DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

# JAMAICA

## NATIONAL IRRIGATION DEVELOPMENT PROGRAM (NIDP)

**(JA-0106)**

**LOAN PROPOSAL**

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## ANNEXES



## BASIC SOCIOECONOMIC DATA

The basic socioeconomic data for Jamaica available on the Internet at the following address:

http://www.iadb.org/RES/index.cfm?fuseaction=externallinks.countrydata

## INFORMATION AVAILABLE IN THE FILES OF RE3/RE3

### PREPARATION:

1. NIDP Master Plan (Harza) Consultants, 1998).
2. Feasibility Report on Three Sample Projects of the NIDP (FAO/TCI, June 2003).
3. NIDP Institutional and Financial Analysis (S. Tyler, April 2003).
4. NIDP Farmers' Technical Assistance and Training (R. Vargas, June 2003).
5. NIDP Water Users Associations (J. Sagardoy, April 2003).
6. NIDP Price Recovery and Water Charges (C. Varela, June 2003).
7. NIDP Economic Evaluation (R. Yrarrazabal, June 2003).
8. NIDP Logical Framework (R. Diez, June 2003).
9. NIDP Land Tenure and Regularization Aspects (H. Román, June 2003).
10. NIDP Environmental and Social Impact Report, ESIR (E. Farnworth, April 2003).
11. NIDP Irrigation Engineering Aspects and Recommendations (R. Bernal, April 2003).
12. NIDP Water Resources Availability and Recommendations (L. Mateos, April 2003).

### EXECUTION:

1. Draft Operating Manual and Guidelines for NIDP Implementation (May 2004).
2. Terms of Reference for the Preparation of the Rehabilitation Plan on Existing Irrigation Systems (May 2003).
3. Terms of Reference to Develop a Methodology to Determine the Economic Value of the Water in Selected Jamaican Watersheds (April 2003).
4. Environmental Management Plan, EMP (April 2003).

## ABBREVIATIONS

| | |
|---|---|
| ADO | Agribusiness Development Officer |
| ASSP | Agricultural Support Services Program |
| CDB | Caribbean Development Bank |
| EIRR | Economic Internal Rate of Return |
| ESIR | Environmental and Social Impact Report |
| EU | European Union |
| FAO/TCI | Food and Agricultural Organization - Investment Center Division |
| GDP | Gross Domestic Product |
| GIS | Geographic Information System |
| GOJ | Government of Jamaica |
| IADB | Inter-American Development Bank |
| IDP | Irrigation Development Project (CDB funded) |
| IFF | Intermediate Financing Facility |
| IRR | Internal Rate of Return |
| LAMP | Land Administration and Management Program |
| MIS | Management Information Systems |
| MOA | Ministry of Agriculture |
| MOFP | Ministry of Finance and Planning |
| MOU | Memorandum of Understanding |
| MOWH | Ministry of Water and Housing |
| NEPA | National Environmental Protection Agency |
| NIC | National Irrigation Commission |
| NIDP | National Irrigation Development Program |
| NLA | National Land Agency |
| NPV | Net Present Value |
| NWC | National Water Commission |
| OC | Ordinary Capital |
| O&M | Operation and Maintenance |
| OUR | Office of Utilities Regulation |
| PIOJ | Planning Institute of Jamaica |

| | |
|---|---|
| PIU | Program Implementation Unit |
| PPF | Project Preparation Facility |
| PSC | Program Steering Committee |
| RADA | Rural Agricultural Development Authority |
| TOR | Terms of Reference |
| USAID | United Sates Agency for International Development |
| WRA | Water Resources Authority |
| WSPSAP | Water Sector Policy Strategy and Action Plan |
| WUA | Water User Association |

INTERAMERICAN DEVELOPMENT BANK
ITS/ITC

# JAMAICA

## IDB LOANS

### APPROVED AS OF APRIL 30, 2004

| | US$Thousand | Percent |
|---|---|---|
| **TOTAL APPROVED** | **1,766,663** | |
| DISBURSED | 1,540,069 | 87.17 % |
| UNDISBURSED BALANCE | 226,594 | 12.82 % |
| CANCELATIONS | 65,105 | 3.68 % |
| PRINCIPAL COLLECTED | 844,698 | 47.81 % |
| **APPROVED BY FUND** | | |
| ORDINARY CAPITAL | 1,402,812 | 79.40 % |
| FUND FOR SPECIAL OPERATIONS | 164,918 | 9.33 % |
| OTHER FUNDS | 198,933 | 11.26 % |
| **OUSTANDING DEBT BALANCE** | **695,371** | |
| ORDINARY CAPITAL | 638,621 | 91.83 % |
| FUND FOR SPECIAL OPERATIONS | 56,751 | 8.16 % |
| OTHER FUNDS | 0 | 0.00 % |
| **APPROVED BY SECTOR** | | |
| AGRICULTURE AND FISHERY | 165,770 | 9.38 % |
| INDUSTRY, TOURISM, SCIENCE AND TECHNOLOGY | 228,998 | 12.96 % |
| ENERGY | 185,113 | 10.47 % |
| TRANSPORTATION AND COMMUNICATIONS | 211,962 | 11.99 % |
| EDUCATION | 113,042 | 6.39 % |
| HEALTH AND SANITATION | 115,693 | 6.54 % |
| ENVIRONMENT | 11,830 | 0.66 % |
| URBAN DEVELOPMENT | 134,503 | 7.61 % |
| SOCIAL INVESTMENT AND MICROENTERPRISE | 86,012 | 4.86 % |
| REFORM AND PUBLIC SECTOR MODERNIZATION | 240,602 | 13.61 % |
| EXPORT FINANCING | 260,499 | 14.74 % |
| PREINVESTMENT AND OTHER | 12,639 | 0.71 % |

* Net of cancellations with monetary adjustments and export financing loan collections.

INTERAMERICAN DEVELOPMENT BANK
ITS/ITC

# JAMAICA

## STATUS OF LOANS IN EXECUTION

### AS OF APRIL 30, 2004

**(Amount in US$ thousands)**

| APPROVAL PERIOD | NUMBER OF LOANS | AMOUNT APPROVED* | AMOUNT DISBURSED | % DISBURSED |
|---|---|---|---|---|
| **REGULAR PROGRAM** | | | | |
| Before 1998 | 2 | 67,700 | 42,655 | 63.01 % |
| 1998 - 1999 | 3 | 54,900 | 14,705 | 26.79 % |
| 2000 - 2001 | 6 | 164,000 | 42,974 | 26.20 % |
| 2002 - 2003 | 2 | 33,000 | 8,649 | 26.21 % |
| **PRIVATE SECTOR** | | | | |
| 2002 - 2003 | 1 | 30,000 | 23,000 | 76.67 % |
| **TOTAL** | **14** | **$349,600** | **$131,983** | **37.75 %** |

* Net of cancellations. Excludes export financing loans.

**Inter-American Development Bank**
Regional Operations Support Office
Operational Information Unit

# Jamaica

## Tentative Lending Program

**2004**

| Project Number | Project Name | IDB US$ Millions | Status |
|---|---|---|---|
| JA0114 | Kingston Metro Water Supply Rehabilitation | 40.0 | |
| JA0106 | National Irrigation Development Program | 16.8 | |
| | **Total - A : 2 Projects** | **56.8** | |
| JA0112 | South Coast Sustainable Development Prog | 14.0 | |
| | **Total - B : 1 Projects** | **14.0** | |
| | **TOTAL 2004 : 3 Projects** | **70.8** | |

**2005**

| Project Number | Project Name | IDB US$ Millions | Status |
|---|---|---|---|
| JA0119 | Youth Development Program | 15.0 | |
| JA0121 | Micro and Small Enterprise Development Program | 3.0 | |
| JA0125 | Post-Secondary Education | 16.0 | |
| JA0129 | Road Natural Disaster Prevention Program | 20.0 | |
| | **Total - A : 4 Projects** | **54.0** | |
| | **TOTAL - 2005 : 4 Projects** | **54.0** | |
| | **Total Private Sector 2004 - 2005** | **0.0** | |
| | **Total Regular Program 2004 - 2005** | **124.8** | |

*** Private Sector Project**

# NATIONAL IRRIGATION DEVELOPMENT PROGRAM (NIDP)

## (JA-0106)

## EXECUTIVE SUMMARY

| | | |
|---|---|---|
| **Borrower:** | Government of Jamaica (GOJ) | |
| **Executing agency:** | National Irrigation Commission (NIC) | |
| **Amount and source:** | IDB: (OC/IFF) | US$16.8 million |
| | Local: | US$ 4.2 million |
| | Total: | US$21.0 million |
| **Financial terms and conditions:** | Amortization period: | 20 years |
| | Grace period: | 5 years |
| | Disbursements: | 5 years |
| | Commitment (for works): | 4 years |
| | Currency: | Dollars from the United States from the Single Currency Facility |

The interest rate, credit fee, and inspection and supervision fee mentioned in this document are established pursuant to document FN-568-3 Rev. and may be changed by the Board of Executive Directors, taking into account the available background information, as well as the respective Finance Department recommendation. In no case will the credit fee exceed 0.75%, or the inspection and supervision fee exceed 1% of the loan amount[1].

| | |
|---|---|
| Interest rate: | LIBOR-based option |
| Credit fee: | 0.25% |
| Inspection and supervision: | 0% |

**Problem to be addressed by the National Irrigation Development Program (NIDP):** One of the main constraints to an improved economic performance of the Jamaica's agricultural sector is its vulnerability to drought: rainfall regime is a major deterrent to increased agricultural productivity, while most of public irrigation systems need major rehabilitation works. Out of the approximately 90,000 ha that are considered irrigable in Jamaica, almost 36,000 ha have some sort of irrigation infrastructure installed, but only some 25,000 ha are currently irrigated.

[1] With regard to the inspection and supervision fee, in no case will the charge exceed, in a given six-month period, the amount that would result from applying 1% to the loan amount, divided by the number of six-month periods included in the original disbursement period.

During the preparation of this project the Bank supported the evaluation and revision of the institutional and policy framework that led to the development and approval by the GOJ of the Water Sector Policy Strategy and Action Plan, (WSPSAP). This new framework comprises the following main elements related to irrigation: (i) the definition of a new role for NIC in view of the progressive establishment of Water User Associations (WUAs); (ii) the revision of the legal framework to define the legal status of WUAs; (iii) the definition of a clear cost recovery policy, including Operation and Maintenance (O&M) and capital costs. Implementations of these elements have already started and will continue during program's execution.

**Objectives:** Purpose of the program is to increase high payoff agriculture and farmers income in the program's area, and therefore contribute to increase the national agricultural area under improved policy framework and irrigation management practices. Main indicator of successful NIDP completion is the increment in irrigated area from 500 has to approximately 1,700 has benefiting about 1,000 farmers with increase in farming income as a result of the introduction of new crops, increase in yields and cropping intensity.

**Description:** The NIDP has four components, besides the provisions for the operation of the Program Implementation Unit (PIU):

**1) Institutional Strengthening of the NIC (US$0.95 million)**

It will strengthen the institutional framework and capacity for irrigation management in Jamaica. The NIC will be reorganized to progressively focus on planning, monitoring and regulating the irrigation sector. This component will achieve five outputs: (i) NIC business Strategy developed and Company reorganized; (ii) Management of Information Systems (MIS) strengthened; (iii) Accounting systems strengthened; (iv) Billing systems strengthened; and (v) Operations strengthened.

**2) Promotion and Formation of WUAs (US$1.69 million)**

It will support (i) the establishment of a WUA Support and Regulation Unit within the PIU; and (ii) the formation and consolidation process of WUAs in all NIDP irrigation systems, i.e., Yallahs, Colbeck, New Forest, Essex Valley and Saint Dorothy. In each of these systems, a specific Action Plan will be implemented.

**3) Farmers' Technical Assistance and Training (US$1.17 million)**

It will support farmers' economic activities by training them in the correct use of relevant agricultural and marketing techniques to properly manage their natural and financial resources under irrigated conditions, and therefore, enhance the performance of their agricultural businesses.

**4) Irrigation infrastructure (US$10.61 million)**

It will fund (i) the construction and/or rehabilitation of five irrigation projects (US$9.31 million), and (ii) the preinvestment costs of the NIDP (US$1.3 million). The irrigation infrastructure include wells, pump houses, power supply, pipe networks, pumping equipment, and on-farm systems in five irrigation areas: Yallahs, Colbeck, New Forest/Duff House, Essex Valley and Saint Dorothy. It is estimated that these systems will benefit about 1,700 ha and 1,000 farmers. The preinvestment includes feasibility studies and final designs for Essex Valley and St. Dorothy as well as the rehabilitation plans for two major irrigation systems (Mid-Clarendon and Rio Cobre).

Additionally, the NIDP includes the funding of the incremental costs of NIC to support the PIU (US$0.93 million), the related engineering and supervision costs for infrastructure (US$1.64 million) and the reimbursement of a Project Preparation Facility (PPF) (US$0.5 million) used during program preparation.

Therefore, total estimated cost of the NIDP, including financial costs, is US$21 million. The Bank will finance US$16.8 million (80%) and local counterpart US$4.2 million (20%). The Bank will recognize up to US$1.76 million (8.4%)[2] in farmers' contribution.

**Bank's country and sector strategy:**

This program was included as an investment priority in the Country Paper (GN-2025) for Jamaica approved on August 1998. The program's main strategy elements (achievement of a better allocation of water resources, promotion of crop diversification, enhancing competitiveness in the agricultural sector and improvement of the institutional and policy framework for irrigation) are consistent with Bank's Strategy efforts towards the promotion of private sector development, the modernization of the public sector and the improvement of environmental management.

**Environmental/ social review:**

The NIDP's environmental impacts are mostly positive and include: (i) enhancement of good farming/cropping practices; (ii) steady provision of cheaper and good quality water; (iii) better water management under the responsibility of the WUAs; (iv) delivery of agricultural support services including extension and marketing information; (v) extensive training in pesticide use; and (vi) implementation of a surface and groundwater quality monitoring program for each system.

No major negative environmental impacts are foreseen as a result of the implementation of the NIDP. Identification and due consideration of direct and indirect negative impacts and the corresponding mitigation measures included in the program, demonstrate that negative impacts can be limited

[2] The farmers' financial contribution relates to the on-farm investments (US$1.7 million) and to the share for the technical assistance (US$60,000).

and controllable if the recommended mitigatory measures are properly applied. Obviously, impacts may result if program components are improperly executed or if they do not effectively address current detrimental agricultural practices.

