Document of
The World Bank

FOR OFFICIAL USE ONLY

Report No: 39120-GY

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT FROM THE

GLOBAL ENVIRONMENT FACILITY
SPECIAL CLIMATE CHANGE FUND

IN THE AMOUNT OF

US$ 3.8 MILLION
TO THE REPUBLIC OF GUYANA

FOR A

CONSERVANCY ADAPTATION PROJECT

September 19, 2007

Sustainable Development Department
Caribbean Country Management Unit
Latin America and the Caribbean Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective September 2007)

Currency Unit = Guyana Dollars
US$ 1 = GY$203
US$.005 = GY$1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

A-OGCM	Atmospheric – Ocean General Circulation Model
CAP	Conservancy Adaptation Project
CARICOM	Caribbean Community
CAS	Country Assistance Strategy
CCCC	Community Climate Change Center
CDC	Civil Defense Commission
CIDA	Canadian International Development Agency
CPACC	Caribbean Project on Planning for Adaptation to Climate Change
CQS	Selection Based on Consultant Qualifications
DEM	Digital Elevation Model
DfID	United Kingdom's Department for International Development
EA	Environmental Assessment
ECLAC	Economic Commission for Latin America and the Caribbean
EDWC	East Demerara Water Conservancy
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EOP	End of Project
FBS	Fixed Budget Selection
FMR	Financial Monitoring Report
GD	Guyana Datum
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GEPA	Guyana Environmental Protection Agency
GHG	Greenhouse Gases
GINA	Government Information Agency
GIS	Geographic Information System
GoG	Government of the Republic of Guyana
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IDB	Inter-American Development Bank
IPCC	Intergovernmental Panel for Climate Change
IS	Implementation Secretariat
LCS	Least-Cost Selection
LIDAR	Light Detection and Ranging
MoA	Guyanese Ministry of Agriculture

NCB	National Competitive Bidding
NDIA	National Drainage and Irrigation Authority
PAD	Project Appraisal Document
PCA	Procurement Capacity Assessment
PEU	Project Execution Unit
PHRD	Japanese Thematic Climate Change Policy and Human Resource Development
PSTAC	Public Sector Technical Assistance Credit
PY	Project Year
QBS	Quality-Based Selection
QCBS	Quality and Cost-Based Selection
SBD	Standard Bidding Document
SCCF	Special Climate Change Fund
SOE	Statement of Expenses
TFIR	Task Force for Infrastructure Recovery
TOR	Terms of Reference
TTL	Task Team Leader
UNDAC	United Nations Disaster and Coordination Team
UNFCCC	United Nations Framework Convention on Climate Change

Vice President:	Pamela Cox
Country Director:	Caroline D. Anstey
Sector Director	Laura Tuck
Acting Sector Manager:	David N. Sislen
Task Team Leader:	Francis Ghesquiere

REPUBLIC OF GUYANA
CONSERVANCY ADAPTATION PROJECT

TABLE OF CONTENTS

THE REPUBLIC OF GUYANA

CONSERVANCY ADAPTATION PROJECT

PROJECT APPRAISAL DOCUMENT

LATIN AMERICA AND CARIBBEAN

LCSUW

Date: September 19, 2007	**Team Leader**: Francis Ghesquiere
Country Director: Caroline D. Anstey	**Sectors:** Flood protection (100%)
Sector Manager/Director: Laura Tuck	**Themes:** Natural disaster management (P)
Project ID: P103539	**Environmental** screening category: Partial
Focal Area: Climate Change	Assessment
Lending Instrument: Specific Investment Loan	

Project Financing Data

[ ] Loan [ ] Credit [X] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:US$3.8 million
Total Bank financing: US$3.8 million
Proposed terms:

Financing Plan (US$m)

Source	Local	Foreign	Total
BORROWER/RECIPIENT	1.20	0.00	1.20
Global Environment Facility (GEF)	3.80	0.00	3.80
Total:	5.00	0.00	5.00

Borrower: The Republic of Guyana

Responsible Agency: Ministry of Agriculture
Regent & Vlissengen Roads
Georgetown
GUYANA
F:+592-227-2978

Estimated disbursements (Bank FY/US$m)

FY	2008	2009	2010						
Annual	1.80	2.00	1.20						
Cumulative	1.80	3.80	5.00						

Project implementation period: Start November 15, 2007 End: June 30, 2010
Expected effectiveness date: November 1, 2007
Expected closing date: June 30, 2010

Does the project depart from the CAS in content or other significant respects? [X]Yes [ ] No

Does the project require any exceptions from Bank policies?	[ ]Yes [X] No
Have these been approved by Bank management?	[ ]Yes [X] No
Is approval for any policy exception sought from the Board?	[ ]Yes [X] No
Does the project include any critical risks rated "substantial" or "high"?	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation?	[X]Yes [ ] No

Project development objective

The objective of the CAP is to reduce the vulnerability of catastrophic flooding in Guyana's low-lying coastal area that is currently threatened by sea level rise resulting from global climate change.

