Production System

(1) The GAPS model introduced an appropriate and effective technology for improved goat production in the area and an additional source of income. The production system is easy to manage and animals are easily controlled and protected from dogs. Furthermore, locally available materials are utilized and it facilitates collection and recycling of waste.

(2) On-farm feed production and the vermicompost technology contributes to sustainable livestock farming. The establishment of fodder bank on the farm is a more efficient utilization of land and it contributes to reducing conflicts among farmers by preventing goats roaming for feed. In vermicomposting the earthworms speed up the process of decomposition so that organic fertilizer can be produced easily to be used by farmers. In addition, it has potential to be an additional source of income for farmers.

(3) Besides the system's potential to increase farm income, goat production has advantages over cattle production because they require fewer resources, are easier to manage, can involve women and youths and there is a high demand for the meat.

(4) Given the the degradation of watersheds in Jamaica, this production system is environmentally friendly and contributes to sustainable livestock farming.

(5) The economic, environmental and other benefits of the GAPS model has attracted women and younger people to goat production.

(6) The model is a valuable tool as a hands-on learning experience of sustainable farming for schools in the community.

5.2 Recommendations

(1) Data collection on all aspects of the experiences of the model needs be considerably improved. Monitoring and evaluation should be a continuous activity because the model is a learning experience, which requires continuous adjustment. This is a weak area and should be addressed as a high priority if the model's impacts are to be evaluated and the experience replicated elsewhere.

(2) There is need to look at the strong areas of the model (inter-agency collaboration, farmers organization, the GAPS model, vermicompost technology, etc.) and consolidate future activities on these. However, the model will not be considered a WS model unless there is additional focus on natural resource and environmental management aspects.

(3) The model is appropriate to addressing issues related to longer-term sustainable development. Therefore, alternative options should be pursued to secure the necessary resources to consolidate some activities and expand those which are integral to the WS concept.

(4) The strengthening of local organizational capability is critical to the model's success. So far, the model has not been successful to develop the capability of local institutions to continue executing it without external support. Strategies for the continued development of community organization and farmers groups should be developed by the institutions working in the watershed area. The capacity of these institutions also needs to be strengthened and activities coordinated with new projects linked to watershed management, community organization, biodiversity and income generation.

(5) In general, greater awareness of watershed protection and management is needed. In collaboration with national institutions, the model should develop an effective program for the community. Education, training, information dissemination and communication, organization of farmers and the communities are critical aspects to be addressed.

(6) More funding for watershed management and incentives to farmers to adopt conservation measures are required. More work is also needed in riverbank control and erosion control. Farmers are still not well trained in erosion control measures because they do not see the short term benefits.

(7) The IICA-GTZ funding ended in October 2000 and additional funding is needed. Continuous training and technical support is needed to improve the farmers' capability. Funding for another phase of the model should be secured so as to strengthen the organizational, managerial and economic activities of the RCGBA.

(8) The mobilization of local resources (both human and financial) and greater commitment by local institutions and groups are critical to the longer term success of such activities. There is much potential for mobilizing resources locally to develop a common strategy on watershed management. The sustainability of such projects can only be realized by greater local "ownership" and continued financial and technical support and leadership from local institutions.

(9) There is increasing pressure on the watersheds from economic activities. In this regard, more needs to be done on solid waste disposal, recycling of plastic containers, public education, better use of pesticides and more protection of the upper and middle watershed areas.

(10) While another watershed could benefit from this experience, the capacity of national institutions to continue executing the model and replicate it should be strengthened. Presently, IICA's continued support is critical for consolidating the activities initiated by the model.

(11) Women's groups are unorganized and there is need for training in specific skills. In general, more community groups need to be organized, strengthened and the leadership base expanded as a high priority in the farming community.

(12) The GAPS model should seek to commercialize some its activities that include commercial goat house construction, earthworm production, grass production, fertilizer production, meat processing and goat milk and cheese production. In this regard, a more business approach is needed for the future that can contribute to a stronger organizational framework and the development of processing and marketing activities. Technical assistance and funding will be required and additional training will be needed for farmers. In these areas, increased support from local institutions are critical.

(13) The RCGBA is expanding rapidly and funding and support will be needed for the commercialization of its activities. However, efforts in the short term should focus on making the present GAPS more viable and sustainable. Acquisition of a vehicle to address the transport constraint is critical in the short run. For the longer term, it is important that the Association develop a strategic plan to address issues related to continued technical assistance, training, management, leadership, funding and marketing.

(14) More analysis needs to be done on the cost of the production of the GAPS model. While farmers see it as having the potential to increase their income, there is little information on the financial and economic returns of this model.

(15) The perception is there is a large market for goats in Jamaica. While this is so, strategies will need to be developed to market live goats and meat after the local market in the community is saturated.

(16) The rapid expansion of the RCGBA and the demand for GAPS technology both within and outside the watershed area are likely to increase beyond the resources and the capacity of the Association. It has grown from 7 to 30 members in 10 months. If this trend continues it could become too large and alternative strategies will be needed to deal with management and organizational issues. The RCGBA may split into smaller groups of about 20 farmers to become more efficient. It should also forge linkages with other associations and institutions to work on activities share information and develop business opportunities.

(17) The rapid adoption of the GAPS model is likely to increase the demand for land for fodder bank as well as for veterinary services. With limited land resources and few support services, longer term strategic planning will be required.

ANNEXES

ANNEX 1
TERMS OF REFERENCE TO EVALUATE WINDOWS OF SUSTAINABILITY

I. WINDOWS OF SUSTAINABILITY CONTEXT

One of the priority challenges facing the agricultural sector in Latin America and the Caribbean (LAC) is the need to achieve and maintain levels of productivity and production that are in keeping with the sustainable use of natural resources. On one hand, the agricultural sector is faced with a decline in the production and productivity of several economically important crops and, on the other, problems caused by unemployment, an increase in rural/urban migration, low levels of investment, economic, social and environmental risks, the lack of coordination among institutions and policies, and the constant expansion of marginal areas.

Since 1990, the Inter-American Institute for Cooperation on Agriculture (IICA), through the IICA/GTZ Project on Agriculture, Natural Resources and Sustainable Development, an interagency cooperation effort that is being executed jointly with the German Cooperation for Development (GTZ), has been producing concepts and instruments for sustainable development, internalization of the concept and support of sustainable development in rural areas. From its third stage (1995-1997) and its following up in the fourth (1998-2000) the concept of Windows of Sustainability was developed.

Windows of Sustainability are practical models, which finality is to demonstrate and to develop *in situ* the concepts and methods of sustainable development, in its economic, social, ecological and political dimensions. With the obtained experience from these models in the fourth phase of this project (1998-2000) it puts in first place the dissemination of experiences of Windows of Sustainability in some countries of Latin America and the Caribbean.

II WINDOWS OF SUSTAINABLE OBJECTIVES

The objectives of the Windows of Sustainability is to contribute in raising incomes and improving life conditions of different actors in rural areas by providing better opportunities for commercial, medium-sized and small farming enterprises to benefit from a development model. Participation is the aim, so the actors manage the process and participate in the diagnostic initial stages, in the implementation, and continue the process of local integral development.

2.1 Result 1: Participation of the target population involved in each locality, who are considered to be the pivotal actors in sustainable development[1]

The aim is to involve different actors, under gender perspective, in different activities carried out in a WS. The intention is to go through the vertical scheme of development. The vision of getting power, it is necessary that the actors take part of the whole process: in the diagnostic of

[1] Formulation of this results varies accordingly with the window.

the situation, in the beginning of the process, in the identification, in the planning and execution of projects.

For getting participation of local population, the collaborators of technical cooperation in as well as organizations and institutions must become in promoters of development, in collaborators who share experiences and support local decisions instead of extracting information and deciding by themselves. It supports identification, mediation and conflicts negotiation within and between the groups.

This process leads to the formulation of social indicators, which show the distribution of additional income and improvements in social parameters such as: health, education, culture, organization through time.

2.2 Result 2: Better understanding of policies and their effects on sustainable development

The challenge is to integrate efforts of organizations and institutions to work for sustainable development.

Policy analysis requires to think on past actions at three levels: groups and local organizations, institutions, and sectorial management (Ministries) It is also important to consider opinions, points of view and initiatives of people who is not beneficiary of those policies. It is needed to compile, analyze and summarize information about policies, norms and decrees that affect positive or negatively sustainable development of the region selected (WS).

In this framework, is collected information on policies (agriculture, livestock, forestry, natural resources, use and land tenure, commerce and others) affecting the communities, the analysis, classification and summary of this information, discussion with local producers, institutions, interest groups, determination of advantages and disadvantages of the influence of policies on decisions and its economic, social and environmental influences. With this, it is achieved specific recommendations and to put into practice policies that contribute to sustainable development.

2.3 Result 3: Analysis of the productivity of production factors (labor, land and capital)

The aim is to identify and analyze the production system, productivity parameters (labor, land and capital), costs, benefits and externalities. Besides, alternatives of production with sustainability criteria are proposed and developed.

Different actors, in each group and organization, progress in developing agricultural and forest appropriate alternatives, supported by specialists. It is included in this discussion, the information and vision for sustainable agricultural techniques.

Groups of farmers, men and women, evaluate financial cost, products marketing, organization issues, food and other natural products processing levels. The points of view from actors without access to land, are also considered concerning employment opportunities in non-agricultural activities (handcrafts, ecotourism, etc.)

Data on production systems of the area and its results are obtained and consulted, from primary and secondary sources. Design and establishment of plots are needed to complete key information for decisions. Analysis of productivity parameters (physical, economical, social and environmental) of the plots are also necessary. Identification, quantification and appraisal of externalities must be considered. Establishment and systematic following up of the indicators of productivity, economic and social efficiency must be considered. Based on this analysis, conclusions and final recommendations are drawn up to support a broader dissemination of results among actors.