The program has many positive social benefits that will increase the economic and social welfare of farmers and their families. Organization and implementation of WUAs will: (i) improve water delivery to individual farms and parcels, increasing crop production and farmers' income; (ii) provide market information to producers improving their ability to access markets; (iii) help farmers secure inputs and gain credit collectively; and (iv) reduce praedial larceny, a major cause of crop and income losses for farmers. Agricultural support services will provide cropping knowledge and skills to increase productivity and give better access to market information. Women will benefit from leadership training, cropping and increased production knowledge and marketing skills and information resulting in increased income equality and independence. Improved fertilizer use and handling, use and storage of pesticides will reduce farmer health risks; lower production costs, and reduce water and soil contamination in the farming areas.

**Benefits:**

Economic evaluation for the overall NIDP resulted in an Economic Internal Rate of Return (EIRR) of 31% and a Net Present Value (NPV) of about US$52.5 million. Thus, the implementation of the program will result in a betterment of the country as a whole and not just for the 1,000 family farms directly benefited by the infrastructure works. Additionally, it is expected that the adoption of the new institutional and policy framework will result in a more efficient allocation of the Island's irrigation water resources.

**Risks:**

**1) Cost recovery**

There has been a tendency over the last few years towards cost recovery in the public systems managed by NIC. Due to strong farmer resistance, however, rate increases were rolled back in 1997. The implementation of a clear cost recovery policy and regulations are essential for the success of the NIDP. The proposed sequencing in irrigation investments and the contractual obligations that the WUAs are expected to assume aim at securing cost recovery.

**2) GOJ's ability to meet its counterpart financing requirements**

Even though it was showed that the GOJ could meet its counterpart requirements, the recent fiscal deterioration could affect the financial commitments of the GOJ to the NIDP. Thus, the design of the program tried to maximize farmers' contribution and GOJ's counterpart was spread out over a 5-year disbursement period.

**3) Land Tenure System**

Secure forms of land tenure in the irrigation areas and the implementation of a clear land administration policy are crucial incentives for WUAs financing and assuming the management of irrigation systems. Successful implementation of the Land Administration and Management Program (LAMP), in particular its land regularization component, and of the Memorandum of Understanding (MOU) between NIC and the National Land Agency (NLA), would enhance these possibilities within the NIDP areas.

**4) Water Users' participation**

The history of farmer organizations (including WUAs) has not been a successful one in Jamaica. To minimize the probability of new failures the project will pay particular attention to social, financial and organizational issues. Another important element will be to integrate the participation of farmers in the design, funding and management of the systems.

**Coordination with other development institutions:** The project team interacted with staff from the Caribbean Development Bank (CDB) and the European Union (EU) about irrigation projects that these institutions are executing in Jamaica (¶ 1.22 and 1.25).

**Special contractual clauses:** The first disbursement of the financing shall be subject to the fulfillment, to the satisfaction of the Bank, of the following requirements:

a. The signing of the following agreements: (i) between the GOJ and NIC whereby the latter assumes the obligations of Executing Agency (¶ 3.1); (ii) between NIC and NLA regarding objectives, activities and roles and responsibilities of the latter in the execution of the land regularization activities (¶ 3.21); and (iii) between NIC and the Ministry of Agriculture's Agricultural Support Services Program (MOA-ASSP) for the execution of the Technical Assistance and Training Component (¶ 3.13).

b. The approval by NIC of the PIU restructuring and staffing and the appointment, in accordance to the Terms of Reference (TOR) previously agreed with the Bank, of its core staff, as such term is defined in (¶ 3.9).

c. The formal approval of the NIDP Operating Manual by NIC (¶ 3.26).

d. The submission of the detailed methodology for the implementation of the capital cost recovery policy to be applied in the NIDP irrigation systems, including the following main aspects: (i) the procedures and arrangements established for estimating the capital costs to be recovered and the farmers' net margins during the recovering period; (ii) the procedure to adjust the capital cost charges for inflation; and (iii) the procedures for collecting the corresponding charges (¶ 3.41).

e. Promulgation of the Regulations of the Irrigation Amendment Act (¶ 3.14).

During the execution of the program, the Borrower should fulfill the following conditions:

a. Prior to the licensing of each irrigation system to a WUA, submit evidence that the land tenure of at least 80% of the parcels in that system has been regularized (with registered titles, or a lease deriving from a registered title, valid for at least three years after joining the WUA) (¶ 3.23).

b. Prior to the call for bidding for infrastructure works in each irrigation system, the Executing Agency will submit evidence to the Bank that it has executed an agreement, prepared in accordance with a model previously approved by the Bank, with the corresponding legally established WUA regarding objectives, activities, commitments, and roles and responsibilities in program execution and administration (¶ 3.17).

c. Prior to the award of the contract for infrastructure works in the first irrigation system, the Executing Agency will submit evidence to the Bank that it has hired two additional irrigation engineers as part of the staff of the Program Implementation Unit (PIU) (¶ 3.10).

**Poverty-targeting and social equity classification:** This operation does not qualify as a social equity-enhancing project, as described in the indicative targets mandated by the Bank's Eighth Replenishment (document AB-1704). Furthermore, this operation does not qualify as a Poverty Targeted Investment (PTI).

**Exceptions to Bank policy:** There will be no exceptions to Bank's Policies in this program.

**Procurement:** Bank procedures will be followed in the procurement of works, goods and consulting services. International competitive bidding will be followed for purchases of more than US$250,000 for procurement of goods and related services, and US$1.5 million for construction works. Consultant's services will be hired in accordance to Bank procedures (¶ 3.29).

# I. FRAME OF REFERENCE

## A. Agricultural sector

1.1 Agriculture in Jamaica accounts for 8% of Gross Domestic Product (GDP) and employs about 25% of the labor force. The sector also accounts for 12% of exports earnings, mainly from sugar, bananas, coffee, cocoa, spices and vegetables. The agricultural sector grew at a rate of only 1.1% between 1990 and 2001 and agricultural production declined at an annual rate of 0.6% during the last six years. This evolution was heavily influenced by the prolonged drought periods experienced by large regions of the country. However, agricultural GDP increased by 5.2% in 2002, and 9.7% in 2003 as a result of an increase in area, as well as improved weather conditions. Jamaica has a total area of 1.1 million ha of which 270,000 ha are cultivated. The potential irrigable area is approximately 90,000 ha, of which 25,000 ha are currently irrigated. The main irrigated crop is sugar cane with 70% of the irrigated land.

1.2 The main economic constraint to an improved economic performance of the agricultural sector has been the evolution of the exchange rate. Real appreciation of the exchange rate prior to 1999/2000 and again in 2001/2002, and the general high level of domestic prices relative to other countries in the region, have resulted in a loss of competitiveness for agricultural production. Several other factors constrain agricultural production and productivity, as follows: (i) economic stagnation: GDP per capita has been flat for 30 years, except for modest growth in the last half of the 1980s, a negative growth in the last half of the 1990s, and a slight growth between 1998-2003 of 1,3% on average; (ii) poverty, that is clearly a rural problem (its incidence is twice higher in rural than in urban areas, and in 2002, 73 percent of the poor population lived in rural areas), it is concentrated in the uplands, and it is predominantly based on poor-resource farmers and farm laborers; (iii) non-competitive commodity sectors: Jamaica's traditional agricultural exports (such as sugar and coffee) are largely non-competitive, while numerous non-traditional agricultural exports are competitive in domestic and international markets; (iv) vulnerability to drought is a major deterrent to invest in rural areas, given the widespread dependence on rainfed agriculture and that most of public irrigation systems need major rehabilitation works; and (v) insecure land tenure arrangements in some areas.

1.3 The full potential of Jamaican agriculture has not been realized due to the factors mentioned above. Though many Jamaican crops are highly rated in international markets, their productivity is low. Most small farmers grow their crops under mixed cropping systems and in too small quantities to be attractive to exporters, processors and wholesalers. However, recent studies have indicated that there are a number of agricultural enterprises, which would be competitive given suitable market outlets. These include: high quality bananas for European niche markets, non-traditional fruit crops, and irrigated vegetables, spices and condiments.

1.4 Land is held under different tenure arrangements: ownership, rental, lease, and squatting. About 80% of the agricultural land is owned, 9% is leased, 7% is rented and 4% is squatting. Around 60% of the land is owned and registered. It is noteworthy that farmers holding less than 2 ha account for almost 70% of the farmers that own 50% of the land.

1.5 However, insecure land tenure arrangements remain as one of the main land administration and management issues in Jamaica. This problem is derived from some constraints that in the land titling and registration process as well as the lack of a current cadastre of agricultural lands. One of the reasons for the low level of titled parcels is high transaction costs for stamp duties and transfer taxes, which result in a disincentive to the transfer and registration of lands. Other problem is the long period of time that it takes to get and register a land title.

## B. Irrigation subsector

### 1. Water availability

1.6 Rainfall in Jamaica is marked by monthly, annual and spatial variability. The average annual rainfall for the entire island is about 1,960 mm. The Blue Mountains and Northeast coast lying in the path of trade winds receive the highest annual rainfall (over 3,300 mm). Kingston receives less than 1,270 mm annually. Water shortages are characteristic of the southern/central lowlands, making irrigation necessary for agriculture. The island rainfall is bimodal, with peaks in May and October and minimums in March and June.

1.7 The country relies on ground water sources for 85% of its available water supply. The total available water supply is about 4,088 $mm^3$/year, 638 $mm^3$/year from surface sources and 3,450 $mm^3$/year from ground water sources. The water demand projected to year 2015 is 1,313 $mm^3$/year for agricultural purposes and 358 for non-agricultural purposes. Thus, the surplus for the whole country will be of about 2,300 $mm^3$/year. However, the water supply and the water demand are not evenly distributed within the Island. For instance, in the basins of Rio Minho, Rio Cobre and Blue Mountains South, water shortages are more likely to occur and thus agriculture under rainfed conditions is not competitive. But at the same time, there is surplus ground water availability in those regions that can be used for irrigation.

### 2. Irrigable areas

1.8 Out of the approximately 90,000 ha that are considered irrigable in Jamaica, almost 36,000 ha have some sort of irrigation infrastructure installed, but only some 25,000 ha are currently irrigated. Almost 55% of the irrigated area is in public irrigation systems, administered by the National Irrigation Commission (NIC). Irrigation is mainly supplementary and most of the Island's agricultural lands are cultivated under rainfed conditions. However, some specific areas with good soils and topographical conditions for intensive agriculture are highly

dependant upon irrigation. According to the Land and Water Atlas of Jamaica produced by the National Irrigation Development Master Plan, rainfall regimes make irrigation a necessity for intensive agriculture in the South/Central Region of the Island (mainly covering some parts of the Parishes of St Elizabeth, Manchester, Clarendon, St. Catherine, St. Andrew and an isolated part of St. Thomas). Indeed, it is there, where most of the current irrigation infrastructure of the Island is located and where most of the proposed projects to be developed by the Master Plan were identified.

### 3. Farmers' participation

1.9 Several studies have concluded that the history of farmer's organizations — including Water Users Associations (WUAs)— has not been a successful one, resulting from the top-down approach followed in the design and implementation of the programs aimed at promoting them. Farmers in public irrigation infrastructure did not develop ownership attitudes and farmers' leadership was often ineffective or absent. There was also a lack of legal authority, power or status for WUAs and deficiencies in technical assistance for agricultural production, farm administration and marketing information. In 1990, the NIC made initial efforts, yet very limited, towards the promotion and formation of WUAs as the basis to secure farmers participation in operation and maintenance (O&M) of the irrigation systems.

1.10 Since 1997 the NIC has been more actively promoting the formation of water user groups, resulting in the establishment of some 14 groups being currently active. To avoid an additional failure, a clear legal status for the WUAs has already been approved, and the NIC's efforts towards the promotion and formation of new WUAs are to be improved by introducing a new methodology that includes a better and sound knowledge of cultural and sociological aspects of the farmers' communities, a deeper involvement of the farmers in consultation and decision-making processes and a stronger training component for WUAs formation and consolidation.

1.11 There are numerous cases of irrigation management transfer and participatory irrigation management worldwide, including some Latin American countries. In Mexico, the transfer program to WUAs started in 1989 and in 2000 around 95% of the large irrigation districts had been transferred. In Colombia, about 90% of the public irrigation districts were transferred to the users associations by 1998. In India, in Andhra Pradesh in 1997 as a result of a new law, about 10,000 WUAs were created. Irrigation management transfer has shown an increase in O&M cost collection rates (Mexico, about 85%, Colombia, 100% and India, 70%). In most cases, the international experiences have shown that success in the transfer process of public irrigation systems is very much linked to the proper involvement of stakeholders in several sequential phases. The transfer process should commence with the mobilization and involvement of farmers to design the strategy, gaining their support for the resolution of key policy issues before going into the implementation phase. Thus, the design of the WUAs Component within

the National Irrigation Development Program (NIDP) included the lessons learned to ensure a successful transitional transfer process.

### 4. Land tenure regularization

1.12 A survey conducted among farmers located within the area of the NIDP sample projects shows that only 17% have registered titles, which is the only conclusive evidence of land ownership. However, another 53% reported to have other documents (sale receipts, tax receipts and lease agreements) that allow them to claim possession and ownership. This indicates that farmers, with some assistance, can regularize (get registered title or have a lease originated from a registered title, valid for at least three years after joining the WUA) most of the irrigable lands. Land tenure problems are more severe in New Forest and could be solved more easily in Yallahs and Colbeck. Specific measures will be taken in order to expedite legal process for land regularization in the NIDP.

## C. Legal and institutional framework for irrigation

1.13 The Water Resources Act of 1995 is the most recent and comprehensive water legislation in Jamaica. The Act established the Water Resources Authority (WRA) and determined its functions. According to the Act in order to abstract and use water any person must have a license issued by the WRA. The WRA is now charging an application fee that covers only the cost of processing such application. Under the Act all water developments must be approved by the WRA, pursuant to the National Water Resources Master Plan. The investments proposed in the NIDP have been approved as being consistent with the existing Master Plan.