Global Environment objective

Somewhat different in scope and theme than previous GEF projects, the CAP represents important opportunities for learning and future application. The majority of climate change related GEF projects have been focused on green house gas emissions abatement and the study of the potential impacts from climate change. These projects often do not involve large infrastructure components aimed at strengthening physical assets to help reduce a country's vulnerability to intense climatic events. Yet infrastructure is a critical sector to consider when implementing adaptation measures to better cope with the effects of climate change. Structures that were not built to withstand the affects of climate change will suffer damages, and costly losses will follow. Shifting the focus of the GEF Adaptation Program to the development and implementation of adaptive measures to strengthen infrastructure will increase the program's robustness and effectiveness.

Like other low-lying coastal countries, Guyana is highly vulnerable to sea level rise and changes in rainfall patterns. Heightened sea levels and more intense rain events increase the vulnerability of low-lying coastal countries to severe flooding. Drainage and irrigation systems that were constructed over a hundred years ago were not designed to cope with these rapidly evolving threats. The project would serve as a template that could be applied to countries with similar geographical attributes and aims to raise awareness to promote the worldwide application of physical infrastructure upgrades to reduce vulnerabilities brought on by climate change.

Project description

The project will finance the development of the technical foundation for a master plan of future interventions within the East Demerara Water Conservancy (EDWC) and lowland drainage systems, as well as specific upgrading works and operational improvements aimed at enhancing the flood control capacity of the EDWC. The tools developed under the analytical component will be used by the GoG and donor agencies to guide future investments.

Component 1 - Pre-investment studies for engineering design of works (US$2.0 mil from GEF SCCF): The objective of this component is to provide the hydrologic baseline necessary for contemplating rational interventions aimed at increasing the current discharge capacity of the flood control system.

Component 2 – Investments in specific adaptation measures (US$ 2.9 mil; US$1.7 mil from GEF SCCF, and $1.2 million Government of Guyana): The objective of this component is to counteract the effects of sea level rise, which has decreased the GoG's ability to manage water levels of the EDWC system. The investments will improve the ability of the Government to manage water levels behind the EDWC dam during heavy rains by improving internal water flows in the EDWC and increasing EDWC drainage relief capacity to the Demerara River and eventually the Atlantic Ocean. Based on analytical outputs, additional upgrading of water control structures will also be undertaken.

Component 3 – Institutional Strengthening and Project Management (US$0.1 mil from GEF SCCF): The objective of this component is to strengthen the institutional framework for flood control within the context of the national emergency management sector headed by the Civil Defense Commission. The project will also support an institutional consolidation of flood control in Guyana to help create consensus around a medium and long term intervention strategy to help the country adapt to sea level rise.
Which safeguard policies are triggered, if any? Environmental Classification: B (Partial Assessment) The project will trigger; (a) Environmental Assessment (OP/BP/GP 4.01), (b) Natural Habitats (OP/BP 4.04), (c) Forests (OP/BP 4.36), and (d) Safety of Dams OP/BP 4.37).
Significant, non-standard conditions, **if any**, for: Grant effectiveness a) The execution and delivery of this Agreement on behalf of the Recipient has been duly authorized or ratified by all necessary governmental and corporate action. b) The Memorandum of Understanding has been executed by all of the parties thereto. c) The Operational Manual has been approved by the World Bank and adopted by the Recipient.

I. STRATEGIC CONTEXT AND RATIONALE

a. Country and Sector Issues

Introduction

Over three-quarters of the Guyanese population live in a 30 kilometer band along the Atlantic coast. This is an area of reclaimed lands, much of it below the regional mean sea level, situated between a water storage basin and a protective seawall complex. The coastal zone is transected by a dense network of drainage and irrigation canals. This network of canals links up with the East Demerara Water Conservancy (EDWC), a water storage system that provides regional agricultural lands and urban areas with irrigation and drinking water. During times of heavy rainfall this system functions as a regional drainage and flood control mechanism.

Present rates of sea level rise associated with global climate change pose a significant threat to the country and its economy. Recent flooding demonstrated the increased vulnerabilities of the existing drainage system and shortcomings in the current infrastructure. This project has been developed to guide a comprehensive upgrading program of the EDWC and lowland drainage system, aimed at increasing discharge capacity and improving water level management. The project will also provide a technical framework for future donor intervention in the drainage and irrigation sector. In addition to developing the technical baseline for adaptation measures, the project will include some small infrastructure improvements to help cope with the immediate threats to the drainage system.

Global Climate Change

The 2001 Third Assessment Report of the Intergovernmental Panel for Climate Change (IPCC) concluded that with the continuing emission of greenhouse gases (GHG), the global mean surface temperature may increase between 1.5 and 5.8 degrees Celsius over the next 100 years. Documentation being used in the preparation of the Fourth Assessment Report, due to be released during 2007, corroborates the range of the projected temperature increase. A change of this magnitude is unprecedented and will result in significant impacts on a global scale. These will manifest in the form of increases in sea level and modifications to global and regional weather patterns.

