Final evaluation: Crop Diversification/Irrigation Project

No. 532 0123

Prepared for:
United States Agency for International Development/Jamaica
Under contract number 532-0123-C-00-2037-00

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Prepared by:
Tropical Research & Development, Inc.
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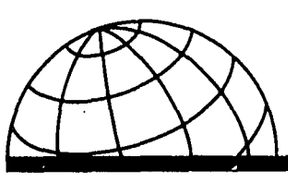

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By:
Michael Julien, Team leader
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John Saunders, Sociologist
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Project fact sheet

1. Country:	Jamaica
2. Project title:	Crop Diversification/Irrigation
3. Project number:	532 - 0123
4. Borrower/grantee:	Government of Jamaica
5. Implementation:	Host-country contracts
6. Project management:	
1985-89:	Agro-21 Corporation, Ltd.
1989-92:	National Irrigation Commission
7. Project dates:	
Original PACD:	September 30, 1990
Revised PACD:	September 30, 1993
8. Project funding and obligations to date:	a) A.I.D. loan and grant agreement: (i) A.I.D. Loan: US$ 8.0945 million (ii) A.I.D. Grant: US$ 11.9055 million (b) Government of Jamaica Commitment: (i) In-Kind: US$ 6 million
9. PP amendments:	No. 1: June 27, 1990 No. 2: September 20, 1991
10. First PROAG amendment:	No. 1: September 25, 1985
11. Recent PROAG amendment:	No. 11: September 30, 1991
12. Project design:	USAID/Jamaica, GOJ, Winrock International Inc.
13. Mission officials:	Mission director: W. Joslin (1985-90) R. Queener (1990-) Project officer: W. McCluskey (1985-87) V. Rochester (1987-91) B. Ellington-Banks (1991-)
14. Previous evaluation:	Development Alternatives Inc., March 1989
15. This evaluation:	
Contract:	USAID/Jamaica and TR&D Inc.
LOE:	109 person-days

Preface

A four-person team from Tropical Research and Development Inc. (TR&D) conducted the final evaluation of the Crop Diversification/Irrigation Project in Jamaica from March 18 to April 28, 1992.

The team was briefed by USAID's Mission in Jamaica on March 19, 1992. An introductory meeting with senior personnel of the National Irrigation Commission was held on the same day. The evaluators reviewed Crop Diversification/Irrigation files and records and visited the project site March 20 and on three other occasions. Representatives of Government of Jamaica (GOJ) organizations and private firms operating in the St. Catherine area were interviewed over the next two weeks. The team spent the third week preparing the field report, a copy of which was submitted to USAID and National Irrigation Commission April 8 for review and comments. The draft was revised and resubmitted to USAID on April 28, 1992.

On August 14, comments from the National Irrigation Commission (NIC) were made available by the Mission to TR&D. These are included in this document in Appendix F. Final comments from USAID/Jamaica were provided to TR&D on September 24. These appear in Appendix G.

Members of the TR&D evaluation team were the following:

Michael V. Julien, team leader, M.Sc. in economic development. Mr. Julien was managing director of an agro-processing company, project manager of an industrial-finance program and, from 1988 - 90, chief of party of a $20-million agribusiness project. As a team leader, he evaluated the Agricultural Management Project in Kenya and the Regional Utilities Maintenance Project in the Caribbean. He has worked in Pakistan and designed enterprise programs and programs for nontraditional export development in The Gambia and East Africa.

Fedro S. Zazueta, irrigation specialist, Ph.D. in irrigation and drainage. Dr. Zazueta is an associate professor in the University of Florida Department of Engineering. He has more than 18 years experience in research and extension in irrigation, drainage, water use management, automated control systems for irrigation and electronic soil moisture sensing devices. Dr. Zazueta has carried out extensive training and consulting assignments in Pakistan, Central America, Spain, the Middle East and Ecuador between 1974-92 for The Bank of Mexico, World Bank and USAID.

John V. Saunders, Sociologist, Ph.D in sociology. Professor for the Department of Sociology and Anthropology, Mississippi State University, with more than 30 years of professional exposure in rural development, land tenure, agrarian reform, monitoring and evaluation and demographic analysis. Between 1965-90, Dr. Saunders conducted a variety of short-term assignments with USAID, the World Bank, United States Department of Agriculture (USDA), The Ford Foundation in Africa and Central and South American countries.

Herman A. Hamilton, Agronomist, (Ph.D., Soil Science), Director of Paragon Agribusiness Development Corporation in Jamaica, has more than 30 years experience in soils, tree and vegetable crops, environmental management, project evaluation, design and implementation. Dr. Hamilton has carried out various consultancies for Food and Agriculture Organization of the United Nations (FAO), Inter-American Development Bank (IDB), United States Agency for International Development (USAID), International Fund for Agricultural Development (IFAD) and United Nations Development Program

(UNDP) in the Caribbean, Malaysia, Thailand, Ireland and Norway. From 1973-78 he was Head of the Division of Chemistry and Management of Peat Soils for the Canadian Department of Agriculture.

The evaluators would like to express their appreciation to NIC personnel including, Mr. Edward Norum, CD/I consulting engineer, Mrs. Sonia French, chief engineer, Mr. Winston Boyne, director, engineering and technical services and Mr. Sydney Small, managing director. The team also thanks Mrs. Barbara Ellington-Banks, USAID CD/I project officer, for her insights and clarification on many of the team's concerns during the evaluation.

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List of abbreviations

ACB	Agricultural Cooperative Bank
ADC	Agricultural Development Corporation
AESP	Agricultural Export Services Project
AMC	Agricultural Marketing Corporation
ARDO	Agricultural and Rural Development Office (USAID)
ASER	Agro-Socio-Economic Research Limited
CAD	Computer-aided design
CBI	Caribbean Basin Initiative
CD/I	Crop Diversification/Irrigation Project
DAI	Development Alternatives Inc.
EC	European community
E_{irr}	Irrigation efficiency
FAO	Food Agriculture Organization of the United Nations Development Programme
FTE	Full-time equivalent
GDP	Gross domestic product
GIS	Geographic information system
GOJ	Government of Jamaica
HRF	Housing Reimbursement Fund
HRP	Housing Reimbursement Project
IBRD	International Bank for Reconstruction and Development
IDB	Inter-American Development Bank
IEE	Initial environmental evaluation
IFAD	International Fund for Agricultural Development
JAMPRO	Jamaica Promotions, Ltd.
JAS	Jamaica Agricultural Society
JADF	Jamaica Agricultural Development Foundation
JBPA	Jamaica Bananas Producers' Association
JCFA	Jamaica Cane Farmers' Association
JFFA	Jamaica Fish Farmers' Association
JICA	Japan International Cooperation Agency
JNIP	Jamaica National Investment Promotion, Ltd.
KMA	Kingston Metropolitan Area
LOE	Level of effort
LOP	Life of project
MOA	Ministry of Agriculture
MFO	Mega Fuel Oil Equivalent
NATE	Non-traditional agricultural exports
NIC	National Irrigation Commission, Ltd.
NWC	National Water Commission
O&M	Operations and maintenance
PACD	Project assistance completion date
PES	Project evaluation summary
PFA	Poultry Farmers' Association
PP	Project paper

PPS	Project paper supplement
PROAG	Project [Loan and Grant] Agreement
RADA	Rural Agricultural Development Authority
RCIW	Rio Cobre Irrigation Works
SCVPA	St. Catherine Vegetable Producers' Association
SFL	Small-farmer linkage
SIA	Sugar Industry Authority
SIR	Small-infrastructure rehabilitation
SIRI	Sugar Industry Research Institute
SOW	Scope of work
TA	Technical assistance
TR&D	Tropical Research and Development Inc.
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
UWA	Underground Water Authority

All currency in U.S. dollars unless stated otherwise

Executive summary

Project profile. The Crop Diversification/Irrigation (CD/I) Project is a USAID-funded, eight-year, $20-million project established in Jamaica in September 1985. The project consists of an $8.0945 million loan and a $11.9055 million grant to the Government of Jamaica (GOJ). The goal of the project is to develop the agricultural sector to increase productivity and employment and to enhance Jamaica's capability to earn and save foreign exchange. The project purpose is to strengthen the institutional capacity of the GOJ to support and develop private agricultural investment. CD/I activities were implemented through four components: 1) strengthening Agro-21; 2) small-infrastructure rehabilitation; 3) operations and maintenance; and 4) small-scale farmer linkages.

Agro-21 was responsible for CD/I implementation from 1985-89. The National Irrigation Commission, Ltd., (NIC) assumed responsibility for project execution for 1989-93. Of the $20 million obligated for project implementation, $18 million was committed for the original life of project period, 1985-90. The additional $2 million was obligated for a three-year extension, 1990- 93. CD/I's primary focus was to rehabilitate the irrigation system of the Rio Cobre Irrigation Works (RCIW) to facilitate diversification of 13,400 acres through private-sector investment in nontraditional export crops and to divest abandoned and underused lands served by RCIW. (See Map I: Original CD/I Project Area in 1985, page 53.)

Evaluation purpose. The purpose of the evaluation was to review the following: 1) the degree to which the project impacted the original goal, increased productivity, increased employment and earnings and savings of foreign exchange and 2) the degree to which the amended purpose - strengthening the GOJ's broader institutional capacity to support and develop private agricultural investment in Jamaica - had been or will be met. The review was to consider the following: 1) the degree to which planned divestment of GOJ lands under the project to medium- and small-sized farmers had occurred; 2) the degree to which these lands were diversified; 3) the degree to which the provision of irrigation water affected incomes; and 4) justification for the use of remaining project funds, given changing circumstances of the project.

Methodology used. Analysis of CD/I activities consisted of the following: 1) review of project documents; 2) interviews and briefings with administration and technical staff from government agencies, development agencies, grower associations, farmers and other end-users of water supplied under the project; and 3) visits to the project site to examine physical progress, constraints and problems encountered during implementation.

Findings and conclusions

Key findings and conclusions were classified under seven categories: 1) design validity; 2) project management; 3) NIC sustainability; 4) costs and benefits; 5) allocation of CD/I funding; 6) implementation; and 7) baseline data and measurement of impact.

1. Design validity. The Crop Diversification/Irrigation Project had a limited impact on Jamaica's capacity to increase agricultural employment or foreign exchange in nontraditional sectors. There was almost no increase impact because of Agro-21's failure to attract large agribusiness investments in the project area. However, farmer productivity improved as a result of increased and more dependable water supplies from the RCIW to traditional crops.

2. Project management. Agro-21 and NIC project management produced mixed results over the life of the project. Agro-21 failed to deliver agribusiness investments to the project area, but successfully initiated policy initiatives that led to the creation of a national irrigation commission with overall responsibility to set, collect and use fee rates on a country-wide basis. NIC's work on RCIW rehabilitation sub-projects resulted in notable achievements in restructuring water-user rates and collection procedures.

Agro-21 efficiently implemented rehabilitation of the RCIW. In contrast, the small farmer linkage component was first suspended, then reinstated and then poorly executed under the project. The program for water use training was not well organized or implemented, and planned infrastructure rehabilitation work on canal sections serving small farmer areas was put on hold in order to reassign obligated project resources for dam reconstruction.

3. NIC sustainability. The NIC's management capacity and its development policy are at relatively nascent stages of growth. NIC assumed responsibility for CD/I implementation in late 1989 and is yet to develop collaborative strategies with other GOJ agencies that would ensure protection of irrigable lands. NIC does not have the capability to effectively coordinate crop diversification nor programs for small farmer linkages.

Insufficient emphasis was placed on the development of corporate policy and management systems needed to reinforce NIC's institutional role or strengthen its long-term operational mandate. This omission resulted in an absence of explicit corporate policy on such issues as land zoning, urbanization and collaboration with other government agencies on water use training and management.

NIC's institutional capability could be compromised by 1) a shortage of technical personnel 2) the completion of both technical assistance and substantial USAID funding, and 3) recent GOJ fiscal polices that led to comprehensive cutbacks in staffing at public-sector agencies and could also result in further reductions in NIC staff. The commission's extension department is understaffed and suffers from lack of direction in planning and operations. In its present form, it is unlikely that the department will be effective in increasing water resource efficiency through NIC training programs in the near future.

4. Costs and benefits. Sixty-three percent or $11.5 million of CD/I's $18 million budget was committed for physical RCIW rehabilitation and RCIW operations and maintenance. Sugarcane and vegetable producers were the main CD/I beneficiaries. These two groups accounted for 68 percent of lands in use and 80 percent of used irrigation water. The reason for this predominance was lack of measurable or sustained production of nontraditional export crops in the 13,400-acre target area and therefore no reduction in acreage of traditional crops. The outcome of RCIW improvements increased water availability to lands under sugarcane and to lands under vegetable production for domestic use.

5. Allocation of CD/I funding. Allocation of project resources was too heavily focused on RCIW infrastructure rehabilitation. About 85 percent of CD/I's funding was committed to physical works and irrigation technical assistance. For example, small farmers were since 1989 specifically targeted as the new CD/I beneficiaries. However, $25,000 of additional CD/I funding made available for training of small farmer water users during the 1990-1993 project extension period was inadequate for effective delivery of such programs.

6. Implementation. Although the imbalance in resource allocation produced an uneven stream of project accomplishments, CD/I enhancement of the RCIW resulted in increased incomes, mainly among traditional producers in the CD/I St. Catherine area.

RCIW service was upgraded to existing areas and service to surrounding areas was enhanced by improving the reliability of water supplies. With consistent supplies of water, agricultural production in the project area was profitable. The most lucrative activity was aquaculture, followed by fruit crops, vegetables, root crops, sugarcane and dairy operations in that order. Significant improvement in water use can be achieved through training and improved water management techniques. However, CD/I funding is lacking for the coordination of agricultural extension services to integrate on-farm water management with farmer education and agronomic extension services. Consequently, efficiencies in on-farm irrigation were much below acceptable engineering standards.

Sustainability of NIC's system for operations and maintenance system was clearly achievable because of low energy costs associated with RCIW's gravity fed surface water system. Other district irrigation systems used mainly electricity as an energy source and were much more expensive to operate.

The Agricultural Development Corporation's divestment program was efficiently implemented for irrigable land in the CD/I area. (See Blocks A, B and E). The evaluation team was unable to determine the extent to which lessees are committed to crop diversification since the collapse of the Rio Cobre Dam. The ensuing shortage of water supplies has led to the suspension of projects proposed by many lessees who acquired land in divested areas. Recent urbanization of project land under the Portmore Housing Project will lead to increasing land speculation and real estate development in the divested area. It is, therefore, unlikely that CD/I will have any future impact on diversification initiatives in those locations.

Apart from limited small farmer production for domestic consumption on less than 750 acres of the revised 4,824 acres of targeted land, there is no evidence to show that the divestment program had more than a marginal effect on nontraditional agricultural production or exports from the project area.

Urban trends are putting agriculture under increasing pressure due to competition for land and water. These conflicts will increase with the extension of the Kingston Metropolitan Area (KMA) into parts of the Rio Cobre irrigation area. This urban extension will intensify demand for RCIW water for potable use, rather than for agricultural development as originally intended.

Urban demand for sand will continue to make illegal sand mining a lucrative activity unless the GOJ takes more comprehensive steps to manage this resource and to create incentives that will attract investment in alternative methods, such as limestone processing.

7. Baseline data and measurement of impact. In 1989, USAID commissioned a baseline survey of small farmer communities in the project area. The survey, however, fell short of recommending establishing a system for monitoring baseline data to record changes in small farmer performance that could be attributed to CD/I interventions. Because such a system had not been established, the evaluation team was unable to measure any quantitative changes in impact in the surveyed areas.

Principal recommendations
The evaluation team concluded its examination of CD/I with the following recommendations:

1. Project priorities The principal CD/I project activities for the last two years of implementation, in order of priority, should be as follows: 1) Rio Cobre Dam reconstruction; 2) training in water-use management for small farmers in the revised project area; 3) completion of infrastructure rehabilitation critical to the physical integrity of the RCIW; 4) infrastructure rehabilitation to improve delivery of water to small farmers and aquaculture ventures; and 5) institutional strengthening of the NIC.

USAID should support project activities that will have discrete impacts within the remaining life of project. These activities are dam reconstruction and rehabilitation of infrastructure critical to the integrity of the RCIW. The Mission should also commit funding outside of the CD/I Project for training programs for small farmers in water-use management in the project area and development of a baseline data and monitoring system to gauge changes in productivity, incomes, employment and impact. Such a system would demonstrate the importance and benefits of both irrigated agriculture and efficient on-farm water management.

USAID funding for water management training should be committed through another A.I.D. project, such as the Agricultural Export Services Project (AESP), or through appropriate GOJ institutions involved in agricultural development. The demonstration effect of water management training will be realized only after dam reconstruction has been completed and continuous water flows have returned to St. Catherine Plains. And water management training will be more cost-effective and more effectively integrated if delivered as part of a comprehensive program of production, farm management and post-harvest technical assistance, rather than through direct NIC training on water use management alone.

GOJ should support activities for which impact requires sustained interventions beyond the date for project assistance completion. These projects should demonstrate long-term viability, such as expansion of export crop production by small farmers. That activity depends upon GOJ policy commitments on issues such as agricultural zoning. The GOJ should also make funding available where viability of the proposed activity has been assured through collaboration between GOJ agencies involved in various facets of agricultural development. These agencies could include the following: The Rural Agricultural Development Authority for farm extension; Ministry of Agriculture for export services; and the Ministry of Production, Mining and Commerce for land protection from sand mining. The GOJ should therefore assume responsibility for the following two project activities: further institutional strengthening of the NIC and infrastructure rehabilitation to improve delivery of water to small farmers and aquaculture ventures.

USAID should continue to co-finance reconstruction of the Rio Cobre Dam with the GOJ and to provide up to $1 million for this purpose. The Mission should also commit up to $112,000 of obligated CD/I funds to three sub-projects for small-infrastructure rehabilitation (SIR). The funds should be distributed among these projects as follows: Stabilization of falls at the main canal, $17,500; 2) rehabilitation of the upper main canal, $17,500; and 3) improvements to the Old Harbor canal, $69,000. These sub-projects have already been designed by NIC and are essential for ensuring the physical integrity of the existing irrigation system. All other resources under the $2 million June 27, 1990, project extension should be removed from the CD/I project.

All project-support activities relating to Blocks A, B, C and E should be discontinued. Limited progress has been made towards measurable crop diversification away from traditional production, such as sugarcane. And any impetus for small- or medium-sized farms on recently divested land in Blocks A and B has been brought to a virtual standstill as a result of water shortages from the dam and vandalism that destroyed irrigation infrastructure on those lands.

USAID should seek reimbursement of approximately $428,425 from the GOJ for irrigation equipment destroyed by illegal sand miners and related, on-site costs incurred in the process of CD/I work on small infrastructure rehabilitation in the affected parts of Blocks A and B.

To provide small farmer groups involved in vegetable and multi-crop production in the CD/I area with water management training to encourage optimized water usage, USAID should commit surplus CD/I funds and reimbursed project resources to an ongoing project, such as the Agricultural Export Services Project (AESP).

2. GOJ and NIC priorities. The NIC should examine practical ways to rationalize its management and operations and to improve its planning, coordination and post-CD/I implementation of rehabilitation work for all of its district irrigation systems.

The NIC should submit to USAID specific proposals for irrigation sub-projects for CD/I funding approval already designed under the small-infrastructure rehabilitation component. The proposed sub-projects must relate to existing infrastructure and be essential to the smooth functioning of the RCIW system.

The GOJ should increase funding to the NIC to finance incomplete CD/I infrastructure-rehabilitation work falling into two categories: 1) work that has not yet been designed, but is deemed critical to maintaining the physical integrity of the RCIW and 2) work that will benefit small farmers and aquaculture ventures in CD/I Project areas not in proximity to the locations threatened by urbanization (See Map II: Proposed CD/I Project Area 1992-93, page 57).

The GOJ should introduce zoning legislation to curtail further urbanization on high-quality St. Catherine lands that are either underused or outside the main areas undergoing ad hoc commercialization. This approach should be adopted for all irrigable land in Jamaica and should be an essential component of future NIC/GOJ policy discussions.

The NIC should conduct needs assessments of human resources and management and information systems. The commission should institute a yearly evaluation of their engineering and extension personnel. The evaluation should document goals, activities, achievements and impact for each professional. Such an assessment would allow NIC to accomplish the following: 1) evaluate staff performance, 2) document work done and 3) estimate impacts of engineering and extension activity in relation to established goals.

The Ministry of Production, Mining and Commerce should conduct a resource utilization study to determine: 1) future demand and supply of sand, 2) appropriate policy and regulatory procedures and 3) incentives for mining alternative resources, such as limestone for commercial sand production.

Future investments in infrastructure and agricultural development should be directed toward the already-

settled agricultural areas that are less vulnerable to urban expansion and lie to the south and west of Spanish Town. (See Map II, page 55.)

Lessons learned. The following lessons learned can improve future project design and management within USAID's Jamaica portfolio:

1. Key factors for successful realization of the impact and goals of novel and innovative project concepts need to be more thoroughly examined and assessed before design and implementation.

Expectations of high levels of foreign investment and attainment of CD/I goals were based on cursory assumptions about Jamaica's attractiveness to foreign agribusiness investors. Comparative analysis was insufficient on key factors that influence agribusiness investment, such as productivity and local content production costs between Jamaica and its Caribbean Basin neighbors. A close analysis of Jamaica's relative attractiveness to offshore agribusinesses suggests that Jamaica lacked many of the key prerequisites for rapid success in nontraditional export-oriented agriculture. Furthermore, Jamaica's political and socioeconomic history also implied that, unlike tourism, large mother farm projects owned and operated by foreign investors was not the most feasible approach to crop diversification in Jamaica.

2. Success of an agricultural irrigation program is determined primarily by two factors: cost effectiveness of water delivery to arable lands and the extent to which farming communities served by the irrigation system make efficient use of water to maximize productivity of their irrigated lands.

The imbalance in CD/I resources between the infrastructure rehabilitation and small farmer project components led to significant inefficiencies in on-farm water utilization. These inefficiencies mitigated both costs and operating efficiencies associated with RCIW system management. In retrospect, greater emphasis should have been placed on end-user support through CD/I technical assistance programs. For future development of other irrigation systems in Jamaica, it would be more effective to provide such support through farm extension support agencies, rather than directly through the NIC. Water utilization is important but is only one of the key aspects of effective on-farm agricultural management.

3. Development projects should include budgeted line items for baseline data management, measurement of impact and maintenance of management information systems.

Impact assessment activities should be defined in grant agreements, loan agreements and in contractors' and executing agencies' scopes of work. Throughout the life of the project, measurement reporting should be included as an essential feature of work plans and period progress reviews. Furthermore, baseline surveys lose their usefulness without a concurrent commitment to establish and maintain a monitoring system following the survey.

Measurement of impact under the CD/I project was limited by the absence of continuous data on small farmer activities in the project area. Although a baseline survey was conducted and useful data collected, the lack of an active system to monitor changes in performance and impact reduced the usefulness of that data for subsequent impact measurement.

Section A: Methodology and report structure

1. Background

In March 1992, the USAID Mission in Jamaica contracted Tropical Research and Development, Inc. (TR&D) to conduct an evaluation of the CD/I Project. The evaluation was to review the project against its original and amended goals in order to provide a factual basis for decision making concerning further implementation over the remaining life of project (LOP). In the process of conducting this assignment, the USAID Mission in Jamaica asked the TR&D evaluation team to highlight and delineate project costs and benefits between the original life of project, 1985 -1990, and the three-year extension from 1990 to 1993.

2. Methodology

The evaluation team used the scope of work (SOW) to identify key project issues, data sources and key players, including institutions and individuals. Specific techniques used by the evaluation team included:

- Clarification of the SOW through discussions between the evaluation team and USAID staff (See Appendix I, Persons interviewed).

- Review of background documents (See Appendix II, Documents reviewed) and procurement of documents that provided macroeconomic data and policies, including Government Of Jamaica 1991-94 Development Plan.

- Interviews and briefings with administration and technical staff from government agencies, development agencies, farmer/grower associations representatives, agro-business representatives and end-users of the water supplied by the CD/I Project. (See Appendix I, Persons Interviewed.)

- Visits to the project site. A first visit was carried out to obtain an overview of the project area and to identify specific problems. Second and third visits were conducted to assess assumptions made in project design and to identify physical evidence of project impact.

3. Report structure

The evaluation report consists of eight sections: A) Methodology and structure; B) Project history; C) CD/I implementation 1985 -1990; D) CD/I extension 1990 - 1992; E) Findings; F) Major conclusions; G) Principal recommendations; and H) Lessons learned. The most critical sections are *C) CD/I Implementation 1985-1990; D) CD/I Extension 1990-1993; E) Findings; F) Major Conclusions; G) Principal Recommendations; and H) Lessons Learned.*

Section C is a summary of implementation, accomplishments and impact for the original project period, 1985-1990. As a prelude to assessing the impact of incremental USAID funding under Section E, Findings, Section D provides a detailed description of rationale, focus and priorities for the CD/I 1990 -93 extension.

Section B: Project history

1. Context

a. Project overview

The Crop Diversification/Irrigation (CD/I) Project was authorized as a five-year, $18-million loan and grant program in September 1985. The goal of the project was to develop the agricultural sector to increase productivity, increase employment and enhance Jamaica's capability to earn and save foreign exchange. The project purpose was to reinforce the institutional capacity of Agro-21 to develop private, agricultural investment in Jamaica to achieve these goals.