1.14 The Irrigation Act (1949) establishes the legal framework for public irrigation in Jamaica. The Act was amended in 1999 to consolidate the legal authority for the government to license an Irrigation Authority to own and operate the public irrigation works in the country. Prior to this amendment, the NIC's responsibility had been derived from two vesting orders and a license. Consistent with the 1999 Amendment, the government licensed the NIC as the Authority under the Act for an additional ten years, i.e., up to 2011. More recently, in December 2003, a further amendment to the Irrigation Act was approved, allowing WUAs to be organized either as limited liability companies, cooperatives or special authorized societies, to actually operate and manage the public irrigation systems under license to be given by the NIC. The respective Regulations of such Amendment are being prepared and are expected to be promulgated by the Ministry of Water and Housing (MOWH) by December 2004.

1.15 The MOWH has overall policy, financial, and administrative responsibility for the water sector, including the NIC, the WRA and the National Water Commission (NWC) (potable water utility). The NIC is a government-owned company, under the MOWH, licensed as the Irrigation Authority in the country, and responsible for the operation, maintenance and development of public-owned off-farm

irrigation works. The Office of Utilities Regulation (OUR) is responsible for calculating and proposing public utility rates, including non-agricultural water rates for the public irrigation systems operated by the NIC. In the case of the agricultural water rates for the public irrigation systems the NIC's provides the basic information for the tariff calculation by OUR. The MOWH approves and set the water rates for agricultural customers. The NIC employs a number of measures to enforce collection, including disconnection and court action, and this has led to the recovery of approximately 93% of its total invoice charges.

1.16 The NIC was created in 1986 and its primary function is to operate and maintain six existing public irrigation systems and one public drainage system, and to develop new systems. The NIC is responsible for producing water and providing it up to the farm gate. NIC's operations are in three regions: Western (Braco, Black River and Hounslow irrigation and/or drainage systems); Central (Mid-Clarendon irrigation system) and Eastern (St Dorothy, Rio Cobre and Yallahs irrigation systems). There are six district offices responsible for each one of these systems. NIC is governed by a Board comprised of 15 members appointed by the MOWH, and employs about 164 persons (nearly 75% of staff is field based).

1.17 In view of the progressive establishment of WUAs, NIC will shift gradually from its current O&M activities towards planning, monitoring, and some regulating related functions. These functions will be related with technical and organizational issues as the regulatory areas related to tariffs will follow the process described in paragraph 1.15. Thus, it is expected that NIC's role will shift from a utility public company towards a sector development planning, and monitoring office, with some regulatory functions that will gradually be eliminated.

## D. Cost recovery policy for irrigation

1.18 In spite of the efforts to increase agricultural water charges, Government of Jamaica (GOJ) currently subsidizes the O&M costs of the irrigation systems operated by NIC. NIC uses the same rate schedule Island-wide regardless of the actual cost of service in every specific system. Still, some differentiation is observed whereby small farmers are charged a lower rate compared to large farmers and domestic users compared to industrial users. In late 90's NIC established a goal to reach full recovery of O&M costs in all systems by 2000,subject to the initiation of rehabilitation works in the irrigation areas. However, fiscal constraints have hindered the realization of these investments and delayed the fulfillment of this policy goal.

1.19 Further evaluation during preparation of the new Water Sector Policy Strategy and Action Plan (WSPSAP), approved by the GOJ in 2001, and the appreciation of the difficulties involved without an adequate farmer participation, led to a revised time-table to reach full recovery of the O&M costs for existing systems and extended the deadline up to year 2010. In the case of new or rehabilitated

systems, the WSPSAP clearly stated the goal to recover 100% of O&M costs since the beginning and the recovery of a reasonable proportion of the capital costs, established in accordance to the farmer's ability to pay on the basis of the net margin mechanism. These objectives, according to the GOJ, can best be achieved by delegating the management responsibility for the irrigation systems to WUAs.

## E. The experience of the Bank and other donors

1.20 In 1985, the United Sates Agency for International Development (USAID), under the Agro 21 Program, funded the Crop Diversification and Irrigation Project, whose main objective was to offer potential investors unutilized sugar cane lands. Of a total area of 5,300 ha, only 800 ha were actually put into production. However, important achievements of this Project were the establishment of the NIC in 1986 and the rehabilitation of several small irrigation systems, benefiting about 600 small farmers.

1.21 Between 1987 and 1996, Jamaica executed the World Bank funded "Second Sugar Rehabilitation Project", amounting to US$34 million. With this project, the government divested several sugar factories and estates, liberalized sugar prices and completed a comprehensive rehabilitation program. However, the ex-post Internal Rate of Return (IRR) estimated for the irrigation part was negative. Further, sugar cane growers never met the originally agreed mandate to pay 100% of recurrent costs.

1.22 Currently the European Union (EU) is funding the "Rural Water Project II" (J$25 million) that provides technical assistance and a revolving fund to support irrigation and drainage investments in banana farms. Also, the European Development Fund is supporting the Rural Agricultural Development Authority (RADA) of the Ministry of Agriculture (MOA) in the implementation of the "Eastern Jamaica Agricultural Services Project" with a funding of €6.9 million.

1.23 In the agricultural sector the Bank is financing the Agricultural Support Services Program (ASSP, Loan 1283/OC-JA) that supports a wide-range of agricultural services (technology, marketing, information, animal and plant health) that would complement irrigation investments of the NIDP. The ASSP started execution in 2001 and is expected to end by 2007[1].

1.24 In addition, the GOJ is currently executing the Land Administration and Management Program (LAMP) to assist in the promotion of an efficient use of land resources. The Inter-American Development Bank (IADB) approved a loan for this program in 1999 (1219/OC-JA).

1.25 In the irrigation sector, the NIC is implementing the "Irrigation Development Project (IDP)", approved by the Caribbean Development Bank (CDB), in 2002,

[1] The current expiration date is 2005. Though, the GOJ is preparing a request to the Bank for a two-year extension.

comprising three irrigation projects of the National Irrigation Development Plan funded by the Bank in 1997-1998[2]. The estimated total cost of the IDP is US$12 million. As this Project is to serve as the "pilot" for the implementation of the new policy approach towards irrigation development, the GOJ has reiterated to the Bank its commitment to apply the Water Sector Policy consistently for all projects.

## F. Bank strategy and the rationale for the program design

1.26 This program was included as an investment priority in the Country Paper (GN-2025) for Jamaica approved on August 1998. The program's main strategy elements (achievement of a better allocation of water resources, promotion of crop diversification, enhancing competitiveness in the agricultural sector and improvement of the institutional and policy framework for irrigation) are consistent with Bank's Strategy efforts towards the promotion of private sector development, the modernization of the public sector and the improvement of environmental management.

1.27 Thus, the strategy followed by the Bank in the development of this specific operation was to support the GOJ in the review and evaluation of all potential irrigation projects that led to the design of the NIDP Master Plan. At the same time, the Bank supported the evaluation and revision of the institutional and policy framework that led to the development of the WSPSAP. As a result of this last effort, a clearer legal, policy and institutional framework was established and is currently being implemented by Jamaican authorities. Most of the new policy and institutional framework elements are already approved, while others will be implemented during NIDP execution. This new framework comprises the following main elements:

### 1. The future role of the NIC

1.28 In view of the progressive establishment of WUAs, NIC will shift gradually towards planning, monitoring and some regulating functions, during NIDP implementation. These functions will concern technical and organizational issues and the regulatory ones related to tariffs will follow the process described in paragraph 1.15.

### 2. The revision of the Irrigation Act

1.29 An amendment of this Act was approved by Parliament in December 2003 to define the legal status of WUAs as recognized private organizations (either as private limited liability companies, as cooperatives or as Specially Authorized Societies), and thus allowing them to be licensed by NIC to operate and maintain the public irrigation systems.

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[2] The projects being funded by the CDB Loan are: Hounslow (St. Elizabeth), Seven Rivers (St. James) and Pedro Plains (St. Elizabeth). These three projects are to irrigate 752 ha, benefiting some 900 farmers.

### 3. Land tenure regularization

1.30 Sample project area results indicate that farmers could claim possession and ownership to most of the land in the irrigation areas. A Memorandum of Understanding (MOU) between NIC and the National Land Agency (NLA) will be established in order to regularize parcels (to obtain a registered title or have a lease originated from a registered title, valid for at least three years after joining the WUA) that would require it, under a simplified procedure such as the applied by the LAMP Program, that will reduce the time and cost of this process.

### 4. Improved irrigation policy framework

1.31 A much clearer irrigation policy framework was established, including the regulatory aspects for irrigation management, and addressing fees and tariffs in connection with recovery of O&M costs and capital costs.

#### a) Operation and maintenance costs

1.32 The WSPSAP included the goal to recover 100% of O&M costs. NIC currently recovers on average only 40% of the O&M costs in existing systems. To reach the goal, envisioned by WSPSAP when an irrigation project is to be built or rehabilitated, the WUAs will be contractually bound to paying (or recovering) 100% of O&M costs before work on the infrastructure commences. The GOJ will apply this O&M cost recovery policy to the projects financed by CDB. For the systems that are going to be rehabilitated under the NIDP, the same cost recovery strategy will be applied. The remaining systems are Rio Cobre (10,000 has) and Mid-Clarendon (4,500has). In the case of Rio Cobre (surface water), NIC currently covers the operating costs of agricultural users, with costs accounting for 94% of revenues. In the case of Mid–Clarendon, that only represents about 20% of the irrigated area managed by NIC and where sugar cane represents the major crop, the NIDP is not allocating resources for any rehabilitation works; however, NIDP is to support the formulation of a Rehabilitation Plan that includes the promotion for agricultural diversification and better farmers' participation in the O&M of the system, thus allowing better opportunities to apply the new policy. Therefore, if all the new built and rehabilitated projects by the NIDP start recovering full O&M costs, NIC recovery share could reach about 85%[3]. However, as mentioned before, a specific strategy for Mid-Clarendon would have to be agreed to reach the goal of full recovery of O&M costs, as established in WASSP.

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[3] If all the systems that are rehabilitated start to recover 100% of O&M costs, Rio Cobre maintains its actual performance and there is no progress in Mid-Clarendon, NIC could reach 80% of O&M costs recovery. The inclusion of new systems could even increase that portion to 85-90%. This shows the viability of reaching full recovery of O&M costs by 2010, the targeted deadline. However, a specific strategy should be developed for Mid-Clarendon if this target is to be met.

### b) Capital costs

1.33 In the case of capital costs, a sample of projects was examined and ranked according to their economic profitability and farmer's ability to pay. Based on that information, for each case the proportion that the government and the farmers will assume in regards to the main and secondary structures will be defined. As a general criterion, a reasonable level of capital cost recovery will be required as established by the farmers' ability to pay on the basis of the net margin mechanism. The fundamental element is the specific methodology that was developed during NIDP preparation to evaluate the farmers' financial capacities (net margin), in the different areas selected, to recover irrigation (O&M and capital) costs.

## 5. Diversification

1.34 NIDP will promote diversified cropping patterns towards competitive crops in accordance with the established goals of the ASSP. To enhance this promotion, the rehabilitation of the St. Dorothy, with 50% of the area in sugarcane, has been included as a potential investment in this program.

## 6. Water tariff structure

1.35 It was agreed to maintain the current two components tariff structure: a flat rate area tariff (service charge) and a volumetric tariff (demand charge). This structure guarantees minimum revenue to the WUAs independently of the volume of water actually consumed. Therefore, in many cases could be necessary to change the current structure of the two-part tariff (from 20% service charge and 80% demand charge, to 30% and 70% respectively), in order to reduce the risk for the new WUAs of having low revenues.

1.36 The implementation sequencing of investments will be the main element to guarantee the successful implementation of the project. To this effect, construction and/or rehabilitation of systems will require the prior commitment to implement important elements of the policy and legal/institutional framework, which are considered essential for sustainability. Chief among them are the establishment of water users associations in those systems to be built or rehabilitated and the commitment to enforce the cost recovery policy through a contract signed between NIC and the specific WUA.

## II. PROGRAM OBJECTIVES AND DESCRIPTION

### A. Objectives and goals

2.1 The purpose of the program is to increase high payoff agriculture and farmers income in the program's area and therefore contribute to increase the national agricultural area under improved policy framework and irrigation management practices.

2.2 Main indicator of successful NIDP completion will be the increment in irrigated area from 500 ha to approximately 1,700 ha benefiting about 1,000 farmers with increases in farming income as a result of the introduction of new crops, increase in yields and cropping intensity. The following are the improved irrigation management and environmental practices to be implemented during program execution:

a. Irrigation Systems are operated and maintained by fully autonomous, self-sustained and viable Water Users Associations (WUAs).

b. Farmers will pay full O&M and capital costs as billed by WUAs and NIC.

c. Farmers will benefit from effective production and marketing information.

d. The loss of soil is avoided, water quality is enhanced, and waste disposal is done in a safe way.

e. Most of the farmers have registered land titles or leases that will grant them WUAs' membership and also access to credit financing.

f. Enhanced opportunities of income improvement will be created for women and youth farmers.

### B. Program components

2.3 The NIDP is a program with four components, besides the provisions for the operation of the Program Implementation Unit (PIU). The components are:

#### 1. Component I: Institutional Strengthening of NIC (US$0.95 million)

2.4 This Component will strengthen the institutional framework and capacity for irrigation management in Jamaica. The NIC will be reorganized to progressively focus on planning, monitoring and regulating (aspects different to tariffs) the irrigation sector. To achieve this purpose, this component will finance consultancies, training and equipment, and will achieve the following five outputs:

2.5 NIC Business Strategy Developed and Company Reorganized: The NIC will develop a new strategy and structure and undertake an organizational

transformation consistent with its future roles and functions. The *Jamaica Water Sector Policy Strategies and Action Plan* (2000) articulates a clear future vision for the role of the NIC that "will shift progressively to focus on planning, monitoring and regulating the irrigation sector." The NIC business strategy includes an aspect that deals specifically with the issue of service delivery. Thus, NIC will (i) identify products and services that could be offered to WUAs and package those products and services; (ii) develop estimated fees for services on the basis of marginal cost; and (iii) consistent with its overall strategy, develop a long-term business plan for the spinning off of any service units that might eventually stand on their own. To complete this output, NIDP resources will be used to hire consultants to assist with the strategy development, business planning, management change and pricing of services.