Meanwhile, information on costs, benefits and externalities is analyzed to support the establishment of sustainability economic indicators.

2.4 Result 4: Development of an Environmental Management Plan

The objective is to identify and analyze the environmental effects, impacts and "externalities" generated by productive activities, using environmental impact assessment (EIA) modules to draw up an environmental action plan in the WS for the sustainable management of soils, water and other natural resources.

Based on the above results people get more conscious about environmental issues. This contributes to manage soil, water, and other natural resources, with sustainability criteria. Special emphasis is placed on efforts to fight soil erosion and pollution caused by agrochemicals, this effort is aimed also to make the current and potential use of the soil compatible. The interrelationships between sectors and space (e.g. competition for the use of water for human consumption, irrigation, industry, etc.), and the approach adopted at the community and regional levels are analyzed.

To prepare an environmental management plan it requires collecting data from primary and secondary sources. In this plan environmental indicators of sustainability are set.

III DESCRIPTION OF WINDOWS OF SUSTAINABILITY IN EXECUTION

3.1 Window of Sustainability of Puriscal, Costa Rica

In Costa Rica, in the Puriscal subregion, a window of sustainability has been developed. The purpose of this window is to solve the environmental problems of the sub-watershed caused by the negative impacts of policies: deforestation, erosion, soil compaction, etc. The IICA/GTZ Project, the Ecotropica Foundation and other local organizations are promoting and developing, among other things, agroforestry systems suited to the area, organic coffee-growing and soil conservation practices, confined cattle, the strategic planning of farms and the conducting of participatory rural diagnostics and environmental education activities.

3.2 Window of Sustainability of Watershed of Rio Reventado, Costa Rica

In the watershed of Rio Reventado in Cartago, Costa Rica was established another window of sustainability. There the principal problems concern with the incompatibility between potential and actual land use; the soil erosion and its compaction due to mechanical practices; the use of vegetables containing large amounts of pesticides, and without appropriate measures to protect the people that use them; the weaknesses in the organization of producers and in other social,

economic and environmental areas. The solutions proposed through the model developed for this window revolve around the development and dissemination of alternatives for production that are compatible with the environment (such as organic agriculture, solarización[2], the use of the subsoil plow, environmental education for young producers, and the strengthening of organizations of producers and others). The actor themselves (producers, organizations and institutions) participate in the entire process.

3.3 Window of Sustainability of Rio Cobre, Jamaica

In Jamaica, in the watershed of Rio Cobre, the window was established to address problems resulting from the effects of the globalization of markets. In this watershed, the agroforestry systems and local technologies that have traditionally been used minimize erosion and other environmental problems. However, the opening up of new markets and the growth of commercial crops (coffee, sugar cane, citrus fruits, etc.) are leading to the more intensive use of land, which affects the use and conservation of natural resources. In this context, the window is designed to strengthen local agroforestry systems, evaluate existing biodiversity, promote alternatives that are compatible with the environment (stabling of small animals, introduction of soil conservation systems, etc.), develop small-scale industries, foster ecological tourism and policy analysis, and promote other options for sustainable agricultural production.

3.4 Window of Sustainability Reserva de la Biosfera El Triunfo, Chiapas, México

In Chiapas, the diversity of ecosystems and biodiversity of the country are threaten by deforestation, over exploitation and tourism without control. Reserva El Triunfo, is one of the priority conservation areas in Mexico, because of its great extension of cloudy forest and diversity of flora and fauna native species, some of them endemic.

The Project "Conservation of biodiversity through the improvement of productive landscapes in El Triunfo Biosphere Reserve", searches for preserving biodiversity within the main center area as well as in the buffer zone of El Triunfo, developing agricultural practices compatible with environment and promoting local conservation of the Reserve. It promotes active participation of local communities and its production organizations in planning, implementation and monitoring of biodiversity conservation. Moreover, a coffee production harmonious with environment and preservation of flora and fauna native species.

[2] An alternative to the use of pesticides. The soil is covered with plastic sheeting and heat from the sun kills pests.

IV OBJECTIVES, METHODOLOGY AND PROCEDURE OF THE EVALUATION

4.1 Evaluation Objectives

1. To analyze and evaluate outcomes of the WS model since its establishment in 1997 up to June 2000, in order to identify major experiences and to make recommendations for the promotion of changes among actors involved in the IICA-GTZ model;
2. To conduct a systematic analysis of the advances of the window of sustainability model in order to identify and analyze its social, economic and environmental impacts and changes within the policy, institutional and political setting;
3. To find out lessons learned and experiences gained after 3 years of development (from 1997 to June 2000) in order to strengthen the WS model towards self sustainability.

4.2 Methodology

- Use a consultative methodology, documents examination, analysis, discussion with different actors involved, such as counterpart personnel and the persons in charge of the WS.
- Use analysis instruments as matrix that integrate:
- Verify the matrices through visits, interviews with actors and participative workshops.

4.3 Input - Output Matrix

Each one of the four expected results of the WS has an Input-Output Matrix, including initial situation, planned indicators for each year, inputs, products or outputs achieved, related observations, and the corresponding qualification progress.

Initial situation:	Describes the situation found before the establishment of the WS. This basic information can be found in previous studies, surveys statements of authorities or scientist, etc.
Planned Indicators:	Indicators for each one of the four expected results for each year, as planned and agreed between the executors of the project, the counterparts and the target groups involved.
Inputs:	All the activities carried out yearly to attain the Products or Results (planned and unexpected), in relation to the technical and financial contributions from counterparts, cooperation partners and IICA-GTZ Project.
Products/Results:	Quantification of essays, trainees, farmers organizations, small projects accomplished, goat pens constructed, small fodder banks established, etc.
Observation:	It allows a reflection on the change achieved, the constraints in the execution of the model, as well as the strengths and advantages which helped to attain the Products and/or Results.
Qualification:	It allows to analyze to what extent the planned indicators were achieved according the categories described below each matrix (A, B or C)

The IICA-GTZ technical team will prepare a draft matrix for each expected result and send it to the WS responsible in IICA Jamaica-CA for validation and adjustment. The WS responsible should prepare information on the WS implementation progress, limitations, execution problems, or the strengths and advantages, which helped in attaining good results as well. This information will be discussed with the evaluation team for their validation.

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development

Chart 1: Inputs – Outputs Matrix for Result 1 (example)

Initial Situation (1997)	Indicators Planned/year	Used Inputs/year	Products or Results/year	Observations	Qualification*
		Workshops: 3 Planning Self-management 5 Political 4 Management 8 Training	300 farmers, men, women, and young people trained		

*A= agree with the programmed; B= Delay (in months); C= Execution impossibility

Result 2: Better comprehension of policies and their influences on sustainable development

Chart 2: Inputs – Outputs Matrix for Result 2

Initial Situation (1997)	Indicators Planned/year	Used Inputs/year	Products or Results/year	Observations	Qualification*

*A= agree with the programmed; B= Delay (in months); C= Execution impossibility

Result 3: Analysis of productivity of production factors (labor, land and capital)

Chart 3: Inputs – Output Matrix for Result 3

Initial Situation (1997)	Indicators Planned/year	Used Inputs/year	Products or Results/year	Observations	Qualification*

*A= agree with the programmed; B= Delay (in months); C= Execution impossibility

Result 4: To develop an environmental management plan

Chart 4: Inputs – Output Matrix for Result 4

Initial Situation (1997)	Indicators Planned/year	Used Inputs/year	Products or Results/year	Observations	Qualification*

* A= agree with the programmed; B= Delay (in months); C= Execution impossibility

4.4 Project Effect/Impact Matrix

A second matrix analyzes Effects and/or Impacts of the Window for each one of the four expected results.

This Effect/Impact Matrix will allow to determine in what extent the WS model contributes or is in the way of attaining the Window of Sustainability main objective:

> *To contribute in the income increasing and life conditions improvement of different actors of rural areas, promoting better opportunities for commercial, medium-sized and small enterprises and the communities participate in and benefit from a development model that considers the social, economic, environmental and political components.*

Based on the outputs identified in the Input-Output Matrix, the evaluation team should identify and evaluate the major effects and/or impacts attained by the WS from 1997 up to June 2000, and therefore determine the current situation. These effects and/or impacts would include not only the Rio Cobre watershed area but also other areas, communities, local organizations, and institutions, which benefit from the WS model products.

Effects: results obtained by using the products of the model in the short and mid terms of the model execution. For example: how many farmers trained in the establishment of goat pens, applied such techniques within their farms and/or exchanged experiences with neighbors.

Impacts: it refers to the changes in the living conditions and the environment of the farmers and their families as a partial or total result of the model in the long run. That is the changes provoked not only for the WS model but also considering the combined effects from other initiatives carried out in the area.

Current Situation: consist in determining which is the current situation after the model implementation.

Result 1: Participation of the target population involved in each locality, as pivotal actor in sustainable development[3]

Chart 5: Projects Impact Matrix for Result 1(example)

Effects	Impacts	Current Situation (Up to June 2000)

[3] It presents an example for ilustrating how the matrix can be fullfill.