CD/I was created in an era when solutions to development constraints were being attempted more often through project initiatives than through extensive macroeconomic reform. Projects like CD/I were expected -- over relatively short time frames of five to seven years -- to create exponential growth through foreign investment. In Jamaica, export led strategies were considered to be essential for future economic growth. Nonetheless, the 1985-90 period was often characterized by continued policy conflicts between advocates of free market versus populist policies.

b. Economic setting

In the early 1980s, the Jamaican economy was subjected to continuous negative trends in external trade. These deficiencies were caused by weak international markets for major exports, such as alumina, bauxite, traditional exports and tourism. In 1984, the balance of payment deficit absorbed $289 million of foreign-exchange reserves, and the fiscal deficit stood at 18 percent of gross domestic product (GDP). Jamaica's imbalances were exacerbated in 1985, when bauxite and alumina exports fell by $150 million, and tourism receipts declined by $21 million. Furthermore, foreign-exchange earnings continued to slide as a result of depressed world market prices for sugar.

To overcome these fiscal constraints, the GOJ set out to encourage private sector investment in nontraditional sectors in order to create a more reliable economic base for generating foreign exchange and employment. In particular, the GOJ decided to reduce its reliance on conventional commodities, such as bauxite and sugar. In agriculture, the GOJ's formula for economic growth consisted of a multifaceted combination of investment promotion and fiscal incentives for new ventures. The motive was to attract resources, access new markets and transfer technology through direct investment by large-scale foreign and domestic agribusiness.

c. Agro-21 Corporation

Agro-21 was created in 1983 by the GOJ to spearhead export-led private investment in nontraditional agriculture. Its modus operandi was to make up to 20,000 acres of abandoned or underused sugar land available for foreign investors' production of winter vegetables, ornamental horticulture and other high-value export crops. Agro-21's first step was to establish a crop diversification program targeted at 13,400 acres in St. Catherine's Plain. The program was to consist of four principal activities: 1) encouraging local and/or foreign investors to use leased land in St. Catherine; 2) rehabilitating and upgrading the RCIW; 3) operating and maintaining the rehabilitated irrigation works; and 4) establishing linkage activities to facilitate technology transfer and small farmer access to export markets through promoting the mother farm/satellite small farmer production model.

In 1989, Jamaica's newly elected political party gave up its long-standing commitment to a mixed economy and opted to continue economic liberalization programs initiated by the previous regime. By that time, however, the Agro-21 foreign investor strategy had failed and was immediately abandoned by the GOJ in favor of indigenous investment in traditional crops. For CD/I, this led to government decisions about management and diversification in 1989 that resulted in notable changes in assumptions, strategy and focus for the extended 1990 - 1993 LOP.

2. USAID support

a. Funding resources

In 1985, through a CD/I loan and grant agreement with the GOJ, USAID agreed to provide $5 million in loans and $13 million in grant support to Agro-21. These resources were to be used for investment promotion, rehabilitation and operations and for maintenance of the RCIW. Agro-21 was to facilitate crop diversification, foreign-exchange earnings and technology transfer through foreign investment in large mother farms. CD/I funding was allocated to four project elements: 1) strengthening Agro-21; 2) small infrastructure rehabilitation; 3) operations and maintenance (O&M) and 4) small farmer linkages.

The $5-million loan was committed in increments for about half of the infrastructure rehabilitation and for a third of the costs of long- and short-term technical assistance. Likewise, grant funds were to be allocated periodically to cover other costs, including operations and maintenance and the small farmer elements. On September 30, 1985, USAID obligated its first tranche of $6 million -- a $4.8 million loan and a $1.2 million grant to Agro-21. Subsequent adjustments were made through 11 amendments to the CD/I loan and grant agreement.

b. Targets and end of project status

By September 30, 1990, the project was to have accomplished the following: 1) enhanced Agro-21's capability to attract investors; 2) transformed underused land into export-oriented production of high-value crops; 3) created commercial linkages between large and small farmers; 4) resulted in greater self - sufficiency in food production; 5) increased employment; and 6) set fee structures to ensure that water - user charges would cover O&M costs for the Rio Cobre system. Quantitative targets, with the exception of employment, were not specified for the other indicators.

3. Key events and milestones

a. Priorities and commitments

About 85 percent of the $18 million committed to the project was set aside to cover physical works and personnel costs associated with irrigation technical assistance. Only $982,000 was allotted to activities related to crop diversification and small farmer linkages. Of that amount, $240,000, or 24 percent, was budgeted for staffing. Thirty four percent, or $335,000, was budgeted for training, and $326,000, or 30 percent, went towards a special projects fund for problem-solving and trouble-shooting activities.

Because of the GOJ policy that Agro-21 should have the capability to respond quickly to investor requests for irrigable lands, GOJ vested Agro-21 with overall authority and responsibility for both land divestment and irrigation. Agro-21's approach to upgrading the RCIW was to let investors' needs dictate the rate and direction of off-site infrastructure improvements. As the need for development of specific tracts arose, Agro-21 would initiate the requisite construction. This market response approach was considered

the most practical and cost-effective for project implementation.

b. National Irrigation Commission

From 1985-87, CD/I was managed by a divisional unit within Agro-21. However, conflicts soon surfaced between Agro 21 and the RCIW over operational versus legal control for rehabilitation work on the dam and canal system. Similar friction was expected with other district works involved in the national diversification effort. In 1986, the GOJ enacted an umbrella statute to establish NIC and was given ultimate authority over irrigation planning and implementation. The NIC's mission was to streamline irrigation management and improvements and specifically to focus on upgrading the Rio Cobre system.

NIC became operational in July 1987. Between 1987 and 1989, the commission concentrated on developing its organizational capacity while Agro-21 continued to coordinate rehabilitation of the dam and upgraded selective portions of the canal system destined to supply water to the first wave of Agro-21 projects.

c. Impact and modifications

The Agro-21 large farm strategy failed to attract foreign investors to St. Catherine Plains. By 1989, only one project, Intergrow, Ltd., located on an 800-acre site, had been started by Jamaican interests. Intergrow went bankrupt because of transport and marketing difficulties. The mother farm concept, the underlying rationale for the project, never materialized. Consequently, neither divestment nor small farmer linkages were achieved during the first four years of implementation. In retrospect, the small farmer component would not have been viable since, at GOJ's request in 1985-86, that component's resources, $982,000, were taken out of the CD/I budget to provide emergency flood relief.

A number of strategic adjustments were made to sustain project implementation between 1986 and 1988. First, Agro-21 decided to include alternative lands, mainly small farmer properties contiguous to the CD/I area, under the Project for irrigation support. The reason for this was based on the Project's need for a target group of nontraditional farmers in the CD/I area to justify continued spending on infrastructure, since there was no point in incurring expenditures for irrigation improvements on non-divested land. Second, Agro 21 developed a 225-acre horticultural park to demonstrate the viability of ornamental and foliage production and to stimulate local interest in horticultural ventures in that subsector. Third, the emphasis on winter vegetables was switched to encompass crops such as papaya and bananas in the Project area. Fourth, there was a change in client focus as Agro-21, with A.I.D. endorsement, decided to target medium-scale Jamaican investors as a means to attaining project objectives.

d. Unforeseen events

Despite these changes, a series of unanticipated circumstances were to permanently alter the potential impact, scope and focus of the project. In 1986, seven thousand of the 13,400 acres of project lands were reassigned to Petronol, Ltd., for growing sugarcane for ethanol production. Then the Rio Cobre Dam was partly damaged when Hurricane Gilbert hit Jamaica on September 12, 1988. In addition to crop and soil damage, the ensuing emphasis on relief work, water diversion and dam repair set back the project by 12 months. A change of government occurred in February 1989. The new government reestablished the Ministry of Agriculture's (MOA) lead role in agricultural development and reinstated its emphasis on increasing traditional exports. In April 1990, GOJ approved use of 911 acres of project lands for a 10,000-unit housing project at Portmore. This approval signaled the impending commercial-

ization of Blocks A, B and E, some of the best agricultural lands in the CD/I area. Illegal sand mining, prevalent in Caymanas since the late 1970s, soon intensified in response to emerging real estate opportunities in Kingston and St. Catherine. In the process, between 300-600 acres of irrigable lands, electric infrastructure and irrigation equipment were destroyed. To make matters worse, the Rio Cobre Dam collapsed under a record flood on May 22, 1991, eliminating water supplies to the project area. Subsequently, pumping brought supplies back up to 50 percent of the dam's normal flow rate.

e. Project status

In March 1989, to identify corrections and improvements in project design and implementation, USAID performed a mid-term evaluation of CD/I. In April 1989, the GOJ assigned Agro 21's divestment responsibilities to the Agricultural Development Corporation (ADC) and spun off the NIC as a separate government agency. However CD/I's engineering activities and staff were all transferred to the NIC. At that time, the GOJ agreed to assume most of the responsibility for funding CD/I-assigned staff before the project assistance date (PACD). In 1990, a J$5.2 million Housing Reimbursement Fund (HRF) was created as a project appendage after the GOJ agreed to refund CD/I for the cost of irrigation work on lands in the Portmore housing project. Housing Reimbursement Fund funds were used for additional infrastructure, such as canal reinforcement, new wells and repairs in the Project area.

Recommendations from the mid-term evaluation were incorporated in Project Paper Supplement (PPS) No.1. dated June 27, 1990. The PPS provided an additional $2 million for continued work on three of the four original project elements: 1) small infrastructure rehabilitation; 2) operations and maintenance; and 3) small farmer linkages. The supplement also extended the PACD by three years to September 30, 1993. Project Paper Supplement No. 1 increased total CD/I funding from $18 million to $20 million. The additional $2 million and the three-year extension were expected to 1) facilitate a more realistic and liberal divestment program to be administered by the ADC; 2) fund training to small farmers in on-farm water management; 3) provide financial support to strengthen the NIC's institutional capabilities; 4) focus on site-related irrigation work in small farmer areas, such as Spring Village, Hartlands and Hill Run, as well as in the newly targeted divestment areas in Blocks A, B and E; and 5) finance common infrastructure at the dam and headworks and finance related long- and short-term technical assistance.

A second project paper supplement, PPS No. 2, was instituted in July 1991. For temporary measures to provide water supplies to the project area and to finance part of the reconstruction costs for the Rio Cobre Dam, PPS No. 2 reallocated $1 million of the $2 million committed in PPS No. 1. Finally, in view of the recent GOJ emphasis on traditional crops and the project distortions created by the several unanticipated events highlighted above, project funding was put on hold pending assessment and recommendations of this evaluation.

Section C: CD/I Implementation 1985-1990

1. Introduction

a. Approach

Section C provides summaries of the four CD/I project components, funding and financial flows, and accomplishments and impact during the original five-year life of the project. The summaries and the financial overview were drawn from project paper and CD/I loan and grant agreement descriptions and subsequent amendments. Conclusions about accomplishments and impact were derived from current

findings, from observations of the mid-term 1989 evaluation and from the project background contained in the PPS. No. 1. Part I also provides a more in-depth assessment of the implementation of the small infrastructure rehabilitation component from 1985 and 1990.

b. Analytical framework

Analysis of the first five years was confined by the absence of a continuous institutional memory for that period. CD/I's impact on Agro-21's capabilities and on its accomplishments was difficult to discern since the organization's operations were terminated in 1989. Similarly, CD/I funds for the operations and maintenance component were used to finance short-term TA and long-term personnel, most of whom are no longer with the project or with the ADC, Agro-21's parent company at the time of the evaluation. The review of 1985/90 activities was restricted partly because the SOW required the team to concentrate on issues relating to the 1990-1993 CD/I extension and because of the level of effort allowed for such a review.

2. Description

a. Project summary

The CD/I project was designed to develop the agricultural sector's capacity to increase productivity, employment and foreign-exchange generation. To accomplish this, the project was expected to accelerate investment in irrigable lands in St. Catherine suitable for high-value production of nontraditional export crops. The purpose of the project was to reinforce Agro-21's capacity to facilitate private agricultural investment in Jamaica. The project was to focus on four principal activities: 1) strengthening Agro-21; 2) small infrastructure rehabilitation; 3) operations and maintenance; and 4) small-scale farmer linkages.

b. Financial overview

CD/I funding resources consisted of a $13 million grant and a $5 million loan for implementation of the four components. Table I, page 63, provides a classification of planned obligations at the start of the project:

On September 30, 1985, USAID obligated the first tranche of $6 million: a $4.8 million loan and a $1.2 million grant to Agro-21. The $12 million, with changes in the loan/grant mix, was obligated in subsequent tranches through six amendments to the CD/I Loan and Grant Agreement between September 30, 1985, and June 28, 1989.

c. Strengthening Agro-21

The purpose of the Agro-21 component was to enhance the Corporation's institutional capability to diversify crop production in Jamaica. Agro-21 was the GOJ's key implementing agency for its diversification program. The program consisted of 1) investment promotion, 2) 49-year leases and 3) restrictions on production of traditional crops to protect domestic markets for small farmers and to encourage exclusive production of export crops. To finance 10 long-term staff, CD/I committed up to $3,705,000 or 22 percent of its resources to this component. Personnel included an expatriate consulting irrigation engineer, second irrigation engineer and a procurement specialist. Third-country nationals and locally hired staff would consist of a hydrogeologist, an irrigation engineer and two site engineers. Short-term technical assistance included a variety of agricultural and environmental specialists. Commodities consisted of five vehicles, computer software and funding for logistical and operating costs.

d. Small infrastructure rehabilitation

The goal of the SIR component was to repair, upgrade and improve the RCIW. The system had the potential to serve up to 24,000 acres of top-quality agricultural lands in St. Catherine Plains. CD/I financing of all off-site land and infrastructure projects in the area was not expected. However, SIR sub-projects had been identified that, once completed, would improve water delivery to up to 13,400 acres in Blocks A-K, which were to be targeted for diversification and divestment. (See Map I, Original CD/I Project Area in 1985, page 53.)

CD/I obligated up to $10,130,000 or 56 percent of its resources to this component. These resources were to be used to finance pipelines, wells and irrigation facilities; rehabilitate canals; and upgrade and improve headworks/Rio Cobre Dam and the main canal. It was expected that Agro-21 would provide off-site improvements only. Investors would finance on-site improvements, such as land leveling, drip and sprinkler irrigation and shade and pack houses for their projects. Thus, CD/I rehabilitation work on the headworks, dam and main canal were to be implemented on an on-going basis while off-site improvements, such as pipelines, wells, irrigation facilities and minor canal lines were to determined on the basis of investor demand for large tracks or blocks of up to 1,000 acres.

e. Operations and maintenance

The objective of the operations and maintenance (O&M) component was to upgrade the GOJ's overall capability to properly operate, maintain and manage the rehabilitated RCIW. Technical assistance was to be channeled through Agro-21, the RCIW and the Underground Water Authority (UWA). CD/I assigned $3 million or 17 percent of its funding for O&M work. These resources funded a director, administration/liaison Rio Cobre Water System for 36 months; an institutional assessment study; a counterpart RCIW general manager for two years; short-term TA, such as water use extension and a rate specialist; RCIW operational support; training; commodities; and small infrastructure and commodities for UWA environmental monitoring work in the project area.

f. Small farmer linkages

The purpose of the component for small farmer linkage (SFL) was to facilitate small farmer access to technology, market outlets and land and to create supplemental employment. To facilitate such access, the SFL would examine ways to develop complementary arrangements under the mother farm model to link larger commercial farms and agribusinesses with smaller producers.

Up to $982,000, or 5 percent of CD/I's resources, was committed to this component to fund a director for small farms programs, additional specialists in areas such as export marketing and new product development, training and field trials for small farmers and a special projects fund for quick response to problems affecting the interests of small farmers in the project area.

3. Findings

a. Institutional strengthening

Agro-21 institutional strengthening, at least in the area of irrigation development, was well executed. Within the first 24 months of implementation, the consulting engineer, third country nationals and local staff were contracted and short-term technical assistance initiated in the project area. For example, lining of the Cumberland Pen canal leading into Blocks A, B and C was completed as early as December 1985.

The mid-term evaluation team's findings, conclusions drawn from discussions with the former managing director of Agro-21 and with NIC staff and a review of NIC data all indicated that Agro-21 made a significant contribution to the GOJ's goal of developing a national irrigation capability to enhance the viability of high-value agriculture in Jamaica. Agro-21's operations were terminated for performance, organizational and political reasons, but its institutional capability in irrigation management was successfully spun-off when all of its CD/I-financed technical personnel were transferred to the NIC in 1989.

b. Crop diversification

Agro-21 failed to attract sustainable investment under the project. As a result, it never achieved two of its primary objectives in the CD/I area -- land divestment to private sector agribusiness and diversification away from sugarcane and into high-value export crops. NIC had attracted only one venture, Intergrow, Ltd., a consortium of local business interests. The venture went bankrupt in 1989 as a result of poor arrangements for marketing and transport.

Jamaica's attempts to attract large ventures through intensive investment promotion did not work because its production costs were uncompetitive with Central American countries offering similar investment concessions to U.S. agribusinesses. Equally important, Jamaica's production and marketing base was severely constrained by the lack of an export track record as well as technology, infrastructure and trained and/or experienced personnel.

Export markets for crops such as winter vegetables are difficult to secure and require reliable post-farm systems for storage, delivery and transport since the window of opportunity is small for highly perishable vegetables from Caribbean Basin Initiative (CBI) countries into the U.S. However, Jamaica lacked the needed post-farm support services to guarantee dependable handling, transport, storage and shipment of high-value fruits and vegetables on such a large scale, from farms averaging 1,000 acres.

The mother farm strategy was also publicly rejected by Jamaica's opposition political party. It was also perceived as a neo-colonialist manipulation of land and labor by substantial portions of the population. High entry-level loan and equity requirements, often more than $1 million for mother farms of approximately 1,000 acres, limited the number of eligible investors with the capital and management to run such operations at a profit. Finally, Agro-21's lease provisions restricted investors from producing food crops for the domestic market thereby eliminating the potential for larger local farmers to participate in the program since they possessed minimal technical knowledge and/or experience in commercial farming of winter vegetables or other high-value export crops.

c. RCIW improvement

Despite setbacks with large-scale investment, the SIR component was well implemented, first by Agro-21 and then by the NIC, over the original life of the project. The extent of CD/I improvements to the Rio Cobre system was determined by comparing a list of infrastructure activities proposed in the project paper and in the CD/I loan and grant agreement, PROAG, with an inventory of accomplishments summarized in a 1991 NIC status report. To verify the data, both lists were cross-referenced against the evaluation team's findings on major CD/I Project engineering sub-components in Table IV, page 65. The assessment of progress against project paper (PP) and PROAG targets was as follows:

Planned activities. The project paper and the PROAG agreement listed 15 infrastructure sub-projects or activities targeted for completion by the original PACD of September 30, 1990. By 1990, initial work was started on eight sub-projects, of which two were in progress, two pending and three canceled because of the lack of investor requests for irrigable lands or because they were deemed technically unfeasible. The impact of these activities include water delivery to 665 acres in Block A; upgrading of irrigation service to 5,000 acres in Hill Run; increased water availability through drilling and equipping of 15 wells in Block B, C and E; irrigation of 225 acres at the horticultural park; and improved water delivery to 2,000 acres of redundant cane lands in Block E.

Unplanned activities. In addition to planned sub-projects, Agro-21 developed five new sub-projects between 1985 and 1990. These sub-projects consisted of work required to maintain the physical integrity of the system, activities to facilitate maintenance of the system and initiatives for small farmer irrigation. These sub-projects reflected a change in project focus, described below.

Three events forced Agro-21 to modify its implementation plans and to change the focus of its sub-project activities. First, in 1986, the GOJ reassigned 7,000 of the 13,400 acres of targeted lands to Petronol, Ltd., for growing sugarcane for ethanol production. As a quid pro quo, lands belonging to small farmers in adjacent areas were included in the project area. Second, Agro-21 attempted to develop Block B, on Caymanas Estate, and Block E on Bernard Lodge Estate for large-scale banana cultivation. Third, to demonstrate the viability of nontraditional export crops to attract both local and medium-scale investors to the project area, the NIC decided to establish a 225-acre horticultural park in Block C in 5 x 45-acre lots.

The NIC's decision to switch its focus to medium- and small-scale farmers in the broader St. Catherine area resulted in small farmer communities in Spring Village and Bushy Park being included in a revised project site. (See Map III, Revised Project Area 1986-1990, page 57.) CD/I's commitment to assist these groups preceded Project Paper Supplement No. 1, which endorsed the strategy in June 1990. For example, in order to improve water supplies to 121 farmers on 100 acres in Spring Village, Agro 21 and the NIC started work on improving the Spring Village irrigation infrastructure between 1988 and 1990. CD/I upgraded RCIW's distribution to 2,000 acres in Bushy Park and to surrounding areas by rehabilitating the Bushy Park canal. The project also maintained the integrity of the system by constructing a retaining wall to the left bank of the Rio Cobre Dam to correct damage caused by Hurricane Gilbert and by improving maintenance by de-weeding work on the main canal.

These activities were not envisioned at the start of the project, but were commendable initiatives on the part of Agro-21 and CD/I technical staff. In the case of small farmers, CD/I irrigation work increased water supplies and resulted in greater vegetable production yields among members of the St. Catherine Vegetable Producers Association (SCVPA), a fledgling group of small farmers interested in increasing sales to domestic and export markets.

d. RCIW management

The major impact of technical assistance under the O&M component was that it led to the creation of a national authority for coordinating development of irrigation systems in Jamaica. The recommendation to create NIC was the outcome of a CD/I-financed study commissioned by Agro-21 to assess the institutional arrangements for management, operation and maintenance of the St. Catherine and St. Dorothy irrigation systems and to offer recommendations for an acceptable reorganization for accountabil-

ity of management performance and sustainability of the systems based on equitable user fees. The study had been proposed in the CD/I Project agreement and was conducted by Dr. Garnett Brown, then Agro-21's director, administration/liaison for RCIW.

Another key accomplishment was the implementation of a revenue-generating policy for all national irrigation systems as a first step towards financial sustainability. At the start of the project, Agro-21 commissioned a CD/I analysis of water rates that led to a new fee structure and new billings/collection procedures. These changes have resulted in substantial increases in both rate collection and revenue generation for RCIW. The revised fee structures and the new billings and collection procedures were designed with Israeli technical assistance and financed under the CD/I Project.

e. Small farmer impact

The SFL component failed to facilitate small farmer access to technology, market outlets, land and supplementary employment because Agro-21 was unable to attract to the project area more than one large venture, Intergrow, Ltd. Even Intergrow never needed to establish small farmer linkages since it could not make full use of its leased 800 acres. A 1989 midterm evaluation noted that the entire SFL budget of $982,000 was accessed for emergency flood relief in rural areas in 1985/86. The evaluation also concluded that Agro-21 had a negative image among the small farmer community. It was generally viewed as a bastion of large-scale, overseas investors who lacked interest in development for the small farmers.

In retrospect, the SFL component may not have succeeded even if the mother farm concept had been moderately successful. The reason for this lack is that none of the key features for effective implementation had been considered by Agro-21 before development of its diversification strategy.

The mother farm model worked well in countries like Kenya, where arable land is limited. The average size of nontraditional farms in that country is approximately 100 acres. The model also worked in The Gambia, where multi-cropping programs led to production sub-contracts for small farmers in proximity to mother farms ranging in size from 100-200 acres. The concept has been best executed when the large investor is domiciled or has a permanent stake in the country and where the investor's ongoing business ventures indicated a consistently visible and successful track record before initiation of the mother farm/satellite operation. The following are key preconditions for successful implementation of mother farm systems for production in emerging economies: trust on the part of small farmers; need on the part of the larger agribusiness investor; and commitment by the lead investor in terms of technical assistance, logistical support and hands-on advice. These prerequisites are especially relevant to Jamaica, where the country's colonial past and a high frequency of dubious foreign investor deals have presaged small farmers' skepticism concerning benefits of participating in such arrangements.

In contrast, the average CD/I mother farm acreage, 1,000, was more than adequate to fulfill the production requirements of most export ventures. Therefore, like Intergrow, the typical mother farm would have no motive to link with small producers for additional output. Nevertheless, more than 600 small farmers in sections of St. Catherine contiguous to the project area, such as Spring Plains, Bushy Park and Hartlands, benefitted from improved delivery and increased water supplies under the project and have increased both production and productivity between 1985 - 1990.

f. Use of financial resources

Between September 1985 and July 1990, USAID-obligated loan funds under the CD/I loan and grant agreement increased from $5 million to $8.1 million while grant commitments were reduced from $13 million to $9.9 million. These changes were reflected in adjustments to three line items: 1) an increase in short-term technical assistance from 2 percent to 8 percent of project funding; 2) a decrease in infrastructure rehabilitation from 56 percent to 51 percent, and 3) an adjustment to contingencies and inflation from 10 percent to 2 percent of the $18 million budget. (See Table II, page 63.)

Short-term technical assistance was increased under the loan component to finance up to 40 NIC staff and senior personnel and for Israeli expertise and for contracts for water user training. Commitments for infrastructure declined because of cancellations of unfeasible sub-projects, temporary delays in subcontractor implementation caused by strike action before the 1989 general election and the postponement of canal rehabilitation work in the aftermath of Hurricane Gilbert in September 1988.

According to NIC personnel, since infrastructure rehabilitation was the largest budget item, shortfalls or overspending in other line items were rectified by reallocating funds from the infrastructure rehabilitation budget.

4. Conclusions

- Agro-21 institutional strengthening, at least in the area of irrigation development, was well executed. Between 1985 and 1990, Agro-21 and CD/I technical staff made a positive contribution to the GOJ's goal of creating a national irrigation capability to enhance the viability of high-value agriculture in Jamaica.