2.6 Management Information Systems (MIS) strengthened: NIC needs to develop its internal MIS capacity to service the upgraded systems and to provide effective services to the WUAs. Thus, program resources will be used to install a Wide Area Network to optimize the transfer, collection, and presentation of data.

2.7 Accounting systems strengthened: The NIC's accounting system will be strengthened to improve cost accounting and reporting. This will include purchasing new hardware and software and conducting training for staff. The NIC will reorganize its cost accounting system so that the various service functions such as maintenance, billing, and MIS begin to charge fees to internal NIC customers.

2.8 Billing systems strengthened: Hand held reading and measuring devices will be deployed, software will be upgraded, computer equipment will be purchased, and staff will be trained. These investments will serve to automate the billing system and provide real-time data about water use and demand.

2.9 Operations strengthened: A Geographic Information System (GIS) system will be deployed to improve decision-making. All aspects of the Water Production Information System will be integrated to provide real-time data about irrigation system performance. As a subproduct of the land regularization the digitized cadastre of each project irrigation area can be added to the GIS used by NIC and each of the WUAs for the water management of the projects. Irrigation design and distribution software will be installed, some pumps will be automated, and staff will be trained.

### 2. Component II: Promotion and Formation of Water Users Associations (US$1.68 million)

2.10 This Component will support (i) the establishment of a WUA Support and Regulation Unit at the NIC, within the PIU; and (ii) the formation and consolidation process of WUAs in all NIDP irrigation systems. In each of those systems, a specific Action Plan will be implemented. Resources will be used for consultancies, training, equipment, and contracting staff.

2.11 Establishment of a WUA Support and Regulation Unit: The establishment of the WUAs Support and Regulation Unit (US$0.8 million) within the NIC-PIU is one of the most important elements in the NIDP strategy towards the strengthening of the WUAs. Resources for preparing OUR rate applications current within the Finance and Corporate Planning Division of NIC will be transferred to this Unit. Activities to achieve this output will include recruiting or transferring current NIC staff towards the WUAs Support and Regulation Unit, training and equipping the staff, and developing policies and operating procedures.

2.12 Action Plans for the Establishment of WUAs in the irrigation systems: The Action Plans (US$0.89 million) to be implemented under the guidance of the NIC's WUAs Support and Regulation Unit, are envisaged for the formation and consolidation of the five WUAs in each NIDP irrigation system. Though each Action Plan is specific to the needs of the farmers of each irrigation project, all of them comprise the implementation of the following main activities:

2.13 Establishment of Ad-Hoc Committees (AC) and Training of its members: Establishment of the Ad Hoc Committees requires important support from the program in order to prepare them to undertake the tasks towards the actual formation of the WUAs. It is necessary to train them in essential aspects related to the promotional activities towards the establishment of the WUA. Training workshops should be provided to the members of the Ad–Hoc Committees and will cover organizational, financial and operational topics. About 34 sessions in each irrigation area, during a period of nine months, are estimated. The members of AC will become members of the Constituent Committees, which will be in charge of preparing the formal constitution of the WUAs, and eventually their leader officers.

2.14 Dissemination campaigns: As the members of the ACs represent only a portion of the members of the future associations, it is then necessary to implement dissemination campaigns to involve the rest of the farmer's community in every irrigation system. The dissemination campaigns have two important elements: (i) the creation of a favorable environment towards the development of irrigation facilities in the project area and the need to involve most of the farmers in such process; and (ii) the preparation of the farmers for taking part in the future organization of the association. It is estimated that about 31 workshops will be needed.

2.15 Pre-Operational Activities and Training: Before formal approval and formation of the WUAs, several other activities should be carried-out, leading to their registration and licensing in each irrigation area: preparation for registration (application forms, preparation of constitution rules, cost of registration); and promotional activities for the inaugural meeting. Similarly, training of leader officers of the future WUA should commence as early as possible in order to provide them with the necessary skills to manage and operate efficiently the irrigation systems, specially in the cases where these officers are to be nominated

among the leaders of the farmers' communities[4]. This training will cover basic aspects like accounting and billing systems, annual budgeting, and O&M activities.

2.16 Establishment of monitoring system in every WUA: Monitoring of the performance of the newly established WUAs is essential to detect problems and assess the progress made. Thus, under the guidance from the WUAs Support and Regulation Unit of the NIC, a monitoring system should be devised in every irrigation project, including main performance indicators. Additionally, WUAs officers should be trained in the collection and analysis of the information.

### 3. Component III: Farmers' Technical Assistance and Training (US$1.17 million)

2.17 This Component will support NIDP farmers' economic activities by training them in the correct use of relevant agricultural and marketing techniques to properly manage their natural and financial resources under irrigated conditions. This component will finance training, consultancies, one vehicle, training materials and related equipment.

2.18 The conceptualization and design of the Component is based on the vision that farmers themselves should identify the demand for the provision of technical services, establish the priority areas on which they want to be better trained and to decide who —and when and how— should provide those services. Thus, they should negotiate and pay for those services at market prices. This is expected to be the situation once the NIDP has been implemented and is fully operational.

2.19 Other important aspect is that not all the farmers have the same progressive attitude towards new alternatives for agricultural diversification, innovation and development. Then, the Component will work more intensively with the so called "Lead Farmers"[5] on a demand and voluntary basis (estimated on 20% of total population target), asking them to share their experiences and new knowledge acquired with, at least, five of their neighbors. Government intervention will be limited on time (maximum three years) and focused on enhancing farmers' demand for private technical services. Lead farmers will be asked to pay a share of the actual cost of the services provided (about 10% of direct training costs, estimated to be about US$60,000 or US$300/lead farmer in a three-year period). Four main outputs are to be obtained from the proper implementation of the Component, as follows:

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[4] This is important as the recently approved Irrigation Amendment Act obliges every WUA to have a "Chief Executive Officer and a Chief Technical Officer", which should comply with some requirements. And, as most of the WUAs are initially expected to be financially weak, they probably will rely on the managerial capabilities of their leader officers.

[5] Lead farmers will be selected among those progressive farmers willing to participate actively in the training activities and to share part of the training costs.

2.20 MOU between NIC and the ASSP of the MOA signed and implemented: This MOU should outline clearly the responsibilities for the execution of the Component, and should be signed prior to the first disbursement of the loan resources.

2.21 Trainers trained and basic training materials developed: Thirty (30) selected trainers trained in modern and effective participatory extension sequential methodology in one intensive (ten-day) course, and then in a refresher one (5-day) two years later. Basic manuals and training materials developed, taking into account environmental, gender and youth issues in the following main topics: crop care and production, land husbandry, on-farm water management, credit assistance, marketing and post-harvesting and agribusiness management.

2.22 Farmers trained: Annual training plans developed by the WUAs and the ASSP — Agribusiness Development Officer (ADO)—, including (i) the intensive technical assistance of 200 lead farmers; and (ii) seasonal field days and other technical assistance activities for 1,000 farmers (including the lead farmers).

2.23 Environmental management training provided: 1,000 farmers and farm families made aware of friendlier and safer environmental practices, especially in the areas of pesticide management and waste disposal.

### 4. Component IV: Irrigation Infrastructure (US$10.61 million)

2.24 This component of the NIDP will fund (i) the construction and/or rehabilitation of five irrigation projects (US$9.31 million); and (ii) the preinvestment costs of the NIDP (US$1.3 million). The irrigation infrastructure include wells, pump houses, power supply, pipe networks, pumping equipment, and on-farm systems in five irrigation areas: Yallahs, Colbeck, New Forest/Duff House, Essex Valley and Saint Dorothy. It is estimated that these systems will benefit about 1,700 ha and 1,000 farmers. The pre-investment includes feasibility studies and final designs for Essex Valley and St. Dorothy as well as the rehabilitation plans for the other two major irrigation systems administered by NIC (Mid-Clarendon and Rio Cobre).

2.25 Three of the NIDP projects were studied by the Food and Agricultural Organization - Investment Center Division (FAO/TCI) at feasibility level (including final designs for construction) during preparation under a Project Preparation Facility (PPF) funding: Colbeck, New Forrest/Duff House and Yallahs, located in St. Catherine, Manchester and St. Thomas parishes, respectively. The first two are new projects, and Yallahs is the rehabilitation of an existing system. Irrigation of these areas will allow the expansion of the existing vegetable production in New Forrest/Duff House, the introduction of new areas for horticultural production in Colbeck, and the reactivation of full agricultural production in the Yallahs area. In all the three cases, provisions have been made to finance land regularization needs through the implementation of the MOU

between NIC and NLA (US$0.19 million)[6]. The following table summarizes the main characteristics of these sample projects:

**TABLE 2.1**
**NIDP projects studied at feasibility level with final designs (ready for implementation)**

| Project name (Parish) | Area (ha) | Farmers (No.) | Construction Costs (US$) | Unit Cost (US$/ha) | Economic return |
|---|---|---|---|---|---|
| New Forrest – Duff House | 368 | 288 | 2,573,586 | 6,993 | 38% |
| Colbeck | 110 | 110 | 747,945 | 6,800 | 45% |
| Yallahs | 303 | 223 | 1,686,832 | 5,567 | 45% |
| **Totals** | **781** | **621** | **5,008,363** | **6,413** | |

2.26 Under this component, two other irrigation systems will be constructed: Essex Valley (new system) and St. Dorothy (partial rehabilitation). The estimated construction costs for these two projects is about US$4.3 million, including the provisions for land regularization. Their main characteristics are shown in the following table:

**TABLE 2.2**
**Other NIDP projects**

| Project name (Parish) | Potential Area (ha) | Possible Area for NIDP (ha) | Farmers (No.) | Construction Costs (US$) | Unit Cost (US$/ha) |
|---|---|---|---|---|---|
| Essex Valley (St. Elizabeth) | 1,067 | 400 | 300 | 2,800,000 | 7,000 |
| St. Dorothy – Rehabilitation | 1,590 | 500 | 100 | 1,500,000 | 3,000 |
| **Totals** | **2,657** | **900** | **400** | **4,300,000** | **4,778** |

2.27 The NIDP will finance the off-farm works and equipment such as drilling and development of new wells, rehabilitation of old ones, supply and installation of well pumps and ancillary equipment, supply and installation of pipelines, construction of new canals and/or rehabilitation of existing ones, minor access roads and minor civil intake works. As part of the local counterpart, the farmers will finance directly the on-farm works and equipment, even though the technical designs are to be provided by the program (on-farm works and equipment will cost, on average, about US$1,000/ha for a total of US$1.7 million). Farmers should agree on the payment of a portion of the direct capital investments to be made on the off-farm infrastructure, estimated to cost about US$7.6 million (see Cost Recovery Section).

[6] The total value of this MOU has been estimated in US$0.4 million including US$0.21 million for the land regularization in the other NIDP Projects (Essex Valley and St. Dorothy).

2.28 Finally, this component includes also additional feasibility studies and engineering designs as follows (total estimated US$1.3 million): (i) preparation of the technical, environmental, social and economic feasibility studies and engineering designs for Essex Valley and St. Dorothy including land regularization action plans, (US$0.4 million); and (ii) the formulation of rehabilitation plans, at feasibility level, in other two major existing public irrigation systems administered by NIC (Rio Cobre and Mid-Clarendon, with an estimated cost of US$0.9 million)[7]. The preliminary Terms of Reference (TOR) for these studies were elaborated during NIDP preparation. The following table summarizes the NIDP pre-investment estimated costs:

**TABLE 2.3**
**Summary of NIDP preinvestment estimated costs**

| Project name | Area to be studied (ha) | | Pre-investment Estimated Costs (US$) |
|---|---|---|---|
| | Feasibility Level | Final Designs | |
| Essex Valley – New irrigation system | 400 | 400 | 200,000 |
| St. Dorothy - Rehabilitation Plan | 1,500 | 500 | 200,000 |
| Mid-Clarendon and Rio Cobre– Rehabilitation Plans | 13,100 | | 900,000 |
| **Totals** | **15,000** | **900** | **1,300,000** |

### 5. Program Implementation Unit (PIU), supervision and administration (US$3.32 million)

2.29 The implementation of the NIDP will be under the responsibility of a special unit within the NIC (the PIU), as explained in the next chapter. NIC incremental costs for the PIU amounts to US$1.18 million (5.5% of total NIDP cost), during the four-year execution period. The NIDP also includes provisions for the reimbursement of the PPF (US$0.5 million) used for its preparation[8] and the hiring of consultancy services for the engineering and supervision of infrastructure construction (US$1.64 million). Thus, total provisions for these items amounts to US$3.32 million.

## C. Cost and financing

2.30 The total cost of the NIDP is US$21 million of which the Bank will finance US$16.8 million (80%) and the local counterpart amounts to US$4.2 million (20%). The Bank will recognize up to US$1.76 million (8.4%)[9], in farmers' contribution.

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7 The Rehabilitation Plans will include the transfer process of the O&M of the existing systems towards the corresponding WUAs (full O&M costs recovery is a basic element on that).

8 The PPF was approved under the IDB Loan 1411/OC-JA and is to be reimbursed by the NIDP loan.

9 The beneficiaries' financial contribution relates to the on-farm investments (US$1.7 million) and to the share for the technical assistance (US$60,000). The PIU should submit evidence of such investment to the Bank.

**TABLE 2.4**
**NIDP cost and financing (in thousands of U.S. dollars)**

| Categories | IDB | Local | Total | (%) |
|---|---|---|---|---|
| **1. Administration and supervision (PIU)** | **2,836.8** | **484.5** | **3,321.3** | **15.8%** |
| **2. Direct costs*** | **11,179.2** | **3,238.2** | **14,417.5** | **68.7%** |
| a) NIC Institutional Strengthening | 651.5 | 302.0 | 953.5 | 4.5% |
| b) WUAs Organization | 1,378.1 | 310.2 | 1,688.3 | 8.0% |
| c) Technical Assistance | 781.5 | 386.0 | 1,167.5 | 5.6% |
| d) Irrigation Infrastructure | 8,368.2 | 2,240.0 | 10,608.2 | 50.5% |
| **3. Concurrent costs (auditing)** | **300.0** | **0.0** | **300.0** | **1.4%** |
| **4. Contingencies** | **1,198.9** | **333.3** | **1,562.2** | **7.3%** |
| **5. Financial costs** | **1,285.0** | **144.0** | **1,429.0** | **6.8%** |
| a) Interest | 1,285.0 | 0.0 | 1,285.0 | 6.1% |
| b) Credit fee | 0.0 | 144.0 | 144.0 | 0.7% |
| c) Supervision fee | 0.0 | 0.0 | 0.0 | 0.0% |
| **Total** | **16,800.0** | **4,200.0** | **21,000.0** | **100.0%** |
| **Percentage (%)** | **80.0%** | **20.0%** | **100.0%** | |

* Project components

2.31 The interest rate, credit fee, and inspection and supervision fee mentioned in this document are established pursuant to document FN-568-3 Rev. and may be changed by the Board of Executive Directors, taking into account the available background information, as well as the respective Finance Department recommendation. In no case will the credit fee exceed 0.75%, or the inspection and supervision fee exceed 1% of the loan amount[10].