Result 2: Better comprehension of policies and their influences on sustainable development *Chart 6: Projects Impact Matrix for Result 2*		
Effects	Impacts	Current Situation (Up to June 2000)

Result 3: Analysis of productivity of production factors (labor, land and capital) Chart 7: Projects Impacts Matrix for Result 3		
Effects	Impacts	Current Situation (Up to June 2000)

Result 4: Development of an Environmental Management Plan *Chart 8: Project Impacts Matrix for Result 4*		
Effects	Impacts	Current Situation (Up to June 2000)

4.6 Execution of the evaluation of Windows of Sustainability (WS)

For the WS evaluation in Rio Cobre, Jamaica, local work teams should be compromised for the reviewing, preparation and execution of the following steps:

- Analyze operational annual plans following the execution of WS from its beginning up to now (June 2000).

- Review and adjust the draft matrixes prepared by IICA-GTZ Project of the four results with additional or adjusted information.

The evaluation team should be comprised by a representative of the Ministry, a representative of the corresponding country IICA Cooperation Agency, and two experts with experience in monitoring and evaluation of projects. The team will act as a facilitator in the evaluation process, as well as in the identification, inclusion and analysis of the corresponding impact indicators (resulting from the effects at mid- and long term impact) and elaborate the recommendations needed in the process of implementation of WS.

The evaluation of the Rio Cobre-WS, Jamaica, will be held from August 28th to September 2nd, 2000.

V. EVALUATION TEAM TERMS OF REFERENCE

Terms of reference of the WS evaluation mission are as follows:

- The evaluation team will prepare a work plan to include:

  - Briefing and debriefing.
  - Interviews with cooperation partner of local and national organizations.
  - Two field days, and interviews with key stakeholders and organized-based groups involved with the WS.
  - Analysis of key documents and reports (advances, ongoing activities, and results).
  - Analysis of financial reports, comprising expenses and the different contributions, direct and indirect, from local, national organizations and cooperation partners (IICA-GTZ, IICA, partners: EFJ, NRCA, FSCD, CARDI, WRA, CIB, RADA, Peace Corps and others).

  This must be consented at the beginning of the evaluation process with representatives and partners responsible for the WS, and IICA-GTZ, in order to give flexibility to the members of the evaluation team for accomplishing the terms agreed.

- The evaluation process must assure participation of the different partners, key stakeholders and other actors involved in the WS.

- The evaluation team will be responsible for preparing:

  1. An Aide Memoir comprising the analysis and results, agreed and signed by technicians in charge of the WS execution; and

  2. A Summary of Results and Recommendations for the Rio Cobre-WS, which should try to answer the following issues:

     a) In what extent has the methodology to develop the WS model been appropriate and which are its strengths, limitations and learned lessons?

     b) Which are the available alternatives, in the WS internal organization, for achieving more participation and self- management? How can the dependence of external support organisms be reduced?

     c) Which is the development dynamic between programs and local institutions?

     d) Which external opportunities can be identified for strengthening the development process at mid and long terms?

     e) Which are the major changes achieved by the model after three years of implementation? In other words, which are the major effects and impacts of the WS model up to now?

- At the end of the evaluation process, on September 1st, the evaluation team will present to the cooperation partners and actors involved in IICA AC offices in Jamaica, a summary of results.

VI. EVALUATION MISSION PRODUCTS

- An Evaluation Report containing a summary of the evaluation results, comprising:
  - Input-output (as detailed on the matrix)
  - Effects and impacts (as detailed on the matrix)
  - Detailed results of economic, social, environmental and political components executed from 1997-June, 2000.
  - Recommendations

  This report should be ready by the last week of September, 2000.

- The evaluation team will be responsible for preparing this report, which will include the matrix with its corresponding indicators.

ANNEX 2
SCHEDULE OF THE EVALUATION MISSION OF THE RIO COBRE WINDOW OF SUSTAINABILITY PROJECT
September 4 - 9, 2000

Monday, September 4, 2000

9:00 - 9:25	Welcome and Introductory Remarks on the WS Project in Rio Cobre Overview of the Mission	 Chelston Brathwaite Martin Carnap, GTZ
9:30 - 10:00	Overview of WS Activities in Rio Cobre	Zithroy Annikie
10:00 -11:00	Mission Briefing and Discussion Objectives, Terms of Reference, Schedule of Activities, Responsibilities, Review of Information, Report Preparation, etc.	Dowlat Budhram Martin Carnap Members of Evaluation Team
11:00 -12:15	Team Discussion with main institutions (RADA, EFJ, CIB NRCA, Forestry Department, WRA US Peace Corps, CARDI)	Team
12:30 - 1:30	LUNCH	
1:30 - 2:30	Discussion and interviews with main institutions continue	Team
2:30 - 4:30	Preparation of Financial Report Review	Team

Tuesday, September 5, 2000: Field Trip

8:15	Depart Kingston for RADA, Lindstead	
10:00 – 1.00	Field visit to WS site Interviews with farmers	Team
1:00 - 2:00	LUNCH	
2:00 - 4:30	Field visit to WS site and interviews	Team
4:30 - 5:00	Review by Team	

Wednesday, September 6, 2000: Field Visit

9:00 - 1:00	Participate in Rio Cobre Goat Breeders Assoc. Quarterly meeting Interviews with with farmers and key stakeholders	
1:00 - 2:00	LUNCH	
2:00 - 4:30	Interviews with stakeholders	Team
4:30 - 5:00	Review by Team	

Thursday, September 7,2000

9:00 -12:00	Interviews Preparation of financial report	
12:00 –1.00	LUNCH	
2:00 – 5.00	Team discussion and review of information	

Friday, September 8, 2000

8:30 – 12.30	Review of information Discussion of draft report	Team
12.30 – 1.30	LUNCH	
1.30 – 5.30	Review of information Discussion of draft report Debriefing	Team

Saturday, September 9, 2000

9.00 – 2.30	Review of information Discussion of report	Team

ANNEX 3
INTERVIEWS AND CONTACTS

Farmers:

- P. Bolt, Riversdale
- Loretta Johnson, Ewarton
- Logan, Redwood
- Harold Mitchell, Byndloss District
- Byron Nugent, Hanover District
- B. Reid, Redwood
- Alex Small, Russell Pen
- Marlyn Samuels, Riversdale
- Errol Young, Williamsfield

Institutional Contacts:

- Chelston Brathwaite, IICA Representative in Jamaica
- Franklin Brown, President of the Rio Cobre GBA
- Louis Campbell, Soil Conservation & Research Officer, Coffee Industry Board
- Derrick Gayle, Project Officer, Environmental Foundation of Jamaica
- Debbie Jackson, Vice-President of the Rio Cobre GBA
- Lenmore Jones, Senior Director, Watershed Protection & Management, NRCA
- Lennox Hemans, Extension Officer for Riversdale District, RADA, St Catherine
- Lisa Latchman, Environmental Protection Officer, NRCA
- Raymond Martin, Research Assistant, Watershed Management Project, CARDI
- Joseph Pennant, Assistant Hydrologist, WRA
- Robert Scott, Sligoville Small Farmers Association
- Randolph White, Parish Manager, RADA, St. Catherine
- Collin Woodham, Parish Development Officer for 4H Clubs, St. Catherine
- Rio Cobre Goat Breeders Association Meeting (RADA Office, September 06, 2000)

ANNEX 4
INPUT-OUTPUT MATRIX FOR THE WINDOW OF SUSTAINABILITY (WS) MODEL'S RESULTS

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1997**

Chart 1: Inputs-Outputs Matrix for Result 1

Initial Situation (before 1997)	Activities and Indicators Planned / year (1997)	Used Inputs / year (1997)	Products or results / year (1997)	Observations
• A holistic view of natural resource management within the context of agricultural production and marketing systems was non existent • A systematic approach to define sustainable cropping systems was not used [4]				
• Team work among farmers non existent	• To identify and analyze target group		• Identification of interested groups • Analysis of most of the target group (farmers, NGOs, Institutions) • Several districts (villages) within the Rio Cobre Watershed were covered in terms of project proposal formulation by training the representatives of the groups [5] • The target group of stakeholders and some interagencies in the local area participated with keen interested	• 80% of the task done at November 1997

[4] It refers to sustainable cropping systems that include tree crops and allow a more integral analysis of economic and social variables within a given organizational and institutional setting.

[5] These districts are: Riverdale, Troja, Crawle, Top Mountain, Facey, Redwood, Jubilee Town, Hampshire and Kendal.

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1997** **Chart 1: Inputs-Outputs Matrix for Result 1**				
Initial Situation (before 1997)	**Activities and Indicators Planned / year (1997)**	**Used Inputs / year (1997)**	**Products or results / year (1997)**	**Observations**
	• Increased involvement of men and women as central actors in sustainable development	• Support by local level institutions to these activities (RADA, JAS and FD)	• Formation of new interested groups (most of them were earlier FACT groups of IICA-USAID-MINAG project)	
• Low level of female participation			• 4 meetings with the IICA/GTZ/RADA team to form women's group and analyze local problems: - *Troja/Meeting:* 12 men and 30 women participated - *Top Mountain/Meeting:* 17 women participated - *Riverside/Meeting:* 15 women - *Facey/Meeting:* 44 women • 188 persons (106 women and 82 men) attended to the meetings and got acquainted of the new projections of the area • 21 representatives went to the meetings and workshops • 4 women's group with the total of 16 female leaders • 2 meetings with the IICA/GTZ/RADA for the preparation of themes to be lectured to the Rio Cobre Watershed farmers: - 5 participants from (RADA, IICA and IICA/CASS) - Preparation of a workshop	

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 1997 Chart 1: Inputs-Outputs Matrix for Result 1				
Initial Situation (before 1997)	**Activities and Indicators Planned / year (1997)**	**Used Inputs / year (1997)**	**Products or results / year (1997)**	**Observations**
	• Training program for farmers to plan activities and generate micro projects, which are socially, economically and environmentally viable.		• 3 Workshops to train farmers on project preparation (on Riverside, Linstead and Troja). Formulation of four major areas for projects: 1) Agroecotourism 2) Waste and Water Management 3) Goat/ Chicken production 4) Sewing machines	• Transportation of farmer groups is difficult, especially to conduct the training and work sessions in the watershed areas or at Linstead where RADA office is located.
			- Participation in Riverside: representatives group, 13 women and 4 men, people from RADA, JAS, IICA and IICA/CASS - Participation in Linstead: participated 11 women and 5 men, people from RADA, JAS, IICA, IICA/GTZ and IICA/CASS - Participation in Troja: 17 women and 4 men, people from IICA, IICA/GTZ and IICA/CASS	• There have been 3 changes in the administration of the TCA in Jamaica. This means different authorities involved in negotiation, planning and implementation in the first year of the project, because this brought difficulties on the communication, understanding and the vision of the new concept of WS.
		• IICA-CASS Volunteer	• Preparation of supporting micro-projects on protected areas, reforestation and organic agriculture[6]	
		• An Agricultural Economist assisted by RADA and IICA-GTZ technicians	• Training sessions conducted to prepare micro projects based on real project ideas,	

[6] These micro-projects were presented to the stakeholders , RADA and Forestry specialists.