- Agro-21 failed to attract sustainable investment under the project and, therefore, did not achieve two of its primary objectives in the CD/I area: land divestment to private sector agribusiness and diversification away from sugarcane and into high-value export crops. Overall, the CD/I Project had no impact on sustained crop diversification or divestment on the 13,400 acres of targeted land in St. Catherine.

- The SIR component was well implemented, first by Agro-21 and then by the NIC, over the original life of project. CD/I improved water delivery to 665 acres in Block A; upgraded irrigation service to 5,000 acres in Hill Run; increased water availability through drilling and equipping of 15 wells in Block B, C and E; irrigated 225 acres at the horticultural park, and enhanced water delivery to 2,000 acres of redundant cane lands in Block E.

- Although the diversification and divestment program failed to materialize, CD/I irrigation work has had a positive impact on vegetable production and yields by increasing water supplies to about 350 members of the St. Catherine Vegetable Producers' Association, a fledgling group of small farmers interested in increasing sales to domestic and export markets.

- The major impact of O&M technical assistance was that it led to the creation of a national authority for coordinating development of irrigation systems in Jamaica. Another key accomplishment was implementation of a revenue generating policy for all national irrigation systems as a first step towards NIC financial sustainability.

- The SFL component failed to facilitate access to technology, market outlets, land and supplementary employment because Agro-21 was unable to attract large, viable ventures to the project area. The SFL component was not activated between 1985 and 1990. However, the inclusion of small farmer groups in the project area in 1986 resulted in improved irrigation services to privately owned plots of one to five acres of vegetable and food crops, with little exception, for the domestic market.

In summary, between 1985 and 1990, USAID committed to CD/I up to $18 million of loan and grant resources. By June 1990, CD/I had failed to achieve its stated goal of increasing employment and generating foreign exchange from large-scale production of underused lands. However, productivity on irrigated lands increased as a result of greater water flow to those areas.

Section D: CD/I Project extension 1990-1993

1. Introduction

a. Purpose

On June 27, 1990, the CD/I Project completion date was extended by three years to September 30, 1993. The purposes of the extension were the following: 1) to complete construction/rehabilitation work on the Rio Cobre irrigation system; 2) to provide additional support to the NIC for further policy reform and institutional strengthening; and 3) to provide limited support to the GOJ for its new land divestment program.

USAID agreed to provide an additional $2 million in grant funds for long- and short-term technical assistance, commodities, operational support and irrigation rehabilitation for small farmers. (See CD/I Project Paper Supplement No. 1, Page 1. Summary and Recommendations.)

b. Background

CD/I performance between 1985 and 1990 produced mixed results. By the end of its original LOP, the project had facilitated establishment of a national capability for developing irrigation systems for high-value crops and had stimulated policy reform on irrigation coordination and development. As a result of these initiatives, the GOJ created the NIC in 1987.

The NIC was granted legal authority for management and operations of Jamaica's irrigation systems and, in December 1988, was empowered to set, collect, retain and use water fees for irrigation operations and maintenance. Within two years of existence, the commission revised its fee rates and collections procedures, thereby enhancing its capacity to generate revenues on a commercial basis. The project, through joint NIC/Agro-21 coordination, also conducted irrigation rehabilitation with reasonable efficiency despite occasional setbacks resulting from preelection unrest, damage done by Hurricane Gilbert and delays in the release of Fiscal Year 1988 funding.

On the other hand, CD/I failed to achieve its stated goal of increasing productivity and employment and generating foreign exchange through large-scale production of underused lands. Moreover, with the exception of sugarcane and traditional vegetables, the project's large-scale divestment and diversification programs had little or no impact on increases in crop production. These latter crops were produced by small farmers on lands which, at least initially, were not part of the targeted, 13,400-acre project area.

c. Approach
This section consists of the following: 1) a synopsis of CD/I priorities, focus and performance indicators for the three-year extension; 2) a financial overview of incremental resources added to the project; and 3) summary descriptions of the key component activities funded under the CD/I extension excerpted from Project Paper Supplement No. 1.

2. Description

a. Priorities
Under PPS. No. 1, USAID and NIC established the following four implementation priorities for the October 1, 1990-September 30, 1993, extension period: 1) completion of irrigation rehabilitation work to benefit small- and medium-scale farmers in newly divested areas, Blocks A, B and E; 2) continued strengthening of NIC's institutional capabilities; 3) training in water use management to small farmer groups situated in the revised project area (See Map IV: CD/I Project area for project extension period 1990-1993, page 59); and 4) support for new USAID/GOJ initiatives relating to divestment of GOJ lands in the CD/I area.

b. Performance indicators
To encourage adherence to PPS priorities, USAID identified three key performance indicators against which the Mission would measure the GOJ's commitment to achieving objectives of the project. These indicators were the following:

- divestment of large blocks of land into small and medium units
- increased fee collection for water users and
- improved sustainability of the National Irrigation Commission.

c. Financial overview
Up to $1,865,000, or 93 percent of the incremental, $2 million CD/I grant to the NIC, was committed for a combination of infrastructure rehabilitation and continued financing of key personnel contracted or employed by the commission (See Table III, page 64).

d. Small infrastructure rehabilitation
The additional $1 million funding to continue irrigation improvement was committed to infrastructure rehabilitation in support of the new GOJ divestment program, as well as for irrigation improvements for small farmer areas taken into the project and common infrastructure work at the Rio Cobre Dam and headgates to the main canal.

Rehabilitation to support divestment included repairs and construction in Blocks A, B and E. Planned support for small farmers was to include reservoir construction and pump installation for small farmers at Spring Village and construction work at Turner's Pen and Hartlands Canals.

e. Operations and maintenance
Between 1985 and 1990, USAID financed up to 40 positions at the NIC. The number of CD/I-funded positions was reduced to 18 during the last 24 months of implementation. Under PPS No. 1, USAID agreed to finance only three positions, NIC chairperson, managing director and managing engineer. The agreement was for a maximum of 24 months of the 36-month extension. As Table III, page 64, indicates,

$604,000 was budgeted for long-term TA, of which $411,000, or 68 percent, was to be set aside for these costs. The NIC was expected to collect sufficient water user fees in 1991 to finance its staff positions on a continuous basis thereafter. In addition, $146,000 of the $211,000 budgeted for operations was to be used to fund other, unspecified NIC operating costs.

f. Small farmer linkage

The SFL component will provide $25,000 in support for NIC and for the Rural Agricultural Development Authority (RADA) in providing outreach extension and training in water usage efficiency to small-sized and medium-sized farmers. Project activities were to cover two groups of farmers: those leasing divested land in Blocks A, B and E and those small farmers brought into the project in areas such as Spring Village, Hartlands and Hill Run. The component was also expected to investigate methods to strengthen associations of water users.

g. Land divestment support

This component provided $65,000 to support ADC transaction costs, such as titling, surveying and registration cost associated with the divestment of Blocks A, B and E to farmers and potential agribusiness investors in the project site.

h. Project paper supplement No. 2

In September 1991, USAID amended the original project authorization "in order to provide emergency assistance to the project as a result of major flood damage in May 1991" (CD/I Project Authorization Amendment No. 4). The purpose of the amendment was to reprogram $1 million of project funds to facilitate reconstruction of the Rio Cobre Dam. The dam was severely damaged by a record flood on May 22, 1991, when flood waters completely washed away its eastern section.

A second project paper supplement, PPS No. 2, reallocated all of the CD/I remaining resources to the SIR component. This component supported financing foreign-exchange costs of equipment, materials and engineering design services to rebuild the dam. At the time of the amendment, the NIC had completed some of the small infrastructure rehabilitation sub-projects targeted under PPS No. 1. The remaining sub-projects, specifically proposed work on Lawrence Field, Old Harbor and Spring Village systems, were cancelled in order to commit the remaining project resources for rebuilding the dam.

The O&M component, funding for NIC top management salaries, was to be supported from the GOJ's CD/I budget. In the case of the SFL component, to provide NIC extension and training to user groups in the project area, a specialist in water management usage was hired with resources from the Housing Reimbursement Project (HRP). At the time of the PPS. No. 2, surveys of lands to be divested under the new component for land divestment support were already completed and funded.

Section E: Findings

1. Small-infrastructure rehabilitation

a. Background

Irrigation water was at the time of this evaluation obtained from the Rio Cobre and from underground sources. Surface water was obtained from a diversion dam constructed in 1874 at a higher elevation than

most of the irrigated lands. A main canal of 4.7 km delivered water to 54 km of distributing canals. The original capacity of the canal was 6.3 m^3/sec (225 cfs). Because of weed growth and silting, however, the capacity at the time of the evaluation varied between 3.25 m^3/sec (115 cfs) and 4.81 m^3/sec (170 cfs). An additional 0.56 m^3/sec (19.6 cfs) was obtained from groundwater sources.

The location and rate of development of mother farms was intended to determine the direction and rate of rehabilitation of the RCIW. When the concept failed to materialize, however, engineering aspects of the project focused on rehabilitation of the complete RCIW system.

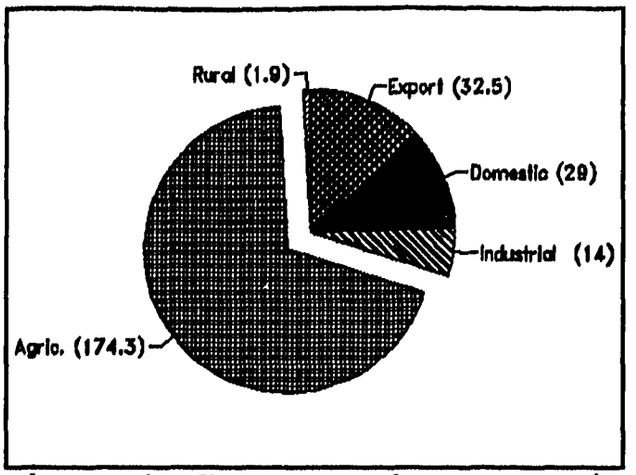

Figure 1: Water use by sector in the Rio Cobre Basin (Mm_3/year.) Adapted from UWC data, 1992.

b. Water demand and supply

The project area is located within the KMA[1]. As a result, it is subject to competition for land and water from urban and industrial sectors. Figure 1 shows water supply uses at the time of the evaluation. About 87 percent of the water resources in the Rio Cobre Basin were used within the basin. The remaining 13 percent were distributed to Kingston. Table V, page 66, shows the available water supply from sources in the basin.

Growing competition for agricultural lands and water was occurring in the project area. Acreage lost to the Portmore development project, illegal sand-mining operations and to the sabotage of the irrigation infrastructure are clear indications of this trend. As population continues to grow, water demands are expected to increase, placing pressure on the water resources used by the agricultural sector. (See Figure 2, next page.) Based on resource-production capability at the time of the evaluation, domestic water supplies for the KMA were estimated to be adequate until 1997 at best. (Earle and Assoc., Ltd., 1991.)

To increase available water supplies, the UWA has studied alternative water sources. Table VI, page 66, provides a summary of these alternatives. Using these data, the 1985 cost of managing a system for wastewater reuse would be between US $450 and US $700 for a sustained, 24-hour flow rate of 1 m^3/hr over a period of one year. These costs are too high for agriculture. A plausible alternative would be to exchange agricultural water suitable for domestic and industrial use for wastewater, with the non-agricultural sectors bearing the cost of managing the system for wastewater distribution.

Studies have indicated that aquaculture would be profitable if the Saline Ferry Springs were developed. Large reservoirs have been found to be an uneconomical alternative, but small reservoirs, short-term storage, may be economically feasible.

[1] Kingston, St. Andrew, South East St. Catharine, Greater Spanish Town

Successful agriculture in the project area depends upon irrigation. Rainfall varies considerably from year to year, with two distinctive dry seasons, one from June-August and another from November-April. Therefore, irrigation is required to supplement rainfall during rainy seasons with the exception of October for some crops. Figure 3 shows the irrigation requirements for some crops grown in the area.

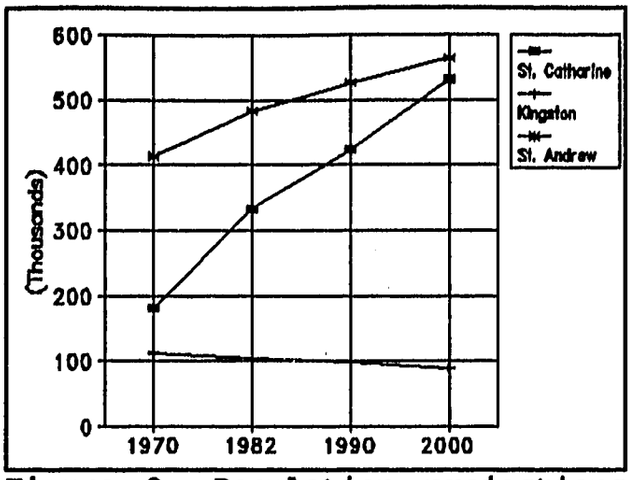

Figure 2: Population projections for the KMA area. Adapted from PIOJ data.

Beneficial use of surface or underground water is closely related to conveyance, distribution and irrigation efficiency. Significant improvements have been made in conveyance through the rehabilitation of the Rio Cobre delivery system and wells in the project area. (See Table IV, page 65). These improvements are a major contribution of the project to farmers in the RCIW area. Interviews with growers indicated that positive impacts include increased yield for traditional crops, as well as facilitating cultivation of cash crops. However, major water savings are yet to be achieved from improvement of irrigation efficiency (E_{irr}).

E_{irr} values in Table VII, page 67, reflect a lack of attention to on-farm water management and a probable lack of understanding of its importance. For example, closer scrutiny of the value used by the World Bank shows that irrigation efficiency was estimated by dividing crop water demands by allotted water, without any consideration to timeliness and uniformity of irrigation. From observations made in the field and general practices described by NIC extension and engineering staff, it is likely that typical values for E_{irr} range from 20 percent - 30 percent for surface water. Sprinklers systems observed in the field were clearly mismanaged and poorly maintained. In part, this mismanagement was due to the cost and lack of component availability.

If values of efficiency were as low as they seemed, major water savings could have been achieved by improving on-farm techniques for water management. (See Figure 4, next page.)

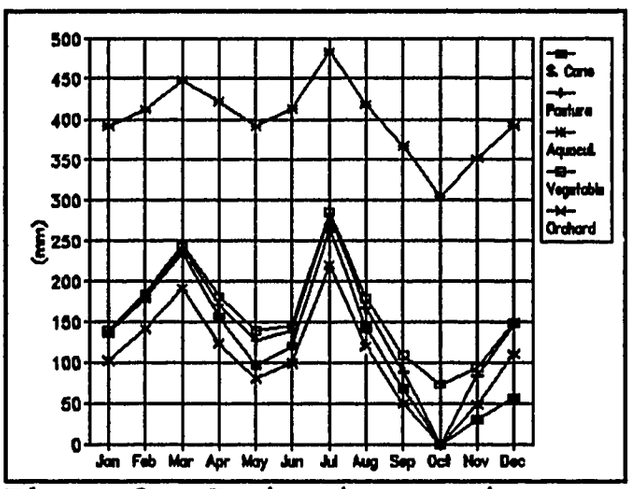

Figure 3: Irrigation requirements for selected crops in St. Catharine Plains. (Assumptions: E_{irr}=40% and LR=0.) Adapted from Earle and Associates, Inc. data.

c. Recovery of management costs

In the past, irrigation water was heavily subsidized. This subsidization was the result of low water rates and inefficient dues collections. Recently, the GOJ committed to reduce subsidies to management from less than 10 percent

to 50 percent nationwide. Rate structures applied to all public irrigation systems, with differential rates for small-scale and large-scale farmers. Table VIII, page 67, shows the rate structure since 1987 and projected rates to 1997.

The NIC established rates for the 1992-93 period, considering end-user acceptability of rates, decreasing government subventions and creating a need at the field level for more efficient use of the resource.

Because the RCIW system uses mostly surface water, management costs were substantially lower when compared to other irrigation districts in Jamaica. Figure 5 shows the relative contribution of surface water to pumped water for different irrigation systems in Jamaica as related to each of them. About 20 percent of RCIW operation and maintenance expenditures were used for electric-energy payments, compared to 79 percent for the Mid-Clarendon Irrigation Association and 67 percent for the Saint Dorothy Irrigation Association. In Jamaica, systems relying on irrigation water supply are expensive to operate. These include Hunslow, BRACO, Mid-Clarendon and St. Dorothy. Successful adaptation depends on other factors, such as NIC data, dynamic pumping depth and whether the water is surfaced or pressurized. Thus, with implementation of a new rate structure and collection mechanisms, the NIC has successfully increased collections and decreased GOJ subventions to management costs, as shown in Figure 6, next page.

Recovery is based on current management procedures and costs. As management is improved, related costs are likely to increase. The RCIW is the largest and, by far, the most economic system to manage. It relies less on electric power than on other system costs. Productive agricultural lands in this system are being lost to urban development and criminal activity because, in addition to the intrinsic

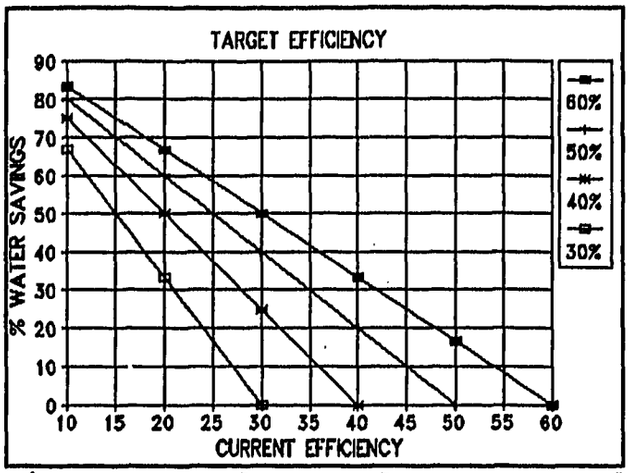

Figure 4: Volumes of water saved with increases in efficiency (*i.e.* If the current efficiency is 25% and it is increased to 60%, then 58% of the current volume of water used will be saved.) Calculated by evaluation team.

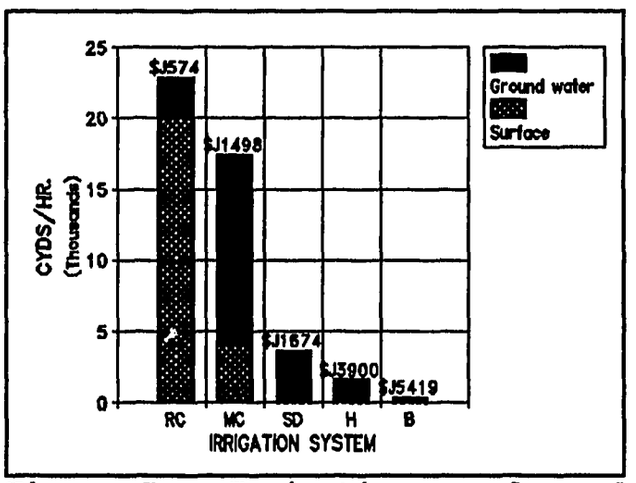

Figure 5: Irrigation supply and cost for irrigation water supply systems in Jamaica (Rio Cobre, Mid Clarendon, St. Dorothy, Hunslow, and BRACO respectively.) Adapted from NIC data.

value of agricultural lands, the remaining production areas are sensitive to the cost of energy, which is mostly imported to Jamaica as fossil fuel[2]. This will make Jamaica's agricultural competitiveness highly dependent on oil prices.

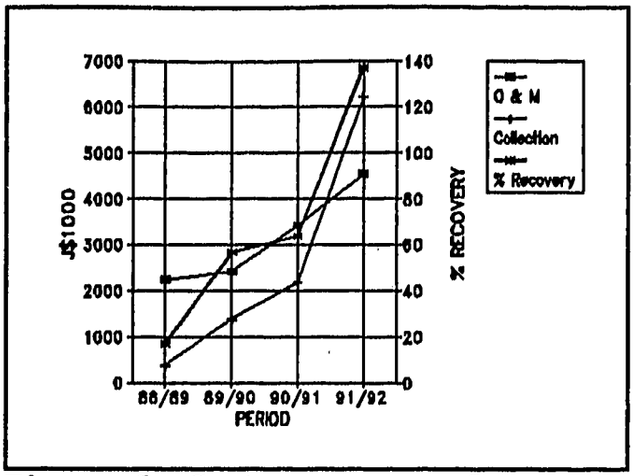

Figure 6: Cost recovery of management costs in RCIW. Adapted from NIC data.

d. Farmer profitability

The May 1991 failure of the dam demonstrated that irrigation water is required for agriculture to be profitable in the area. Field visits to growers adjacent to the project area revealed that they are not producing water sensitive crops, such as vegetables, and they expect yields for other crops to decrease significantly, by about 50 percent or less. Under normal operating conditions, net incomes demonstrated irrigated agriculture was profitable. (See Table IX, page 68.) Also, the price of water was affordable and accounted for a small production cost for some crops.

Water is critical to some 230 small farmers serviced in the RCIW area[3]. Water availability allows them to produce cash crops and maintain a weekly income. By multi-cropping, some of these farmers are able to produce a yearly income of J$80,000 to J$90,000 per acre.[4]

Producers in the vicinity of the project area are highly aware of the improvements that have been made in the availability of water. It is clear from interviews with small farmers, vegetable producers and aquaculture producers that they have benefitted directly from increased water availability as a result of the improvements to the infrastructure of the Rio Cobre system.

e. NIC strengthening

The engineering department at NIC is small. At the peak of the Agro-21 project, it consisted of six engineering full-time equivalents (FTE), two draftsperson FTEs and one purchasing staff FTE. With the completion of the tenure of the consulting chief engineer, the engineering department will be reduced to two engineering FTEs, one draftsperson FTE and less than one purchasing staff FTE.

It is the impression of the evaluation team that, for the past few years, the consulting chief engineer had been the engine for the engineering department. Without such initiative, it is unlikely that the NIC will

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[2] In 1989 88.6% of the energy consumed was from petroleum. Energy demands are expected to increase from 12.4 MFOE in 88/89 to 20.0 MFOE in 94/95. (GOJ, 5 year plan)

[3] Number of farmers who have contracted with NIC.

[4] Mr. Williamson, personal communication

maintain its aggressive approach to project design and installation. Most likely, it will have to contract design and installation to private firms. Depending on the size and number of projects, it may find itself in difficulties in preparing bid specifications, as well as inspecting installation and other field operations.

The extension department is seriously understaffed. It consists of three extensionists, one with responsibilities that require coverage of the complete island. In addition, operating resources, such as vehicles, funds for demonstrations and printed extension materials are inadequate. Staff training for extension technology is also lacking, as is a general understanding of proactive extension programming. The extension staff does not follow a plan of clearly outlined objectives. Extension activities that reached large audiences were few in number, as exhibited in Table X, page 69.

Extension efforts are insufficiently coordinated with other agencies to successfully incorporate or support water components in other extension programs. For instance, agricultural extension services were not well coordinated to farmers who had received divested lands. Only one of NIC's three extension officers had interacted with RADA extension staff. And this interaction was through chance meetings in the field or occurred on an ad hoc basis. This lack of coordination between principal agricultural support agencies left both small-scale and medium-scale farmers on CD/I land with inadequate on-farm water management training, as well as insufficient advice on agronomic practices.

Assessing O&M of the RCIW water delivery system was beyond the scope of this evaluation. However, some field observations indicated that improvements could be made. Some of the canals were invaded by vegetation, and significant amounts of trash were found.

2. CD/I Impact on productivity, employment and foreign-exchange earnings

a. CD/I impact on productivity

Agricultural productivity can be increased through changes in agronomic practices, including adoption of better cultivation techniques and use of improved inputs, such as pesticides, herbicides and fertilizers, seeds and plant varieties. Productivity can also be enhanced through reliable provision of irrigation water, adoption of optimal irrigation systems and application of agronomic techniques acquired through extension services.

Despite damage caused by Hurricane Gilbert in 1988 and the partial destruction of the Rio Cobre Diversion Dam in 1991, a result of the largest flood ever recorded in the Rio Cobre River, significant progress was made toward ensuring an adequate supply of irrigation water to the lands served by RCIW.

Those farms and agricultural enterprises served by the RCIW benefitted significantly from a flow that increased and became more reliable as CD/I rehabilitation efforts progressed on the RCIW. The importance of Rio Cobre irrigation was underscored by two diametrically opposite scenarios. First, according to estimates provided by Bernard Lodge Estates, CD/I improvements to the RCIW resulted in an increase of as much as 50 percent to 100 percent in productivity of sugarcane and traditional vegetables. The increase was measured in terms of yields on the same acreage. On the other hand, yields for all crops dropped significantly when water supplies were seriously curtailed as a consequence of the 1991 flood. For instance, calaloo growers did not have a crop to export. Vegetable production also suffered and aquaculture farmers were unable to expand their operations because of the uncertainty of water supplies in the 1991-92 period.

b. Impact on employment generation

No records on agricultural employment levels in the project area were maintained by Agro-21, ADC, NIC or USAID, either at the start of the project or during implementation. Therefore, the evaluation team could not determine the CD/I's impact on employment generation over the life of project.

The team, however, developed employment estimates for the project area from a combination of estimates for 16,017 acres of sugarcane, vegetables, livestock, aquaculture, cotton, orchard crops and ornamental horticulture production in April 1992. Table XI, page 69, shows that annual employment, based on standards for production of the various crops in the project area, was probably in the vicinity of 1,000-1,100 full-time workers with about 700 jobs, or 70 percent, generated in the sugarcane subsector. This estimate does not reflect seasonal employment, nor was any attempt made to determine the amount of incremental employment generated as a result of CD/I interventions.

c. Impact on foreign-exchange generation

With the exception of sugarcane, the level of foreign-exchange earnings generated from exports of nontraditional crops could not be determined by the evaluation team since data on export crops grown in the project area was consolidated by crop variety with exports from other parts of Jamaica. In 1989, about J$317.4 million, or approximately US$60 million, was produced in the area served by the RCIW. Since all of the sugarcane processed was exported, foreign exchange generated from the project area in 1989 was approximately US $24 million, or J $130.1 million, as shown in Table XII, page 70.