Climate Change in Guyana

Sea Level Rise - While sea levels are rising worldwide at a rate of 2-4 mm/year, Guyana's United Nations Framework Convention on Climate Change (UNFCCC) Initial National Communications Report (2002) and the Guyana National Vulnerability Assessment (2002) forecast a more severe impact locally. Analysis of tide gauge records from 1951 to 1979 shows the trend in sea level rise for Guyana to be in excess of 10 mm/year, which implies a net change in sea level of 0.9 feet over the 28 year period examined. If one assumes the rate to be constant to date, the net change in sea level from 1951 to 2005 is estimated at 1.8 feet. This projection is consistent with the work conducted by Douglas (1995) and Smith et al (1999) which indicates that sea level in the region of Guyana is increasing at a rate of more than 10 mm/year - or 2 to 5 times faster than the global estimate. This is corroborated by the estimates presented by Singh (1997) in his work on neighboring Trinidad and Tobago, which finds sea level rise in the Caribbean to be significantly higher than the globally observed levels.

Using the commonly accepted Atmospheric - Ocean General Circulation Model (A-0 GCM) approach to analyze future sea level changes, the forecast rise of the mean sea level, ignoring melt water runoff from land areas, is projected to be 40 cm by the end of the 21st century. The analysis of local tide gauge data suggests greater increases in mean sea level in Guyana. The rate of sea level rise will continue to be tracked through a network of monitoring stations employing geo-referenced tide gauges. This network was funded under the GEF financed Caribbean Project on Planning for Adaptation to Climate Change (CPACC), whose objective was to support Caribbean countries in preparing to cope with the adverse effects of global climate change.

Decrease in Average Rainfall; Increase in Rainfall Intensity – Concerning rainfall patterns, the *Initial National Communications Report* and the *National Vulnerability Assessment* (2002) presented evidence that, since 1960, there has been a tendency for below normal rainfall, as well as an increase in intensity of rainfall events. To forecast future trends, both studies employed the (A-OGCM) of the Canadian Climate Centre (CGCM 1) to develop predictions of rainfall, temperature, evaporation and water deficit based on a doubling of CO_2 concentrations. Under this scenario, temperature is expected to rise by an average of 1.2°C in the period 2020 to 2040 from the present. Increases in excess of 1.5°C are expected in southern Guyana in the Second Dry Season (August to October). Rainfall is expected to decrease by an average of 10 mm per month but the decrease in the First Wet Season and Second Dry Season (May to October) will be 12 mm per month or higher.

Estimates from climate models developed by the United Kingdom's Meteorological Office's Hadley Centre, support the prediction that Guyana will experience a general drying trend. In fact these models predict that Guyana will be among the most affected countries in the world, with average precipitation decreasing by roughly 1 mm/day by 2050. A drying trend of this nature would lead to not only increased intensity of rainfall events, but also to a greater reliance on the EDWC water storage system during dry seasons. To meet this need, water storage levels within the EDWC would have to be maintained as high as possible in order to support agriculture and urban centers on the coastal plain. This increases the importance of effective water level management within the EDWC system, placing an even greater emphasis on rapid response to water level changes within the system to meet demand and system safety requirements.

Guyana Coastal Drainage and Flood Control

Guyana's drainage and irrigation system has its origins during the Dutch colonial period beginning in the late 1600's. Land reclamation began under their tender and continued through the British colonial period until Guyana gained independence on May 26, 1966.

The country's coastal zone consists of a low-lying system of marine and riverine deposits which formerly comprised an extensive network of tidal deltas. Much of the land now in use in northern Guyana lies in this coastal zone below the mean high tide level of around 54 ft Guyana Datum (GD), as shown in Figure 1. This land was reclaimed from tidal areas, beginning in the 1600's by the Dutch, and is protected by an intricate network of seawalls, dykes, polders and drainage structures, including the EDWC system. Guyana's agrarian economy, which accounts for over 35 percent of GDP, is highly dependent on this coastal drainage and irrigation system that, among other benefits, provides flood control and allows for bi-annual harvests of their principal crops, rice and sugar.

Human settlement and infrastructure is concentrated in the reclaimed coastal plain where approximately 75 percent of the nation's population resides. The population is distributed in locations determined by the availability of suitable land for housing and services. The areas of

the Essequibo Islands – West Demerara (Region 3), Demerara – Mahaica (Region 4) and the Mahaica – Berbice (Region 5) are the most densely populated areas, with the majority of Guyana's citizens located in Region 4. The highest population densities are found in the vicinity of the capital, Georgetown, and adjoining areas.

Drainage during rainfall events has been managed through the use of a gravity based system augmented with pumps. This system is under increasing stress and is suffering from the impacts of sea level rise. Specifically, as sea level rises, the discharge window from low tide to mean tide is shrinking. The maximum safe operating level of the EDWC was about five feet above the peak 1951 sea level, which left a narrow operating window for emergency discharges during heavy rains. This maximum discharge level has closed to within three feet since that time. As the sea level continues to rise and the discharge window continues to shrink, the ability to manage water levels is further compromised.

Today's problems stem from the fact that the coastal drainage and irrigation systems in Guyana were largely constructed some 150 years ago. The additional stress to the EDWC system resulting from sea level rise, increases concern for the possible collapse of the EDWC. If the discharge flow is not improved, and the EDWC continues to be managed without regard for climate change related sea level rise, storm events will increasingly overcome the ability to release excess water from the system. This is because the period available to discharge excess water will continue to shrink. Taking no action will ultimately result in the failure of the EDWC due to overtopping and breach of the system's levees.