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1997** **Chart 1: Inputs-Outputs Matrix for Result 1**				
Initial Situation (before 1997)	**Activities and Indicators Planned / year (1997)**	**Used Inputs / year (1997)**	**Products or results / year (1997)**	**Observations**
			• The response to training and bringing about awareness of their own potential, especially in the area of agro-ecological aspects, were well received.	
		• Assistance from an IICA consultant from Costa Rica (Evelyn Silva)	• Workshop on Gender Issue	
			Institutional Strengthening	
• Weak institutions in the area of sustainable agriculture and natural resource development	• To make people and institutions aware of the importance of natural resources management and sustainable development	• RADA, NRCA, FD, EFJ and other institutions coordinated some activities in Rio Cobre	• 2 inter-agency bimonthly meetings where the project was presented	
		• IICA/GTZ team went to Jamaica and participates in these activities	• Secondary information has been collected in those meetings and workshops	
			• Two stakeholders workshops with the participation of the Chief Conservator of the FD	
		• IICA-CASS Volunteer from Guatemala worked six months with RADA and NRCA in technical and social issues	• Formation of Gender Oriented Groups	
			• Seminar Workshop on EIA[7]	
		• IICA-GTZ	• Evaluation of seminar and workshops	

[7] This seminar is also a product of the fourth result.

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1997**

Chart 1: Inputs-Outputs Matrix for Result 1

Initial Situation (before 1997)	Activities and Indicators Planned / year (1997)	Used Inputs / year (1997)	Products or results / year (1997)	Observations
		• To transfer validated experiences • Local Management Committee (LMC) and Farmer Action Committee Team (FACT)	• Preparation of informative pamphlets *Local Organization Strengthening* • Diagnostic and formulation of project proposal • Extension activities organized for the farmers and On Farm Research Adaptive Research Trials • A field day with the participation of 16 members of local groups was carried out in the Chips Factory, run by an organized group in Portland: 16 members of the local groups exchanging efforts and widening their perception about group and community efforts	
			• Farmers trained in the planning of activities and in generating micro-projects, which are socially, economically and environmentally viable (process of preparing micro-projects in four different key areas)	• The lack of availability of the expertise in agriculture and natural resource has reflected in the overall performance of related activities programmed. Contracting an Economist on a short-term basis has helped partially in the preparation of micro-project.
		• Bilateral and Multilateral Institutions (part of Donors and Lenders committee) met with IICA/GTZ evaluation team	• Implementation of the Micro-project strategy	

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1997** **Chart 1: Inputs-Outputs Matrix for Result 1**				
Initial Situation (before 1997)	**Activities and Indicators Planned / year (1997)**	**Used Inputs / year (1997)**	**Products or results / year (1997)**	**Observations**
	• To widen the perception of the farmers about group and community efforts • To promote the eventual financing of Community based projects (IICA-GTZ and EFJ)	• RADA, RNCA, Consultants • CIDA, IICA, UNDP, EU, FAO, GTZ BRD	• Meeting with RADA for the preparation of a join plan action based upon the interests and resources of the involved institutions • Meetings with representatives of organizations and partner institutions. Participation of 11 women and 5 men • Meeting with Cooperation Agencies involved in the environmental management of Jamaica. Participation of 18 women and 4 men • Workshop with local representatives in Río Cobre/Linstead. One project was elaborated (sewing and embroidery). Three profiles more on: Waste Management, Eco-tourism, Goat/Chicken	
			• Workshop with representatives of the women groups and others/ Troja. Gender Oriented Groups were formed as result • Workshop for Environmental Education and Sustainable Development[8]	• 50% of the workshop prepared

[8] Workshop on Environmental Education and Sustainable Development is also a product of the fourth result.

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 1997 Chart 1: Inputs-Outputs Matrix for Result 1				
Initial Situation (before 1997)	**Activities and Indicators Planned / year (1997)**	**Used Inputs / year (1997)**	**Products or results / year (1997)**	**Observations**
			• One week trip of farmers and professionals to Costa Rica for taking a look at the goat management practices for milk and cheese production: 14 participants (5 private farmers of which one was small farmer; 4 professional from private companies and 3 from public institutions, 1 private consultant in livestock and 1 from a commercial bank) observed goat milk and cheese production systems and the functioning of relevant farmers Associations • A farmer built a goat house as part of the training	

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 1998
Chart 1: Inputs-Outputs Matrix for Result 1

Initial Situation (before 1997)	Indicators/ Activities Planned (1998)	Used Inputs / year (1998)	Products or results / year	Observations
	• PRA Workshop (indepth of natural resources) • • Workshop on environmental education and sustainable development (continuation) • • Preparation of environmentally sustainable local projects (continued) • • Workshop on Gender Issue • • Training on Agricultural Natural Resources Development in watershed areas • Seminar/Workshop on EIA			

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1998**

Chart 1: Inputs-Outputs Matrix for Result 1

Initial Situation (before 1997)	Indicators/ Activities Planned (1998)	Used Inputs / year (1998)	Products or results / year	Observations
	• To increase participation by large farmers, the agricultural industry and non agricultural activities in the area	• IICA-GTZ	• Participatory diagnosis in 4 communities of Rio Cobre watershed area • About 30 farmers met and using SWAP methodology, diagnosed the problems that affected them and identified possible solutions. Some problems identified were: High unemployment, Killing of goat by dogs , Shortage of water, Disposal of animal waste, Assistance in farm inputs, Lack of credit information, Animal Sickness	
		• RADA, NRCA, EFJ and NGOs	• Development of micro–projects to benefit women	• Difficulty in procuring credit from the relevant authorities (for doing projects?)
			• Increase participation by stakeholders and agencies in the area. • Training in the preparation of socially, economically and environmentally viable micro-projects. One project prepared on sewing and embroidery *Institutional Strengthening*	

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development **1998** **Chart 1: Inputs-Outputs Matrix for Result 1**				
Initial Situation (before 1997)	**Indicators/ Activities Planned (1998)**	**Used Inputs / year (1998)**	**Products or results / year**	**Observations**
		• IICA-GTZ-RADA	• A one-week workshop on the appraisal of on-going and future activities in the Rio Cobre Watershed: field trips, group discussions and use of SWAP technique.	
• Lack of funding for project activities			• The Hemispheric Mission of IICA-GTZ strengthened the ties with Donor/Lender Watershed groups and provided recommendations for implementing the Watershed project in Jamaica	
		• Assistance from a consultant from the IICA Office in Trinidad y Tobago	• Workshop on Feasibility Study to assist local groups in the preparation of local projects	
		• Participants from CARDI, RADA, USAID, MINAG, IDB, EFJ, OPM, NRCA and IICA	• Course/Workshop on Definition on Indicators of Sustainability for Watershed Integrated Management	
			• Development of a Matrix of Sustainability Indicators to Monitor IWM	

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 1999

Chart 1: Inputs-Outputs Matrix for Result 1

Initial Situation (before 1997)	Indicators Planned / year (1999)	Used Inputs / year (1999)	Products or results / year (1999)	Observations
• Lack of leadership at the local level hinders the effectiveness of local organizations	• Train local groups to develop profiles for micro-projects		• 1 person received initial training on public speaking and lead writing for the press • 2 two days workshops on the preparation of "Matrix of Sustainable Indicators for the Monitoring Watersheds"	• Lack of transportation continues to restrict the movement of individuals to meetings and training
• Most farmers in the area rent or lease the land they work, so there is lack of ownership		• Local Management Committee with the assistance of IICA-GTZ	• Funding obtained for the Rio Cobre Environmental Support Project, an educational project designed to increase awareness about the problems resulting from poor management of the watershed[9].	
		• IICA-GTZ, RADA, JGBA, LMC	• Coordination of efforts to bring the farmers from the area together. It led to the formation of Rio Cobre Goat Breeders Association (RCGBA),[10] for developing goat herd in the area in order to take advantage of the market for goat meat and markets for other value added products such as organic fertilizer and goat dairy products.	
		• Glenroy Ennis was hired by IICA as a consultant for collecting and organizing the information generated from the workshops.	• Matrix of Sustainability Indicators for Monitoring of Watersheds and other activities prepared.	

[9] Mentioned in result 4 as a product

[10] RCGBA has as its goals the improvement of the local goat, to increase income, to increase goat production and to increase knowledge of goat rearing.