3. Small farmer linkages

a. Degree of diversification

Diversification in the project area occurred in two subsector groups: areas being divested from sugarcane by Agro-21, Blocks A-I, which will be referred to as the divested area and small farmer groups in the districts of Bushy Park, Hill Run, Hartland, Springvale and Thetford, which will be referred to as the small farmer area. A potential 15,684 acres in Blocks A-I were to be diversified and taken out of sugarcane. The condition of the sugarcane lands is indicated in Figure 7. The mother-farm concept heightened by the arrival of Intergrow, Ltd., during the period from 1985 to 1987 saw approximately 800 acres of these lands diversified to winter vegetables and melons, which were directed to an export market. As the result, however, of commercial failure of the Intergrow venture, these lands were at the time of the evaluation mostly ruinate. Table XIII, page 71, shows that from the total area of 3,315 acres divested by ADC, 753 acres, or 23 percent, were in sugarcane. Eighteen hundred and forty nine acres, or 55 percent, were ruinate, unused or under preparation, and 745 acres, or 4.75 percent, were diversified.

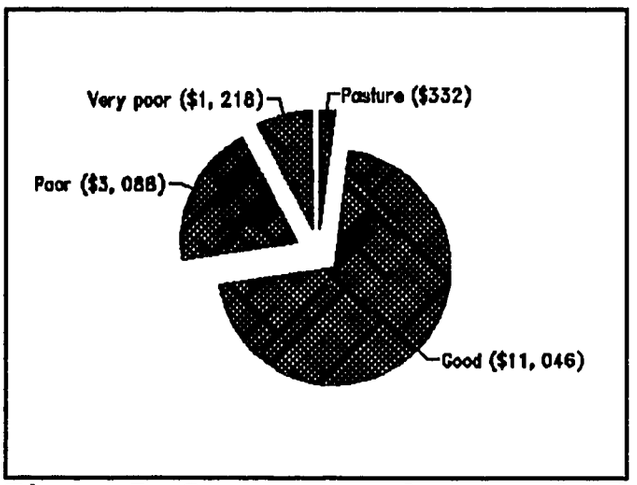

Figure 7: Sugarcane and pastureland acreage prior to diversification of estate lands.

Diversification efforts in the divested area suffered a number of set-backs, and, consequently, projected acreage and crops have not been achieved. A proposal to establish more than 1,000 acres of bananas in Blocks B, C and H never materialized. Similarly, only 50 acres of the 225 acre Horticultural Park for ornamental and foliage production were ever established. Table XIII indicated that 83.8 percent of the land in the divested area is in sugarcane, ruinate or unused. The large sugarcane acreage arises from the decision in 1986 to resuscitate nearly 7,000 acres of sugarcane lands for ethanol production by Petronol, Ltd.

Bushy Park, Hill Run, Hartland, Springvale and Thetford were traditionally used for vegetables and sugarcane production by small farmers before CD/I's inception. Increased availability of irrigation water has resulted in a wider variety of vegetables being produced on small farmer lands in those areas. Some farmers have focussed on export vegetable production, notably calaloo and scotch bonnet peppers. Others have accessed the local market.

As shown in Table XIV, page 71, 850 acres in the small farmer areas were identified in 1989 as being in mixed crops or pure stand (ASER, 1989). By 1991, this total increased to 1,129 acres. Thus, an additional 279 acres, or 6 percent of the total land in the small farmer areas, was diversified during the CD/I 1989-91 implementation period. The major source of additional land for increased diversification came out of ruinate lands in the area.

b. Activities and acreage under cultivation

Agricultural commodities produced in the divested area are the following: sugarcane, 753 acres; livestock (pastures), 252 acres; cotton, 220 acres; mixed crops (vegetables), 208 acres; ornamental horticulture, 50 acres; and orchard crops, 15 acres. Table XIII, page 71, shows acreage under each commodity. Livestock consists mainly of race horses and their accompanying stables and pastures. Cotton was recently introduced and remains at the experimental stage. Vegetables and other crops in the divested area were produced largely by Mr. Sam Patel. This produce was intended for export to the Indian ethnic markets in North America.

Agricultural commodities in the small-farmer areas were the following: mixed crops (vegetables), 1,129 acres; sugarcane, 573 acres; livestock 248; aquaculture, 234; orchard crops, 144. Vegetables produced were largely calaloo and scotch bonnet peppers for the export market and a wide variety of vegetables for the local market. Sugarcane production is indicative of a continued interest in growing a crop that, irrespective of natural adversities, will provide some income. Moreover, it is treated somewhat like livestock, where sales generate a lump-sum income for educational expenses, alternative investments outside of agriculture or repayment of loans. Most livestock consists of cattle and small stock. Contract farming as it relates to poultry is limited. Jentech Consultants reported 36 producers in aquaculture operations and a larger number present but inoperative for 1987 (Jentech, 1987).

Aquaculture and vegetable crops increased in the small farmer area. Jamaica Fish Farmers Association (JFFA) estimates indicated about 60 active producers in the area. Thus, an increase of about 24 producers occurred over the past five years. A visit to the Hill Run area provided information from the JFFA president that some cane lands either privately owned or recently purchased were being diversified to aquaculture. The extent to which this diversification had occurred could not be estimated against the background of ponds not actively used as a result of water. Orchard crops consist primarily of mangoes, for which a growing export market is developing. Environmental conditions were well suited to mango

production, and, therefore, it was expected to be an area of growth given the availability of water. A substantial 2,007 acres, however, remains in ruinate condition.

c. Financing of sugar and non-sugar activities

CD/I funding for irrigation-related activities in the Rio Cobre service area consisted of the following:

a) Small-infrastructure rehabilitation	$10,130,000
b) Operations and maintenance	3,000,000
c) Small farmer linkage	409,000

These activities focusing on the RCIW service were provided at a total cost of $13,539,000. NIC estimated about 79 percent of the water is used by cane farmers. Consequently, $10,695,000 can be associated directly with sugar production and $2,845,000 with non-sugar activities.

Before CD/I's inception, approximately 15,352 acres of sugarcane was cultivated in the diversified area. Eleven thousand and forty six acres, or 72 percent, was sugarcane in good condition and therefore likely, in terms of increased production, to be highly responsive to a more reliable source of water. Such a supply is a limiting factor for production. At the time of the evaluation, 230 NIC water users benefitted from AID financing of irrigation rehabilitation for the Rio Cobre system. Cane farmers used 79 percent of the water. The NIC's fee structure allowed the commission to earn revenue of close to 100 percent of RCIW operation and maintenance costs. Thus, sugarcane farmers were not directly subsidized. Because fee rates do not contain contributions to capital expenditures, sugar farmers receive an implicit CD/I subsidy because they are not contributing to the capital costs of supplying increased water flows to their farms. This subsidy would amount to $6,995,000, or 79 percent, if CD/I direct capital expenditures on infrastructure rehabilitation, $8,855,000, was allocated on the basis of water usage.

Based on estimates by Bernard Lodge Estates, CD/I benefitted the large sugar estates by increasing yields from between 8 tons to 10 tons per acre as a result of improved irrigation. The incremental benefit to sugar producers was about $4,600 per acre at a farm price of $460/ton. Since the sugar estates occupy approximately 9,400 acres, increased sugarcane production was also an indirect benefit of J$43.2 million, or US $1.7 million, annually. Incremental benefits to the small farmer are considered negligible and, consequently, by direct or indirect support, sugar production benefitted by at least US$7.168 million, or 40 percent of CD/I's $18 million of expenditures.

However, benefits to the sugar industry must be viewed with the perspective that the RICW was established more than 100 years ago to facilitate increased sugar production on St. Catherine Plains. Such high benefits to the sugar industry were inevitable when the mother farm concept failed; CD/I infrastructure rehabilitation was focused on the existing RCIW system, and the majority of lands were already under sugarcane.

d. Small-sized and medium-sized farmer involvement

In the original design of the program for small-scale farmer linkage, the express purpose was to facilitate access to technology, market outlets, land and supplementary employment through commercial agricultural activities. Intergrow, Ltd., became the only large, nontraditional farm in the divested area. During the period 1985-1987, Intergrow, Ltd., controlled about 800 acres of land used for the production of winter vegetables and melons destined for the U.S market. As a result of the commercial failure of

the Intergrow, Ltd., venture, the lands were abandoned and left ruinate and subject to the ravages of sand mining.

Diversified agriculture occurred to a limited extent in some parts of the originally targeted divested area, Blocks A, B and C. In general, there was little development of substance as it relates to small farmers in these parts of the project. Only 25 farms, each with 25 or fewer acres, cultivate 352 acres of land in Blocks A, B and C.

e. Crops produced by small-scale and medium-scale farmers

A group of small farmers from the divested area produced a variety of crops, including ornamental horticulture, sugarcane, cotton, papaya and mixed crops. In the small farmer area, farmers were involved in cultivation of ruinate lands that increasingly were restored from a ruinate condition and diversified to produce mixed vegetables. The driving force was provision of irrigation water. The SCVPA claimed that the major crops grown for export included calaloo and scotch bonnet peppers. Management of the Agricultural Marketing Corporation (AMC) confirmed a virtual monopoly of calaloo exports from the Bushy Park area prior to the collapse of the Rio Cobre Dam in 1991.

For the domestic market, major vegetables introduced recent to the time of the evaluation were cauliflower, snow peas, zucchini and a wide assortment of melons. In addition to vegetables, there was a new thrust for production of orchard crops, principally mangoes, and for aquaculture production of the tilapia species.

f. Project impact on small-scale and medium-scale farmers

The project had a positive effect on farm life in the small farmer area. Increased availability of Rio Cobre water was a major reason behind revitalization of local organizations, such as the SCVPA, Jamaica Fish Farmers Association (JFFA), Poultry Farmers Association (PFA), Jamaica Agricultural Society (JAS) and emerging groups of small farmer cooperatives, such as those at Braeton and at Martha's Pen. As another outcome of the project, six water user groups encompassing 237 active participants were developed, reflecting a commitment to improved water management and a vested interest in protection and maintenance of irrigation canals.

Before the collapse of the Rio Cobre Dam, small farmers were increasingly producing crops destined for export markets. These export crops were the result of increased and more dependable water flow that resulted from CD/I improvements to RICW. AMC reports calaloo exports of 255,035 lbs in 1989 and 346,571 lbs in 1991, almost entirely from the CD/I small farmer area. Similarly, 75 percent of scotch bonnet exports of 332,132 lbs in 1989 and 537,602 lbs in 1991 were estimated to originate from the CD/I small farmer area. In addition, the Hill Run area, using Rio Cobre run-off water from the Bernard Lodge Estate, has become the focal point for production of freshwater tilapia although this subsector is now hampered by insufficient water supply from the Rio Cobre system. However, aquaculture farmers' observations of a high mortality rate of fish in some ponds was somewhat disturbing. This high mortality could be caused by contamination from drainage from town gullies, which run into some ponds. Such water supplies need to be replaced by adequate flow from the RCIW system.

g. Impact of water availability on communities

Rehabilitation of the irrigation system through the project area was realized at a total cost of approximately US $18 million. Six hundred and thirty nine small farmers in the small farmer area

occupy 4,500 acres while 25 small farmers in the divested area occupy 352 acres. In the Central Village, Lawrence Field and in Rhoden Pen areas, approximately 136 farmers occupy 190 acres. These farmers are beneficiaries of the irrigation system. In terms of CD/I project costs, these farmers benefit to the extent of J $22,500 per farmer or J $35.70 per acre.

The canal waters are widely used for domestic purposes in all areas. However, no data by gender were available for on-farm water delivery. Consequently, only information obtained through interviews with the extension staff could be used by the evaluation team. An informal survey provided by the staff of the NIC's extension division revealed that availability of water was instrumental in the variety and volume of crops tended, but the impact of increased water flow on social aspects of life on farms in CD/I targeted areas was not strongly indicated.

h. Baseline survey

In 1989, USAID commissioned ASER, Ltd., a Jamaican socioeconomic research firm, to conduct a baseline survey of small farming communities in the project area. The study was conducted in five districts -- Thetford, Spring Village, Bushy Park, Hartlands and Hill Run -- and focused on two main categories of information: farm size and the nature of the agricultural enterprises. Data were collected on the number of farmers in the region, average farm size, land utilization, crops grown and aquaculture operations. Data were also obtained on housing adequacy, credit availability and the degree of GOJ agricultural extension services to small farmers.

The ASER study identified 639 farmers with an average age of 48 years who, before the collapse of the Rio Cobre Dam in May 1991, grew a variety of crops, such as sugarcane, plantain, calaloo, peanut, cucumber, pumpkin and okra. Total acreage farmed was estimated at 4,473 acres. The average farm size was seven acres. Over 80 percent of this acreage is owned by farmers although about half of the total acreage is ruinate and/or fallow.

Women were singled out for much of the information collected. It showed that about 14 percent of farmers surveyed were women. Of this group, more than 90 percent owned their farms. Further, they were better educated, less experienced and less familiar with the question of land utilization.

The survey identified key problems in the target area, namely insufficient irrigation water, poor feeder roads and praedial larceny. However, ASER fell short of recommending adoption of a database monitoring system that would record new technical support in the project area, trends in the project area or the impact of the CD/I-funded irrigation system on small farmers in the surveyed area. Consequently, the evaluation team was unable to measure any major changes in results since the study was done. Furthermore, a comparative analysis would have produced distorted results because of the then limited availability of water.

4. Land-divestment support

a. Original strategy

Agro-21's *raison d'etre* was to promote its mother farm and crop diversification program to foreign investors. The program guaranteed large tracts of land through 49 year leases on condition that investors: 1) focus on nontraditional crops, such as winter vegetables, ornamentals and non-food horticulture for export markets; 2) stay away from traditionals, like sugarcane or produce grown by local farmers for the

domestic market; and 3) create small farmer linkages through satellite production and procurement agreements with small farmers in the project area.

Agro-21's mandate was to transform 13,400 acres, Blocks A-I of St. Catherine Plains, into export-oriented production. Its first priority was to target 2,316 acres of unused lands at Caymanas (i.e., Blocks A, B and C of the project area) for irrigation, divestment and diversification. Blocks A, B and C were chosen because the sub-areas: 1) had the best soils, clay loam, with no limitations and with a wide range of agricultural uses; 2) were supplied by Cumberland Branch, one of the principal RCIW canals; and 3) were close to the Norman Manley International Airport and would minimize produce damage and internal freight costs.

The corporation intended to divest other tracts in the project area, namely Blocks D through I. Timing, however, was to depend on investor demand and the rate at which the first three sub-areas -- A, B, and C -- were taken up by the first set of large-scale agribusinesses.

In 1986, the GOJ took 7,000 acres -- Blocks D, G and I -- out of the project to provide Petronol, an ethanol venture, with acreage for sugarcane cultivation and processing. As a compromise, small farmer lands in Bushy Park, Amity Hall and Hartlands situated in the southwest sector of St. Catherine were to benefit from canal upgrading and irrigation systems development under the project. These lands were already leased or owned by small farmers. In addition, Blocks H and F in Caymanas, totalling 2,570, acres were retained in sugarcane. Therefore, Agro-21's divestment program was essentially restricted to four discrete subareas, Blocks A, B, C and E. Block A's 880 acres were targeted for vegetable production; Block B's 864 acres were also for vegetables, and within Block C, 436 acres of the 880 acres were for ornamental-horticulture crops. Block E, consisting of 2,508 acres, was targeted for grains and mixed vegetables. (See Map IV, page 61).

Agro-21's divestment strategy consisted of three components: large-scale acreage to foreign investors; 2) 50-acre plots to small-scale and medium-scale banana farmers; and 3) a 212-acre horticultural park. The focus on large foreign investors turned out to be Agro-21's downfall. Between 1986 and 1989, Agro-21 failed to entice any foreign investors to take up irrigable land in the project area. Only one venture, Intergrow, Ltd., a joint venture between U.S and local interests, developed an 800-acre site in Block A. The company went bankrupt in 1988-89 despite its repeated attempts to infuse additional capital and foreign expertise into its post-farm and marketing operations. Banana farming was set back by Hurricane Gilbert. It was further hampered by political and technical controversy over the feasibility of growing that crop in such an exposed area. Agro-21 did, however, have moderate success as a result of its effort to initiate crop diversification via the 225-acre horticultural park in Block C.

Agro-21's demise was attributed to a combination of highly restrictive policies for land use and land lease, a lack of investor response and delays in rehabilitation of the RCIW. Agro-21's failure was, however, symptomatic of a more germane deficiency. Agro-21 was introduced prematurely, at a time when Jamaica, with its costly production base, was not nearly as attractive to offshore investors as were its Central American competitors.

b. CD/I divestment support

In February 1989, new government policies on agricultural development led to a return to public sector support for traditional crops and an emphasis on crop diversification. In effect, the mother farm concept

was abandoned in favor of a liberal land divestment program for small- and medium-sized farmers. USAID decided to offer assistance for divestment as a supporting initiative to strengthen the project's institutional capability to focus on irrigation infrastructure that would benefit small farmers.

In June 1990, USAID authorized $2 million of additional CD/I grant funds to facilitate NIC completion of the RCIW rehabilitation work, to continue to provide operational support to the NIC and to "provide a limited amount of additional support to the GOJ for its lands-divestment program" (Project Paper Supplement No. 1). The PPS committed approximately $50,000 to finance transaction costs (i.e., surveying, titling and registration of lands to be divested) in an effort to expedite leasing of lands in the project area. Blocks A, B, C and E, totalling 4,824 acres, were targeted for divestment cost support.

c. Utilization of project resources

As of January 20, 1992, J $513,721, or approximately US $22,335 at then current exchange rates of J $23.00/US $1.00, or about 44 percent of the committed resources, had been expended on ADC surveys of targeted lands. Four surveys were conducted between February 1991 and January 1992 consisting of subdivisions surveyed at Thetford, Spring Plain, Block A and Block E. Thetford and Spring Plain are situated in areas adjacent to the original project area that were subsequently swapped for Petronol lands. NIC's information on divestment support was limited to a financial line item in CD/I quarterly reports made available to the evaluation team. However, correspondence from USAID to NIC on Mission approval of survey contracts confirm that NIC had instituted a system of prior approvals for use of CD/I divestment support funds.

d. Assessment of divestment process

The ADC's divestment program is based on an abridged version of Agro-21's application, review and allocation policies and procedures. A profile of ADC's divestment process was pieced together from interviews with third parties associated with the NIC, RADA, JAMPRO and JADF and from an introductory meeting with the ADC director for land utilization and divestment.

After Agro-21 became an ADC-managed company in 1989, a Secretariat was established to promote divestment, review applications and interact with the MOA's commissioner of land on providing leases to successful applicants. A divestment committee was created as a sub-committee of the Agro-21/ADC Board to oversee the secretariat's work, to recommend sale or lease options to the Board and to ensure that consultations took place with relevant GOJ agencies before placing lands on an approved list.

The committee comprised representatives from the Ministry of Finance, Commissioner of Lands, Town Planning Department, Ministry of Agriculture, Jampro, the Agricultural Credit Bank and the NIC. The NIC's role was to follow through on divestment by upgrading irrigation infrastructure on divested land. The Commissioner of Lands was to assign blocks of land approved by the Minister of Agriculture to ADC/Agro 21 for allocation to individual applicants. However, little evidence suggested that other committee representatives, such as Town Planning or the ACB, played more than a nominal role in the divestment process. Jampro, for instance, was listed as a committee representative, but the Group Director for Agriculture and Agro Industries was unaware of even the basic features of ADC's divestment program.

e. Production targets for divestment

The new Agro-21/ADC leases gave lessees three options: to buy the farmed property after five years; to lease for the first 25 years; and to extend the 25-year lease to 49 years. A key feature of the GOJ's liberalized divestment program was to eliminate prior Agro-21 stipulations on crop eligibility, zoning, allotted acreage and prior agricultural experience of the leasehold applicants. Consequently, crop variety targets were never established by the ADC nor written into the new lease agreements with small-, medium- or large-scale leaseholders.

Similarly, minimum land use levels and start dates and deadlines for implementation of production plans submitted on applicants' request for land were also left out of the terms and conditions of the ADC leases. Total acreage divested was the only indicator that could be identified for the divestment program. In that regard, the ADC divested two thirds of its 4,824 acres within the three-year period, 1989-92.

f. Small-farmer emphasis

The ADC divestment program resulted in more land being allotted to applicants requesting larger acreage than to small- and medium-scale farmers. Over two-thirds of the new leases were granted for acreage exceeding 25 acres. This group of large leaseholders put about 68 percent of its used land into sugarcane and livestock production. Table XV, an analysis of CD/I divested lands, appears on page 72. It illustrates the relative distribution of lands allocated to farmers in the targeted areas by ADC between 1989 and 1992.

Under Agro-21, a total of 13,400 acres were initially committed for divestment. However, by 1989, after 7,000 acres were reallocated to Petronol and 2,778 acres of Blocks H and F were retained in sugar, only 4,824 acres, or 36 percent of the original target, was available for divestment. As Table XV, page 72 shows, the ADC approved 102 applications to lease Blocks A,B, C and E lands. Of the 3,316 leased, 1,849 acres, or 54 percent, are unused. Of the 46 percent used, about half, or 51 percent, is in sugarcane. The remainder is dedicated as follows: 17 percent to mixed crops, 8 percent to livestock and the balance to a combination of ornamental horticulture, cotton, papaya and horse rearing.

The percentage of land divested to small farmers with less than 25 acres is shown in Table XVI on page 72. Of the 1,467 acres divested and used, only 25 small- and medium-scale farmers, were using 352 acres, of this land. If small farmers were classified as growers with five acres or less, only three such farmers were on divested lands.

In summary, divestment of Blocks A, B, C and E is yet to have anything more than a marginal effect on small farmer access to productive lands. Foreign-exchange earnings, with the exception of indirect receipts from sugarcane sales, were nonexistent. In addition, increase in farm employment as a result of CD/I interventions were not discernable.

g. Changes in land-use demand

The 1985 CD/I loan/grant agreement contained various assumptions about land use in St. Catherine. The primary assumption was that 13,400 of underused or abandoned land would be irrigated and systematically brought into production. Of the 13,400 acres, only 1,467 acres, or 11 percent of the original target, was cultivated. Of this acreage, 1,467 acres, more than half, was put back into sugarcane on plots ranging in size from 25 acres to 100 acres. Large tracts of unused agricultural land therefore remained in the area.

Major changes in spatial distribution of the population of the KMA were threatening the long-term viability of agricultural production on that land. The topography of the Kingston-St. Catherine area is such that Kingston can expand only to the west, in the direction of the project area and of Spanish Town.

According to the GOJ's five-year development plan for 1990-1995, Kingston is a commercial and administrative center, having largely lost its residential status. In turn, sections of St. Catherine are becoming a permanent extension to the residential outskirts of Kingston. Between 1982 and 1990, St. Catherine's population increased exponentially, from 332,000 to 424,000. By the year 2,000, population in that area is expected to reach 530,000. The GOJ predicts that the KMA, including the 911-acre Portmore housing project, will by 1995 comprise from 25 percent to 30 percent of the country's total population. This 10,000-unit project will not only increase residential growth, but will inevitably attract commercial businesses to surrounding environs on Blocks A and E.

Apparently, about 1,849 acres of divested land is either under a suspended state of land clearing or preparation or is temporarily unused. (See Table XV, page 72.) In reality, many of the larger leaseholders are positioning themselves for the inevitable urban encroachment on the CD/I project area, in particular, those with the foresight to have secured leases for the prime areas of Blocks A, where there is no farming at all, and Blocks B and E, where minimal production by small- and medium-scale farmers was underway.

With the exception of Block E, which is under sugarcane cultivation, the majority of Blocks A, B and C is likely to succumb to urbanization within the next 20 years. Strong evidence of this trend includes low rates of use of irrigable lands, increasing pressure to divert Rio Cobre irrigation water for potable use, weak agricultural extension services for small farmers, growing demand for real estate land, and acquisition of tracts ranging in size from 25 acres to 100 acres for farming by amateur farmers. This situation lends itself to a three-way conflict over land use, agricultural versus urban land use, as well as land for sand mining. In this contest, agriculture is the likely loser.

Almost 20 percent of the divestment area, or 911 acres, has been taken for low income housing at Portmore, and more acreage is being lost to sand mining. (See below, Subsection 2. Findings f. Sand Mining.) Further urbanization of St. Catherine East is inevitable. Also, the actual small farmer presence of 25 is marginal. Moreover, residual CD/I resources are limited and, because of urbanization, would have only a temporary positive impact on agriculture in those areas.

h. Illegal sand mining

Sand mining could be a legitimate business activity if regulated and monitored by the Quarries Division of the Ministry of Production, Mining and Commerce. The regulatory framework protects environmentally sensitive areas, such as beaches, watershed sites and areas subject to flooding and establishes application, approval and monitoring procedures that facilitate legal and commercial sand mining. Legal sand mining is conducted in the following manner:

1) A sand miner identifies a potential area and applies to the Quarries Division for a license to quarry sand in that area. The miner must show proof of land ownership, leasehold rights or must have written permission from the landholder to support the license application.

2) The Quarries Division initiates clearance by circulating the request to various GOJ Ministries and

agencies for environment, water and infrastructure. The site is inspected and a Quarries Committee, consisting mostly of private citizens appointed by the Minister of Agriculture, approves or rejects the application.