Considering the accumulated and expected impact of sea level rise, the current ad-hoc approach to flood control is no longer viable. It is also clear that any program to strengthen and upgrade the system will have to take into account the impact of climate change. Given the forecast impacts of sea level rise, the risk of future flooding, even during normal weather events, is increasing annually. It is therefore urgent that the Government of Guyana (GoG) and the donor community embark on a comprehensive program to strengthen the current system. This project is the first step in this process.

Box 1: EDWC System and Coastal Plain

The EDWC system includes: i) a reservoir, fronted by an earthen dam; ii) drainage channels, used to release excess water from the reservoir during the rainy season; and iii) a network of canals, used to provide drinking water and irrigation during the dry seasons. Because of this system, Guyanese farmers are able to realize two harvests of sugar cane and rice annually.

The drainage relief structures were created to protect the EDWC dam from overtopping and collapsing during rainy seasons. Relief canals were constructed from the EDWC west towards the Demerara River, east towards the Mahaica River and north towards the Atlantic Ocean. A network of creeks was also created within the Conservancy to conduct water through the reservoir to relief outlets. Drainage infrastructure within the EDWC is gravity based. Relief capacity is therefore dependent on the difference (head) between the water level in the system and the sea level. The greater the difference between the two, the more quickly water can be released from the system. As sea levels rises, the hydraulic head between the EDWC water control structures and sea outlets is significantly reduced. The lower head reduces both the flow rate and discharge window available to release excess water from the system.

In addition, sea level rise has shortened the discharge window for the coastal plain flood control network. At present, flood control is managed on an emergency basis and control efforts are focused on responding to immediate needs rather than the development of long-term flood control strategies. This ad-hoc system of flood control is no longer effective as there are growing systemic limitations on the ability to manage water levels within the inhabited coastal plain area.

Figure 1: Impact of Sea Level Rise in Coastal Guyana
(Prepared from: UNFCCC Initial National Communications (2002) and Royal Haskoning, Delft Hydraulics Leveling Report)

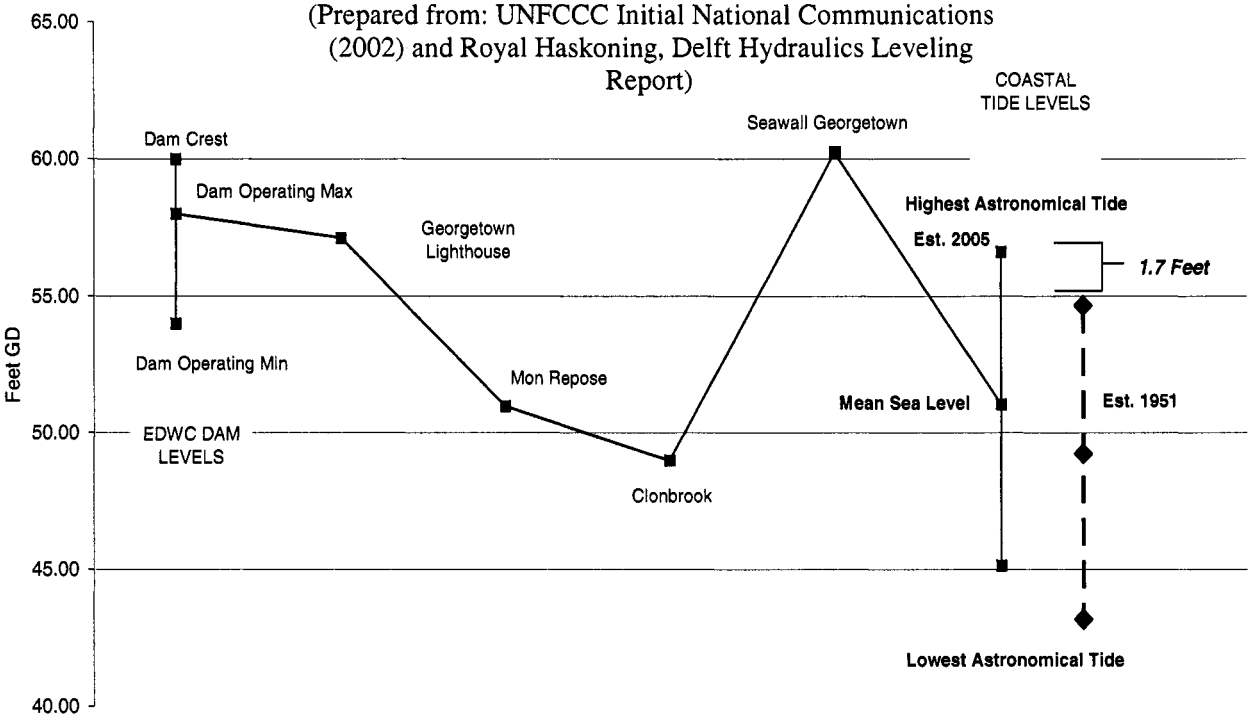


Figure 1 illustrates that the difference in elevation between the water level of the EDWC at representative locations and tide levels is a matter of a few feet. Towns such as Mon Repose and Clonbrook occupy elevations below both the minimum operating level of the EDWC and the mean high water spring tide level of 54.99 feet GD. Without a properly functioning drainage system, these towns and many others-including the capital-would not be able to survive.