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 1999 **Chart 1: Inputs-Outputs Matrix for Result 1**				
Initial Situation (before 1997)	**Indicators Planned / year (1999)**	**Used Inputs / year (1999)**	**Products or results / year (1999)**	**Observations**
	• To build effective local organizations		• Increase participation by stakeholders and institutions through workshops	• Lack of effective leadership at the local level continues to hinder the effectiveness of local organizations
		• Technical support from an economist (IICA) and an agronomist (IICA-GTZ) • Technical Support from Red California Earthworm and Organic matter		
	• To promote entrepreneurship, innovation and employment in the agribussiness sector		• Rewards is given to entrepreneurs through the use local raw materials, developed a new product or technique, expanded existing business or provided a new service which could make a significant contribution to food security, employment generation and/or development of new markets. In Saint Catherine, Ms.Jackson (2° place) was awarded to assist in acquiring technology and information from any country in the Hemisphere to improve the operations and efficiency of her farm.	
		• IICA contracted the services of Mr. Richards to assist Watershed Management Specialist Mr. Zithroy Annikie with the IICA/GTZ Waste Management Project.	• IICA/GTZ Waste Management Project executed	

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 1999 Chart 1: Inputs-Outputs Matrix for Result 1				
Initial Situation (before 1997)	**Indicators Planned / year (1999)**	**Used Inputs / year (1999)**	**Products or results / year (1999)**	**Observations**
		• The United States Peace Corps assigned an assistant to IICA's Watershed Management Specialist on Goat Agroforestry System over a period of two years		
		• Technical Mission Travel to Jamaica (Carlos Reiche, Laura Ramirez and specialist and advisors from IICA and other institutions)	• Evaluation Report 98-99	
		• Linstead Parish	• Mini-Workshop for farmers and technicians • Workshop to prepare an action plan up to 2000	

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 2000 **Chart 1: Inputs-Outputs Matrix for Result 1**				
Initial Situation (before 1997)	**Indicators Planned / year 2000**	**Used Inputs / year 2000**	**Products or results / year 2000**	**Observations**
	• To strengthen Rio Cobre Goat Breeders Association, by advising officers and participating in the meetings			
	• Complete project proposal and seek funding from agencies			
	• Rio Cobre Watershed Matrix Evaluated			
	• One matrix on farm level indicators each month			
	• A training session conducted through the RCGBA concerning farm record keeping	• RADA and RCGBA	• A farm record keeping workshop in Linstead (24 participants)	
	• Compile a final report on WS	• Consultant Zithroy Annikie	• Report of the project Promotion of the Sustainability of Hillside Farming Systems and Watershed Management – Rio Cobre Watershed for the period January 1st to April 30th	
	• Support to the Rio Cobre Goat Breeders Association (RCGBA)		• The RCGBA held 2 regular meetings and 1 emergency meeting related to Vermocomposting Micro-project. Membership and participation increased.	
	• Conduct experiments and research with help of local farmers		• Identified 2 farmers who had agreed to participate in research	
	• To finance the participation of Mr. Franklin Brown, President of LMC, in the Global Dialogue in Hanover Germany (August 2000)			

Result 1: Participation of target population involved in each locality, as pivotal actors in sustainable development 2000 Chart 1: Inputs-Outputs Matrix for Result 1				
Initial Situation (before 1997)	**Indicators Planned / year 2000**	**Used Inputs / year 2000**	**Products or results / year 2000**	**Observations**
	• To execute an Impact Evaluation of WS (July 28th -September 2nd) with a team of evaluators from IICA, IICA-GTZ and Ministry of Agriculture)			

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development **1997**
Chart 2: Inputs-Outputs Matrix for Result 2

Initial Situation (before 1997)	Activities and Indicators Planned / year 1997	Used Inputs / year 1997	Product or Results/ year 1997	Observations
• In 1995, the government finalized a national plan which identifies as a priority the strengthening of the legal framework • No local enforcement of laws to regulate use of alternative energy (wood, coal, etc) • Lack of well-defined and practical guidelines to operate various Acts and Regulations of the Government for Watershed Management, hence working mechanisms are sought	• To get the collaboration among public institutions, NGO's and Community Based in order to ensure sustainability of the projects • Seek working mechanisms to operationalize regulations for watershed management			

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development				**1997**
Chart 2: Inputs-Outputs Matrix for Result 2				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Product or Results/ year 1997**	**Observations**
	Institutional Strengthening • To generate Policy Guidelines for the Watershed Management and their implementation		• Revision of documents on policies and guidelines for watershed and management in Jamaica • Visits and interviews with stakeholders Dr. B. Ramakirshna • Analysis of diagnostic results by high level technical team • Two days diagnostic workshop (ZOOP) with stakeholders, community based NGO's key institutions and other interest groups	• The institutional and the local levels are analyzed and needs fine-tuning early next year • In progress; 90% of the activity carried out at November 1997.
		• EFJ provided resources and encouragement in the development of the policy guideline document. • A consultant hired to prepare the document. • High level interagencies, representatives from Ministry of Agriculture and the Deputy Director of the Water Resource Authority	• Policy Guidelines for Watershed Management Document (preliminary version) • Definition of policy guidelines for Rio Cobre watershed area • Validation of policy guidelines	• In progress; not started.

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development **1997** **Chart 2: Inputs-Outputs Matrix for Result 2**				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Product or Results/ year 1997**	**Observations**
		• GTZ Evaluation Team already done.		
	Local Stakeholders Level • To plan based on the ZOPP Matrix		• Preparation of Micro-projects and the EMP	
	• To organize a high level panel discussion and incorporate the results of the discussion in the final document			
	• To select the sites and the trials to be reactivated for further research	• IICA-GTZ	• Design and establishment of trials	
	• To prepare a work plan			
		• Bilateral and Multilateral Institutions that are part of the Donors/Lenders watershed committee in Jamaica met with the IICA/GTZ evaluation team	• Advances in some aspects of policy guidelines • Two days diagnostic workshop (ZOOP technique) with stakeholders, leaders, farmers, community based NGO's, key institutions and other interested groups	

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development Chart 2: Inputs-Outputs Matrix for Result 2			1997	
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Product or Results/ year 1997**	**Observations**
			• Planning based on the ZOPP Matrix (progress in preparation of Micro-projects and Environmental Management Plan) • PRA Workshop	

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development **1998**
Chart 2: Inputs-Outputs Matrix for Result 2

Initial Situation (before 1997)	Activities and Indicators Planned / year 1998	Used inputs / year 1998	Product or Results/ year 1998	Observations
	• Final adjustments to policy guidelines • Discussion and recommendations of highest level panel, key stakeholders and some donor agencies • To incorporate the results of the discussions in the final document • Validation of policy guidelines	• RADA, NRCA, EFJ and NGOs	• Work in the development of micro-projects, especially in the area of policy guidelines developed for Integrated Watershed Management	

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development **1999**
Chart 2: Inputs-Outputs Matrix for Result 2

Initial Situation (before 1997)	Activities and Indicators Planned / year 1999	Used Inputs / year 1999	Product or Results/ year 1999	Observations

Result 2: Better Comprehension of Policies and their Influences on Sustainable Development 2000 Chart 2: Inputs-Outputs Matrix for Result 2				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 2000**	**Used Inputs / year 2000**	**Product or Results/ year 2000**	**Observations**

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 1997 Chart 3: Inputs-Outputs Matrix for Result 3				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
• In 1995, the government finalized a national plan, which identifies as a priority the enforcement capacities			• Revision of documents (land use and cropping)	• Just 20% of the activity completed.
			• Evaluation of the potential of crop biodiversity with particular reference to food forestry and agroforestry measures for income and reduction of soil degradation	• 30% of the activity carried out.
	• Analysis of land use and cropping systems	• HASP-USAID-IICA-MINAG • A consultant was hired to analyze the cropping systems from a market driven stand point but without using land degradation	• Analysis and identification of land use and the cropping systems research	• Partially done
			• Viable cropping system options for the Rio Cobre Watershed identified • Analysis of production parameters (based substantially on the earlier IICA-GTZ findings)	

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 1997

Chart 3: Inputs-Outputs Matrix for Result 3

Initial Situation (before 1997)	Activities and Indicators Planned / year 1997	Used Inputs / year 1997	Products or results / year 1997	Observations
			• Selection of the sites and trials to be reactivated for further research IICA-GTZ • Design of trials and work plan • Establishment of trials (where?)	• An important factor that affected OFAR cropping system trials was the drought happened in 1997[11]. The delay in rains did not permit the planting of short term crops and the planting inputs could not be procured because of the scarcity in the market. However, the trials that were based on earlier trials of HASP project are being under observation.
• Labor cost high • Lack of marketing for agricultural projects, so investment cannot be recovered • Low level of technology			• Collect data from the field trials	• 40% of the information collected
• Weak technology transfer system		• RADA, IICA-GTZ and NRCA	• As a local strategy, training days were carried out in the area of technology transfer in different districts of the area. This encouraged the participation of farmers	• Methods of extension have to be introduced, so that more farmers can have access to the information

[11] The year 1997 has been considered the worst drought year in the past 60-70 years.

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) Chart 3: Inputs-Outputs Matrix for Result 3			1997	
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
			• Caribbean participants interested in the area of Local Empowerment and the environmental aspect (how many people participated?	
• Lack of training to develop skills. As a result the farms are abandoned and there are unemployment and emigration • Production problems are mostly health related because of inappropriate conditions of the goats housing			• Jamaica WS Project participated in the seminar promoted by IICA-GTZ, which took place in St. Lucia, by transferring experiences up to date	

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 1998 Chart 3: Inputs-Outputs Matrix for Result 3				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1998**	**Used Inputs / year 1998**	**Products or results / year 1998**	**Observations**
• Unavailability of inputs • Poor farming and forestry practices	• Revision of document on land use and cropping systems • Diagnosis of cropping systems in upper, middle and lower watershed • Evaluation of the potential of crop biodiversity and Genetical Resources with particular reference to food forestry and agroforestry measures for income and reduced soil degradation • To analyze the cropping systems research HASP-USAID-IICA-MINAG		• A review carried out in April by 8 national institutions and 5 farmers, recommended the areas that require intensified work[12]	

[12] These areas are GAPS, Waste processing, Development of pesticides and Use of velvet beans.