3) If approved, a license for up to five years is granted to the sand miner. Application fees are nominal, but the miner is required to pay a 3.5 percent quarry tax, charged against actual extraction from the quarried area. The miner must also set aside financial resources for land restoration as may be deemed necessary by the Quarries Division.

The division has a team of quarry inspectors who monitor sand mining monthly to ensure that miners are honoring these special stipulations and to report unanticipated effects that could adversely affect the environment.

From three sources, sand is obtained for construction and real estate development. These sources are inland surface areas, river beds and limestone processing. Surface areas, whether on unused land or from river locations, are estimated to provide more than 90 percent of all supplies in Jamaica.

Sand mining in St. Catherine mushroomed in Caymanas in the 1970s. Between 1985-1990, four licenses were granted to leaseholders in Block A by the Quarries Division. When these licenses were issued, St. Catherine was classified as a restricted area. But inspectors observed increasing violations of license provisions, as well as an alarming growth in illegal mining, vandalism, and the wanton disregard for the rights of leaseholders and private property owners. As a result, the Division placed total restrictions on sand mining in St. Catherine. In many instances, inspectors were chased off by organized quarry crews equipped with sub-machine guns and communications systems.

In 1989, the minister responsible for mining decided to eliminate illegal mining in St. Catherine. Subsequently, police and the Jamaica Defense Force conducted a series of ad hoc raids to deter the sand miners. Vehicles were confiscated and fines levied against violators. Legal loopholes in the Quarries Act, however, neutralized the effect of these initiatives. In every case, both vehicles and the loaded sand were returned to their owners.

Illegal mining is the direct outcome of the rapid urbanization of the KMA. Population growth and the ensuing development of housing and commerce in Portmore, Spanish Town and in neighboring areas increased the demand and the prices for sand. The problem was exacerbated by import content costs of construction materials, and transport costs for materials sourced locally. These costs rose in line with the decline of the Jamaica dollar. The increasing pattern of unpredictable costs changed the dynamics of the construction business. As total construction costs rose, so did pressure to find innovative ways to contain local content costs.

Increased sand prices and low extraction costs in St. Catherine created extremely lucrative short-term opportunities for unemployed persons and illegal sand miners. Illegal sand mining requires a small amount of up-front capital, no sunk costs, has no left-over inventory and is a tax-free activity. A typical sand-mining venture needs a rented front-end loader and a crew of two to three people. Contact is made with truck drivers who agree to buy sand for cash at the chosen site.

Between 1989 and 1992, sand mining and vandalism caused substantial economic, environmental and

social damage in Blocks A and B. According to an NIC estimate, at least US$488,425 of irrigation equipment and infrastructure was destroyed. Up to US $883,782 of CD/I funds were spent on land preparation, piping system, new-well construction and installed pumps for Block A. In infrastructure, about US $148,212, or 17 percent was demolished or vandalized by sand miners. In the case of Block B, US $1,328,817 was spent on irrigation infrastructure, of which approximately $340,213, or 26 percent, was lost under similar circumstances.

Environmental damage was extensive, as miners wantonly denuded properties, created huge sand pits, eliminated topsoils and permanently destroyed more than 300 acres of the best agricultural land in the project area. Illegal sand mining also rendered land useless for residential purposes and forced potential farmers to shelve plans indefinitely for food crops, sugarcane or livestock farming.

The GOJ tried in various ways and on different occasions to stem sand mining in St. Catherine. However, as the data show, GOJ efforts had limited success. In April 1992, the GOJ indicated that it would 1) raise penalties to J $2,000 per day for a total of J $50,000; 2) confiscate equipment found on sites; and 3) sell confiscated assets to pay for land restoration. On April 2, 1992, a joint police/military operation impounded a bulldozer and truck caught in the project area.

The Minister of State responsible for irrigation in the MOA instructed the NIC to prepare a security plan for the area. The MOA's strategy calls for private security arrangements, fencing and prompt small farmer production. The security strategy will include options to reclaim destroyed lands by using the mined areas as a temporary garbage dump for the KMA. However, sand from the St. Catherine area is sold at J$60/cubic yard versus $130/yd. for sand from St. Thomas or from other locations. This differential is a revealing indicator of both profitability of mining St. Catherine sand and the price cushion that will motivate illegal raiders, irregardless of physical deterrents, fines and other penalties.

Section F: Conclusions

1. Introduction

Major conclusions presented in this section were based on the following: analyses presented in Section E., Findings; key issues in the SOW; conclusions drawn from the performance, impact and benefits of the four CD/I components; and the evaluation team's overall impressions of the project once most of the assessment work was completed.

2. Design validity

- CD/I was designed to facilitate large-scale, export-driven production of high-value nontraditional crops on 13,400 acres of abandoned or underused land once served by the Rio Cobre Irrigation System. The rationale for rehabilitation of the Rio Cobre Irrigation System was that Agro-21 needed to provide large mother farm ventures with prompt access to irrigable land in order to attract large agribusiness ventures to the project area. However, Agro-21 attracted only one local agribusiness, Intergrow, Ltd., to an 800-acre site in the project area and failed to get foreign investors to establish large farms on targeted lands.

- CD/I has had limited impact on Jamaica's capacity to increase agricultural productivity, employment

or foreign exchange in nontraditional sectors, as anticipated at the design stage because of Agro-21's failure to attract large agribusiness investments in the project area.

3. Project management

- Agro-21 and NIC project management produced mixed results over the life of project. Agro-21 failed to deliver agribusiness investments in the project area, but successfully launched policy initiatives that led to the creation of a national irrigation commission (NIC) with overall responsibility to set, collect and use fee rates on a countrywide basis.

- Rehabilitation of infrastructure of RCIW was efficiently implemented by Agro-21. Apart from the institutionalization of irrigation policy through the creation of the NIC, however, SFL activities were first suspended and then poorly executed under the project. Original funding for the SFL component was used for flood relief; the water use training program was not well organized or implemented. In addition, planned infrastructure rehabilitation for canal sections serving small farmer areas was put on hold in order to reassign obligated project resources for dam reconstruction.

- NIC's work on RCIW rehabilitation sub-projects resulted in notable achievements in restructuring water user rates and collection procedures. However, the commission is at an early stage of organizational development and does not have the capability to effectively coordinate crop diversification or programs for small farmer linkages. Operational responsibility for programs for water user training should have been assigned to an agricultural support agency or agencies, whose primary functions included provision of extension services to small-scale farmers.

4. NIC sustainability

- The NIC, in terms of management capability and development policy, is still at a relatively nascent stage of growth. It was created in 1986 and became operational in July 1987. The Commission assumed responsibility for CD/I implementation in late 1989 and is yet to develop collaborative strategies with other GOJ agencies. Despite its attempts, the NIC could not get the GOJ to reconcile its policies for urbanization and agricultural development in the interest of protecting valuable agricultural land in the CD/I area.

- NIC's successful implementation of the components for small infrastructure rehabilitation and for operations and maintenance occurred partly because competent technical personnel financed by USAID under CD/I were recruited and assigned responsibility for project tasks. While CD/I provided NIC with adequate technical staff, however, insufficient attention was given to development of corporate policy or to management systems to reinforce NIC's institutional role or strengthen its long-term operational capabilities. This omission resulted in an absence of explicit corporate policy on such issues as land zoning, urbanization and inter-agency collaboration on resource management and water user training.

- NIC's institutional capability is threatened by three factors:

  shortage of technical personnel because a number of key technical personnel have left the commission and have not been replaced;

  completion of technical assistance and substantial USAID funding because USAID financing will soon expire and NIC will lose a key resource, its chief engineering advisor, and

  GOJ fiscal polices that led to comprehensive cutbacks in staffing at various public-sector agencies and could also result in further reductions in NIC staff. Because of loss of staff, the NIC engineering department should concentrate on engineering management activities until such deficiencies are rectified. Any further technical staffing shortages will jeopardize the commission's ability to manage and maintain the RCIW and other key irrigations systems.

- The NIC extension department is seriously understaffed and suffers from lack of direction in planning and operations. This lack is the reason that its programs for water user training were inadequate, poorly structured, infrequently administered and had no meaningful impact on water usage efficiencies. In its present form, it is unlikely that the Commission's extension department will be effective in increasing resource efficiency in the near future.

5. Costs and benefits

- Approximately $11.5 million, or 63 percent of CD/I's $18 million budget, was committed for physical RCIW rehabilitation, operations and maintenance (O&M). Implementation of these two components was the most beneficial aspect of the project. About 85 percent of the planned rehabilitation work was completed, and the NIC has used CD/I's O&M resources to develop a fee rate and collection policy that will allow the corporation to generate independent revenues to cover its annual RCIW O&M expenses.

- Sugarcane and vegetable producers were the main beneficiaries of the CD/I project. These two groups accounted for 68 percent of lands in use and 80 percent of used irrigation water. The reason for their predominant use of lands and water was the absence of measurable or sustained production of nontraditional export crops in the 13,400-acre target area. There was, therefore, no reduction in acreage of traditional crops. The outcome was that RCIW improvements increased water availability to lands under sugarcane and vegetable production. Traditional crops were cultivated before CD/I implementation in 1985 and, because Agro-21's diversification program failed, remained as the principal sources of revenue for farmers in the CD/I area during the LOP. Yields are estimated to have increased by 50 percent to 100 percent for most crops and vegetables.

6. Allocation of CD/I funding

- Allocation of project resources was too heavily focused on RCIW infrastructure rehabilitation. About 85 percent of CD/I's funding was committed to physical works and irrigation technical assistance. Although small farmers were specifically targeted as the new CD/I beneficiaries since 1989, the $25,000 of additional CD/I funding made available for small farmer assistance in water user training was inadequate for effective development and delivery of such programs during the 1990-93 project-

extension period. This imbalance in funding support is a principal reason for the lack of improvement in water user efficiency in the project area.

7. Implementation

- Although the imbalance in resource allocation produced an uneven stream of project accomplishments, CD/I enhancement of the RCIW has resulted in increased incomes for traditional producers in the CD/I St. Catherine area. It is clear that RCIW service was upgraded to existing areas and service to surrounding areas was enhanced by improving the reliability of water supplies. With consistent supplies of water, agricultural production in the project is profitable. The most lucrative activities in descending order are aquaculture, fruit crops, vegetables, root crops, sugarcane and dairy operations.

- Sustainability of NIC's system for operations and maintenance is clearly achievable because of low energy costs associated with RCIW's gravity-fed surface system. Other irrigation systems using mainly electricity as an energy source are more expensive to operate. In addition, operation costs are heavily affected by changes in the cost of electricity caused by depreciation of the Jamaican dollar or increases in the price of fuel oil used for electrical energy.

- The ADC's divestment program was efficiently implemented, partly as a result of its more liberal approach to approving applications for irrigable land in the CD/I area. However, at least 50 percent of the divested land was allocated to professionals and commercial businessmen whose primary interest was in land speculation and real estate development. As a result, divestment of Blocks A and B will have little future impact on crop diversification initiatives in those locations.

- Apart from limited small farmer production for domestic consumption on less than 750 acres of the revised 4,824 acres of targeted land, little evidence suggests that the divestment program has had more than a marginal effect on agricultural production in nontraditional exports from the project area. The reasons for this are as follows: 1) many lessees have only recently received lands under the revised Agro-21 divestment program that was being implemented by the ADC. Consequently, it is too early to discern any visible benefits of new acreage under production; illegal sand mining and the failure of the Rio Cobre Dam have forced small- and medium-scale farmers to postpone a number of proposed projects because of the likelihood of vandalism by sand miners and the shortage of water supplies from the dam.

- The lack of post-divestment support threatens to compromise the significant CD/I investment in rehabilitation of the RCIW irrigation system. Support is lacking in the coordination of agricultural extension services that could integrate on-farm water management with farmer education and agronomic extension services. On-farm irrigation efficiencies are believed to be much below acceptable engineering standards. Therefore, significant improvement in water use can be achieved through on-farm irrigation systems and improved water management techniques.

- Because of specific climate, soil and cultural factors, water is essential for profitable agriculture on St. Catherine Plains, particularly for farmers growing crops other than sugarcane. However, urban trends in the project area put agriculture under increasing pressure from competition for land and water. These conflicts will increase with extension of the KMA into parts of the Rio

Cobre irrigation area and will intensify demand for potable use of RCIW water originally intended for agricultural development.

- Wastewater recycling in the KMA could provide additional supplies to the RCIW system. However, costs of a recycling system would probably increase irrigation water rates to levels that would adversely affect the profitability of both traditional and nontraditional crops in the St. Catherine area unless the cost burden of the recycle/transfer system is shifted to another economic sector.

- Recent GOJ actions to curtail illegal sand mining must be maintained at all times if the remainder of Blocks A, B and C is to be protected from further destruction. The GOJ plans to hire a private security firm, designate the mined areas for landfill, and impose stiff penalties are important steps in the right direction. The GOJ may succeed with its renewed thrust at stopping sand mining in affected project areas. Urban demand for sand will continue to make illegal sand mining a very lucrative and profitable activity unless the GOJ takes more comprehensive steps to manage this resource and to create incentives to attract investment in alternative methods, such as limestone processing.

Section G: Principal recommendations

1. Project priorities

a. Key activities

- The principal activities in the CD/I area of influence should be the following: 1) Reconstruction and rehabilitation of critical infrastructure; 2) training in water use management for small farmers in the revised project area; and 3) institutional strengthening of the NIC.

- Obligated CD/I funds that remain uncommitted after funding for the dam and critical rehabilitation of the RCIW and programmed support for the NIC is assured should be de-obligated for the project for at least two reasons. First, the project is mainly benefitting traditional crops, especially sugar, and has not met its primary goal of developing the agricultural sector's capacity to increase productivity, employment and save foreign exchange through production and exports of nontraditional crops. Second, the NIC does not have the capacity to deliver on-site training cost effectively. Therefore, funding small farmer water use training through the NIC is unlikely to produce the level of impact desired. Third, the remaining 24-month time frame is too short to allow USAID and the NIC to examine, modify, implement and observe the benefits of any further design amendments to the CD/I Project.

- USAID should discontinue all project support activities relating to Blocks A, B, C and E. Limited progress has been made towards measurable crop diversification away from traditional production, such as sugarcane. And vandalism and illegal sand mining in the area have virtually halted any impetus for small-scale or medium-scale farmers on recently divested land in Blocks A and B.

- USAID should seek reimbursement of approximately $428,425 from the GOJ for irrigation equipment

destroyed by illegal sand miners and for related on-site costs incurred in the process of CD/I small infrastructure rehabilitation in the affected parts of Blocks A and B.

b. Reconstruction and Rehabilitation of Infrastructure

- Recommended infrastructure works include: 1) Rio Cobre Dam reconstruction; 2) completion of infrastructure rehabilitation deemed critical to the physical integrity of the RCIW; and 3) infrastructure rehabilitation to improve delivery of water to small farmers and aquaculture ventures.

- USAID should continue to co-finance reconstruction of the Rio Cobre Dam with the GOJ and provide up to $1 million for this purpose. The Mission should also commit up to $112,000 of obligated CD/I funds to three SIR sub-projects: 1) $17,500 for stabilization of falls at the main canal; 2) $17,500 for rehabilitation of upper main canal; and 3) $69,000 for improvements to the Old Harbor canal. These sub-projects have been designed by NIC and are essential for ensuring physical integrity of the existing irrigation system.

- GOJ should assume responsibility for the rehabilitation of infrastructure deemed necessary to improve delivery of water to small farmers and aquaculture ventures.

c. Water Management Training

- Educated farmers are the most essential aspect of a successful irrigation and production system. Farmers who understand the value of water and can manage this resource often become the principal proponents of prudent water utilization in urban communities. In turn, their model benefits the society as a whole. Given the low irrigation efficiencies documented and suspected, substantial yield increases can be attained in the RCIW service area with systematic training and technical assistance. An uninterrupted, long-term commitment for technical assistance by USAID and the GOJ would achieve optimal impact if extended beyond the CD/I PACD.

- Therefore, USAID should re-obligate surplus CD/I funds and/or reimbursed project resources to an ongoing project, such as the Agricultural Export Services Project (AESP) to provide small farmer groups involved in vegetable and multi-crop production in the CD/I area with training in water management and should encourage optimized water usage in the small farmer and divested areas. This strategy will accomplish the following: 1) allow training to be delivered to beneficiaries in the CD/I project area beyond the CD/I PACD; 2) allow adequate time for designing a new, detailed training component; and 3) provide flexibility to integrate water user training under creative programs for farm extension. These programs would provide comprehensive technical assistance on production, farm management and post-harvest handling.

- USAID funding for water management training should be committed through another AID project, such as the AESP or through appropriate GOJ institutions involved in agricultural development for at least the following reasons: the demonstration effect of water management training will be realized only after the dam is reconstructed and continuous water flows are returned to St. Catherine Plains and water management training will be more cost-effective and more effectively integrated if

delivered as part of a comprehensive program of production, farm management and post-harvest technical assistance, rather than through direct NIC training on water use management alone.

d. Strengthening of the NIC

- GOJ should commit resources for activities where impact requires sustained interventions beyond the PACD and long-term viability, such as small farmer expansion of export crop production, depends upon GOJ policy commitments on issues such as agricultural zoning. GOJ should also make funding available where viability of the proposed activity has been first assured through collaboration between its agencies involved in various facets of agricultural development, such as The Rural Agricultural Development Authority for farm extension, the Ministry of Agriculture for export services and the Ministry of Production, Mining and Commerce for land protection from sand mining.

- Therefore, the evaluation team that GOJ should assume responsibility for further institutional strengthening of the NIC, with the exception of vehicles ($ 50,000) and dam management course ($ 8,323). Next section include additional suggestions on how this might be accomplished.

2. GOJ and NIC priorities

- The NIC should examine practical ways to rationalize its management and operations and improve its planning, coordination and post-CD/I implementation of rehabilitation work for all of its district irrigation systems. CD/I funds essentially paid for the salaries of key NIC personnel over the life of project. Little or no emphasis was placed on corporate planning or on identification and adoption of management practices to improve NIC long-term competence, capabilities and capacity to develop Jamaica's irrigation potential beyond the LOP.

- The NIC should submit to USAID for CD/I funding approval specific irrigation sub-projects proposals that have been designed under the component for small infrastructure rehabilitation. The proposed sub-projects must relate to existing infrastructure and be essential to the smooth functioning of the RCIW system.

- The GOJ should increase funding to the NIC to finance incomplete CD/I infrastructure rehabilitation work that is critical to maintaining the physical integrity of the RCIW will benefit small farmers and aquaculture ventures in CD/I Project areas not in proximity to locations threatened by urbanization. (See Map II, page 57.)

- The GOJ should introduce zoning legislation to curtail further urbanization on high-quality St. Catherine lands that are still underused or are located outside the main areas undergoing ad hoc commercialization. This policy should be adopted for all irrigable land in Jamaica and should be an essential component of future NIC/GOJ policy discussions.

- Failure of the Rio Cobre diversion dam has sensitized people to the importance of water. Thus, a unique opportunity is now available to NIC and other extension agencies to educate users on water management. A baseline study should be conducted for the purpose of developing an extension

program. A long-term plan should be developed that includes goals, objectives, measurable progress parameters, specific extension programs broken down into activities and should include training of the staff on extension education technologies.

- NIC should institute a yearly evaluation of their engineering and extension personnel. The evaluation should document goals, activities, achievements and impact on the area for each professional. This evaluation would serve several purposes including: 1) evaluating performance of staff, 2) documenting work done and 3) estimating impacts of engineering and extension activity in relation to established goals.

- NIC should conduct needs assessments on human resources and management and information systems. For instance, given the attrition of personnel in the engineering department, options for streamlining the department and making people more productive should be examined. If only one draftsperson is available, this person should be trained in Computed Aided Design (CAD). A well-trained CAD operator can be as much as three times more productive than one relying on traditional drafting methods.

- The Ministry of Production, Mining and Commerce should conduct a resource utilization study to determine the following: 1) future demand and supply of sand; 2) appropriate policy and regulatory procedures; and 3) incentives for mining alternative resources, such as limestone, for commercial sand production. Illegal sand mining will continue until GOJ finds ways to encourage increased production or mining of sand.

- Future investments in infrastructure and agricultural development should be directed toward already settled agricultural areas that are less vulnerable to urban expansion and lie to the south and west of Spanish Town.

Section H: Lessons learned

The following lessons learned may improve future project design and management within USAID's Jamaica portfolio:

1. Key factors for successful realization of the impact and goals of novel and innovative project concepts need to be more thoroughly examined and assessed before design and implementation.

Attainment of CD/I goals was based on superficial assumptions about Jamaica's comparative advantages in key agribusiness factors, such as productivity and production costs for local content. These factors would lead to significant levels of foreign investment in targeted productive sectors. A close analysis of Jamaica's comparative attractiveness to offshore agribusiness investors strongly indicates that Jamaica lacked many key factors for rapid success in nontraditional export-oriented agriculture. Furthermore, Jamaica's political and socioeconomic history suggested that, unlike tourism, large mother farm projects owned and operated by foreign investors was not the most feasible approach to crop diversification in Jamaica.

2. Success of program for agricultural irrigation is determined primarily by two key factors: cost effectiveness of water delivery to able lands and the extent to which farming communities served

by the irrigation system make efficient use of water to maximize productivity and production on their irrigated lands.

The imbalance in CD/I resources between the components for infrastructure rehabilitation and for small farmer projects led to significant inefficiencies in on-farm water usage. These inefficiencies mitigated both costs and operating efficiencies associated with RCIW system management. To avoid similar inefficiencies, greater emphasis should be placed on end-user support through technical assistance programs. For future development of other irrigation systems in Jamaica, providing such support through farm extension support agencies would be more effective than providing it directly through the NIC. Water usage is important, but is only one of the key aspects of effective on-farm agricultural management.

3. Development projects should include budgeted line items for baseline data management, measurement of impact and maintenance of management information systems. Impact assessment activities should be defined in grant and loan agreements and in contractor's and/or executing agencies' SOW. Measurement reporting should be included as an essential feature of work plans and period progress reviews over the life of all projects. Furthermore, baseline surveys lose their usefulness without a concurrent commitment to establish and maintain a monitoring system.

Measurement of impact under the CD/I project was limited by the absence of continuous data on small farmer activities in the project area. Although a baseline survey was conducted and useful data collected, the lack of an active system to monitor changes in performance and impact reduced the usefulness of that data for subsequent measurement of impact.

Appendices

Appendix A: A.I.D. Evaluation Summary
Appendix B: Maps and tables
Appendix C: Documents reviewed
Appendix D: Persons interviewed
Appendix E: Priority list for infrastructure development
Appendix F: Scope of work
Appendix G: NIC comments
Appendix H: USAID comments

Appendix A: A.I.D. Evaluation Summary

A.I.D. EVALUATION SUMMARY - PART I

1. BEFORE FILLING OUT THIS FORM, READ THE ATTACHED INSTRUCTIONS.
2. USE LETTER QUALITY TYPE, NOT "DOT MATRIX" TYPE.

IDENTIFICATION DATA

A. Reporting A.I.D. Unit:

Mission or AID/W Office _____

(ES# _____)

B. Was Evaluation Scheduled in Current FY Annual Evaluation Plan?

Yes ☐ Slipped ☐ Ad Hoc ☐

Evaluation Plan Submission Date: FY ___ Q ___

C. Evaluation Timing

Interim ☐ Final ☐

Ex Post ☐ Other ☐

D. Activity or Activities Evaluated (List the following information for project(s) or program(s) evaluated; if not applicable, list title and date of the evaluation report.)

Project No.	Project /Program Title	First PROAG or Equivalent (FY)	Most Recent PACD (Mo/Yr)	Planned LOP Cost (000)	Amount Obligated to Date (000)

ACTIONS

E. Action Decisions Approved By Mission or AID/W Office Director Action(s) Required	Name of Officer Responsible for Action	Date Action to be Completed

(Attach extra sheet if necessary)

APPROVALS

F. Date Of Mission Or AID/W Office Review Of Evaluation: (Month) (Day) (Year)

G. Approvals of Evaluation Summary And Action Decisions:

	Project/Program Officer	Representative of Borrower/Grantee	Evaluation Officer	Mission or AID/W Office Director
Name (Typed)				
Signature				
Date				

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ABSTRACT

H. Evaluation Abstract (Do not exceed the space provided)

COSTS

I. Evaluation Costs

1. Evaluation Team Name	Affiliation	Contract Number OR TDY Person Days	Contract Cost OR TDY Cost (U.S. $)	Source of Funds

2. Mission/Office Professional Staff Person-Days (Estimate) _____

3. Borrower/Grantee Professional Staff Person-Days (Estimate) _____

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A.I.D. EVALUATION SUMMARY – PART II

SUMMARY

J. Summary of Evaluation Findings, Conclusions and Recommendations (Try not to exceed the three (3) pages provided)
Address the following items:

- Purpose of evaluation and methodology used
- Purpose of activity(ies) evaluated
- Findings and conclusions (relate to questions)
- Principal recommendations
- Lessons learned

Mission or Office:	Date This Summary Prepared:	Title And Date Of Full Evaluation Report:

Purpose of activities evaluated. The goal of the Crop Diversification and Irrigation Project (CD/I) is to develop the agricultural sector to increase productivity and employment and to enhance Jamaica's capability to earn and save foreign exchange. Activities evaluated were intended to strengthen the institutional capacity of the GOJ to support and develop private agricultural investment. The project was implemented through four components: 1) strengthening Agro 21 and then the NIC; 2) small-infrastructure rehabilitation; 3)operations and maintenance and 4) small-scale-farmer linkages. CD/I's primary focus was to rehabilitate the irrigation system of the Rio Cobre Irrigation Works (RCIW) to facilitate diversification of 13,400 acres through private-sector investment in nontraditional export crops on abandoned and underused lands served by RICW.