[10] With regard to the inspection and supervision fee, in no case will the charge exceed, in a given six-month period, the amount that would result from applying 1% to the loan amount, divided by the number of six-month periods included in the original disbursement period.

## III. PROGRAM EXECUTION

### A. Borrower and Executing Agency

3.1 The borrower will be the GOJ while the NIC Ltd. will be the Executing Agency for the program. Organizationally, the NIC is headed by a Managing Director and has four Divisions: Production and Maintenance; Commercial Operations; Corporate and Legal Services; and Finance and Corporate Planning. **The signing of the agreement between the GOJ and NIC where by the latter assumes the obligations of Executing Agency of the operation will be a condition prior to first disbursement of the loan.**

3.2 Currently, the NIC has a total staff of 164 persons. Of these, 146 are permanent staff with the remainder being contractors and temporary staff. Of the permanent staff, 76 are technical and 70 are administrative. Nearly 75 percent of the NIC's staff is field based. There is a 50-50 split between technical and administrative staff. The NIC has undertaken a number of measures over the past several years to "right-size" its organization.

### B. General organization for execution

3.3 The executing agency will be the NIC, which is under the purview of the MOWH. All components with the exception of the Technical Services and the Land Regularization activities will be executed by NIC. The PIU recently established for the CDB Program within NIC will be strengthened and serve to manage the IDB Program and its components. The Program Director (PD) will be in charged of the PIU, and will report to the Managing Director of NIC. The PIU will administer the disbursement of funds to the different components and consolidate the accounting, using NIC's accounting, financial and procurement systems, which will be strengthened during program execution. A private auditing firm will carry out an external audit.

#### 1. The Program Steering Committee (PSC)

3.4 A PSC has been established by the GOJ to provide the necessary direction, policy guidance, and inter-agency coordination throughout program preparation and implementation. The PSC is chaired by the Chairman of the NIC and includes the Managing Director of the NIC and senior representatives from the MOWH, the MOA, the ASSP, the RADA, the Planning Institute of Jamaica (PIOJ), the Social Development Commission, the Ministry of Finance and Planning (MOFP), the National Environmental Protection Agency (NEPA), the NLA, the WRA, and beneficiary groups. The PIU serves as secretary to the PSC. The PSC will meet as often as is necessary to review monthly or other progress reports on program implementation, review and approve policies, procedures, operating manuals, annual work programs and budgets, promote inter-organizational cooperation and resolve inter-ministerial conflict and review other aspects of the program.

### 2. The Program Implementation Unit (PIU)

3.5 The restructuring and additional staffing of the PIU is justified by the need to coordinate the implementation of numerous institution strengthening and construction works activities, consistent with the NIDP. The NIC has established a NIDP unit since 1998, and this unit has already been formed into a PIU to implement the IDP funded by the CDB. In this regard, the PIU will not really be a new unit, but an enhanced version of that pre-existing unit. The PIU will be responsible for the following functions:

3.6 Technical: (i) planning, coordinating, monitoring, and evaluating the activities on the program's components and reporting on their execution progress; (ii) assisting WUAs in becoming established and building their institutional capacity; (iii) promoting the NIDP; (iv) overseeing the design and construction of new irrigation systems; (v) ensuring that beneficiaries receive the necessary agricultural technical services to be provided through the ASSP; (vi) ensuring that beneficiaries receive the land regularization services to be provided through the NLA; (vii) promoting the strengthening and transformation of the NIC; (viii) preparing or assisting in the preparation of TOR, preparing bidding documents and procuring goods and services in accordance with the Bank's requirements; and (ix) promoting the use of environmental and social guidelines in the preparation of new systems.

3.7 Financial: (i) establishing and implementing sound financial reporting and controlling systems in accordance with program's requirements; (ii) preparing and submitting disbursement requests to the Bank and the corresponding justification; (iii) ensuring timely and adequate pari-passu contribution of local counterpart funds; (iv) preparing the program's and the NIC's financial statements and facilitating their timely audit; (v) maintaining an adequate disbursements support and documentation filing system, which must always be available for review by the Bank and the External Auditors; (vi) preparing and submitting to the Bank the semi-annual Revolving Fund Status report, within sixty days after the close of each semester; and (vii) reporting to the Bank the resources invested by farmers in on-farm investments.

3.8 Managerial/Controlling: (i) ensuring the establishment and compliance of work plans and internal and operational controls in accordance with program's objectives and implementing remedial actions for variances; (ii) promoting coordination, communication and integration among various agencies and beneficiaries; (iii) serving as program's liaison with the Bank and with government agencies.

3.9 To carry out the above functions, the PIU's core staff will consist of a Program Director and a Multi-Disciplinary Team, integrated by a irrigation engineer, a social organizer, an environmental officer, a procurement specialist and an accountant. PIU's personnel will be transferred from within the NIC or recruited locally on a competitive basis. **The approval of the NIC's PIU restructuring**

**and staffing, including the appointment of its core staff, in accordance to the TOR previously agreed with the Bank, will be a condition prior to first disbursement.**

3.10 In addition to the core staff, the PIU would hire specialized consultant services in the main following areas, as needed: (i) agricultural/irrigation engineering; (ii) operations and maintenance aspects; (iii) social and water users associations; (iv) environmental aspects; (v) land regularization aspects; and (vi) legal aspects. **Prior to the award of the contract for infrastructure works in the first irrigation system, the Executing Agency will submit evidence to the Bank that it has hired two additional irrigation engineers as part of the staff of the Program Implementation Unit (PIU).**

## C. Implementation of the program components

### 1. General responsibilities

3.11 The PIU will have lead responsibility for implementing the Component 1 (Institutional Strengthening of NIC), Component 2 (Promotion and Formation of WUAs), and Component 4 (Irrigation Infrastructure). To implement these components, the PIU will undertake the required activities, procure the necessary equipment and services, and supervise consultants and contractors.

### 2. Coordination with MOA (ASSP) for the Execution of the Farmers' Technical Assistance and Training Component

3.12 The MOA, using the PIU of the ASSP, which is already established, will implement the Farmers' Technical Assistance and Training Component. The ADO to be hired by the ASSP will be responsible for managing the implementation of this Component.

3.13 **Prior to the first disbursement of loan resources the borrower should submit evidence of the signing of a MOU between the MOA-ASSP and the NIC for the execution of the Technical Assistance and Training Component.** A draft MOU has been prepared stipulating the terms under which the ASSP shall provide the technical services required by the farmers in the different irrigation projects. The PIU will transfer the necessary resources to the MOA-ASSP (or, in the case of IDB resources, IDB may transfer those funds directly at the request of the PIU and consistent with IDB procedures).

### 3. WUAs special responsibilities in program execution

3.14 NIC shall undertake the necessary technical, environmental, social and economic feasibility studies and engineering designs for all areas that will be included in the NIDP. In conjunction with the pre-investment work, the NIC will organize the WUAs. Prior to the call for bidding to commence construction NIC should sign a MOU with a legally established WUA. Upon completion of the construction, the

NIC shall grant a license to the WUA to operate the area. The NIC will continue to monitor and provide support to the WUAs. Thus, WUAs will be prepared to be responsible for the O&M of the irrigation systems. Although the recently approved Irrigation Amendment Act permits the organization of the WUAs as limited liability companies, cooperatives or special authorized societies, the respective Regulations are not promulgated yet. **The NIC should submit evidence to the Bank of the promulgation of the Regulations of the Irrigation Amendment Act, prior to first disbursement of the loan.**

3.15 The WUAs Support And Regulation Unit: A WUAs Support and Regulation Unit in the PIU of the NIC —included as part of the Component 2— will be responsible for the implementation of every WUAs' Action Plan. A Constituent Committee will be established, consisted of farmers to prepare the groundwork for the formal establishment of WUAs in close coordination with the Support Unit.

3.16 WUAs Promotion, Formation and Licensing: The formation of WUAs and the granting of licensing to WUAs shall be consistent with the Irrigation Act (as amended), and any regulations made pursuant to that Act and the *Jamaica Water Sector Policy Strategies and Action Plan* (2000). Thus, the NIC will provide assistance in the formation of water user groups or constituent committees as predecessors to the WUAs[11]. This assistance will include training, facilitation, and organizational support. This assistance will continue throughout the program and for a period of at least two years after construction. The NIC will proceed with developing detailed engineering designs and undertaking environmental studies and other preparatory activities while the WUAs are being developed and strengthened.

3.17 **Prior to the call for bidding for infrastructure works in each irrigation system, the NIC should submit evidence to the Bank that it has executed an agreement, prepared in accordance with a model previously approved by the Bank, with the corresponding legally established WUA regarding objectives, activities, commitments, and roles and responsibilities in program execution and administration.** The agreement will describe at a minimum: (i) the irrigation system to be constructed; (ii) the intention of the NIC to grant the WUA a license to operate the irrigation system, provided all conditions are met; (iii) the commitment of the NIC to provide institution strengthening assistance to the WUA; (iv) any specific cash or in kind contributions of the WUA for the construction; (v) the Board or Committee and officers of the WUA, including the lead point of contact; (vi) the commitment of the WUA to take responsibility for the actual O&M of the system, including all costs thereof; (vii) the commitment of the WUA to repay to the GOJ an agreed portion of the capital costs of the

[11] Those eligible to be members of the WUA must be: (i) land owners within the irrigation area; (ii) been in the process of acquiring land (the title of the land should be regularized before the person becomes a full member of the WUAs); or (iii) have a valid lease originated from a registered title for at least a three-year period or the option to renew such lease for a period not less than a three-year.

irrigation system that is to be determined on a net margin basis and amortized over the life of the investment; (viii) the commitment of the WUA members to obtain financing for any necessary on-farm investments; (ix) the commitment of the NIC to assist the WUA in preparing the initial rate application to the OUR; and (x) any other provisions deemed necessary on the part of the NIC and the WUA.

3.18 Upon completion of the construction and commissioning of the system, the NIC will grant the WUA a license to operate the irrigation system, subject to the terms and conditions of the Irrigation Act and any regulations made pursuant to that Act. The NIC shall develop a standard application process for licenses, including forms, information requirements, and fees. Any application by a WUA shall be accompanied by copies of articles of association and the business plan for the viable operation of the irrigation area.

### 4. Coordination with the NLA for land regularization activities

3.19 The NLA will implement the land regularization activities as part of the NIDP. The Land Regularization Specialist to be hired under the MOU between NIC and the NLA will be responsible for managing the implementation of the land regularization process.

3.20 During the pre-operational activities that lead to the establishment of WUAs, the NIC and the NLA will implement the following activities: (i) a pre-assessment of the tenure situation of each of the NIDP projects; and (ii) the regularization of the land tenure situation in each of the NIDP projects. A parcel is considered as regularized if the farmer has a registered title or have a lease originated from registered title, valid for at least a three-year period after joining the WUA. These activities should take into consideration the experienced gathered by LAMP based on a cost efficient method, as well as the waivers used by LAMP or others, like the application of the Facilities for Titles Act.

3.21 As the implementation of the land regularization activities (included as part of the Irrigation Infrastructure Component) will be provided by the NLA, NIC will enter into an agreement with such Agency through a MOU. **Prior to first disbursement of the loan resources, the NIC should submit evidence of the agreement signed with the NLA regarding objectives, activities and roles and responsibilities of this agency in the execution of the land regularization activities.**

3.22 The NLA will execute the land tenure regularization activities following IDB procedures for the acquisition of goods and services required. Thus, the NLA will be authorized, to: (i) contract the services with any government agency or private sector organization, procure goods and equipments, in accordance with IDB contractual procurement procedures; and (ii) contract the temporary personnel and undertake other operational decisions as deemed necessary.

3.23 The NIC and the WUAs will require NLA assistance during NIDP execution — and beyond— in matters related to maintenance of the cadastre of the irrigation projects and on any tenure matters such as ownership changes, leases extensions, new holding subdivisions or consolidation of parcels, changes from provisional title to registered titles. **Prior to the licensing of each irrigation system to a WUA, the borrower will submit evidence that the land tenure of at least 80% of the parcels in that system has been regularized (with registered titles or a lease deriving from a registered title, valid for at least three years after joining the WUA).**

3.24 However, before awarding the contract for infrastructure works in each irrigation system, the NIC will demonstrate, to the Bank's satisfaction, that the level of regularization of the land tenure for the parcels within the system has advanced at least 40% between the level of regularization determined by an audit previously carried out by the NIC and the level of regularization required for licensing described in paragraph 3.23.

## D. Planning and budgeting and program implementation schedule

3.25 The program's execution will be guided by an initial work plan for the whole execution period and annual work plans that will be prepared jointly by the PIU in consultation with affected agencies and stakeholders. The work plans will describe the specific activities to be undertaken to achieve each output, the timeframe for implementation, and the entity or individual responsible for executing each activity. The work plans shall also contain detailed annual and quarterly budget estimates. The initial plan and the annual work plan for the first year has been prepared as part of the program preparation activities**.** In accordance with GOJ budgetary process, subsequent annual work plans will be presented to the Bank within the fourth quarter of each calendar year for the following year.