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 1998 **Chart 3: Inputs-Outputs Matrix for Result 3**				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1998**	**Used Inputs / year 1998**	**Products or results / year 1998**	**Observations**
	• To select new sites and trials for further research • Identify, quantify and valuate externalities • To design and establish trials • To develop and transfer new technologies aimed at improving the socio-economic situation and well being of the residents		• Good response to training by small and medium scale farmers, since they realize that there are benefits to be derived from improved technologies.	• The ratio of farmers to the technical personnel from the different organizations resulted in slow dissemination of new technologies
		• IICA-GTZ technicians trained in seminars and workshops	• IICA-GTZ developed a flexible response mechanism, to accommodate requests for technical assistance from groups, organizations and the government • IICA-GTZ personnel participated in inter-agency monthly meetings, which appraised the activities of the different institutions being performed within the watershed area	

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital)				1998
Chart 3: Inputs-Outputs Matrix for Result 3				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1998**	**Used Inputs / year 1998**	**Products or results / year 1998**	**Observations**
• National goat production should be almost tripled in order to meet the consumer demands. The current production is supplemented by imported mutton, but there is preference for local mutton although this is sold at higher price. The premium price and the unsatisfied demand indicate the need for developing an economically viable goat production system, which should also be socially and environmentally acceptable. • The management of goat production is affected by poor housing or enclosure facilities. Breeding and other health care practices are very irregular or non existent in most cases		• RADA, NRCA, EFJ, CIB, FD, WRA worked closely with IICA-GTZ	• Validation and transfer of new improved technologies *Technologies introduced:* - GAPS - Multiple cropping - Technology environmentally friendly • Development of a Goat Agro-forestry Production System • Application of Goat Agro-forestry Production Systems (GAPS)[13] • 10 GAPS in 5 Districts in the area. Local goats are used and plans are instituted to improve the genetic material by cross-bearing with the Anglo Nubian, a dual purpose breed. • Construction of rustic goat houses[14] (9-10 animals), built from local materials such as bamboo and round wood fodder banks (10 Goat Houses and their fodder bank[15]).	• Continuous rainfall in the last quarter of the year reduced field activities and as a result, the estimated time for completion of goat houses was not attained

[13] The GAPS technology consists of at least five fundamental area transfer: the rustic goat pen, animal health practices, goat improvement and the marketing of meat and at later stages the milk and the cheese production.
[14] The role of IICA-GTZ-RADA has been one of training and the goat houses are built with no subsidies from none of the institutions, except providing required nails, for the construction. Farmers have financed their own materials and the cost of lunches borne by them.

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 1998 Chart 3: Inputs-Outputs Matrix for Result 3				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1998**	**Used Inputs / year 1998**	**Products or results / year 1998**	**Observations**
			• The farmers opted for the "Day by Day" system and each one helped others to built the structure, only the requirement being that each assured enough material for construction when the group arrived at his or her farm. The required wooden posts and bamboo material were cut from nearby areas.	•
			• Validating *Trials:* Earthworm technology is used for complementing GAPS[16] Vermiculture technology introduced at the Bog Walk Coffee factory as a joint pilot project between the Coffee Board and IICA for validating[17]. Similar work was carried out simultaneously on a farmer's holding in Jubilee Town (Mr. Franklin Brown) Development of a repellent like insecticide from locally grown shrubs and "old woman bitter bush" was crudely tested on Mr. Dennis Hyde's farm in Pear Tree Grove One plot of velvet beans planted	•
			• Agroforestry plantation in which leguminous bush forage, morera, hibiscus and other pastures of king grass are used in the production of livestock feed.	

[16] In this technology, California Red worms quickly break down farm waste, agro-processed waste, example coffee pulp and animal dung into environmentally friendly organic fertilizer which is rich in plant nutrients.

[17] The process involved the removal of coffee pulp from the storage area to a low-cost shed, where measured quantities of the pulp are inoculated with the Red California Earth worm. The worms injest and pass out the waste which is well refined and rich in plant nutrients.

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 1998

Chart 3: Inputs-Outputs Matrix for Result 3

Initial Situation (before 1997)	Activities and Indicators Planned / year 1998	Used Inputs / year 1998	Products or results / year 1998	Observations
•			• The consensus of the key producers in Rio Cobre watershed identified priorities that include protection of the goats from the "dogs killing" and avoiding neighbor conflicts, followed by the health and breed improvement efforts.	
• The small farmers of the middle zone do not react as quickly to changing markets patterns as their larger counterparts and this results in less availability of finance and unnecessary problem on their farms.			• Establishment of Multiple cropping	
• The small subsistence farmers are found at the upper zone, rested on steep slopes with very poor soils. In many instances they are found on rent, lease lands or government lands. Their cropping system is very diverse and there are as many as six or more crops grown simultaneously on the same path of land.			• Introduction of Macuna • Establishment of other environmentally friendly technology • Reinforcement of simple local technologies • IICA-GTZ promoted sustainable agricultural production through the introduction of agronomic-based, soil conservation practices and agro-forestry production systems agricultural	• Low prices for produce contributed to low returns for farmers

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) **1999**

Chart 3: Inputs-Outputs Matrix for Result 3

Initial Situation (1997)	Indicators Planned / year 1999	Used Inputs / year 1999	Products or results / year 1999	Observations
	• To access and adapt environmental friendly technology from other Caribbean and Latin American countries: Organic farming *Production of organic fertilizer with the aid of California Earthworm*		• 2 Field Trips • 2 Fodder Banks Established • 2 Farm Management	• The ratio of technical personnel to farmers results in slow dissemination of technologies
	• To promote and strengthen agroforestry programs		• Continuation of the development of GAPS • 13 GAPS in 8 Districts in the area (January 1999)	
• Many small farmers operate on poor and fragile soils	• To train farmers on Macuna, earthworm technology and GAPS		• One component of GAPS incorporates vermicomposting technology in the breakdown of goat waste into organic fertilizer. This technology was transferred to schools, farmers who do not have GAPS and to other institutions	
• Inadequate marketing capacities by farmers • Lack of development of value-added products	• To develop more micro-projects	• IICA-GTZ	• Developed a simple manual highlighting the benefits and construction of GAPS.	
	• Develop organic pesticide from local material		• 2 plots prepared (carbage and corn)	• 40% of the task completed at September • Drought during May-July affected additional work

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital)				1999
Chart 3: Inputs-Outputs Matrix for Result 3				
Initial Situation (1997)	**Indicators Planned / year 1999**	**Used Inputs / year 1999**	**Products or results / year 1999**	**Observations**
	• Organic Farming • 5 farmers practicing organic farming • Production of organic fertilizer with aid of California Earthworm • 4 farmers practicing this technology • Agroforesty program promoted		• 3 farmers used organic fertilizers to assist in crop production • 3 farmers have produced organic fertilizer • 2 agroforestry production system promoted (GAPS)	• This practice coincide with development of GAPS • Floors of original houses being replaced with waste from sawmill (slab)

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) 2000 Chart 3: Inputs-Outputs Matrix for Result 3				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 2000**	**Used Inputs / year 2000**	**Products or results / year 2000**	**Observations**
	• To assist RCGBA in the development and implementation of micro-project, "The Rio Cobre Goat and Organic Fertilizer" • To continue the construction of new GAPS in the area • To assist farmers who have goat houses to establish fodder banks and vermicomposting systems • To develop an organic pesticide manufactured from local plants • Introduce Rio Cobre farmers to organic farming techniques by taking them on field trip to an organic farm in St. Thomas • Contingent upon funding; beginning of the construction of the organic fertilizer in February • Creation of a revolving buck program by RCGBA • Assist in the acquiring and installation of machinery • Assistance to help start up vermicompost production		• A fodder bank field day was held in Williamsfield (10 farmers) • Farm tour of goat farmer in Clarendon to observe methods of goat production and to Sligoville to observe organic farming (25 farming)	

Result 3: Analysis of Productivity of Production Factors (Labor, Land and Capital) Chart 3: Inputs-Outputs Matrix for Result 3				2000
Initial Situation (before 1997)	**Activities and Indicators Planned / year 2000**	**Used Inputs / year 2000**	**Products or results / year 2000**	**Observations**
	• A training session conducted to show farmers how to construct GAPS and explain the benefits of the technology • A training session conducted through the RCGBA concerning goat herd management (breeding and feeding)			
	• Research possible organic pesticides from local plants • Make arrangements with local farmers and establish experimental plots • Complete 13 new GAPS • Training session on the marketing of goat meat (RCGBA) • Training session to show farmers how they can keep their records electronically (RCGBA) • A publication produced to describe effective organic pesticides derived from local plants and how farmers can produce their own pesticides • To analyze and evaluate outcomes of the WS model since its establishment		• Identified 2 farmers who had agreed to participate in research • Established a fodderbank and vermicomposting bin at a farm in Williamsfield • Improved security of GAPS in Kingston	• 25% of the task completed 25% of the task completed

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 4: To Develop an Environmental Management Plan **1997**

Chart 4: Inputs-Outputs Matrix for Result 4

Initial Situation (before 1997)	Activities and Indicators Planned / year 1997	Used Inputs / year 1997	Products or results / year 1997	Observations
• Scarcity of land for low-income settlements with adequate basic amenities. • In 1991 the government established a National Resource Conservation Authority (NRCA) • In 1994 the government drafted a green paper on forestry and also a bill to update the forestry act • In 1995, land use and watershed management were identified as priorities that needed attention, also hillside erosion and pollution from the bauxite industry, lack of human settlement policy and other issues (National Action Plan)		• IICA/GTZ	• Revision of documents on policy guidelines for watershed and management in Jamaica • Visits and interviews with stakeholders • Valuable information collected. The information generated in the HASP project by IICA-MINAG-USAID, and the IICA-GTZ study, provided sufficient information for project implementation.	