Box 2: Region 4 Flood Control System

The water management system in Region 4 and Region 5 is composed of two separate elements. Drinking and irrigation water is collected and stored within the conservancy behind the EDWC dam. In the coastal lowlands, between the dam and the sea defenses, an intricate network of canals manages water for drainage and irrigation.

East Demerara Water Conservancy

One of the major water conservancy systems in Guyana is the EDWC. The EDWC is a freshwater impoundment located in Region 4, 15 miles south of the most densely populated section of the Guyana coast. It is bounded to the north by a 40 mile earthen dam structure built some 150 years ago and to the south by the natural topographic rise composed largely of ancient coastal dune formations. The area consists of an impoundment of approximately 550 hectares and ranges in depth from 12 to approximately 15 feet along the dam.

The EDWC Dam is variously constructed of clay, earth and organic material (pegasse), depending on the section involved. A series of drainage relief structures were constructed to protect the EDWC dam from overtopping and collapse during rainy seasons. Relief canals were constructed from the EDWC west towards the Demerara River and north towards the Atlantic Ocean. A network of creeks was also created within the Conservancy to conduct water from east to west, in order to increase discharge flows to the Demerara River. Canals connecting east to the Mahaica River were constructed to conduct water from the

river into the conservancy during periods of extreme low water. However, when these canals are used for emergency drainage relief, the inhabited downstream lands invariably flood – this is a direct consequence of the sea level rise that has occurred over the past 50 years.

Conservancy relief canals are currently operating with limitations as changes in land-use and local increases in sea level have greatly limited their effectiveness. The degradation of the EDWC system has been compounded by a number of recent severe weather events, such as the floods of 2004-2005. Overtopping of the dam during these rains, in addition to significant dam creeping, has weakened the integrity of an already vulnerable system. Dam creep is particularly evident along the north-eastern portion, where pegasse was the principal material of construction.