**TABLE 3.1**
**NIDP financial implementation schedule (in thousands of U.S. dollars)**

| Categories | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|---|---|---|---|---|---|---|
| 1. Administration and supervision (PIU) | 826.1 | 443.6 | 605.6 | 654.6 | 791.4 | 3,321.3 |
| 2. Direct costs* | 1,898.0 | 2,243.0 | 3,085.8 | 4,405.8 | 2,785.0 | 14,417.6 |
| a) NIC Institutional Strengthening | 420.5 | 408.0 | 69.0 | 56.0 | 0.0 | 953.5 |
| b) WUAs Organization | 482.5 | 409.5 | 399.8 | 396.6 | 0.0 | 1,688.4 |
| c) Technical Assistance | 85.0 | 275.5 | 277.0 | 265.0 | 265 | 1,167.5 |
| d) Irrigation | 910.0 | 1,150.0 | 2,340.0 | 3,688.2 | 2,520.0 | 10,608.2 |
| 3. Concurrent costs | 60.0 | 60.0 | 60.0 | 60.0 | 60.0 | 300.0 |
| 4. Contingencies | 189.8 | 224.3 | 308.5 | 440.5 | 399.0 | 1,562.1 |
| 5. Financial costs | 81.0 | 159.0 | 254.0 | 385.0 | 520.0 | 1,399.0 |
| **Total** | **3,054.9** | **3,129.9** | **4,313.9** | **5,945.9** | **4,555.4** | **21,000.0** |
| **Percentage (%)** | **14.5%** | **14.9%** | **20.5%** | **28.3%** | **21.7%** | **100.0%** |

* Project components

## E. Operating Manual and guidelines for program execution

3.26 A Program Operating Manual was prepared to facilitate NIDP execution and to serve as a guideline for implementation. **The formal approval of the NIDP Operating Manual by NIC will be a condition prior to first disbursement of the loan.** The OM contains, in a more detailed manner, the main topics included in this chapter. If necessary, the NIC (PIU) may periodically revise the Operating Manual for the Program, subject to IDB non-objection.

## F. Financial management and revolving fund

3.27 The management of the program's financial resources will be the responsibility of the Program Director, with assistance from the Program Accountant. The PIU shall establish a Financial Manual that documents all of the financial management and accounting policies and procedures of the program. The program's accounting system will be computerized and will permit the preparation, by source of funds, of monthly and end of year statements of program investments and cash flows. The computer program will include an audit trail. The PIU will establish and maintain separate bank accounts for the IDB loan's revolving fund and for the resources from local counterpart. The revolving fund will amount to 5% of the value of the loan. The GOJ system for disbursement of external funds will be maintained for the Bank loan resources. In this system, payments are effected, at the request of the PIU, directly by the commercial bank where the funds are deposited. All requests for payments or actual payments with local counterpart for program's activities will originate at the PIU. The PIU will have responsibility for ensuring that the 80-20 pari-passu of Bank and GOJ contributions is met.

## G. External audit

3.28 The program's and the NIC's annual financial statements will be presented to the Bank during the period of execution duly audited by a firm of independent Certified Public Accountants or Chartered Accountants acceptable to the Bank, based on the TOR previously approved by the Bank. Such presentation will take place within 120 days after the closing of each GOJ fiscal year, and the final statement will be presented within 120 days of the date of the last disbursement of the program. The audit firm will be contracted for a period of at least three years, subject to a contractual termination clause in case of inadequate performance. The audit firm will be selected in accordance with the bank's audit bidding procedures and the audit's costs will be covered by the Bank's financing.

## H. Procurement

3.29 Bank procedures will be followed in the procurement of works, goods and consulting services. Internationally competitive bidding will be followed for procurements valued at US$0.25 million in the case of goods, US$1.5 million in the case of construction works, and US$0.2 million in the case of consulting

services. . Consultant services will be hired in accordance with Bank procedures. To expedite early compliance with all IDB procurement requirements, the Program Director, Program Accountant, Procurement Officer, and NIC Director of Finance and Corporate Planning will attend a Bank procurement training session prior to execution of the program or as soon as possible thereafter (see Annex III-1: Procurement Plan).

## I. Project Preparation Facility (PPF)

3.30 The GOJ used resources from a PPF (approved under Loan 1411/OC-JA) for the preparatory activities of the program. These resources, amounting to US$0.5 million will be recovered from the first disbursement under the loan.

## J. Monitoring and evaluation during NIDP implementation

3.31 Program implementation will be monitored through a number of instruments that will include: (i) the presentation and monitoring of an Annual Work Plans; (ii) the implementation of annual reviews; and (iii) the commission of an independent mid-term and a final evaluation work. All the monitoring and evaluation exercises would be based on the performance analysis of the set of indicators developed during NIDP preparation (see Annex III-2: Logical Framework). The Baseline data was completed for the three sample project areas and will be prepared for the remaining two areas in the feasibility studies during execution. A group of performance indicators could be seen in Table 3.2.

### 1. Midterm evaluation and review

3.32 The PIU shall commission an independent mid-term evaluation of the program, that would be undertaken when 50% of the loan resources has been disbursed. This evaluation shall assess progress toward the program's objective in accordance to the indicators stipulated in the NIDP Logical Framework for the achievement of main outputs. Based on this evaluation, the GOJ and the Bank will conduct a mid-term review that will provide recommendations for improvements in program execution and any mid-course corrections to address issues that were not adequately anticipated during the program's preparation.

### 2. Final evaluation

3.33 A final evaluation will be undertaken with program's resources, when 90% of the disbursement of loan resources has taken place, that will look into the evolution of the main indicators of the logical framework and into the sustainability of the main policy, institutional changes and improved management practices for irrigation[12]. The NIC will collect, store and retain all necessary information,

[12] Quality indicators for this are: (i) irrigation systems are operated and maintained by fully autonomous, self-sustained and viable WUAs; (ii) there is full recovery of irrigation costs; (iii) farmers are benefiting from effective production and marketing information; (iv) there is adequate soil management, enhanced water quality and safe waste disposal; and (v) there are enhanced opportunities for women and youth within the farmers communities.

indicators and parameters, including the annual plans, the mid-term review, and final evaluations, to help the Bank to prepare the Project Completion Report.

3.34 Given the importance of the institutional strengthening for program execution a set of strategies will be monitored in this case:(i) NIC business strategy developed and company reorganized; (ii) MIS strengthened; (iii) accountant systems strengthened; (iv) billing systems strengthened; and (v) Operations strengthened. Benchmarks for NIC's reorganization were established as follows: business plan strategy develop by the end of the first year; and signing of the MOUs with the WUAs and the provision of the corresponding licenses for the O&M of the irrigation infrastructure by the end of the second year[13].

**TABLE 3.2**
**Benchmarks and performance indicators**

| Indicator | Baseline | Mid-Term Review | End of Program |
|---|---|---|---|
| Number of hectares in irrigation schemes | 0 | 800 | 1700 |
| Increase in sample crop yields (ton/ha) | Tomato 18 | 22 | 22 |
| | Scallion 20 | 25 | 25 |
| | Watermelon 18 | 30 | 30 |
| | Pumpkin 9 | 15 | 15 |
| Increase in net income(US$000) | Yallahs | 7 | 12 |
| | New Forest | 10 | 14 |
| | Colbeck | 11 | 13 |
| Formation of WUAs | 0 | 3 | 5 |
| Number of farmers trained in management, production and environmental practices | 0 | 30 (trainers) | 1,000 |
| Cost Recovery (%of O&M costs recovered by NIC and WUAs) | 37 | 55 | 85 |

## K. Irrigation water tariffs and cost recovery

### 1. Methodology for cost recovery and estimation of water tariffs

3.35 A methodology of a disaggregated farm level analysis was used to calculate the financial results (net margin) of different farm types. This methodology has been selected to respond to the policy objective agreed with the GOJ to establish, for the new systems, the full recovery of O&M costs and a recovery scheme for capital costs based on a case-by-case net margin mechanism. Thus, this methodology was developed with the purpose of evaluating the capacity that different types of farmers have in the different areas selected to recover irrigation costs, both O&M and capital costs.

[13] It refers to the irrigation systems of Yallahs, Colbeck and New Forrest. For the remaining systems the process will be completed by the end of the third year.

3.36 Farm models were defined for the three sample areas included in the NIDP (Colbeck, New Forrest and Yallahs). In all systems different types of farm models were defined to reflect the characteristics of the area (farm size, cropping mixes, tillage operations, inputs used and yields). From the basic farm models, different levels of crop yields were simulated as well as different levels of crop prices to analyze the farmers' capacity to recover O&M costs and capital costs in different situations.

3.37 Water tariffs are defined according to the most adequate structure (two-part tariff) and are then calculated to recover the O&M costs and irrigation investment costs (capital costs). O&M costs are annual recurrent costs and will be calculated annually. Capital costs correspond to an irrigation investment that will be recovered along an amortization period. Thus, the correspondent annuity will be calculated at each project's commissioning to define the water tariff that will permit the (full or partial) recovery of the irrigation investment costs.

3.38 For O&M costs a two-part tariff is an adequate tariff structure: a flat rate component (per area tariff) and a volumetric component (per cubic meter consumed). The flat rate per area component guarantees stable revenue to the WUAs regardless of the water volumes actually consumed by the irrigators. The volumetric component induces an efficient use of water, as the irrigators will pay for the amount of water consumed. For the program, an estimate of the system-specific water tariff rates (maintaining the same basic structure) that will recover the costs of irrigation in each system was made, as every irrigation system has different O&M costs. Based on these estimations a tariff with a 30% flat rate and a 70% volumetric rate was chosen to assure full recovery of O&M costs.

3.39 Full capital cost recovery analysis for off-farm investment were based on the calculation of the investment annuities in each irrigation system that determine the correspondent water charges. The basic assumptions for this calculations were: (i) investment repayment period of 20 years; (ii) interest rate of 6% in real terms (nominal interest rate 15%, and inflation 9%); and (iii) a transitory period of 5 years was considered, where the farmer will pay an increasing share of the accumulated five annuities: 10% in the first year, 15% in the second year, 20% in the third year, 25% in the fourth year and 30% in the fifth year. From year 6 onwards up to the end of the repayment period of 20 years, the capital cost charge can be paid in full.

### 2. Process for establishing water tariffs and charges for recovering irrigation costs

3.40 The calculation of the O&M cost will be performed by the WUAs on an annual basis, as water consumption varies annually. Once these costs are calculated, the WUAs will present this information to the OUR. The OUR is the agency responsible for the estimation of adequate tariff levels. As explained in paragraph 1.15 these tariffs should be approved by MOWH, but given the postulates of WSPSAP should reflect full recovery of O&M costs. The tariff will also include a

Price Adjustment Mechanism (PAM) for inflation and energy. Irrigation tariffs for recovering O&M costs are applied annually and payments will be a full annual payment. The WUAs will be responsible for presenting the water bills to the farmers and for collecting the O&M tariffs payments. The revenue collected from the O&M water tariffs will be the earned income for the WUAs out of which they will have to pay their annual expenses (electricity, administration, water delivery costs, maintenance of the irrigation conduits and equipment, etc.).

3.41 Capital costs annuities for capital cost recovery will be calculated for the whole investment payback period once at the commissioning of each project. They will also be adjusted for inflation. NIC will be responsible for their estimations with the collaboration of the OUR and the MOA. They will also be approved by the MOWH. The application period of the capital cost charges will be divided into a 5-year transitory period and a 15-year ordinary period. **Prior to the first disbursement of the loan, the borrower should submit, to the satisfaction of the Bank, the detailed methodology for the implementation of the capital cost recovery policy to be applied in the NIDP irrigation systems, including the following main aspects: (i) the procedures and arrangements established for estimating the capital costs to be recovered and the farmers' net margins during the recovering period; (ii) the procedure to adjust the capital cost charges for inflation; and (iii) the procedures for collecting the corresponding charges.**

3.42 As the capital cost charges are established to recover the public funds invested for the irrigation works of the NIDP, the approved capital costs water charges will be informed to the MOFP. NIC will be responsible for the collection of the charges and the collected revenue will then be transferred to the special consolidated funds of the MOFP following the ad-hoc funding and payment procedures agreed by the MOFP. NIC is expected to enforce collection of the capital charges, including the use of disconnection and court action.

## L. Operation and Maintenance (O&M)

3.43 The O&M of irrigation infrastructure will be the responsibility of the WUAs in all NIDP irrigation systems, including those to be rehabilitated and that are currently operated and maintained by NIC, but that should be transferred toward the WUAs in accordance with the WSPSAP. The WUAs will be properly trained and prepared to undertake this responsibility by the NIDP (component 2).

## IV. PROGRAM VIABILITY AND RISKS

### A. Technical viability

4.1 Feasibility studies conducted by FAO/TCI during NIDP preparation for three irrigation systems (Yallahs, Colbeck and New Forest), demonstrated the technical viability of the program. In fact, the studies show that there is enough good-quality water available for intensive irrigation development of the areas studied, and that the soils are appropriate for irrigated agriculture. Based on that, actual engineering and agricultural development designs were elaborated taking into consideration farmers' technical abilities and cultural attitudes. As a result, the irrigation systems proposed were designed using simple and well-known irrigation technologies, and the actual agricultural development, although intensive and horticultural oriented, is based in rather simple agricultural practices. Other NIDP projects (still to be studied at feasibility level) will be designed following similar technical and technological approaches.

4.2 The NIDP will promote a more diversified cropping pattern, including competitive high value crops (mainly vegetables), whose benefits will come mainly from the expected increase in yields, as result of better water management during crop development, and from the increase in the number of crop cycles. To ensure that, an intense farming training activities will be provided for enhancement of farmers' abilities in irrigation water management and control.

4.3 The Farmers' Technical Assistance and Training component has a methodology that has proved to be successful in similar cases. The use of progressive and entrepreneurial lead farmers as promoters is an effective way to disseminate the adoption of technological and managerial changes in well-related communities. The demand-driven approach for the formulation of the annual training plans with active participation of farmers, ensures the pertinence, validity and effectiveness of the technological answers to be provided in response to their demands. And the flexibility to acquire, wherever be necessary, the specialized expertise in intense vegetable/horticultural production techniques and marketing skills, warrants farmers access to that knowledge as necessary.

### B. Institutional viabilty

4.4 NIC was established in 1986 for the O&M of public irrigation infrastructure in Jamaica and as such has obtained the relevant experience to properly manage and control irrigation systems. NIC's organizational chart and staffing is currently tailored for that purpose and has been functioning well. As the new irrigation water policy stated in the Water Sector Strategy and Action Plan approved by the GOJ establishes a new role for NIC, its organizational chart should be adjusted accordingly. NIDP's Component I was designed toward that purpose.