Evaluation purpose, to review the following: the degree to which the CD/I project 1) achieved its original goal and increased productivity, employment and foreign-exchange earnings and savings and 2) the degree to which the amended purpose - strengthening the GOJ's broader institutional capacity to support and develop private agricultural investment in Jamaica - had been or may be met.

Methodology used. Analysis of CD/I activities consisted of the following: 1) review of project documents; 2) interviews and briefings with administration and technical staff from government agencies, development agencies, grower associations, farmers and other end-users of water supplied under the project; and 3) visits to the project site to examine physical progress, constraints and problems encountered during implementation.

Findings and conclusions. Key findings and conclusions were classified under seven categories: 1) design validity; 2) project management; 3) NIC sustainability; 4) costs and benefits; 5) allocation of CD/I funding; 6) implementation; and 7) baseline data and measurement of impact.

1. Design validity. CD/I had limited impact on Jamaica's capacity to increase agricultural employment or foreign exchange in nontraditional sectors. Agro-21 failed to attract large agribusiness investments in the project area. However, farmer productivity improved as a result of increased and more dependable water supplies from the RCIW to traditional crops.

2. Project management. Agro-21 and NIC project management produced mixed results over the life of the project. Agro-21 failed to deliver agribusiness investments to the project area, but successfully initiated policy initiatives that led to the creation of a national irrigation commission with country-wide responsibility to set, collect and use fees. NIC's work on RCIW rehabilitation sub-projects resulted in notable achievements in restructuring water-user rates and collection procedures.

Agro-21 efficiently implemented RCIW rehabilitation. In constrast, the project first suspended the small-farmer-linkage component, then reinstated it but conducted it poorly. The program for water-use training was not well organized or implemented, and planned infrastructure-rehabilitation work on canal sections serving small-farmer areas was put on hold in order to reassign obligated project resources for dam reconstruction.

3. NIC sustainability. The NIC's management capacity and its development policy are at relatively nascent stages. NIC assumed responsibility for CD/I implementation in late 1989 but has yet to develop collaborative strategies with other GOJ agencies to ensure protection of irrigable lands. NIC does not have the capability to effectively coordinate programs for either crop diversification or small-farmer linkages.

Insufficient emphasis was placed on the development of corporate policy and management systems needed to reinforce NIC's institutional role or strengthen its long-term operational mandate. This omission resulted in an absence of explicit corporate policy on such issues as land zoning, urbanization and collaboration with other government agencies on water-use training and management.

NIC's institutional capability could be compromised by 1) a shortage of technical personnel 2) the completion of both technical assistance and substantial USAID funding, and 3) recent GOJ fiscal polices that led to comprehensive cutbacks in staffing at public-sector agencies and could also result in further reductions in NIC staff. The commission's extension department, in its present form, will not likely be effective in increasing water-resource efficiency through NIC training programs.

4. Costs and benefits. Sixty-three percent or $11.5 million of CD/I's $18 million budget was committed for physical RCIW rehabilitation and RCIW operations and maintenance. Sugarcane and vegetable producers were the main CD/I beneficiaries, accounting for 68 percent of lands in use and 80 percent of used irrigation water. The reason for this predominance was lack of measurable or sustained production of nontraditional export crops in the 13,400-acre target area and,

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therefore, no reduction in acreage of traditional crops. RCIW improvements increased water availability to sugarcane lands and to lands under vegetable production for domestic use.

5. Allocation of CD/I funding. Allocation of project resources was too heavily focused on RCIW infrastructure rehabilitation. About 85 percent of CD/I's funding was committed to physical works and irrigation technical assistance. For example, small farmers were since 1989 specifically targeted as the new CD/I beneficiaries. However, $25,000 of additional CD/I funding made available for training of small-farmer water users during the 1990-1993 project-extension period was inadequate for effective delivery of such programs.

6. Implementation. Although the imbalance in resource allocation produced an uneven stream of project accomplishments, CD/I enhancement of the RCIW resulted in increased incomes, mainly among traditional producers in the CD/I St. Catherine area.

With consistent supplies of water, agricultural production in the project area was profitable. The most lucrative activity was aquaculture, followed by fruit crops, vegetables, root crops, sugarcane and dairy operations in that order. Significant improvement in water use can be achieved through training and improved water-management techniques. However, CD/I funding is lacking for the coordination of agricultural-extension services to integrate on-farm water management with farmer education and agronomic extension services. Consequently, efficiencies in on-farm irrigation were much below acceptable engineering standards.

Sustainability of NIC's system for operations and maintenance system was clearly achievable because of low energy costs associated with RCIW's gravity-fed surface-water system.

The Agricultural Development Corporation's divestment program was efficiently implemented for irrigable land in the CD/I area. (See Blocks A, B and E). The evaluation team was unable to determine the extent to which lessees are committed to crop diversification since the collapse of the Rio Cobre Dam. Recent urbanization of project land under the Portmore Housing Project will lead to increasing land speculation and real estate development in the divested area. It is, therefore, unlikely that CD/I will have any future impact on diversification initiatives in those locations.

Apart from limited small-farmer production for domestic consumption on less than 750 acres of the revised 4,824 acres of targeted land, it appeared that the divestment program had no more than a marginal effect on nontraditional agricultural production or exports from the project area.

The extension of the Kingston Metropolitan Area (KMA) into parts of the Rio Cobre irrigation area will continue to divert land and water away from agricultural uses.

- Urban demand for sand will continue to make illegal sand mining a lucrative activity unless the GOJ takes more comprehensive steps to manage this resource and to create incentives that will attract investment in alternative methods, such as limestone processing.

7. Baseline data and measurement of impact. A 1989, USAID-commissioned baseline survey of small-farmer communities in the project area did not recommend establishing a system for monitoring baseline data to record changes in small-farmer performance as a result of CD/I interventions. Because such a system had not been established, measurement of quantitative changes in impact in the surveyed areas was not possible.

Principal recommendations

Project priorities Principal CD/I project activities for the last two years of implementation, in order of priority, should be as follows: 1) Rio Cobre Dam reconstruction; 2) training in water-use management for small farmers in the revised project area; 3) completion of infrastructure rehabilitation critical to the physical integrity of the RCIW; 4) infrastructure rehabilitation to improve delivery of water to small farmers and aquaculture ventures; and 5) institutional strengthening of the NIC.

USAID should support project activities that will have discrete impacts within the remaining life of project. These activities are dam reconstruction and rehabilitation of infrastructure critical to the integrity of the RCIW. The Mission should also commit funding, outside of the CD/I Project, for training programs for small farmers in water-use management in the project area and development of a baseline data and monitoring system to monitor changes in productivity, incomes, employment and impact. Such a system would demonstrate the importance and benefits of both irrigated agriculture and efficient on-farm water management.

USAID funding for water-management training should be committed through another A.I.D. project, such as the Agricultural Export Services Project (AESP), or through appropriate GOJ institutions involved in agricultural development. The demonstration effect of water-management training will be realized only after dam reconstruction has been completed and after continuous water flows have returned to St. Catherine Plains. This training will be more cost effective and more effectively integrated if delivered as part of a comprehensive program of production, farm management and post-harvest technical assistance, rather than through direct NIC training on water-use management alone.

GOJ should support activities for which impact requires sustained interventions beyond the date for project-assistance completion. These projects should demonstrate long-term viability, such as expansion of export-crop production by small farmers. That activity depends upon GOJ policy commitments on issues such as agricultural zoning. The GOJ should also make funding available where viability of the proposed activity has been assured through collaboration between GOJ agencies involved in various facets of agricultural development. These agencies could include the following: The Rural Agricultural Development Authority for farm extension; Ministry of Agriculture for export services; and the Ministry of Production, Mining and Commerce for land protection from sand mining. The GOJ should therefore assume responsibility for the following two project activities: 1) further institutional strengthening of the NIC and 2) infrastructure rehabilitation to improve delivery of water to small farmers and to aquaculture ventures.

USAID should continue to co-finance reconstruction of the Rio Cobre Dam with the GOJ and to provide up to $1 million for this purpose. The Mission should also commit up to $112,000 of obligated CD/I funds to three small-infrastructure rehabilitation (SIR) sub-projects. The funds should be distributed among these projects as follows: Stabilization of falls at the main canal, $17,500; 2) rehabilitation of the upper main canal, $17,500; and 3) improvements to the Old Harbor canal, $69,000. These sub-projects have already been designed by NIC and are essential for ensuring the physical integrity of the existing irrigation system. All other resources under the $2-million, June 27, 1990 project extension should be removed from the CD/I project.

All project-support activities relating to Blocks A, B, C, and E should be discontinued. Limited progress has been made towards measurable crop diversification away from traditional production, such as sugarcane. And any impetus for small- or medium-sized farmer on recently divested land in Blocks A and B has been brought to a virtual standstill as a result of water shortages from the dam and vandalism.

USAID should seek reimbursement of approximately $428,425 from the GOJ for irrigation equipment destroyed by illegal sand miners as well as for related, on-site costs incurred in the process of CD/I work on small-infrastructure rehabilitation in the affected parts of Blocks A and B.

To provide small-farmer groups involved in vegetable and multi-crop production in the CD/I area with water-management training to encourage optimized water usage, USAID should commit surplus CD/I funds and reimbursed project resources to an ongoing project, such as the Agricultural Export Services Project (AESP).

GOJ and NIC priorities. The NIC should examine practical ways to rationalize its management and operations and to improve its planning, coordination and post-CD/I implementation of rehabilitation work for all of its district irrigation systems.

The NIC should submit to USAID specific proposals for irrigation sub-projects for CD/I funding approval already designed under the small-infrastructure rehabilitation component. The proposed sub-projects must relate to existing infrastructure and be essential to the smooth functioning of the RCIW system.

The GOJ should increase funding to the NIC to finance incomplete CD/I infrastructure-rehabilitation work falling into two categories: 1) work that has not yet been designed, but is deemed critical to maintaining the physical integrity of the RCIW and 2) work that will benefit small farmers and aquaculture ventures in CD/I Project areas not in proximity to the locations threatened by urbanization (See Map II: Proposed CD/I Project Area 1992-93).

The GOJ should introduce zoning legislation to curtail further urbanization on high-quality St. Catherine lands that are either underused or outside the main areas undergoing ad hoc commercialization. This approach should be adopted for all irrigable land in Jamaica and should be an essential component of future NIC/GOJ policy discussions.

The NIC should conduct needs assessments of human resources and management and information systems. The commission should institute a yearly evaluation of their engineering and extension personnel. The evaluation should document goals, activities, achievements and impact for each professional. Such an assessment would allow NIC to: 1) evaluate staff performance, 2) document work done, and 3) estimate impacts of engineering and extension activity in relation to established goals.

The Ministry of Production, Mining and Commerce should conduct a resource-utilization study to determine: 1) future demand and supply of sand, 2) appropriate policy and regulatory procedures, and 3) incentives for mining alternative resources, such as limestone for commercial sand production. Future investments in infrastructure and agricultural development should be directed toward the already-settled agricultural areas that are less vulnerable to urban expansion and those to the south and west of Spanish Town (See Map II).

ATTACHMENTS

K. Attachments (List attachments submitted with this Evaluation Summary! always attach copy of full evaluation report, even if one was submitted earlier; attach studies, surveys, etc., from "on-going" evaluation, if relevant to the evaluation report.)

COMMENTS

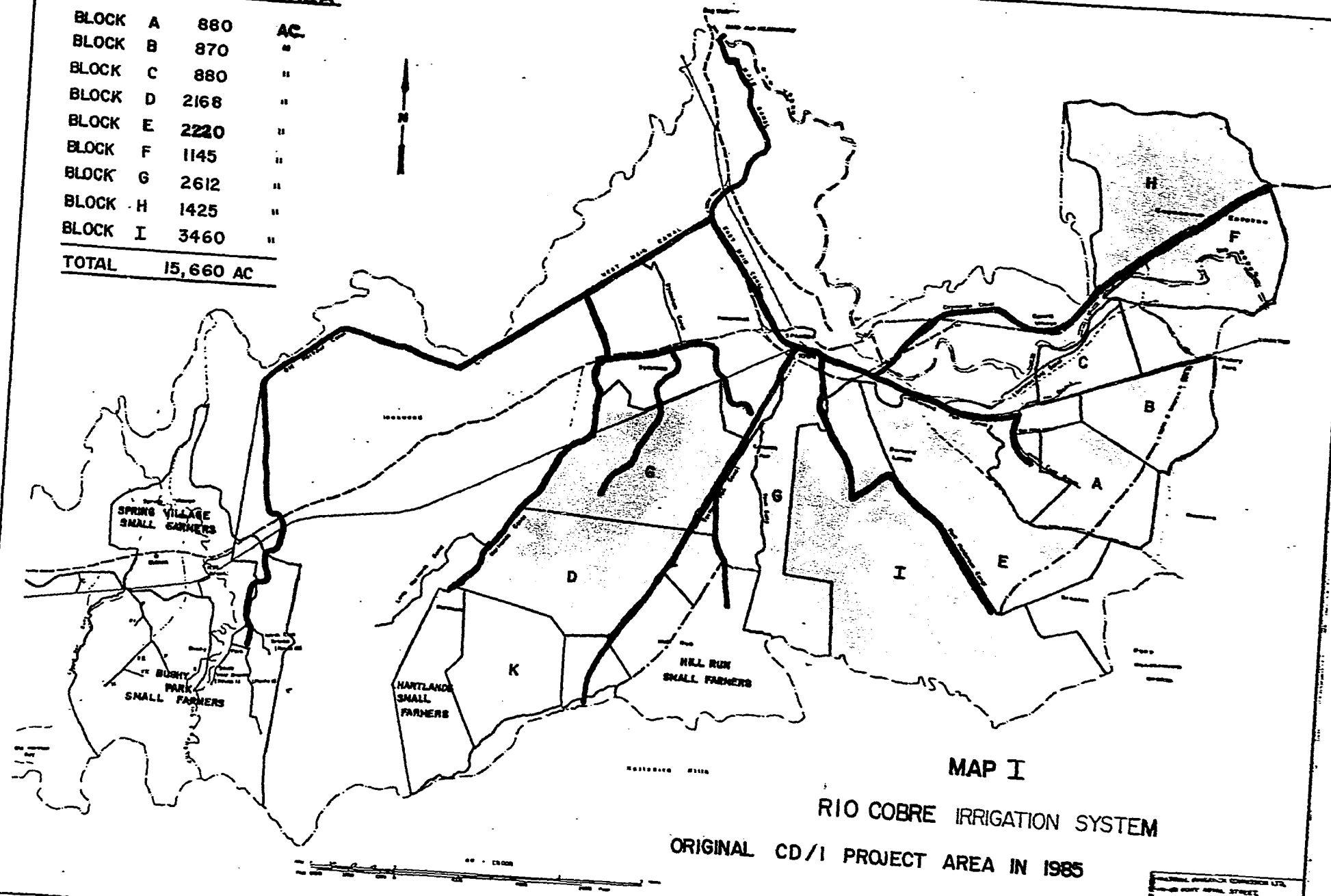
L. Comments By Mission, AID/W Office and Borrower/Grantee On Full Report

Appendix B: Maps and tables

Maps

CD/1 TARGET AREA

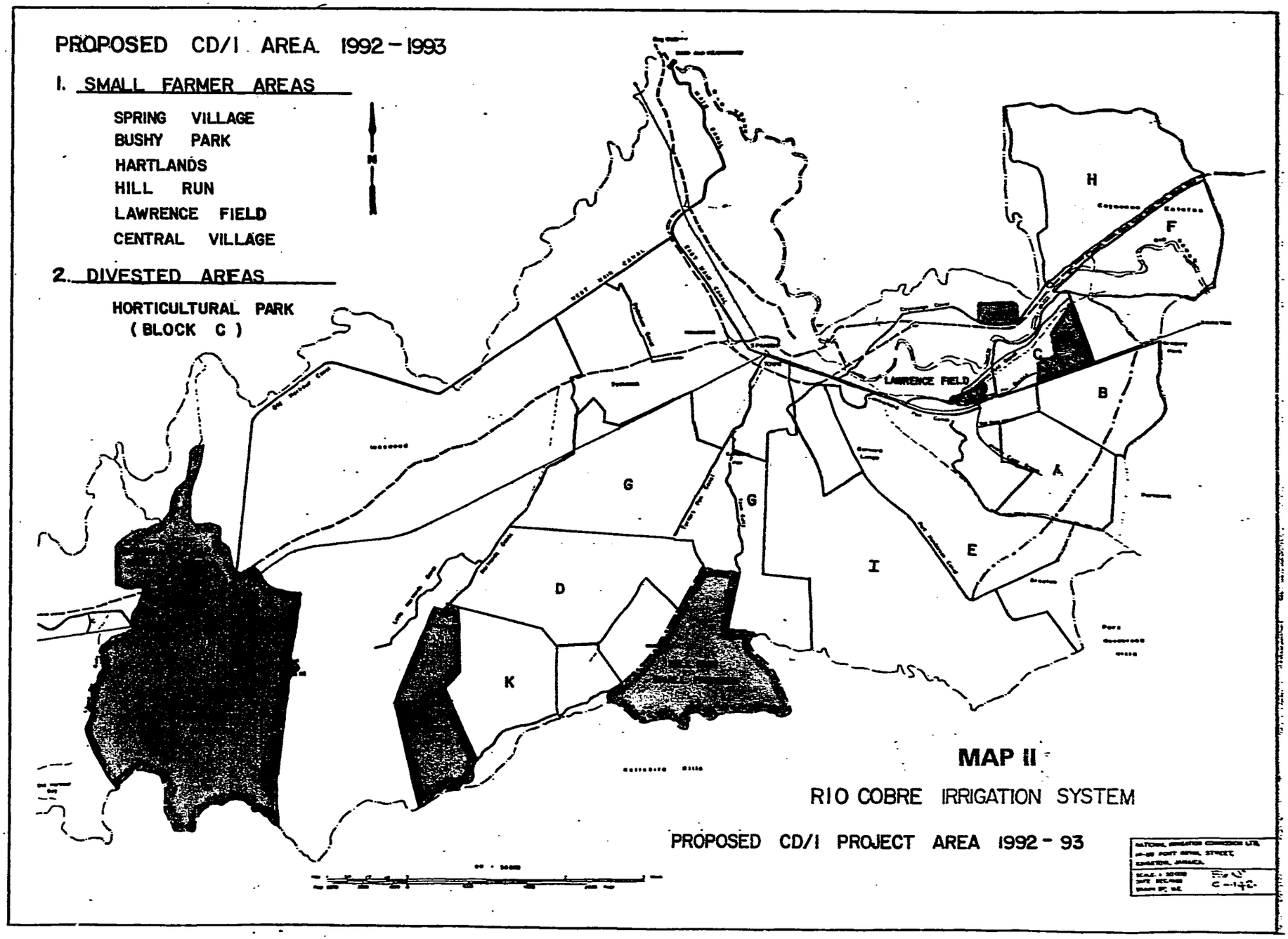
BLOCK	A	880	AC.
BLOCK	B	870	"
BLOCK	C	880	"
BLOCK	D	2168	"
BLOCK	E	2220	"
BLOCK	F	1145	"
BLOCK	G	2612	"
BLOCK	H	1425	"
BLOCK	I	3460	"
TOTAL		15,660 AC	



MAP I

RIO COBRE IRRIGATION SYSTEM

ORIGINAL CD/1 PROJECT AREA IN 1985


PROPOSED CD/I AREA 1992 - 1993
1. SMALL FARMER AREAS
SPRING VILLAGE
BUSHY PARK
HARTLANDS
HILL RUN
LAWRENCE FIELD
CENTRAL VILLAGE
2. DIVESTED AREAS
HORTICULTURAL PARK
(BLOCK C)
N
LAWRENCE FIELD
A
B
C
D
E
F
G
G
H
I
K
MAP II
RIO COBRE IRRIGATION SYSTEM
PROPOSED CD/I PROJECT AREA 1992 - 93

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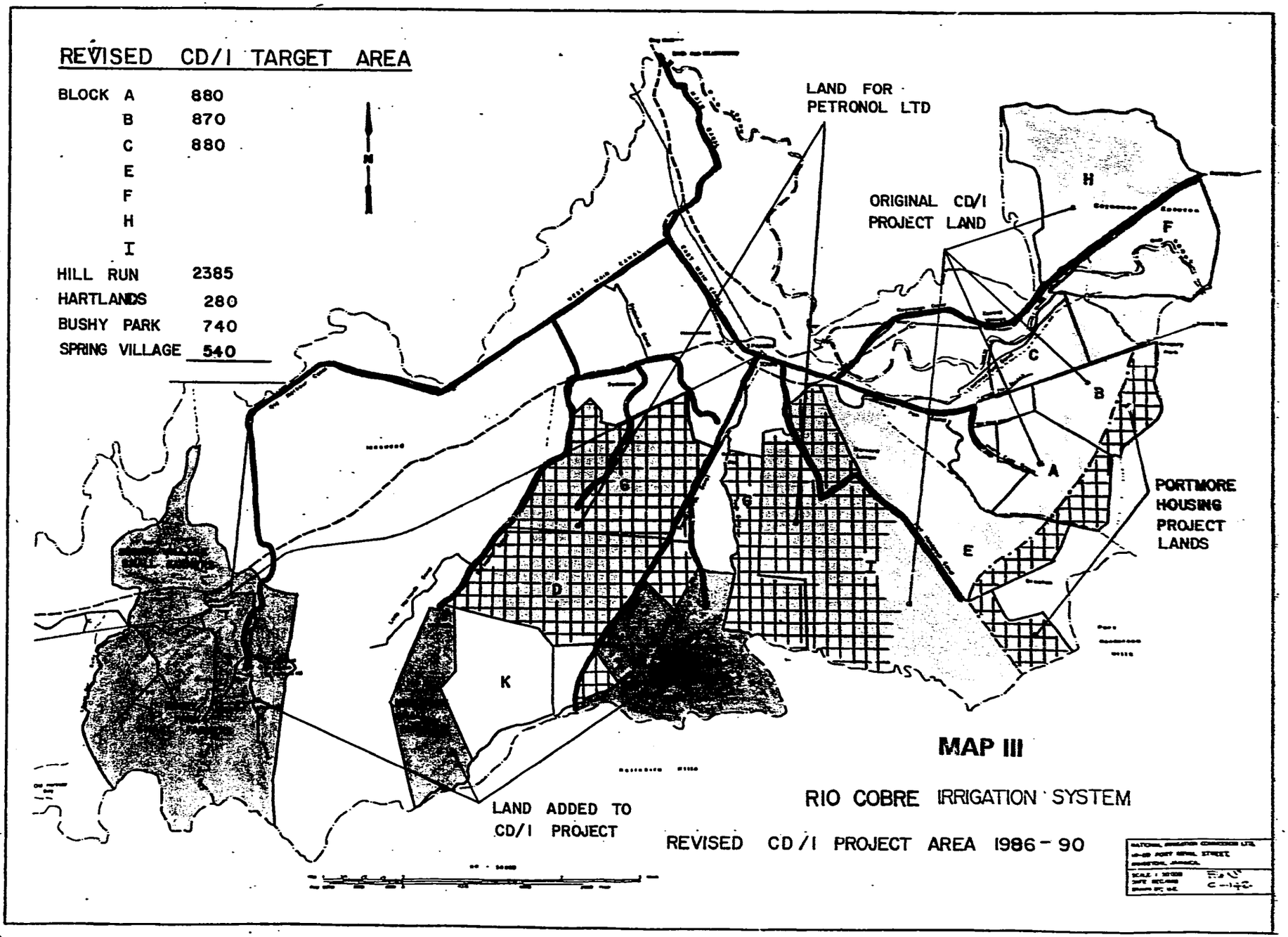

REVISED CD/I TARGET AREA
BLOCK A 880
B 870
C 880
E
F
H
I
HILL RUN 2385
HARTLANDS 280
BUSHY PARK 740
SPRING VILLAGE 540
LAND FOR PETRONOL LTD
ORIGINAL CD/I PROJECT LAND
PORTMORE HOUSING PROJECT LANDS
LAND ADDED TO CD/I PROJECT
MAP III
RIO COBRE IRRIGATION SYSTEM
REVISED CD/I PROJECT AREA 1986-90

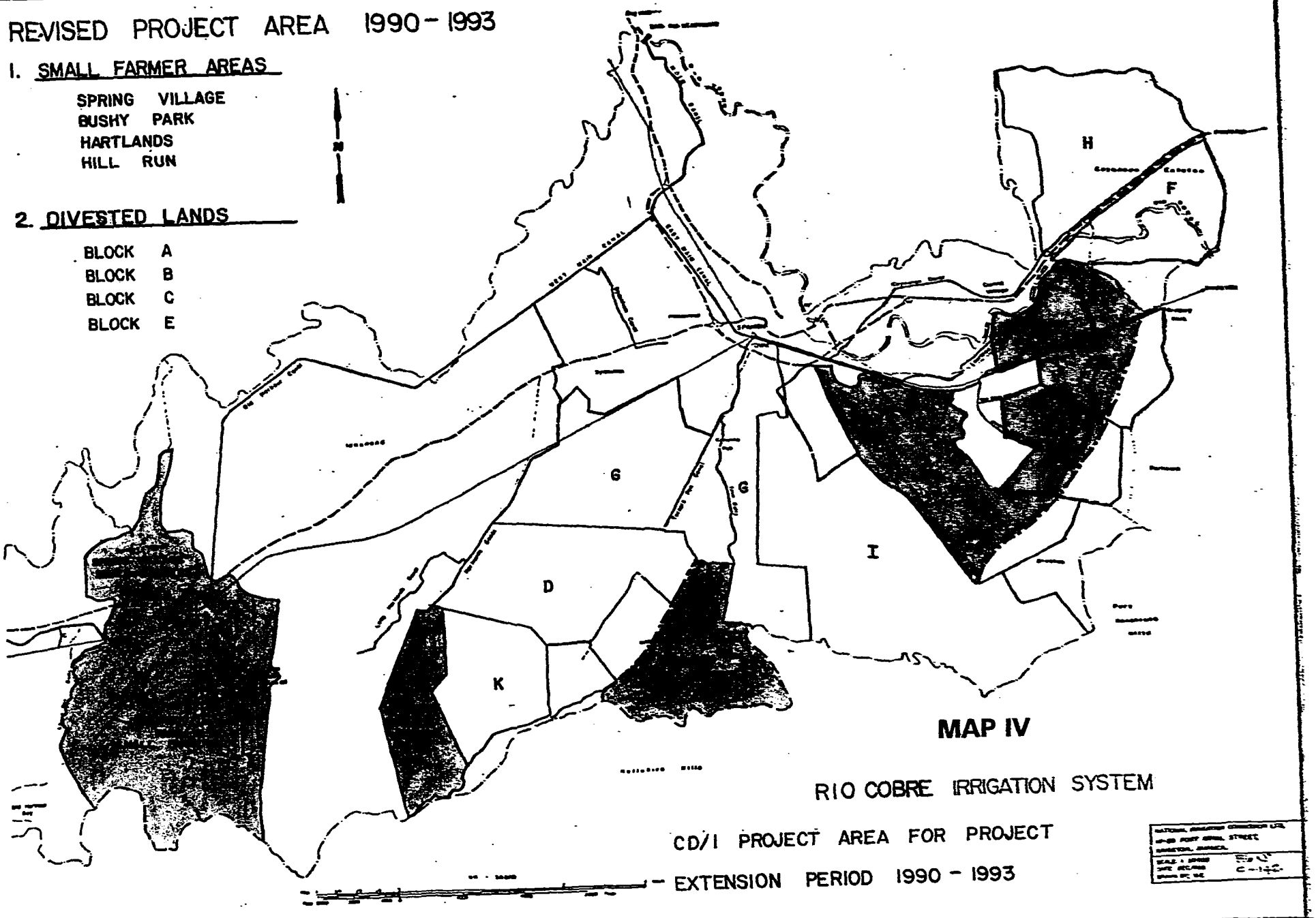
REVISED PROJECT AREA 1990 - 1993

1. SMALL FARMER AREAS

SPRING VILLAGE
BUSHY PARK
HARTLANDS
HILL RUN

2. DIVESTED LANDS

BLOCK A
BLOCK B
BLOCK C
BLOCK E



MAP IV

RIO COBRE IRRIGATION SYSTEM

CD/I PROJECT AREA FOR PROJECT

EXTENSION PERIOD 1990 - 1993

Tables

Table I: Illustrative Budget for CD/I Project at September 30, 1985

Budget Element	Grant	Loan	Total	%
Long-term TA	2,810	880	3,690	21
Short-term TA	304	160	464	2
Commodities	583	-	583	3
Operations	375	-	375	2
Infrastructure Rehab.	6,616	3,550	10,166	56
Interim O&M Measures	100	-	100	1
Training	425	-	425	2
Special Project Fund	326	-	326	2
Evaluations/Audits	156	-	156	1
Contingencies and inflation	1,306	409	1,715	10
Total	**13,000**	**5,000**	**18,000**	**100**

Source: CD/I Loan and Grant Agreement. September 30, 1985.