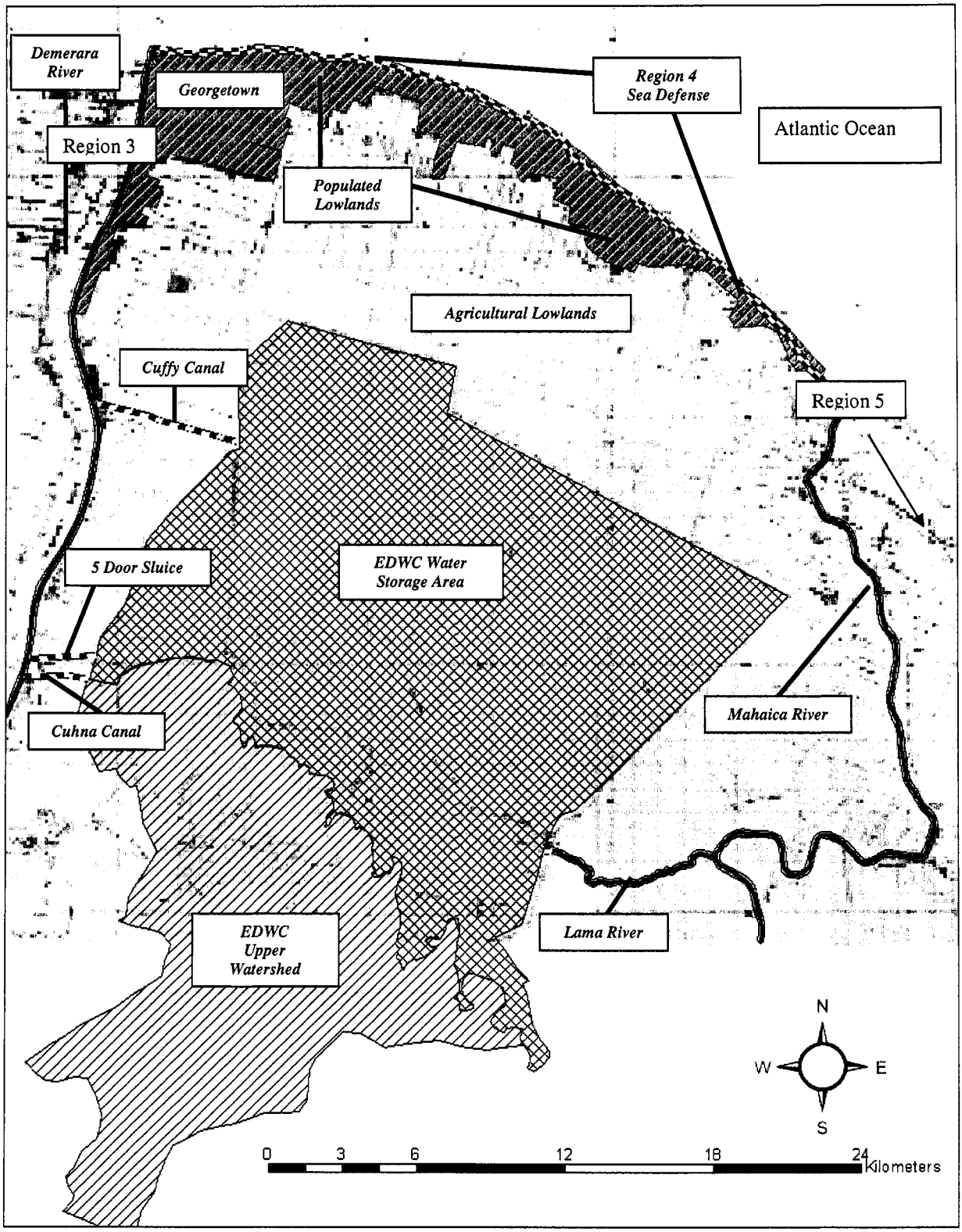
Populated Coastal Lowlands of Region 4

Apart from the issue of the EDWC, the inhabited coastal lowlands present an additional set of challenges. Flooding is becoming more frequent. The majority of Guyana's population lives along this reclaimed coastal plain which is also the area where most agricultural activities are located. Unmanaged regional development has exacerbated the flood control problem as development has altered or interdicted water control systems without a sound understanding of the systemic impacts of these changes. In many cases, activities such as backfilling canals and cuts in the levies have changed the functional dynamics of the system.

To accommodate regional land use changes, numerous drainage structures have been constructed, modified or abandoned, over the years, despite the fact that no comprehensive plan was ever developed to coordinate these interventions. While these changes addressed short-term drainage and land use needs, they have further contributed to the degradation of the regional flood control system, particularly in light of changes to regional sea level. As of today, there exists no comprehensive analysis of the region's flood management system and, more fundamentally, the country lacks a functional topographic baseline for drainage analysis.

Sea level rise has shortened the discharge window from the coastal lowlands. As a result, the previous ad-hoc system of flood control is no longer effective. There are severe limitations in the ability to prevent flooding and manage flood waters and the impact of land-use changes has clearly damaged the flood control drainage infrastructure. At present, flood control is managed on an emergency basis and control efforts focused on responding to immediate needs rather than the development of long-term control strategies.

Map 1 – EDWC and Region 4



Government Constraints

The floods of 2005 and 2006 highlighted the significance of the risks posed by the weakened containment and drainage capacities of the EDWC system. After the January 2005 floods, the authorities demonstrated only modest commitment to recommendations made in early 2005 to open five blocked relief canals and implement a long-term upgrading strategy. Within a constrained public finance framework, action was not taken because it was argued, and widely believed, that the January 2005 floods were a once in a thousand year event. Calculations leading to that conclusion have since been called into question. As flooding occurred again the following year, the GoG and the international community recognized flood management to be crucial to Guyana's economic, social and political well-being.

Global Environmental Facility Eligibility

Guyana ratified the UN Framework Convention on Climate Change on August 29, 1994 and entered the agreement on November 27, 1994. Guyana is in conformity with the GEF's eligibility criteria as determined by the Conference of the Parties to the UN Framework Convention on Climate Change. Article 4.1 (e) of the Convention recognizes the importance of adaptation in the context of disasters, stating, "All Parties shall 'Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods.'" The project aims to increase the GoG's understanding of the dynamics of the EDWC system in an effort to reduce the vulnerability of catastrophic flooding in the country's low-lying costal areas.

To meet funding eligibility requirements for the Special Climate Change Fund (SCCF), in accordance to the ninth session of the Conference of Parties, the project should: a) address the adverse impacts of climate change; b) serve as a catalyst to leverage additional resources from bilateral and other multilateral sources; c) be country-driven, cost-effective and integrated into national sustainable development and poverty-reduction strategies; and d) include technology transfer and its associated capacity building activities.

The project responds to the four criteria established by the SCCF and increases Guyana's ability to adapt to the regional impacts from climatic changes as follows:

a) by implementing adaptation measures, including upgrading the capacity to manage water levels in the EDWC system, the project will reduce Guyana's coastal vulnerability to sea level rise;
b) GEF financing under the SCCF window will play a catalytic role in attracting and underpinning additional investments to climate proof Guyana's Conservancy. The project has been designed in close collaboration with the donor community which is awaiting preliminary results to guide future interventions that will benefit directly from this GEF project.
c) the project has been developed at the request, and in close coordination with the Guyanese authorities. It builds on the Government's Initial National Communications (2002), the Guyana National Vulnerability Assessment (2002), and the Integrated Coastal Zone Management (ICZM) Action Plan (2000);
d) the project will increase the GoG's understanding of EDWC system and coastal lowland regimes. Hydraulic engineers will be trained in the use of flow model technology to

better plan follow-on interventions. The model applied here can be easily replicated in all the coastal countries of the region.

b. Rationale for Bank involvement

The World Bank has been assisting the GoG in the identification of a project to reduce the vulnerability of the country since the dramatic floods of January 2005. Over the past 24 months the World Bank has been working in close collaboration with the National Drainage and Irrigation Authority (NDIA) to identify sources of repetitive flooding affecting the country in recent years. This work has been done with the involvement of the Sea and River Defense Division, Ministry of Works and the Lands and Surveys Commission and included consultation with the Office of the President, the Guyana Environmental Protection Agency; the Ministry of Finance; Conservation International, the Citizens Defense Initiative, and the Civil Defense Council.