4.5 The WUAs viability relies on the participatory process for establishing them, the legal and policy framework that guarantees its establishment and operation, the

institutional strengthening of NIC to support the associations, the training of the leaders of the WUAS and the farmers, and the agricultural services that the farmers will receive through the technical assistance and training component and the ASSP. The success of this participatory approach and of the cost recovery policy will translate itself in a shift of NIC towards its new functions in planning, monitoring and regulating the irrigation sector.

4.6 The institutional arrangement designed for the implementation of the Farmers' Technical Assistance and Training Component, that is to use the ASSP instead of the NIC, is justified on the clear advantages of the former to provide this type of services while the latter clearly lacks this kind of expertise.

## C. Financial viability

4.7 Financial viability was evaluated at several levels: (i) ability of the WUAs to manage the systems effectively and to be financially viable, (ii) ability of the NIC to manage the finances to implement the program, (iii) ability of the GOJ to sustain any new recurrent costs resulting from the program after execution, (iv) ability of the GOJ to allocate sufficient financing during program implementation, and (v) farmers ability to pay O&M and capital costs.

4.8 Ability of WUAs to manage the systems effectively and to be financially viable: The WUAs will receive training and technical assistance from the NIC to build their capacity in this regard. The NIC will work very closely with the WUAs to develop them and to ensure that they have adequate institutional and financial capacity to manage the systems. Although success cannot be guaranteed, the program is being designed with adequate safeguards to ensure the success of the WUAs.

4.9 Ability of the NIC to manage the finances of the program: The program size is quite significant compared to baseline NIC financing. The annual budget for this program will average US$4.5 million, nearly doubling the NIC's annual income. While the program will have a significant impact on the NIC's finances, the NIC will have the capacity to handle the program finances in a judicious manner. The NIC already has significant in-house financial management and accounting experience. The strengthening of the PIU and the establishment of effective management systems will enable the NIC to manage the program's resources effectively.

4.10 Ability of the GOJ to sustain any new recurrent costs: The program will not create any new recurrent costs to the NIC or the GOJ during or after its implementation. On the contrary, by promoting the divestiture of irrigation systems and enhancement of the NIC, the program should reduce GOJ recurrent costs.

4.11 Ability of the GOJ to meet its counterpart financing requirements: Based on the analysis of budget allocations for MOWH, the following conclusions are drawn:

a. NIDP will have a significant but manageable impact on the projected MOWH baseline Capital B budget (the special account for bi- or multi-lateral funded projects on which GOJ and external funds are allocated). The marginal impact is 12% and 15% in FY04-05 and FY05-06 respectively. The impact is more significant in FY06-07 and FY07-08, but this is mainly due to the ending of other capital projects rather than NIDP budget increases.

b. There is reason to be concerned that the total Capital B budget allocation of US$3.2 million for FY03-04 is significantly below the (requested) total projected Capital B expenditure of US$13.2 million. This suggests that there would be a shortfall in FY03-04, even though it will not affect NIDP directly, as this program it is not yet budgeted. Nevertheless, it could affect it indirectly by hampering implementation of other projects undergoing, creating greater competition in FY04-05, when NIDP is expected to start.

4.12 Farmers ability to pay O&M costs and capital costs: Although the complete analysis of the farm models comprises all the potential combinations, we use the financial results for all irrigation systems in the case that crop prices attain 100% of the official MOA prices (2002-2003) and crop production reaches 75% of the crop production levels reported in the feasibility studies (MOA data, 2003). The reason for this choice is that this situation is a realistic and commonly reported situation. Crop production is reduced, in average, up to 25% due to crop losses and frequent stealing of the produce on the fields.

4.13 From the results obtained, it is clear that even in the situation in which prices and production levels are below the official standards, farming practices are lucrative in all irrigation systems and all farm types. Farm profits (net margin per ha) range from a minimum of J$365,176 (US$6,640) in the 1 ha-farm model of Colbeck to a maximum of J$851,282 (US$15,478) in the very intensive 1 ha-farm model of Yallahs (where cropping intensity index is 266%).

4.14 The impact that O&M cost has on farm profits (net margin/ha) is low in the Yallahs system (3-4%) and in Colbeck (5%) and moderately higher in New Forest (8-9%), evidencing that full recovery of O&M costs (as stated in the approved policy) will be easily affordable in all systems. The impact of off-farm irrigation investment costs on farm profits ranges from a low 4-5% in Yallahs to a medium level 7% in New Forest and 11% in Colbeck. Considering that these results correspond to a situation in which full crop prices and yields are not attained (only 75% of both), it is feasible for all farmers to pay the investment costs.

4.15 The results of the analysis show that it will be feasible to recover O&M costs from the beginning of the project, as agreed by the GOJ approved policy. They also show, based on net margin estimates that it will be feasible to recover off-farm capital costs, provided that full-rate crop prices and full production levels are attained (in this case, the impact of capital costs on the farms' net margin ranges from 6% to 2%). However, in those situations, when marketable production is only a portion of total production (due to crop losses and

on-the-farm produce stealing) and crop prices are not at their peak levels, the program will take into account these problems and a cap will be established on capital cost recovery as a proportion of farmers net profit. The target for recovering capital costs is that these costs do not exceed 20% of total farm profits (net margin). Thus, if farm profits decrease due to crop prices decline or production losses, so that capital costs tariffs represent a higher impact on farm profits than the 20% ceiling, the GOJ could partially subsidize the capital costs charges.

## D. Economic evaluation

4.16 This section presents the financial and the economic evaluations of the three irrigation systems of the sample (781 ha and 611 farmers)[14], as well as the financial and the economic evaluation of the overall NIDP (1,700 ha and 1,000 farmers).

4.17 The irrigation benefits were estimated as the difference between the stream of net margins to be obtained in the area under irrigation "with the project" and the one to be obtained "without the project". Farm models were estimated and evaluated for both, the "without project" and the "with the project" situations in each system. Each farm model is a parcel of a certain size and with a given mix of crops produced. Having the per unit crop budgets for each farm model and for each situation, the net margins per hectare corresponding to each farm without and with irrigation were determined. The difference between the two constitutes the incremental net margin per hectare due to irrigation (including the land use intensity, increase of yields and expansion of land cultivated). Knowing the amount of hectares occupied by each farm model in each system, the increments per hectare were expanded to the whole irrigated area of the system. Therefore, the total incremental benefits of irrigation at the system, or project level, were obtained. In addition, for estimating the irrigation benefits in a more conservative manner, the incremental net margin was gradually built up as follows: 10% in the first year, 25% in the second year, 45% in the third year, 70% in the fourth year and 100% in the fifth year.

4.18 The irrigation costs were estimated by the engineering team, including the on-and off-farm costs. Other NIDP costs (institutional strengthening, organization of WUAS, technical assistance and training, pre-investment and PIU) were allocated proportionally to the three sample projects.

4.19 Each system's profitability is examined at two levels: (i) the project level and (ii) the program level. At the project level, only the direct costs of irrigation investments and of O&M are included, thus reflecting the costs and the benefits to the farmers. At the program level, the costs of the other components of the NIDP are added, thus reflecting the profitability at market prices from the government's and the lending agency's perspectives.

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[14] New Forrest –368 ha and 288 farmers, Yallahs –303 ha and 223 farmers and Colbeck –110 ha and 110 farmers.

4.20 Considering the project level at market prices, the three systems IRRs are 36% in Colbeck, 36% New Forrest, and 39% in Yallahs. In the scenario of a 50% reduction in incremental net benefits, the IRRs are 23%, 22% and 27%, respectively.

4.21 Considering the program level at market prices, the three systems IRR's are 24% in Colbeck, 27% in New Forrest and 29% in Yallahs. In the scenario of a 50% reduction in benefits, the IRRs diminish to 14%, 15% and 19%, respectively.

4.22 Thus, the irrigation investments and the supporting costs corresponding to the three systems, can be considered very profitable at market prices, both from the point of view of the farmers, as well as the government's and the lending agency's. The program at market prices as a whole is also profitable, as the IRR is 29%. If incremental benefits are diminished by half over the base situation, the IRR is still very attractive (17%).

4.23 For estimating the Economic Internal Rate of Return (EIRR), market prices were transformed into economic prices. The crop budgets were transformed into economic crop budgets by adjusting the market product and input prices by a set of conversion factors (factors are Papaya 1.05, Thyme 2.03, Hot Pepper 1.37, Callaloo 1.44 and Scallion 1.20, all of which are export crops: for import crops a factor of 0.84 was used) The investment costs and the O&M costs were also adjusted to get their economic prices.

4.24 Considering the project level at economic prices the results are even higher than in the case of market prices: the three systems EIRRs are 45% in Colbeck, 38% New Forrest, and 45% in Yallahs. In the scenario that a 50% reduction in incremental net benefits is assumed: the EIRRs are 31% in Colbeck, 25% New Forest, and 32% in Yallahs. Considering the program level at economic prices, the three systems EIRR's are 28% in Colbeck, 27% in New Forrest and 32% in Yallahs. In the scenario of a 50% reduction in benefits, the EIRRs diminish to 18% in Colbeck, 16% in New Forest and 22% in Yallahs. The program at economic prices as a whole is very profitable, as the EIRR is 31% and the Net Present Value (NPV) is US$52.5 millions. If incremental benefits are diminished by half over the base situation, the EIRR is still attractive (20%).

4.25 From an income distribution perspective, and based in the information obtained by the socioeconomic survey conducted in the sample project areas, it can be concluded that the farmers to be benefited by the program are small farmers with an average farm size of 1.8 has and an annual per capita income of about J$89,000 (2003). Therefore, the program does not quality as PTI, as the current per capita income is above the Bank's poverty line (J$30,990 in 2003).

## E. Environmental and social viability

4.26 In 1997 an Environmental Assessment (EA) was conducted for Jamaica's overall irrigation sector as an integral part of the preparation of the National Irrigation

Development Master Plan. The EA assessed the state of and the potential for irrigated agriculture in the country, emphasizing environmental constraints and deficiencies. Broad and specific environmental and social issues were identified with focus on natural resources, public health, socio-economic and institutional aspects, as well as agriculture-related issues.

4.27 Using environmental, social and economic criteria, 16 projects were selected from the Master Plan. Three projects were selected for execution in the first year of the NIDP (Colbeck, New Forrest/Duff House and Yallahs) to test methodology to be applied in the overall NIDP. An Environmental and Social Impact Assessment (ESIA) was performed on the sample projects. The ESIA generated an Environmental and Social Impact Report (ESIR), an Environmental and Social Management Plan (ESMP), and guidelines for ESIA preparation for future projects.

4.28 The ESIA for the NIDP has been an interactive process between technical, environmental and social consultants and farmers over the past three years. Group and individual consultations were conducted with farmers, farmer groups, government officials and affected citizens in and around the three sample irrigation systems. Four meetings were held in Colbeck, four in New Forest/Duff House and five in Yallahs with farmers and agricultural related people and organizations. WUAs are being formed at Yallahs, Colbeck and New Forrest/Duff House. A Rapid Rural Assessment surveyed 20% of the affected people in the systems to determine the sociological situation and issues, as well as related environmental issues.

4.29 The NIDP's environmental impacts are overwhelmingly positive and include: (i) enhancement of good farming/cropping practices; (ii) steady provision of cheaper and good quality water; (iii) better water management under the responsibility of the WUAs; (iv) delivery of agricultural support services including extension and marketing information; (v) extensive training in pesticide use; and (vi) implementation of a surface and groundwater quality monitoring program for each system.

4.30 No major negative environmental impacts are foreseen as a result of the implementation of the NIDP. Identification and due consideration of direct and indirect negative impacts and the corresponding mitigation measures included in the program, demonstrate that negative impacts can be limited and controllable if the mitigatory measures shown below are properly applied. Obviously, impacts may result if program components are improperly executed or if they do not effectively address current detrimental agricultural practices. The major potential negative impacts and their corresponding mitigation measures are presented in the following table:

**TABLE 4.1**
**NIDP potential negative environmental impacts and mitigation measures**

| **A. Construction Phase** | | |
|---|---|---|
| **1. Well drilling and installation** | | |
| **Direct** | **Indirect** | **Mitigation Measures** |
| • Vegetation cleared. | • Soil erosion and sedimentation. | • Minimize land taken around well site.<br>• Provide soil erosion barriers where needed.<br>• Work during dry season problem areas.<br>• Monitor during construction. |
| • Drilling mud uncontained.<br>• Fuel/lubricant spills. | • Soil & surface water contaminated. | • Contain mud in sediment basin.<br>• Proper fuel/lubricant storage and transfer. |
| **2. Pipeline installation** | | |
| **Direct** | **Indirect** | **Mitigation Measures** |
| • Vegetation cleared. | • Soil erosion and sedimentation. | • Minimize amount of vegetation cleared. |
| • Soil erosion and sedimentation. | • Surface water contaminated. | • Install erosion barriers.<br>• Work during dry season. |
| **3. Micro-dam Rehabilitation** | | |
| **Direct** | **Indirect** | **Mitigation Measures** |
| • Sediment removal and storage uncontrolled. | • Erosion and surface water contamination. | • Install erosion and sediment control barriers during excavation and throughout storage. |
| **B. Operations Phase** | | |
| **Direct** | **Indirect** | **Mitigation Measures** |
| • Increased demand for expansion of agricultural land from irrigation water availability. | • Vegetation loss and deforestation.<br>• Biodiversity and soil loss. | • Training to increase productivity on existing parcels in order to reduce land expansion. |
| • Cropping intensification and crop concentration leads to increased vulnerability for pests and disease attack. | • Increase in pesticide use. | • Implementation of integrated pest management, biological control and mixed cropping techniques. |
| • Increased demand for pesticides and fertilizer. | • Increased ground and surface water and soil contamination. | • Training in Integrated Pest Management.<br>• Training in targeting, handling, application and storage of agro-chemicals.<br>• Implement a recycling program for used pesticide containers.<br>• Public awareness campaign. |
| • Intensive cultivation and misuse of irrigation water increases soil erosion. | • Sedimentation and contamination of surface waters. | • Extension services to target slopes > 20 degrees with soil conservation techniques.<br>• Slopes >30 degrees not cultivated with irrigated crops. |
| • Inefficient and environmentally unfriendly water-use practices continue. | • Energy and water demand increase.<br>• High operating costs.<br>• Water logging and salinization reduces crop yields. | • Enhanced water-use efficiency included in design and in training. |
| • Environmentally unfriendly disposal of household waste. | • Contamination of watercourses and ground water. | • Program for recycling and proper disposal of waste implemented through WUAs. |

4.31 The program has many positive social benefits that will increase the economic and social welfare of farmers and their families. Organization and implementation of WUAs will: (i) improve water delivery to individual farms and parcels, increasing crop production and farmers' income; (ii) provide market information to producers improving their ability to access markets; (iii) help farmers secure inputs and access to credit; and (iv) reduce praedial larceny, a major cause of crop and income loss for farmers. Agricultural services will lead to increased farmers' income, hence a better standard of living, provide cropping knowledge and skills to increase productivity and better access to market information. Women will benefit from leadership training, cropping and increased production knowledge and marketing skills and information resulting in increased income equality and independence. Improved fertilizer use and handling, use and storage of pesticides will reduce farmer health risks, lower production costs, and reduce water and soil contamination.