Table II: Revised budget and obligations for the CD/I Project at June 28, 1989

$'000

Budget element	Grant	Loan	Total	%
Long-term TA	2,557	1,361	3,918	22
Short-term TA	324	1,133	1,457	8
Commodities	692	183	875	5
Operations	622	147	769	4
Infrastructure Rehab.	4,219	5,041	9,260	51
Interim O&M Measures	293	-	293	1
Training :	115	-	115	0.5
Special Project Fund	883	-	883	5
Evaluations/audits	2	-	2	0.5
Contingencies and inflation	198	230	428	2
Total	9,905	8,095	18,000	100

Source : CD/I Loan and Grant Agreement. Amendment No.7, June 28, 1989.

Table III: Incremental budget and obligations for the CD/I Project extension 1990-93 at June 27, 1990

$'000

Budget Element	Grant	Loan	Total	%
Long Term TA	604	-	604	31
Short Term TA	50		50	3
Commodities	50		50	3
Operations	211		211	11
Infrastructure Rehab.	1,000		1000	50
Interim O&M Measures	-0-		-0-	-
Training	25	-	25	1
Special Project Fund	-0-	-	-0-	-
Evaluations/Audits	30	-	30	1
Contingencies and Inflation	30	-	30	1
Total	2,000		2,000	100

Source : CD/I Loan and Grant Agreement. Amendment No.8, June 27, 1990.

Table IV: Major CD/I Project engineering sub-component

Sub-component	Direct Cost* 1,000J$	Date	Impact/Comments
1. Cumberland Pen canal lining	1,547	12/85	The lining improved its capacity, allowing an additional 1,700 acres of land to be irrigated.
2. Completion of irrigation infrastructure Block A	4,133	9/86	Water deliver infrastructure to 880 acres[a].
3. Headworks	1,542	12/86	Install sluice gates for silt removal from the head gate of main canal.
4. Culvert addition under railway line	210	6/87	An additional 1,100 acres of land were brought into production in Bushy Park.
5. Caymanas Horticultural Park	5,389	9/87	Water delivery infrastructure to 215 acres[b].
6. Spanish Town Water Works	664	12/87	The weir that headed up water and threatened banks was removed, relift pump was installed.
7. Improvement to Cherry Garden canal[c]	479	12/89	Allowed service into Bushy Park.
8. Repair Gilbert damage	1,320	12/88	Restore left abutment protection to preserve dam.
9. Spring Village irrigation system	1,245	10/89	Major improvements to 100 acres, improved 400 acres.
10. Installation of irrigation infrastructure	8,033	12/89	Water delivery infrastructure to 870 acres in Block B[a].
11. Improvements to Old Harbour	2,460	1/90	Upgrading capacity of Old Harbour Canal from 40 cfs to 70 cfs.
12. Irrigation infrastructure in Block E	5,521	5/90	Irrigation infrastructure to 2,000 acres of redundant cane land.
13. Turner's Pen canal lining	4,855	6/90	Lining to canal upgraded 5,000-acre service to Hill Run.
14. Port Henderson	4,407	9/90	Lining upgraded canal to bring an additional canal 5,200 acres of land into production.
15. Canal system improvement	1,263	12/90	Improved water service and increased flow rate to 1,500 acres of small farmers in Bushy Park.
16. Serge Island Dairies	1,496	9/91	Capital works to improve small farmer component of milk production.
17. Infrastructure Block C	250	4/92	40 acres pressurized placed into production.
18. Installation of emergency pumping plant	760[d]	12/91	Effort to supply 60-80 cfs after dam failure.
19. Hartlands canal	2,723	Incomplete	Will improve control and delivery to 5,900 acres.
TOTAL:	J$48,348,000 (US$8,855,000 @ 5.46)		

Source: Chief Consulting Engineer, NIC. *All J$ at 5.46:1, no allowance for NIC/AGRO-21 engineering overhead. [a]Area affected by sand mining and vandalism. [b]Area used for export crop production (shade houses). [c]Raising banks, paving invert, gradient control structures, access road and bank reinforcement. [d]Plus approximately US$100,000 for direct purchase of US manufactured plants.

Table V: Sources of basin-water supply (Mm^3/year)

Source	Domestic	Indust.	Rural	Agricult.	Export	Total	(%)
Rio Cobre River	2.7			104.3		107.0	(42.5)
Limestone wells[a]	23.7	9.2		36.0	19.2	78.6	(31.2)
Limestone wells[b]	18.8	4.6	0.07	7.0	13.3	29.87	(11.9)
Alluvial wells	4.9	4.6		27.0		32.4	(12.8)
St. Catherine Springs	2.6	2.0	1.66			3.66	(1.5)
St. Andrew Springs			0.17			0.17	(0.1)
Total	29.0	14.0	1.9	174.3	32.5	251.7	

Adapted from: Water Res. Dev. Plan, Annex 2, UWA, 1990. April, 1991

[a] Lower sub-basin.

[b] Upper sub-basin.

Table VI: Alternative water resources

Project study	Supply MCM/year	Capital Cost 1000$US	Op.Cost 1000$US	Unit Cost $US/$m^3$
		Wastewater Reuse (1985)		
Greenwich and Western primary treatment plants[a]	20.0	6504	1,121	0.056
Southern Linguanea aquifer effluents[a]	12.1	5,447	752	0.062
Portmore area effluent[a]	7.3	3,600	487	0.080
		Reservoirs (1986)		
254 Ha reservoir[a]	66.2	10,500	Uneconomical (UWA)	
Small reservoirs[a]	Short-term demand		As economically feasible	
		Other Undeveloped Resources (1987)		
Saline Ferry Springs[b]	30.8	2,592	460	0.019[d]

Source: Feasibility studies on the projects, UWA.

[a] Any agricultural use.

[b] Aquaculture.

[c] Maximum capacity.

[d] Weighted average costs for different sites.

Table VII: Irrigation efficiencies

Source	E^{irr} percent	Comment
Adler, 1988	19	Bernard Lodge
	31	Caymanas and Innswood
FAO	40	Over the whole area
JICA	49	
Melamed, 1989	35 to 40	Researcher comments, could be much lower
Gan, 1989	12 to 68	Extreme values[a]
	7 to 25	Pasture, flood
	35 to 40	Pasture, sprinkler
World Bank, 1991	40	See text for comments

a) All values for surface irrigation in sugarcane, except where noted.
b) Test conducted on a 2.7-acre plot.

Table VIII: Water rates in RCIW

	Rate (J$/m/hr/yr)	
Period	Small farmer	Large Farmer
88/89	18.0	39.0
89/90	78.5	157.0
90/91	157.0	314.0
91/92	312.6	512.7
92/93	444.0	592.0
93/94[a]	652.0	652.0
94/95[a]	717.0	717.0
95/96[a]	789.0	789.0
96/97[a]	868.0	868.0

Source: Proposed rates and tariffs structure, NIC.
[a]Proposed rate structure. All rates from 1992-93 allow for a 10-percent inflation rate.

Table IX: Yield, production costs and net income per acre for selected commodities*

Commodity	Yield/acre	Total cost	Net income
Sugarcane[1]	26.2	7,514	11,406
Dairy[1]		5,504	3,994
Tilapa[1]		106,709	87,691
Mango[1]	5400/Doz	34,836	173,906
Orange[1]	960 boxes	23,547	78,813
Callaloo[1]	48,000 lbs	50,988	57,436
Callaloo[2]		12,356	
Hot Pepper[2]		5,826	
Pumpkin[2]		3,243	

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Quality of data is questionable; different sources show great variation, most likely due to fluctuations or assumptions related to market prices.

[1] Ecceles, NIC rate consultant.

[2] Economic Planning division, MOA.

Table X: NIC-conducted extension activities

Activity	Date	Audience	Impact/Comments
Field demonstration	6/27/89	Not stated	Not Documented
Irrigation demonstration	7/14/89	17	17 farmers want to own syphons
Irrigation-management demonstration	9/14/89	Not stated	Not documented
Irrigation demonstration	7/6/89	Not stated	Not documented
Visits to growers	on-going	Farmers 2-3/day	Verbal advice only

Source: Evaluation Team Interviews and Responses From NIC Extension Agent. March 1992.

Table XI: Employment estimates for project area in 1991

Crop	Acres	Employees/Acre	Total Employment/YR
1. Sugar Cane	9,978	.07	700
2. Ruinate	3,824	n/a	n/a
3. Mixed Crops	1,337	.15	200
4. Cotton	220	.12	26
5. Horticulture	50	.60	30
6. Orchard	159	.30	47
7. Livestock	50	.20	10
8. Aquaculture	234	.20	47
9. Housing	165	n/a	n/a
Total	16,467		1,060

Sources: All Island Jamaica Cane Farmers Association, April 1992.
Investment Potential in Commercial Agriculture Vol. 1 and 3. L. Mills and Assoc. Aquaculture Profiles/Self Sufficiency Department. Agro-21. December 1987.
Beef Extensive Grass Fed System/Self Sufficiency. Agro-21. December 1987.
Farm Management Section. Economic Planning Division. MOA. 1989.

Table XII: Number of acres served by the RCIW in stated crops, net income per acre and total income, 1989

Crop[a]	Acre	Net income per acre	Total income (OOOs $J)
Sugarcane	9,978	11,496	149,040.0
Livestock[b]	500	9,497	14,558.9
Vegetables	1,337	57,436	60,552.4
Aquaculture	234	87,691	75,028.1
Orchards[c]	159	126,359	32,727.0
Rice[d]	250	17,524	4,381.0
Total	16,920	--	336,287	4.4

Source: NIC, Economic Planning Division, Ministry of Agriculture. April 1992.

a Estimates. At variance with other sources, probably because of different assumptions.
b Based on net income reported for dairy herds.
c Average of the return from mangoes and oranges.
d No net income reported for rice. Number used is the average net income of the other crops.

Table XIII: Land-use activities in the project area

Activities	Location			Total	
	Divested by ADC	Un-divested	Small-farmer area	Acres	%
Sugarcane	753	8,652	573	9,978	60.6
Ruinate[1]	1,887		2,007	3,824	23.2
Mixed crops (Vegetables)	208		1,129	1,337	8.1
Cotton	220			220	1.3
Ornamental horticulture	50			50	0.3
Orchard	15		144	159	1.0
Livestock	252		248	500	3.0
Aquaculture			234	234	1.4
Housing			165	165	1.1
TOTAL	3,315		4,500	16,467	100.0

*) From data supplied by ADC and NIC.
[1]) Land assumed ruinate where no information supplied concerning current crop.

Table XIV: Acreage and farms by location and land utilization

Location	Land utilization									
	Pure Stand	Mixed Stand	Imp. grass	Uimp. grass	Fish pond	Fallow	Ruinate	Bldgs	Other	Total
Nightengale	133	44	77	91	21	35	168	14	4	587
Thetford	31	8	1	46	0	162	76	1	0	326
Hartlands	145	0	5	113	2	254	879	19	0	1418
Bushy Park	391	4	307	105	36	165	1	28	18	1054
Hill run	49	43	0	30	199	11	696	42	18	1088
Total	750	100	389	386	257	626	1821	104	41	4473

Source: A survey of small-scale farming in the CD/I area. ASER 1989.

Table XV: Land divestment in crop diversification and irrigation

Area	No. of Apps. For Leases	Acres Applied For	Number of Acres: Un-utilized[a]	Utilized	Percent
Block A	16[bc]	632	632	0	100.0
Block B	17	472	457	15[d]	96.8
Block C					
Hort. Park	20	225	40	185[e]	17.7
Other	26	476	173	303[f]	36.3
Block E	23	1,511	547	964[g]	36.2
Total	102	3,316[h]	1,849	1,467	53.8

Source: Based on data supplied by the Agricultural Development Corporation, March 1992.
[a] Includes "non-utilized," "land preparation," and no information on the use currently being made of the land.
[b] In block A, 45 acres are devoted to race horses.
[c] None of the applicants for Block A land are farmers.
[d] Cotton, 20 acres; mixed, 95 acres; horticulture, 50 acres; papaya, 15 other, 45 acres.
[f] Livestock, 78 acres; mixed, 25 acres.
[g] Sugarcane, 754 acres; livestock, 114 acres; mixed, 96 acres.
[h] 13,400 acres were initially made available for divestment. Blocks A, B, C and E contain 4,827 acres.

Table XVI: Utilization of Crop Diversification and Irrigation Project lands by small-scale to medium-scale farmers and crops grown as of February, 1992

Area	Number of Farmers	Number of acres cultivated in: Sugarcane	Cotton	Horticulture	Mixed	Other	Total
Block A	0	0	0	0	0	0	0
Block B	1	0	0	0	15	15	30
Block C							
Hort. Park	14	0	20	50	65	15	150
Other	6	0	0	0	25	78	103
Block E	4	25	0	0	44	0	69
Total	25	25	20	50	149	108	352

Source: Based on data supplied by the Agricultural Development Corporation, March 1992.
[a] In this table, small- to medium-scale farmers are defined as those currently using 25 acres or less, regardless of crop.

Appendix C: Documents reviewed

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von der Ohe, W., R. Kaske, and G. Vaagt. 1990. Jamaica Chemical Pesticide Study.

Appendix D: Persons interviewed

Winston Armstrong	Parish agricultural manager for St. Catherine, Rural and Agricultural Development Authority.
B. Ellington-Banks	Crop Diversification/Irrigation project officer, USAID Kingston.
Winston Boyne	Director, Technical And Irrigation Services, National Irrigation Commission.
Garnet Brown	Executive director, Rural Agricultural Development Authority.
Donny Bunting	St. John's Fish Farm and Longview Park Farms.
Solvalyn Ecceles	Rates and tariff consultant, National Irrigation Commission.
Basil Fernandez	Deputy managing director, Underground Water Authority.
Sonya French	Chief engineer designate, National Irrigation Commission.
Prince Golding	Director, St. Catherine Vegetable Producer's Association.
Thorant Hardware	Managing director, Underground Water Authority.
Maurice Harrison	Manager, Bernard Lodge Sugar Estate, Spanish Town.
Hasan Hasan	Director, Office of Engineering and Energy, USAID Kingston.
Joseph Hendricks	Senior livestock operations, Agricultural Development Commission.
Devon Holgate	Farm extension officer, National Irrigation Commission.
Vaughn Kelly	Manager, Land Utilization and Divestment, Agricultural Development Corporation.
D. Gregory-Jones	Chief architect/planner, Urban Development Corporation, Kingston.
Clover LeGuerre	Farm extension officer, National Irrigation Commission.
Tom McAndrews	Office of Private Enterprise, USAID Kingston.
Everton Medley	Water management specialist, National Irrigation Commission.
Edward Norum	Chief consulting engineer, National Irrigation Commission.
Donovan Reid	Director of administration, National Irrigation Commission.

Keith Roache	Managing director, Jamaica Agricultural Development Foundation.
Denise Rollins	Office of Program and Project Development. USAID Kingston
Pamela Rowe-Williams	Acting Director, Field Operations, Agricultural Credit Bank.
Heather Royes	Office of Program and Project Development, USAID Kingston
Claude Stewart	Group general manager, Agricultural Development Corporation.
Averall Tapper	Operations manager, Jamaica Agricultural Marketing Corporation.
Ralph Thompson	Former managing director, Agro-21 Corporation.
Rawle Tyson	Executive chairman, Fellowship Aquaculture Limited.
Lancelot White	Head, Energy, Land and Water Management Unit, Sugar Industry Research Institute.
Gerald Williamson	President, Church Pen Branch, Jamaican Agricultural Society.

Appendix E: Priority list for infrastructure development

Priority List for Infrastructure Development

A list of high priority items has been developed by the Chief Consulting Engineer. These include design and contract documents in various stages of completion. Following is an outline of the projects starting with the higher priority items.

1. Stabilization of the falls at the main canal bifurcation in Spanish Town. *
   FIB No. 532-0123-308
   Budget Estimate: US$17,500
   Allowed construction time: 2 months.
   Status: Design and drawings complete. Contract documents pending.

   Comments: Failure of the structure would result in massive damage and system shut down for an indefinite time. The falls area shows advanced signs of erosion.

   Work must be completed before dam is repaired.

2. Rehabilitation of the upper main canal aqueduct. *
   FIB No. 532-0123-306
   Budget Estimate: US$25,000
   Allowed construction time: 2 months.
   Status: Consultant hired to make survey and recommend rehabilitation works.

   Comments: Supporting structure of the aqueduct shows significant deterioration. This component is critical to water delivery. Failure would shut down system for an indefinite time.

   Work must be completed before dam is repaired.

3. Improvements to the upper section of Old Harbour canal.
   FIB No. 532-0123-293
   Budget Estimate: US$69,000
   Allowed construction time: 2.5 months
   Status: Design and contract documents in final stage.

   Comments: would increase the current capacity of Old Harbour canal from 70 cfs to 100 cfs.

   Work should be done before dam is repaired to minimize care of water expense.

4. Hartlands canal lining (1.26 miles from stn. 49+40 to 116) rebid.
   IFB No. 532-0123-230R
   Budget estimate: US$440,000
   Allowed construction time: 3.6 months
   Status: Original contractor defaulted. IFB issued, received and evaluated spring/91. Contractor unmobilized because of dam failure. Will have to rebid.

Comments: Service to 5900 acres. Lining approximately 45% completed. Prime area not threatened by sand mining and urban expansion.

Should be completed before dam is rebuilt.

5. Operation storage reservoir for Spring Village irrigation system.
IFB No. 532-0123-274
Budget estimate: US$102,000
Allowed construction time: 3.5 months
Status: Original contractor defaulted. IFB issued, received and evaluated spring/91. Contractor unmobilized because of dam failure. Will have to rebid.

Comments: Project will improve delivery efficiency to Bushy Park (500 acres) and Spring Village (1500 acres) small farmers by stabilizing and allowing better flow management.

6. Hartlands canal lining (0.94 miles, Stn. 0+00 to 49+40) rebid.
IFB No. 532-0123-230R
Budget estimate: US$370,000$
Allowed construction time: 2.7 months
Status: Original contractor defaulted AID approved IFB. Held in abeyance because of dam failure.

Comments: See number 5 for benefits.

7. Turner's Pen canal lining (1.43 miles, Stn 136+00 to 211+10) phase II.
IFB No. 532-0123-305
Budget estimate US$590,000
Allowed construction time: 4.1 months.
Status: Surveying, design and drawing complete. Contract documents pending.

Comments: Overall service area of 3500 acres. Final extension of canal to its natural terminus. Will provide a supply to the Hill Run small farmers and aquaculture area (2385 acres.)

8. Hartlands canal lining (1.43 miles, Stn. 136+00 to 211+10) Phase II.
IFB No. 532-0123-303
Budget estimate US$545,000
Allowed construction time: 4.7 months.
Status: Surveying, design and drawing complete. Contract documents pending.

Comments: Would open 1000 to 2000 acres currently in ruinate (including 280 acres in the Hartlands small farmer area.)

9. Installation of waste gate No. 3, upper main canal at aqueduct.
IFB No. 532-0123-315
Budget estimate: US$10,000
Allowed construction time: 2 months.
Status: Consultant hired to conduct study and recommend design.

Comments: Operational assist in management of the system, avoid flooding in Spanish Town.

10. Lawrencefield canal improvements (1.31 miles Stn. 0+00 to 69+30.) ✳
IFB No. 532-0123-292
Budget estimate: US$445,000
Allowed construction time: 3.7 months
Status: IFB documents submitted to AID, approval pending. Held in abeyance because of dam failure.

Comments: Impacts small farmer area in Lawrence field (47 acres). Provides gravity water to west end of block C (500 acres, 30% to 40% divested)

11. Irrigation system installation in the small farmer areas of block C (500 acres.) ✳
IFB No. 532-0123-278
Estimated budget US$250,000
Allowed construction time: 4.0 months
Status: In design phase.

Comments: To be installed incrementally in reaction to divestment effort progress. Will make use of pipe recovered at no cost from Portmore Housing Project.

Appendix F: Scope of work

SECTION C - STATEMENT OF WORK

1. Purpose

This Project is being evaluated to review: 1) the degree to which the Project has impacted on the original goal, increased productivity, increased employment, and earnings and savings of foreign exchange; and 2) the degree to which the amended purpose, broader institutional capacity of the Government of Jamaica (GOJ) to support and develop private agricultural investment in Jamaica, has been or will be meet. The review will consider: 1) the degree to which planned divestment of GOJ lands under the Project to medium and small farmers occurred; 2) the degree to which these lands have been diversified, e.g., due to the change in growth of sugar production, 3) the degree to which the provision of irrigation water has affected farm incomes; and 4) justification for the utilization of remaining Project funds, given the changing circumstances of the Project.

The findings of the evaluation will indicate the level of success of the Project in meeting its purpose and provide a factual basis for making decisions for the use of the remaining Project funds.

2 Background

Over the past year problematic situations within the Crop Diversification/Irrigation (CD/I) Project have led to serious questions about the impact of the Project and the justification for continued AID involvement in the Project, other than to finance the reconstruction of the Rio Cobre Dam. On May 22, 1991, the flood of record destroyed the diversion dam which provides water for the irrigation canals. In September a resurgence of destruction of Project lands began in earnest through illegal sand mining and the destruction of electrical supply to irrigation pumping equipment rendering the land unusable for agriculture. Approximately 1,000 acres of lands already divested to medium and small farmers have been directly affected and another 1,000 acres indirectly affected. Illegal sand mining operations have left approximately 400 acres permanently out of agriculture. Investigations into the sand mining and vandalism situation coupled with the failure of the dam created concern that the Project can meet its goal and purpose.

The goal of the Project, to develop the agricultural sector to increase productivity, increase employment and enhance Jamaica's capacity to earn and save foreign exchange, has remained unchanged through two amendments to the Project Paper. The purpose, to strengthen the broader institutional capacity of the GOJ to support and develop private agricultural investment in Jamaica, changed in the first amendment to the Project Paper reflecting the demise of the original implementing agent, AGRO 21 Corporation. The institution referred to in the amended purpose is the National Irrigation Commission (NIC).