During each visit, the World Bank presented the result of its findings and sought feedback from the donor community in Guyana, including the Inter-American Development Bank (IDB), European Union (EU), United Nations Development Program (UNDP), United Kingdom's Department for International Development (DfID), Canadian International Development Agency (CIDA), and the United States Agency for International Development (USAID). A thematic group on flood control was proposed in June 2006 and should mobilize shortly. In June 2006, the donor community agreed to work jointly with the GoG to develop a comprehensive strategy to assist the government in increasing the drainage capacity of the country's water control systems, particularly the EDWC. The proposed GEF SCCF Conservancy Adaptation Project (CAP) will support this approach by providing donors with pre-identified works to increase drainage capacity of the EDWC and a tool to identify future interventions.

The CAP was not included in the last Guyana Country Assistance Strategy (CAS), which was issued on May 17, 2002. However, the dramatic floods of 2005 and 2006 have shown the need for serious intervention. Strengthening the EDWC system is now a top priority of the GoG, which has requested World Bank assistance in accessing GEF resources and in supporting its effort to work with the donor community in the development of a comprehensive strategy to adapt the EDWC to the impact of sea level rise.

c. Higher level objectives to which the project contributes

Somewhat different in scope and theme compared to previous GEF projects, the CAP represents important opportunities for learning and future application. The majority of climate change related GEF projects have focused on green house gas emissions abatement and the study of the potential impacts from climate change. These projects often do not involve large infrastructure components aimed at strengthening physical assets to help reduce a country's vulnerability to climate change events. Yet infrastructure is a critical sector to consider when implementing adaptation measures to better cope with the effects of climate change. Structures that were not built to withstand the affects of climate change will suffer damages, and costly losses will follow. Shifting the focus of the GEF Adaptation Program to the development and implementation of adaptive measures to strengthen infrastructure will increase the Program's robustness and effectiveness.

Like other low-lying coastal countries, Guyana is highly vulnerable to sea level rise and changes in rainfall patterns. Heightened sea levels and more intense rain events increase the vulnerability

of low-lying coastal countries to severe flooding. Drainage and irrigation systems that were constructed over a hundred years ago were not designed to cope with these evolving threats. The project would serve as a template that could be applied to countries with similar geographical attributes and aims to raise awareness to promote the worldwide application of physical infrastructure upgrades to reduce vulnerabilities brought on by climate change.

In addition to flood control, the EDWC also serves as a source of irrigation storage and provides drinking water supply for a substantial portion of the Guyanese population. An improved understanding of the drainage regimes within the EDWC should lead to the development of more effective water use policies, both for irrigation and drinking. Land use planning and urban development outside the EDWC, which have been adversely affected due to the changing flood control environment, will also benefit as integrated development strategies and flood management planning will combine to offer improvements to long-term development planning.

II. PROJECT DESCRIPTION

a. Financing Instrument

The Climate Convention guidance to the GEF on adaptation has evolved through a series of staged approaches. Originally, the GEF supported initial studies, vulnerability and adaptation assessments, and capacity building. More recently, the United Nations Framework Convention on Climate Change asked the GEF to support pilot and demonstration projects in the field of adaptation. Under its strategic priority "Piloting an Operational Approach to Adaptation", the GEF supports projects that provide real benefits and may be integrated into national policies and sustainable development planning. In addition, the GEF supports adaptation activities through the Least Developed Country Fund and the SCCF.

The CAP is to be supported under the SCCF, with emphasis being placed on the reduction of the countries vulnerability to catastrophic floods through the development of the technical basis for future physical interventions and the implementation of urgent adaptation measures. The integration of technology and analytical methods for the design of future interventions under this project are replicable. The CAP can serve as a demonstration for the development of adaptation interventions that can be implemented in similar contexts (e.g. delta regions, coastal zones, river systems) throughout the world. The execution of the project will be coordinated with activities being developed within CARICOM's Community Climate Change Center (CCCC), currently implemented through the World Bank/GEF.

b. Project development objective and key indicators

The objective of the CAP is to reduce the vulnerability of catastrophic flooding in Guyana's low-lying coastal area that is currently threatened by sea level rise resulting from global climate change.

This objective will be achieved through a) strengthening the GoG's and donor understanding of the EDWC system and coastal plain drainage regimes while identifying key drainage regimes for follow-on intervention; b) implementing infrastructure investments aimed at increasing the drainage capacity of the EDWC; c) strengthening institutional capacity of the GoG to manage

water levels in the EDWC and to guide interventions aimed at reducing Guyana's vulnerability to floods.

At project completion, the following will have been achieved: a) development of a hydraulic engineering foundation critical for flood control management; b) identification of at least 10 key drainage regimes for follow-on intervention; c) increase in the drainage relief capacity of the EDWC to the Demerara River by 35 percent.

c. Project Components

The project will finance the development of the technical foundation for a master plan of future interventions within the EDWC and lowland drainage systems, as well as specific upgrading works and operational improvements aimed at enhancing the flood control capacity of the EDWC. The tools developed under the analytical component of the CAP will be used by the GoG and donor agencies to guide future investments.