4.32 Negative social issues could emerge from failures in design and implementation of the program's activities and mitigation measures. Potential negative social impacts are presented in the following table along with mitigation measures.

**TABLE 4.2**
**Potential negative social impacts and mitigation measures**

| **1. Water User Associations** | | |
|---|---|---|
| **Direct** | **Indirect** | **Mitigation Measures** |
| Groups restrict entry or accessibility to all farmers. | • Cropping/marketing information restricted.<br>• Effectiveness of program reduced. | • Operating guidelines for associations established and implemented.<br>• Public awareness program targets all farmers and encourages all to participate. |
| **2. Agricultural Support Services** | | |
| **Direct** | **Indirect** | **Mitigation Measures** |
| Preferential access to services. | • Increased inequality among farmers.<br>• Fewer at-risk farmers participate.<br>• Effectiveness of program reduced. | • Operating guidelines for service delivery established and implemented.<br>• Public awareness program to advertise services and encourages participation. |
| Duplication or replication of training. | • Poor use of training resources. | • Training needs assessed.<br>• Training targeted to farmers specific needs. |
| Inadequate number of women targeted for training. | • Women remain in secondary farming roles. | • Assess needs of women farmers and develop and implement programs to address discrepancies.<br>• Develop a group of women to train others. |

4.33 No important cultural or historical features were found within any of the systems or directly influenced by them. The ruin of the historic Colbeck Castle, identified near the Colbeck system, will not be impacted by construction or operation of the irrigation facilities or from farming activities in the area.

4.34 The measures, implementation schedules and responsibilities to mitigate negative and enhance positive impacts are designed and included in the ESMP, and will cost about US$0.75 million already incorporated into the program's budget: (i) Training in land stewardship, land preparation and soil conservation and crop technology for 1,000 farmers; (ii) Technical training in agrochemical use and management for 1,000 farmers; (iii) Campaigns for pesticide safety awareness, pesticide container recycling and environmentally unfriendly waste disposal practices; (iv) Training in efficient use of irrigation water for 1,000 farmers; (v) ESIA development for future projects; (vi) Water quality monitoring program; (vii) Methodology development for water tariff determination incorporating environmental and natural resources costs; and (viii) Environmental Officer to address environmental and social issues of NIDP.

4.35 To support implementation of the ESMP, the program will hire an Environmental Officer through the PIU, that will be responsible for: (i) assuring that the mitigation measures of the ESMP are executed; (ii) overseeing environmental and social impacts assessments for future projects; (iii) promoting good environmental practices consistent with IDB guidelines and Jamaican legislation; (iv) promoting the establishment of an environmental management system for the NIC; and (v) liaison between the NIDP and the NEPA.

## F. Issues and program risks

### 1. Financial viability

4.36 Cost recovery: There has been a tendency over the last few years towards cost recovery in the public systems managed by NIC. Due to strong farmer resistance, however, rate increases were rolled back in 1997. The design and implementation of a clear cost recovery policy and regulations are essential for the success of the NIDP. The proposed sequencing in irrigation investments and the contractual obligations that the WUAs are expected to assume aim at securing cost recovery.

4.37 Ability of the GOJ to meet its counterpart financing requirements: Even though it was showed that the GOJ could meet its counterpart requirements, the recent fiscal deterioration could affect their financial commitments to the NIDP. Thus, the GOJ's counterpart was spread out over a 5-year disbursement period.

### 2. Land tenure system

4.38 The existence of secure forms of land tenure in the irrigation areas and the implementation of a clear land administration policy is a crucial incentive for WUAs financing and assuming the management of irrigation systems. Successful

implementation of the LAMP, in particular its land regularization component, and of the MOU between NIC and NLA, would enhance these possibilities within the NIDP areas.

### 3. Water users' participation

4.39 The history of farmer organizations (including WUAs) has not been a successful one in Jamaica. To minimize the probability of new failures the project will pay particular attention to social, financial and organizational issues. Another important element will be to integrate the participation of farmers in the design, funding and management of the systems.

**NATIONAL IRRIGATION DEVELOPMENT PROGRAM (NIDP)**
**(JA-0106)**

## Bidding Schedule – Tentative Procurement Plan

| PRINCIPAL PROCUREMENT | BANK FINANCING % | METHOD | PREQUALIFICATIONS | AMOUNT (US$ thousands) | PUBLICATION DATE (Quaarter Year) |
|---|---|---|---|---|---|
| **A. Water and Sanitation Schemes** | | | | | |
| 1. Lot 1: Yallahs irrigation system. | 75 | ICB | Yes | 1,600 | III/2005 |
| 2. Lot 2: Colbeck irrigation system. | 75 | LB | Yes | 700 | III/2005 |
| 3. Lot 3: New Forest/Duff House irrigation system. | 75 | ICB | Yes | 2,500 | III/2005 |
| 4. Lot 4: Essex Valley irrigation system. | 75 | ICB | Yes | 2,650 | I/2007 |
| 5. Lot 5: St Dorothy rehabilitation system. | 75 | ICB | Yes | 1,500 | I/2007 |
| **B. Consulting Services** | | | | | |
| 1. Pre-investment studies St Dorothy and Essex Valley. | 100 | ICB | Yes | 400 | III/2006 |
| 2. Engineering and supervision of works (lots 1, 2 and 3). | 100 | ICB | Yes | 900 | IV/2005 |
| 3. Engineering and supervision of works (lots 4 and 5). | 100 | ICB | Yes | 700 | II/2007 |
| 4. Training for the PIU. | 100 | LB | No | 15 | II/2005 |
| 5. Training for the NIC. | 70 | LB | No | 220 | II/2005 |
| 6 Training for WUAs*. | 80 | LB/ICB | No | 500 | II/2005 – II/2007 |
| 7. Training for trainers (Component III) – ASSP. | 50 | LB | No | 200 | I/2006 |
| 8. Consultants for the NIC – PIU. | 70 | LB | No | 180 | III/2005 |
| 9. Consultants for WUAs*. | 80 | LB/ICB | No | 1,100 | II/2005 – II/2008 |
| 10. Consultants for the MOU with ASSP*. | 50 | LB/ICB | No | 740 | III/2005 – IV/2007 |
| 11. Consultants for the MOU with NLA*. | 50 | LB/ICB | No | 400 | II/2005 – II/2007 |
| 12. Rehabilitation plans of Mid-Clarendon and Rio Cobre. | 100 | ICB | Yes | 900 | III/2008 |
| **C. Goods** | | | | | |
| 1. Vehicles for the PIU-NIC. | 100 | LB | No | 150 | II/2005 |
| 2. Office equipment, computers and software*. | 100 | LB/ICB | No | 820 | II/2005 – II/2007 |

ICB1 International competitive bidding (under Bank's regulations)
LB Local bidding (under Jamaican bidding legislation, but following Bank's procedures for consultants)
* Several contracts during Program implementation

**NATIONAL IRRIGATION DEVELOPMENT PROGRAM (NIDP)**
**(JA-0106)**

## Logical Framework

| NARRATIVE SUMMARY | INDICATORS | MEANS OF VERIFICATION | ASSUMPTIONS |
|---|---|---|---|
| **A. GOAL** | | | |
| 1. To increase the national agricultural area under improved policy framework and irrigation management practices. | 1.1 Three years after Program completion, 12 irrigation projects and 4,000 has are operated and maintained by fully autonomous, self sustained WUAs, and NIC is collecting capital cost charges. Farmers are benefiting from effective production and marketing information and improved environmental and management practices are applied. | 1.1 NIC Annual Reports. | |
| **B. PURPOSE** | | | |
| 1. To increase high payoff agriculture and farmers income in the program's area. | 1.1 From 500 hectares at present to approximately 800 has in year 3 and 1,700 hectares in year 5 are cultivated with high payoff products (thyme, Scallion, sweet pepper, tomatoes, cucumber, broccoli, mango, and watermelon). | 1.1 NIC supervision and mid term and final evaluation reports. | 1.1 Market demand and prices of crops remain attractive. |
| | 1.2 Increase in crop yields (ton/ha) from the present to the first crop cycle under irrigation and maintained afterward:<br>(i) Tomato, from 18 to 22.<br>(ii) Scallion, from 20 to 25.<br>(iii) Watermelon, from 18 to 30.<br>(iv) Pumpkin, from 9 to 15. | 1.2 MOA reports. | 1.2 Weather is good for farming. |
| | 1.3 Increase in cropping intensity (1ha) from the present to the first crop cycle under irrigation and maintained afterwards:<br>(i) Yallahs from 1.7 to 2.7.<br>(ii) N. Forest, from 1.1 to 1.8. | 1.3 MOA Reports. | |
| | 1.4 Increase in net income/ha (US$000/ha):<br>(i) N. Forest: 10 in 1st crop and 14.0 in 3rd crop and maintained afterwards.<br>(ii) Yallahs: 7.0 in 1st crop and 12 in 3rd crop and maintained afterwards.<br>(iii) Colbeck: 11.0 in 1st crop to 13 in 3rd crop and maintained afterwards. | 1.4 MOA Reports. | |

| NARRATIVE SUMMARY | INDICATORS | MEANS OF VERIFICATION | ASSUMPTIONS |
|---|---|---|---|
| **C. COMPONENTS** | | | |
| **1. Strengthening of the National Irrigation Commission.** | 1.1 The NIC will be reorganized to progressively focus on planning, monitoring and regulating the irrigation sector. To that effect: a new NIC Business Strategy will be developed by y-2; the management information System by y-5; and the accounting, billings and operations systems will be strengthened by y-2. | 1.1 Inspections and Evaluations. | 1.1 Political willingness to make NIC technically and operationally viable in accordance with the policy guidelines for the sector. |
| **2. Promotion and formation of Water User Associations.** | 2.1 It will consist of establishing 5 autonomous, viable, self-sustained WUAs in Colbeck, New Forest, and Yallahs by y-2; Essex Valley and Saint Dorothy, by year 3 to cover 1,700 hectares with approximately 1,000 farmers. Members will have full participation in the decision-making activities of the WUAs established. WUAs will be regulated by the NIC. | 2.1 Visits; Inspection of WUAs Books. | 2.1 (i) Farmers are willing to participate in the formation and operation of WUAs; (ii) Farmers are willing to pay full O&M and capital costs as billed by WUAs and NIC. |
| **3. Farmers' technical assistance and training.** | 3.1 It will consist of providing training to 30 Trainers, by y-2 and technical assistance and training to 1,000 farmers (y-2 to y-5) in topics related to farming with irrigation and the use of sound environmental practices. By means of a M. of U. with the PIU, the ASSP will implement this component. | 3.1 ASSP Training Reports and Evaluations of Results of Training. | 3.1 ASSP works well and farmers are willing to receive training and T.A. |
| **4. Irrigation Systems Infrastructure.** | 4.1 It will consist of carrying out construction and/or rehabilitation and installation of irrigation systems infrastructure in 1700 hectares. Wells, pump houses, power supply, pipe networks, pumping equipment, and on-farm systems will be implemented in irrigation areas at Yallahs, Colbeck and New Forest by year 3; Essex Valley and St. Dorothy by year 5. | 4.1 Inspection of works completed and operating. | 4.1 (i) Budget requested is approved and flows on schedule; and (ii) Successful Implementation of the MOU between NIC and NLA for land regularization activities. |

| NARRATIVE SUMMARY | INDICATORS | MEANS OF VERIFICATION | ASSUMPTIONS |
|---|---|---|---|
| **D. ACTIVITIES** | **Budget (US$)** | | |
| **1. Institutional Strengthening of NIC.** | **1. US$953,500** | 1. Budget Implementation Register of the PIU. | |
| 1.1 Business strategy developed. | 1.1 US$206,500 | | |
| 1.2 MIS strengthened. | 1.2 US$243,000 | | |
| 1.3 Accounting systems strengthened. | 1.3 US$155,000 | | |
| 1.4 Billing systems strengthened. | 1.4 US$204,000 | | |
| 1.5 Operations strengthened. | 1.5 US$145,000 | | |
| **2. Promotion and formation of WUAs.** | **2. US$1.688,300** | 2. Budget Implementation Register of the PIU. | |
| 2.1 WUA in Colbeck community. | 2.1 US$128,100 | | |
| 2.2 WUA in New Forest/Duff House. | 2.2 US$148,100 | | |
| 2.3 WUA in Yallahs. | 2.3 US$126,400 | | |
| 2.4 WUAs Essex Valley and St Dorothy. | 2.4 US$486,200 | | |
| 2.5 WUA Support Unit in the NIC's PIU. | 2.5 US$799,500 | | |
| **3. Technical Assistance and training** | **3. US$1.167,500** | 3. Budget Implementation Register of the PIU. | |
| 3.1 MOU NIC-ASSP implemented. | 3.1 US$578,500 | | |
| 3.2 Trainers trained. | 3.2 US$158,000 | | |
| 3.3 Farmers trained. | 3.3 US$391,000 | | |
| 3.4 Environmental training provided. | 3.4 US$40,000 | | |
| **4. Irrigation systems infrastructure.** | **4. US$10.608,359** | 4. Budget Implementation Register of the PIU. | |
| 4.1 Yallahs irrigation system. | 4.1 US$1.686,832 | | |
| 4.2 Colbeck irrigation system. | 4.2 US$747,943 | | |
| 4.3 New Forest irrigation system. | 4.3 US$2.573,584 | | |
| 4.4 Essex Valley and St Dorothy. | 4.4 US$4.300,000 | | |
| 4.5 Pre-investment. | 4.5 US$1.300,000 | | |