Result 4: To Develop an Environmental Management Plan Chart 4: Inputs-Outputs Matrix for Result 4			1997	
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
			Institutional Strengthening	
		• IICA GTZ and NRCA-UNDP	• A short-term participatory project in the area	
			• Organization of EIA Course in Kingston	
• Significant bauxite contamination of the Rio Cobre. Some remedial measures taken against this, for example: sealing of disposal ponds, thickening of mud and solar drying and recycling of liquid fraction.	• To make people aware of the importance of natural resources management and sustainable development	• RADA	• Preparation and distribution of three watershed posters and informative pamphlets on soil conservation and environmental protection (for being distributed among producers and institutions)	
			• Workshop for Environmental Education and Sustainable	

Result 4: To Develop an Environmental Management Plan **1997** **Chart 4: Inputs-Outputs Matrix for Result 4**				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
	• To organize and execute Environmental Impact Assessment		• Training for the preparation of EIA Plan and Execution • EIA Plan	• Half of the task done
	• To prepare an Environmental Management Plan for Rio Cobre[18] • To prepare environmentally sustainable local projects	• IICA-CASS Volunteer from Guatemala worked six months with RADA and NRCA	• Preliminary proposal of EMP EMP that covers 3 major areas: - Silvicultural Management (Unmanaged Forest, Reforestation, Management of Artificial and Natural Forests, etc.) - Agroforestry (Introduction of practical systems) - Organic Farming (introduction of natural pesticides and production of manure) *Stakeholders Local Level* • Stakeholders prepared two related micro projects on Agro-ecotourism and Waste and Water Management, which provided important guidelines in preparing EMP	B: Largely due to lack of experience of Jamaica TCA and the local institutions. The final plan had a larger bearing on what NRCA perceives and also depends on 2 micro-projects that are being prepared by the stakeholders.

[18] Plan to be ready on the end of the first semester of 1998.

Result 4: To Develop an Environmental Management Plan Chart 4: Inputs-Outputs Matrix for Result 4				1997
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
	• To strengthen national institutions and Community based Organizations, in order to develop sustainable agriculture and natural resources base of the watershed			
• Deforestation and loss of bio-diversity.[19] Agriculture contributes greatly to environmental degradation. • Poor farming and forestry practices leading to soil erosion and the loss of soil structure, soil nutrients, slit laden rivers, high turbidity of streams, siltation in reservoir, siltation on the harbors and coral reefs • Agro-chemical pollution, pesticides, weedcides, etc., over-application of fertilizer and soil contamination due to residue in soil, water contamination and eutrophication of streams • Burning of sugar cane prior to reaping[20], dunder from sugar factories, run off from fish farms and cattle farms, also waste from milk, citrus and coffee processing				

[19] Causes of this situation are: land clearing, slash and burn methods that often causing forest fires, charcoal production, indiscriminate use of fire, overgrazing of animals, demand for yam sticks, etc.

[20] Sugar cane is the dominant crop in this area.

Result 4: To Develop an Environmental Management Plan **Chart 4: Inputs-Outputs Matrix for Result 4**				**1997**
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
• The Rio Cobre Watershed is potentially a very significant water resource base to the national development of the nation. • The main problem of this watershed is the shortage of irrigation water in the plains, with major deficits in July to September. • Flooding problems				
• Significant degradation of watersheds, pollution of ground and surface water, and urban sprawl and blight.[21] The broad-leaved tropical forests have largely disappeared. • Rio Cobre is a principal conveyance for waste material. The volume of waste discharge into the system affects its capacity for self-purification. • Factories in the agro-industrial complex in the Bog Walk discharge their effluent into the river, producing a high Biochemical Oxygen Demand (BOD), pungent odor, high discoloration and turbidity • No landfill to place garbage • No local research on crops • No promoting of organic farming				

[21] This situation is partly caused by population pressures on the land, rapid expansion of mining, tourism and farming.

Result 4: To Develop an Environmental Management Plan **Chart 4: Inputs-Outputs Matrix for Result 4**				**1997**
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1997**	**Used Inputs / year 1997**	**Products or results / year 1997**	**Observations**
• Possible damage to the natural resource due to goat raising activity in watershed areas and the lack of sustainable goat production • Unsustainable land use: over and under use • Low level of application and management of soil conservation systems • Low soil fertility				
• Insufficient soil moisture management • Low crop yields: tree annual cropping systems (need for dynamic cropping systems) • Low information about available technology for competitive and niche market				

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 4: To Develop an Environmental Management Plan **1998**

Chart 4: Inputs-Outputs Matrix for Result 4

Initial Situation (before 1997)	Activities and Indicators Planned / year 1998	Used Inputs / year 1998	Products or results / year 1998	Observations
	• Revision of EMP for Rio Cobre • GIS Course • Execution of EIA • Implementation of EMP			
• Diagnostic activities reveal that the major contaminants of the watershed are medium and large enterprises and agricultural and non-agricultural organizations. Some owners ignore the pollution problem and do not take steps for alleviating the situation.	• To strengthen local organizations and institutions		*Institutional strengthening* • A training course in Environmental Impact Assessment with the participation of fifteen professionals from NRCA, RADA, FD, WRA and MYADP	
• The problem is further aggravated by the non-enforcement of legislation, that is the anti-litter act.	• To strengthen local organizations (or liasing with the different institutions) in watershed management	• IICA-GTZ project collaborated in short term NRCA/UNDP	• Project for promotion of organized local groups to develop an environmentally oriented plan of action • The Hemisphere Mission of IICA-GTZ strengthened the ties with Donor/Lender Watershed Groups of Jamaica and provided recommendations for implementing the Watershed project	

Result 4: To Develop an Environmental Management Plan **1998**

Chart 4: Inputs-Outputs Matrix for Result 4

Initial Situation (before 1997)	Activities and Indicators Planned / year 1998	Used Inputs / year 1998	Products or results / year 1998	Observations
			• Workshop on definition of Indicators of Sustainability for Integrated Watershed Management (August 1998, Kingston) • 26 participants from different organizations (the Caribbean Agricultural Research Development Institute (CARDI), RADA, United States Aide for International Development, MINAG, IDB, EFJ, Office of the Prime Minister, OPM, NRCA and IICA) attended this workshop. They got involved in the monitoring and management of watersheds in Jamaica, looked at activities, the positive and the negative effects, and then defined proposals to solve the problems. • Matrix of Sustainability developed to further enhance the management of watersheds	
		• Workshop on Feasibility study to assist local groups in the preparation of micro projects, was carried out by personnel from the IICA office in Trinidad y Tobago	• 9 participants	

Result 4: To Develop an Environmental Management Plan				**1998**
Chart 4: Inputs-Outputs Matrix for Result 4				
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1998**	**Used Inputs / year 1998**	**Products or results / year 1998**	**Observations**
			• A one week Workshop on the appraisal of on-going and future activities in the Rio Cobre Watershed (April 1998) • Participation of 2 national institutions and 18 farmers *Technologies introduced:* • Waste/ manure from goat pens is broken down by the Red California Earth and used fertilizer in the fodder bank or on the crops	• The field trips and group discussions were the major source of information • The SWAP technique was used to synthesize the present situation and the future activities

Result 4: To Develop an Environmental Management Plan Chart 4: Inputs-Outputs Matrix for Result 4			1999	
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1999**	**Used Inputs / year 1999**	**Products or results / year 1999**	**Observations**
			• One day Workshop in Linstead to analyze the activities of 1998 and a plan put in place for 1999 • IICA-GTZ along with RADA and NRCA, participated in 2 environmental education programs at the Springfield All Age School and the Jubilee Town All Age School. These programs were targeted to students and parents and focused on the local environmental degradation issues in the watershed (with guide of technical experts) • IICA-GTZ along with RADA participated in environmental education program in Berkshire Hall District. This program was geared mainly to farmers and discussed the environmental and economic implications of different farming practices	
		• A visiting marketing consultant from IICA-GTZ Costa Rica (Nelly Vinueza) helped with the problem of product marketing		

Result 4: To Develop an Environmental Management Plan Chart 4: Inputs-Outputs Matrix for Result 4			1999	
Initial Situation (before 1997)	**Activities and Indicators Planned / year 1999**	**Used Inputs / year 1999**	**Products or results / year 1999**	**Observations**
		• IICA-GTZ, RADA, Peace Corps, CIB,CARDI, NRCA, EFJ, FD and WRA developed an agreement to collaborate in development efforts in the area • A peace Corp Volunteer collaborates with the IICA-GTZ Watershed Management Specialist	• IICA-GTZ with RADA, NRCA and FD participated in a gully plugging exercise in Dover Castle District, where farmers were exposed to the use of barriers in preventing erosion • "Memorandum of Understanding Concerning Development in the Rio Cobre Watershed"	