Annex A, attached, provides additional information on the history of the Project.

3. Statement of Work

This evaluation will seek to answer the following specific questions related to the design, implementation and current status of the Project to provide sufficient information for determination of the level of AID's continued involvement. The evaluation team will form conclusions with corresponding recommendations, consistent with and supported by the evaluation's empirical findings. The evaluation team will identify lessons learned that may arise from the analysis.

General:

1. To what extent has progress been made toward achievement of the Project goal - increased productivity and employment and enhanced capacity to earn and save foreign exchange; and purpose - strengthening the GOJ institutional capacity to support and develop private agricultural investment in Jamaica? What benefits have accrued to date or are likely to be achieved based on the investment of AID resources? (Compare for infrastructure alone and all other Project inputs.)

2. To what extent has increased productivity, employment/foreign exchange been a specific objective of the Project? (Cost/benefit analyses are expected.)

3. Are there baseline data for the Project area to measure trends in agricultural production in the service area, by crop, by size of farm holding, for domestic/export crops? If so, to what extent have the trends changed since the beginning of the Project?

4. The availability of water was identified as the main constraint to production within the Project area. With the completion of the irrigation system, are there other constraints to increased production/productivity which should/could be addressed by the Project?

Divestment:

5. As a result of the first amendment to the Project, divestment of GOJ lands by the Agricultural Development Corporation (ADC) was primarily targeted for medium and small farmers. Has the Project truly emphasized small/medium farmers and delivered significant benefits? What percentage of the land within the Project area has been divested and to what crops? Assess the divestment process.

Were production targets set in the divestment process? Have the targets been met? Was agricultural extension incorporated into the divestment process?

- To what extent have the land use demands changed from those identified in the original loan/grant agreement and subsequent amendments. What has been the impact of any changes on the outcome of the Project? What is the impact and the direction of urban land use, encroachment/sprawl, in Project areas?

- Project lands have been left unproductive due to illegal sand mining and vandalism. What mechanism should be established for the recovery of these lands to realize the potential returns from the investment? Assess the likely success of NIC/ADC plans for security against sand mining and vandalism?

Water:

- What is the impact of the canal irrigation system versus the well system? What are the costs associated with each system? What percentage of the costs of operating and maintaining the systems is recouped in the fee structure? To what extent are the syatems, considering operating and maintenance costs, sustainable, operable and effective?

10. Does the NIC fee structure ensure sustainability by payment of operations and maintenance costs? What other resources are required for sustainability?

11. What are the water uses for the systems; percentage industrial, domestic and agricultural?

12. What has been the impact of increased water availability on the productivity and profitability of producers in the area? Can farmers, large, medium or small, make a profit paying for water considering any crop mix?

Diversification:

13. To what degree has diversification in the Project area occurred? What agricultural activities (crops, aquaculture, etc.) have been established in the Project area? What acreage is under cultivation, what activities?

14. To what extent have AID-financed activities in the Rio Cobre service area focussed on diversified agricultural production other than sugar? To what extent is AID-financing supporting increased sugar production, directly and indirectly?

Small/Medium Farmer Involvement:

15. Small/medium farmer involvement was a major emphasis of the first amendment to the Project Paper. How have small/medium farmers been involved in the Project? What has been the impact of the Project on small/medium farmers? What crops/activities have been initiated by small/medium farmers since the beginning of the Project? (Please provide gender disaggregated data.)

16. The availability of water through open canals has created an additional resource to the communities through which it passes. How has this resource affected these communities, particularly women?

17. A baseline survey of small farming communities in the Project area was completed in 1989. Do the results vary today and why?

Summary Considerations for the Evaluation Team:

The evaluation team will ensure that the following issues, which summarize the above questions, are considered in forming conclusions and recommendations regarding AID's future role in the Project:

--Project support for the dam reconstruction effort will continue. However, given the present circumstances of the Project and the probable impact as determined by this evaluation, is there justification for disbursement of remaining AID funds?

--If so:

-what are the highest priority uses of remaining AID funds?

-what are the benefits and costs associated with any further investment of AID funds in the Project? (Estimate ~ 14 million)

-how should such activities be scheduled in relationship to completion of the dam reconstruction?

-is there any justification for further Project funded assistance to the areas affected by illegal sand mining and vandalism?

-is there need for additional or intensified activities, e.g. agricultural extension, to assure Project outputs directly impact increased agricultural production and exports?

4. Method and Procedures

The evaluation team will: 1) review pertinent documentation from USAID, NIC, ADC, National Water Commission (NWC), Innswood and Bernard Lodge Sugar estates, the Sugar Industry Board, the Rural Agricultural Development Authority (RADA) and the Underground Water Authority (UWA); 2) interview NIC, ADC, NWC, water consumers and USAID; 3) investigate land use patterns and prospective uses; and 4) visit the Project areas. Collection of data and material investigations will be the primary basis for the formulation of findings and recommendations.

The evaluation team will work primarily in Kingston and in the St. Catherine Plains and Spanish Town (within a 30 minute drive from Kingston). USAID and NIC will make available all pertinent Project documentation as requested by the contractor. The USAID Project Officer for the Project will be assigned full time to assist the evaluation team.

The tentative schedule of the evaluation exercise will require the evaluation team to spend at least four weeks in Jamaica and one week in their home office to finalize the evaluation report. The tentative schedule follows.

Week One: Arrival, entry briefing, initial introductions and site visits, begin document review and interviews. The team will submit an outline of work to be done identifying individual responsibilities.

Weeks Two and Three: Site visits, document review, interviews.

Week Four: Prepare draft report and brief Mission and NIC. Briefing should include findings and recommendations. Mission comments will be included in the final draft.

Week Five: Prepare final evaluation report for submission to USAID.

5. Reporting Requirements

The evaluation report will follow the format described below:

- Project Evaluation Summary (PES) - AID Form
- Executive Summary
- Project Identification Fact Sheet
- Table of Contents
- Body of Report
- Appendices

The Project Evaluation Summary will be prepared according to standard AID instructions included as attachment A. The Executive Summary will state the development objectives of the activity evaluated; purpose of the evaluation; study method; findings; conclusions, recommendations and lessons learned.

The body of the report will include discussion of: 1) the purpose and study questions of the evaluation; 2) the economic, political and social context of the Project; 3) evaluation team composition and study methods; 4) evidence/findings of the study concerning the evaluation questions; 5) conclusion drawn from the findings; 6) recommendations based on the study findings and conclusions. The body of the report should be more than 20 pages but less than 40 pages in length.

Detailed discussions and methodology and technical issues should be in appendices to the report. Other appendices should include the scope of work for the evaluation, a list of documents consulted and individuals and agencies contacted.

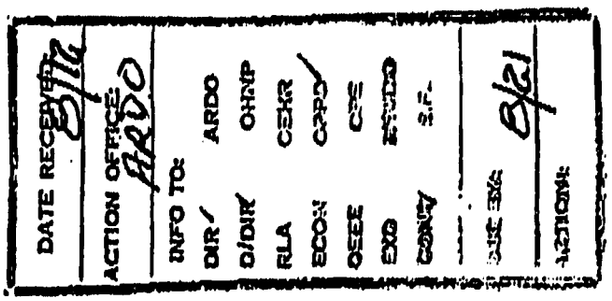
Appendix G: Comments of the National Irrigation Commission

NATIONAL IRRIGATION COMMISSION LIMITED

14-20 PORT ROYAL STREET,
JAMAICA CONFERENCE CENTRE, 3RD FLOOR,
KINGSTON, JAMAICA WEST INDIES.
TEL: 922-1470-9

01973

August 5, 1992



The Director
USAID Mission to Jamaica
6B Oxford Road
Kingston 5

ATTENTION: MR. STEPHEN SZADEK

Dear Sir:

SUBJECT: EVALUATION REPORT/CD/I BY TROPICAL RESEARCH AND DEVELOPMENT INC. - 8/6/92

The National Irrigation Commission accepts the report in principle in relation to its general contents. However the NIC proposes that:

A. COMMENTS

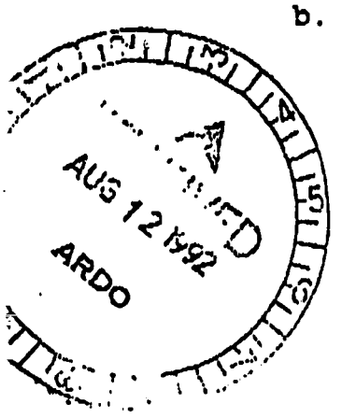
1. The final report even the Executive Summary be edited to show:

   a. The original project objective, namely:

      - crop diversification and divestment;
      - institutional strengthening;
      - infrastructural rehabilitation, operation and maintenance;
      - small farmers linkages.

   b. The achievements:

      - the degree of divestment and diversification of crop;
      - what institutional strengthening has taken place including the establishment of NIC, its mandate and functions;
      - the degree to which infrastructural rehabilitation is accomplished and if efficiently done;
      - the influence of the project on small farmers production and other linkages.



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If financial data was attached to these achievements then the benefits and/or failures of the project can easily be assessed and used for future project formulation.

One activity which by itself strengthens the achievement of one of the objectives, namely small farmers linkage, the Serge Island Project has been excluded. I propose that this project detail be included in the final report.

ii. Executive Summary

Project Profile - Should be corrected to read:

AID Loan US$ 8.0945 million
AID Grant US$11.9055 million

iii. Findings and Conclusion

Subhead (4) Cost and Benefits: To be corrected to read -

$10.167 million of CD/I's $18 million budget (56.5%) was committed for physical RCIW rehabilitation .....

Subhead (5) Allocation of CD/I Funding: Paragraph should be corrected to read -

About 56.5% of CD/I funding was committed to physical works ..... rehabilitation.

Subhead (6) Implementation: The Serge Island project achievements should be added to read -

... in the CD/I St. Catherine and the Serge Island project in St. Thomas.

Last paragraph (page xiv) -

Apart ..... consumption on less than 7,500 acres of the revised 4,824 acres.

The figure of 7,500 acres must be incorrect.

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iv. Project Priorities

1. NIC and the PIOJ agree with the project priorities stated, namely: (1) reconstruction of the RCIW dam; (2) training in water use; (3) completion of infrastructure rehabilitation deemed critical to the physical integrity of the RCIW; (4) infrastructural rehabilitation to improve delivery of water to small farmers and aquaculture and (5) institutional strengthening of the NIC.

While NIC and the PIOJ accept the need for a training programme for agricultural development involving, water management, production agronomy, farm management and post harvesting; it is believed that such a programme would envisage a new project, with long term goals which would extend beyond the PACD even is extended into a ten (10) year project. In addition the training project should have an island wide objective rather than just RCIW.

This is regardless of whether it is coordinated by the AESP, RADA, NIC or any other institution. Therefore uncommitted funding from the CD/I should not be used for this purpose but to achieve the critical priorities recommended by the evaluation report.

Blocks A, B, C & E

While NIC agrees with the proposal to withdraw existing CD/I funding from the blocks; the report should recommend that the GOJ make an effort to control sand mining principally in blocks A and B and commit funding and other measures, i.e., zoning, to insist that the lands remain in agricultural production.

NIC recommends the following:

Blocks A & B

The irrigation infrastructure, wells, pipeline,etc. be leased to farmers, who in conjunction with NIC will invest in the rehabilitation to ensure their sustained interest.

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The lease be based on the capital recovery factor of the investment over say fifteen (15) years at 10%.

The lease would be for periods of say five (5) years, renewable, with covenants which ensures water abstraction, within the approved volumes and guarantees that the wells be not used or disposed of for other purposes beside agriculture.

Two group of farmers have now applied for leasing approximately 290 acres.

Block E

NIC presently has water contracts and applications for 1,300 acres with four (4) wells operating. The other two costing approximately J$400,000 is being rehabilitated.

There is continuous request from farmers for water supply for Block E.

Block C

This block was never damaged by sandmining and NIC recommends that the plans for installation of pressurized piping to the divested lands from the HPR funding be continued.

Repayment of US$428,425 by GOJ

Although NIC sympathizes with the view point taken, the GOJ is not the direct beneficiary of sandmining, therefore an alternative proposal should be considered.

2. GOJ AND NIC PRIORITIES

The statement of NIC should:

(1) rationalize its management and operations and (2) improve its planning though acceptable for continued progress it is not understood on this occasion since the Policy and Plan document of NIC

since 1890 were never discussed with the Consultants. This seems a general statement needing further explanation and detailing.

v. Lessons Learned

NIC agrees with the key factors in 1, 2 and 3 as elements which forms the basic concepts to be considered in project formulation.

B. OTHER COMMENTS

The incidences of illegal sandmining and the vandalism of irrigation facilities and power supply have seriously affected the creditability of the CD/I project and form the basis for with-holding funding in the area. Coincidentally the areas affected are those originally delineated for crop diversification and divestment to encourage agricultural exports.

From recent efforts by the GOJ agencies responsible for security, NIC was informed that there is considerable reduction to the point of abatement of illegal sand mining in the area.

The Ministry of Agriculture was requested to provide USAID and NIC the following:

- information on the initiatives undertaken to reduce sand mining, including regulations;
- achievements in the reduction in sand mining, the plans which will ensure the sustaining of such reduction;
- estimated acreage damaged and the plans to restore these lands and/or the proposed usage;
- coordination with other governmental agencies namely Town Planning and Natural Resources Conservation Authority, to establish zoning of the area for agriculture to reduce urbanization of agricultural lands. The zoning proposal should consider not only the immediately affected areas but all Class I to Class III lands for agriculture and Class IV lands for aquaculture;

- review the divestment procedures, allottees and the assurance that the land will remain in agriculture.

C. RECOMMENDATION BY NIC

In accordance with the project priorities identified in the report, NIC recommends the following:

The uncommitted funding of the CD/I project of US$1,926,403 be retained by NIC for completing critical works namely:

i. Dam Reconstruction

- Harza Design Contract #532 0123 328	US$ 674,282
- Amendment to Harza Contract - 532 0123 72	22,000
- Soils Investigation	23,000
- Procurement of Sheet Piling	333,898
- Purchase 150 Hp Pump - dewatering	40,000
	1,093,180

ii. Coopers & Lybrand 25,500

iii. Infrastructure Rehabilitation

Hartlands Canal - Previously approved but Contractor defaulted. Second contract approved by USAID, delayed due to failure of dam. Canal serves small farmers, aquaculture and estates.

Station 0 + 00 - 49 + 40 - To rebid estimated cost	343,700
Station 49 + 40 - 116 + 00 - To rebid 40% complete. Water being supplied via by-pass canal, inadequate to maintain volume - estimated cost	405,700
	749,400

iv. Replacement of Vehicles

Approved by USAID since 1991 delay for reconciliation of accounts	50,000
v. Training Course - Dam Management	8,323
T O T A L	1,926,403

The National Irrigation Commission request your favourable consideration of the foregoing comments and recommendations.

Yours sincerely,

Winston L. Boyne
DIRECTOR OF ENGINEERING
& TECHNICAL SERVICES

db

cc: Dr. Garnet Brown - RADA
Mr. Sidney Small - NIC
Ms. Beverly Lawrence - PIOJ
Mr. Hibbert - PIOJ
Mr. Pencil - MOA
Mr. Edgar Watson - NIC

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Appendix H: USAID comments

USAID

KINGSTON, JAMAICA

48 OXFORD ROAD
KINGSTON 5, JAMAICA
TEL: (809) 296-8645 thru 9
FAX: (809) 929-3750 or 2

KINGSTON (ID)
DEPARTMENT OF STATE
WASHINGTON, D.C. 20521-3210

September 24, 1992

Mr. Alberto Vega
Project Manager
Tropical Research and Development
519 N.W. 60th Street, Suite D
Gainesville, Florida 32607

Dear Mr. Vega:

Re: Contract No. 532-0123-C-00-2037-00: Final Evaluation for the Crop Diversification/Irrigation Project

There are two areas of concerns which have been discussed on the subject evaluation, length of the document and clarity of the conclusions and recommendations. The report should conform to the specified length as stated in the scope of work in the contract, the body of the document should be no more than 40 pages. The project is complex and implementation activities have had to shift to accommodate the changing environment. Therefore, we understand the need to cover all aspects of the project and this cannot be done in a few pages. However, there are some areas which could receive less attention. In order to accomplish this, we suggest reviewing the following sections:

Section C: CD/I Implementation 1985-1990

Review parts 1 and 2 for inclusion in Section B, Project History. Section C would then focus on the findings and conclusions about the project during that period.

Section E: Findings

Review this section and determine the information (tables) which might be better suited for an appendix. Part 1., a. and b., contain numerous tables and figures which provide detailed information on water demand and supply and management cost. However, a summary of the information may be most useful in the text with reference to the actual data in the appendix. The objective would not necessarily be to shorten this section but to simplify the information provided. Shortening could actually be done in your editing procedures. This is only a suggestion and the effort involved to move the tables and/or figures should be weighed against rewriting this part of the report.

Sections F and G: Major Conclusions and Principal Recommendations

We have included for your information a letter to the Chairman of the Task Force reviewing the evaluation. This may be helpful in reviewing these sections to add clarity. The Task Force was made up of both USAID and GOJ officials and the letter describes the agreement reached on the major issues arising from the evaluation. As presented, the recommendations/activities are separated from the funding conditions which affect the implementation of the recommendations/activities.

As stated previously, the project is complex and implementation has changed as needed. The evaluation was an effort to clarify the remaining responsibilities of the GOJ and USAID in the project meeting the planned objectives. We appreciate your efforts at reaching this goal.

Please contact us if you have questions as to the above suggestions.

Sincerely,

Barbara Ellington-Banks
Office of Agriculture and
Rural Development

Attachment: a/s

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WASHINGTON, D.C. 20521-3210

September 15, 1992

Subject: Joint Actions in Response to the Final Evaluation of the Crop Diversification/Irrigation (CD/I) - AID Project No. 532-0123

Dr. Garnet Brown
Task Force Chair, Crop Diversification/
Irrigation Project
Director
Rural Agriculture Development
Authority
Ministry of Agriculture
Hope Gardens, Kingston 6

Dear Dr. Brown:

Ref: National Irrigation Commission (NIC) letter dated August 5, 1992, regarding subject

USAID has thoroughly reviewed the evaluation report, the referenced letter and Minutes of the Task Force meetings held on July 29 and August 12, 1992. The Task Force discussed the issues below at our September 9, 1992 meeting and have agreed, in principle, to the plan of action presented for continued implementation of the project.

The evaluation raises three major issues: (1) reconstruction of the Rio Cobre Dam; (2) reimbursement from the Government of Jamaica (GOJ) to the project for damage of irrigation infrastructure due to sand mining and vandalism; and (3) use of remaining project funds. The Task Force has reviewed and reached consensus, in principle, on the content of this letter. The following represents the results of our discussions on the above issues and two minor issues regarding vehicles and training.

Issue No. 1: Reconstruction of the Dam:

USAID and the GOJ are committed to financing the reconstruction of the Rio Cobre dam from the project-authorized amount of US$20 million and country-owned local currency. This is formalized in Project Paper Amendment No. 2, dated September 20, 1991 and continues to be the primary focus of the Project.

Issue No. 2: Reimbursement for Damages in Blocks A and B:

The evaluation recommends that USAID seek reimbursement of approximately US$428,425 for AID financed irrigation infrastructure in Blocks A and B, which has been damaged or rendered unserviceable by sand mining and vandalism.

NIC estimates approximately J$1,000,000 will repair damaged infrastructure in Blocks A and B and return that irrigation system to serviceable use. The NIC further recommends that funds be drawn from the Housing Reimbursement Project (HRP) funds.

Principal HRP funds may not be used as requested because the terms of the Project Agreement will not allow project funds, including HRP, to be used as proposed by NIC. The original principal deposit of HRP funds was returned to the Project in local currency for specific activities identified and agreed upon. These funds may not be used to compensate for damages (sand mining, vandalism) in Blocks A and B because that principal is equivalent to original dollar loan/grant funds. Project Agreement Amendment No. 1 stipulates that the principal shall be used for additional project costs. The interest, however, (1) is earnings above the principal, (2) is not dedicated to specific purposes, and (3) is owned by the GOJ so that its usage would not be inconsistent with the designated usage of the principal.

Therefore, USAID is prepared to concur with the use of interest generated from HRP funds given the following conditions:

(a) The GOJ provides a plan for assuring security in Blocks A and B, including specific GOJ measures to prevent future damage from sand mining and vandalism and a list of specific farmers, by name, who will develop the area.

(b) The GOJ and the farmers should be partners required to place some capital at risk through the investment of repairing pumps, cleaning wells or other required investments to develop the area. Discussions with NIC indicate that, legally, NIC must maintain some control within the areas and that license can be given to farmers to operate, manage and/or maintain particular aspects of the irrigation apparatus. The GOJ commitment may be determined by the annual appropriations for the maintenance of the system. NIC will develop an appropriate licensing system for the involved farmers.

(c) The GOJ is requested to initiate an implementable zoning plan for Cabinet decision. The decision would prohibit any residential development not directly related to agriculture for the area.. This is intended to assure that the project area, including Blocks A and B, will be protected from urbanization and used for agricultural purposes for a specified time period. Government agencies with responsibilities for area planning and development, i.e., Town Planning, should be consulted in the paper or zoning discussions. The time period should be tied to appropriate benefits returned for the investment made by the GOJ and USAID. This will require an economic and financial analysis to be completed to determine the minimum period of time.

Any further damage sustained to Blocks A and B or other project areas resulting from sand mining or vandalism will be the responsibility of the GOJ. USAID cannot commit further resources from project funds, including HRP, to rectify damage which may result from a lack of security.

The above conditions for use of the interest earned on HRP funds should be accomplished within a three month period following agreement on these conditions. This will assure that the restoration of agricultural production in Blocks A and B achieves some momentum before the project's completion date.

Issue No. 3: Remaining Project Funds:

The Evaluation report recommends that, after the Rio Cobre dam is repaired, project funds be used only to finance US$112,000 of infrastructure rehabilitation deemed essential to the overall functioning of the Rio Cobre system. It further recommends that USAID and the GOJ reprogram the remaining balance from the CD/I project to another Mission project. These funds will finance farmer linkage activities intended in the first amendment to the project, but not carried out to date.

The NIC has requested instead that the remaining balance be used to finance completion of the Hartlands canal, an activity previously approved under the project but not completed.

USAID is prepared to consider the NIC proposal with the following conditions:

(a) The project area has shown a marked increase of sugar cane production. As you know, USAID policy directives

discourage use of AID funds to promote sugar production. However, the original Project Paper focused on diversification away from sugar production and, therefore, concern for sugar production was not a factor. USAID is obligated, given the current situation and the apparent increase of sugar production, to assess likely sugar production levels in relation to our regulations. An analysis must be conducted to determine the probable impact of using USAID project funds to complete the Hartlands canal on the production of sugar versus diversified crops. This analysis must be undertaken before a decision on financing the Hartlands canal can be made. We suggest assessment by an independent party and project financing to conduct the study.

(b) An assessment must be completed to determine the impact of water availability and anticipated uses for crop production. This analysis is necessary for the GOJ and USAID to evaluate the potential use of the project area for agriculture and develop a set of priorities that will meet the goals and objectives of the project. In addition, the assessment will provide basic information on social, economic and farming practices in the project area. This will form the basis for a monitoring system that will demonstrate the benefits of effective farm water management and the potential for irrigated agricultural land in the St. Catherine Plains. The assessment will be the basis for designing and implementing a demonstration sub-activity for farmer linkage described in (c) below.

(c) In order to respond directly to the concern voiced by the evaluation team for farmer linkage activities, the GOJ is requested to design and implement a substantial demonstration water management and crop production activity in a project area such as Bushy Park or Spring Village, using a portion of the remaining Project funds. This activity would be designed to demonstrate the production potential of irrigated agricultural land with effective on-farm water management and related agricultural extension support, collect baseline production and water use data for comparison with information in the 1989 survey of Small Scale Farming in the CD/I project area, and measure the impact of irrigation facilities on agricultural productivity in selected areas of the Rio Cobre irrigation system.

Replacement of Vehicles:

Our records indicate that USAID has previously concurred with the purchase of additional vehicles. The same restrictions apply as in the previous purchases to have their source and origin in the United States. Coopers and Lybrand must complete their report on NIC's contracting capabilities prior to purchase.

Training:

USAID concurs in the use of US$8,400 in project funds to provide training in dam management.

We appreciate clarification on the issue of the Agricultural Development Corporation's (ADC) involvement on the Task Force at our meeting on September 9, 1992. We were concerned at the absence of any representatives from ADC during our previous meetings, given the role they were to play in the success of the project. We believe the Ministry of Agriculture's policy determination to return the responsibility of land divesture to the Commissioner of Lands will facilitate coordination of efforts under the CD/I project.

Further to the farmer linkage activity, we applaud the decision of the Rural Agriculture Development Authority (RADA) in recognizing the need to assign extension agents to each irrigation system, including the Rio Cobre. This will assure that the demonstration farm concept agreed to at the September 9, 1992 meeting of the Task Force will receive the necessary support for successful implementation.

It is suggested that, based on the outcome of our discussion, the final consensus to the proposed actions in this letter would be formalized in a Memorandum of Understanding (MOU) to be signed by the Minister of Agriculture and myself.

I wish to thank you, the Ministry of Agriculture and all the members of the Task Force for your outstanding participation and cooperation in reaching resolutions to the issues raised by the evaluation.

I look forward to the results of the Task Force meeting scheduled for September 16, 1992 and to meeting with Minister Mullings to finalize the MOU for moving forward with the implementation of CD/I.

Sincerely,

Robert S Queener

Robert Queener
Director

cc: Sidney Small, NIC
Winston Boyne, NIC