"WINDOWS OF SUSTAINABILITY": IICA/GTZ PROJECT

Result 4: To Develop an Environmental Management Plan Chart 4: Inputs-Outputs Matrix for Result 4			2000	
Initial Situation (before 1997)	**Activities and Indicators Planned / year 2000**	**Used Inputs / year 2000**	**Products or results / year 2000**	**Observations**

ANNEX 5
TRAINING ACTIVITES EXECUTED BY THE PROJECT
1997-2000

Location	Trainers	Activities	Participants
Riversdale	IICA-GTZ: Annikie	Training on Project preparation	17
Linstead	IICA-GTZ: Annikie	Training on Project preparation	5
Linstead	G. Ennis	Training of community representatives on the preparation of projects	16
Kingston	Dr. Reiche	Training of professionals on Environmental Impact Assessment	15
RADA, Linstead	IICA-GTZ Dr. Carnap & Dr. Ramakrishna	Farmers trained in and used SWAP methodology to diagnose the problems that affect them and identified possible solutions	30
Riversdale	IICA staff from Trinidad	Training in micro project development	?
Riversdale	IICA-GTZ Marlene Antoine	Training and workshop on feasibility study	?
IICA Kingston	IICA-GTZ Dr. Reiche Dr. Ramakrishna	Training and workshop on indicators of sustainability	26
Kingston	Mr. Reckord	Training on public speaking and handwriting for the press	2
Riversdale	IICA-GTZ Mr. Glenroy Ennis	2 two day workshops on the preparation of sustainable indicators	?
Berkshire Hall	IICA-GTZ: Annikie RADA:Laws LMC: Brown	Environmental Education training to make farmers aware of environmental issues	25
USA	Cochran Fellowship Program USDA	Goat Herd Management Workshop	1
Springfield	IICA-GTZ: Annikie NRCA: Hall RADA: White LMC: Brown	Environmental Education training at Springfield All Age School	75 children
Redwood	IICA-GTZ: Annikie NRCA: Hall RADA: Pinnock LMC: Brown/FD	Gully Plugging Training and workshop	20

Location	Trainers	Activities	Participants
Kingston	IICA-GTZ Annikie, Smith	Trained environmental club at Ardenne High School in using California earthworm in vermicomposting	15
Williams-field	IICA-GTZ Annikie, Smith	A fodderbank field day was held to train farmers in how to establish fodder banks	10
Linstead	IICA-GTZ/Annikie RADA	Training on farm record keeping	24
Maypen & Sligoville	IICA-GTZ Annikie, Smith	Training field trip to visit goat farm in Maypen and organic farm in Sligoville	25
Linstead	IICA-GTZ: Annikie Minag: Vermont	Training session on common goat diseases	30
Rio Cobre	IICA-GTZ Annikie, Smith Rio Cobre GBA	Numerous training workshops on GAPS establishment. Usually held every Monday	30

ANNEX 6
PRINCIPAL TECHNICAL DOCUMENTS AND REPORTS FROM THE MODEL

Annikie, Z. 1998. *A case study on waste management in goat production system for sustainable agriculture in Rio Cobre.* Cooperation Agency of IICA in Jamaica.

Annikie, Z. and C. Smith. 1999. *A goat agroforestry production system for Jamaica.* Memorandum: Benefits for Mr. Annikie. IICA TCA in Jamaica.

Arlington H. and D. Chesney. 1997. *Windows of Sustainability.* Memorandum.

Brathwaite, C. 2000. *Watershed management policy inciatives. Donors/Lenders Environmental Programmes. IICA actions in Jamaica- 1997.* Memorandum: Visit of Dr. Mark Bernard.

Campbell and B. Ramakrishna. 1998. *Report of two cases of waste management for sustainable agriculture: Pulpery waste management using red California earthworm (Eiseni foetida) in Jamaica and waste management for organic farming in Costa Rica.* Cooperation Agency of IICA in Jamaica.

Environmental Foundation of Jamaica. 2000. *Rio Cobre goat and vermicomposting project proposal.*

IICA. 1996. *Development in watershed areas: methodological experiences of the Technical Cooperation Agency of IICA in Jamaica.*

IICA. 1998. Sewing and Embroidery.

IICA. 1998. *Status report on watershed management policy iniciatives in Jamaica and proposed operational framework for the Rio Cobre watershed.* Memorandum and report. EIA, IICA, Ministry of Agriculture and Mining, WRA and NRCA. Jamaica.

IICA. 1999. *Integrated natural resources management: a watershed scenario.* IICA in Focus. IICA TCA in Jamaica.

IICA-GTZ. 1997-99. *Annual report.*

Mulleady, J. T. 1994. *Environmental impact of present land use: the Rio Cobre watershed case study.*

Ramakrishna, B. 1997. *Course-workshop on environmental impact assessment* (EIA). Memorandum.

Ramakrishna, B. 1997. *Project profile on Windows of Sustainability Rio Cobre watershed 1997-1999.*

Ramakrishna, B. 1997. *Window of Sustainability: experiences and future actions in Rio Cobre watershed area.*

Ramakrishna, B., Annikie, Z. and T. Mulleady. 1998. *Direct transfer of Technology from Central America to Jamaica: case of goat-forestry production system.* IICA TCA in Jamaica.

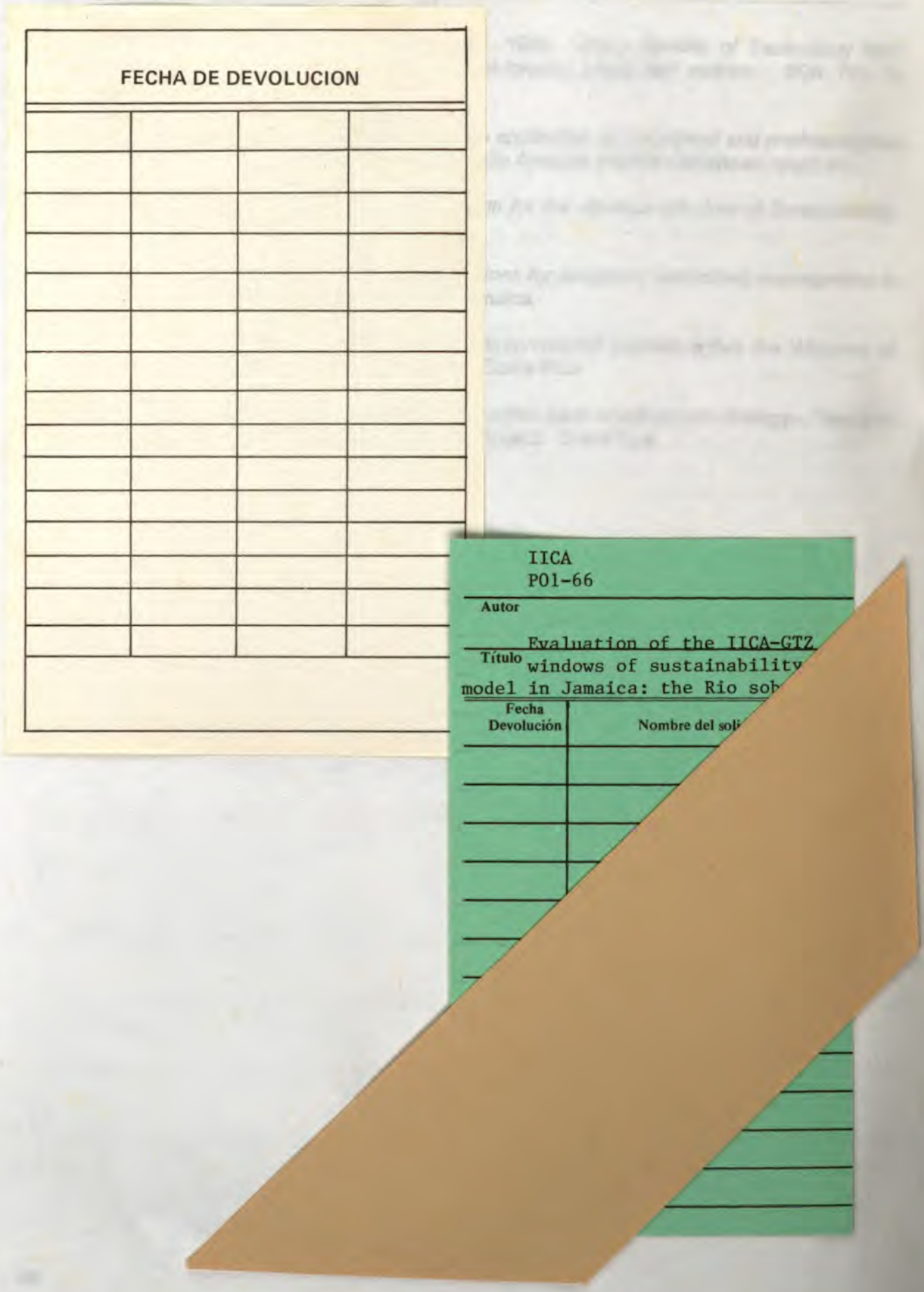
Reiche, C. 1998. *Windows of Sustainability: the application of conceptual and methodological instruments for sustainable development in Latin America and the Caribbean countries.*

Reiche, C. 2000. *Complementary project design for the Jamaica Window of Sustainaibitity.* IICA-GTZ Project. Costa Rica.

Rieger, E. 1997. *Establishment of policy guidelines for integrated watershed management in Jamaica: case of Rio Cobre.* IICA TCA in Jamaica.

Vinueza, N. 1999. *Developing of new small entrepreneurial projects within the Windows of Sustainability in Jamaica.* IICA-GTZ Project. Costa Rica.

Vinueza, N. 1999. *Rural products differentiation within local development strategy. The case of Rio Cobre watershed, Jamaica.* IICA-GTZ Project. Costa Rica.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