- *Component 1 – Pre-investment studies for engineering design of works (US$2.0 mil from GEF):* The objective of this component is to provide the hydrologic baseline necessary for contemplating rational interventions aimed at increasing the current discharge capacity of the flood control system. This objective will be achieved through:

    - *Detailed topographic and land use mapping*
    - *Hydrologic modeling of coastal lowlands*
    - *Assessment of* EDWC *system integrity*
    - *EDWC hydraulic modeling*
    - *Pre-feasibility studies for coastal lowland interventions*
    - *Operational capacity building*

    The key outcome of these pre-investment studies will be a high resolution topographic model of the inhabited coastal plain to be used as the basis for hydrologic analysis of the region under current and projected climate scenarios. The results from this component will pinpoint key areas where interventions will improve the system discharge capacity critical for flood zone management. Pre-engineering designs will be completed for a set of prioritized interventions. Specialized staff within the following agencies will be trained in the application of the analytical tools produced: NDIA, the Lands and Surveys Commission, the Ministry of Works' River and Sea Defense Division, the Guyana Environmental Protection Agency and the Civil Defense Commission.

- *Component 2 – Investments in specific adaptation measures (US$ 2.9 mil - US$1.7 mil from GEF and $1.2 million Government of Guyana):* The objective of this component is to counteract the effects of sea level rise, which has decreased the GoG's ability to manage water levels of the EDWC system. The investments will improve the ability of the Government to manage water levels behind the EDWC dam during heavy rains by improving internal water flows in the EDWC and increasing EDWC drainage relief capacity to the Demerara River and eventually the Atlantic Ocean. Based on analytical outputs, additional upgrading of water control structures will also be undertaken. This objective will be achieved through:

    - *Widening of key drainage relief canals*
    - *Improvement of water flow system within EDWC*

- *Upgrading of water control structures*
- *Selected equipment purchase and installation*

By the end of project, activities under this component should result in an increased drainage capacity of the EDWC to the Demerara River by roughly 35 percent (the exact figure will be finalized during the first year of implementation). The GoG, through the NDIA, will direct additional investments in the strengthening of drainage and irrigation infrastructure based on the engineering foundation to be developed under Component 1.

- *Component 3 – Institutional Strengthening and Project Management (US$0.1 mil from GEF):* The objective of this component is to strengthen the institutional framework for flood control within the context of the national emergency management sector headed by the Civil Defense Commission. The project will also support an institutional consolidation of flood control in Guyana to help create consensus around a medium and long term intervention strategy to help the country adapt to sea level rise. This work will center around specific products, including:

  - *Contingency plan for flood events*
  - *Consolidation of flood control actors*
  - *Monitoring and evaluation of project progress*
  - *Project management*

Through this component, the Government will be better positioned to respond to flood emergencies. Moreover, through the Implementation Secretariat, flood control work will begin to be consolidated in the country, which is expected to lead to greater information sharing and institutional memory throughout the government.

For a breakdown of project costs by component and subcomponent, please see Annex 5.

d. Lessons learned and reflected in project design

- Under previous projects, important documentation was lost to accidents and fires. For example, after the 2001 national election, the NDIA headquarters was destroyed by fire. To prevent similar information losses, all analytical work developed under the project will be distributed to three GoG agencies: the NDIA, the Lands and Surveys Commission and the Sea and River Defense Division of the Ministry of Works. These agencies will be trained in data management and analysis.

- Project implementation in Guyana often suffers significant procurement delays due to several factors, including: i) re-bidding because of poor response; ii) bid costs that are much higher than original estimates; iii) inconsistency between some bid-evaluation reports and recommendations; iv) the small pool of able contractors; v) system deficiencies (little or no penalties for late mobilization, poor quality of work, etc.); and vi) slow decision making at all levels of government. Due to the urgent need of implementing project activities, the number of tenders under the project will be limited to two, which should limit overall procurement delays and attract wider competition.

- Recent projects in Guyana have highlighted several institutional and other basic deficiencies affecting the absorptive and implementation capacity of the country. In limiting the number of contracts in the project, implementation should be streamlined and in the hands of international experts. The World Bank will provide significant support to assist in the

drafting of Tender Documents and an expert in flood management will be retained by the Bank for quality control.

- Earlier attempts have been made to strengthen the capacity of the Hydromet Office, notably under the 1998 El Nino Emergency Assistance Project. Under this Bank financed project, 9 weather stations were installed and located throughout the country. Similar efforts have also been made by other donor agencies. However, high turnover, lack of knowledge and the poor physical condition of Hydromet's facilities have reduced its effectiveness substantially. The CAP does not contemplate providing any assistance to the Hyrdomet Office because the sustainability of such an intervention is judged to be highly unlikely.

e. Alternatives considered and reasons for rejection

The limited International Development Association (IDA) 14 allocation for Guyana of US$20 million has already been committed to other projects and therefore the Bank does not have the resources to finance a project to strengthen the EDWC system. One alternative source of finance does exist in the form of a US$1 million Japanese Thematic Climate Change Policy and Human Resource Development (PHRD) Grant which are limited to US$1 million. Because of the scope of the works in Guyana, US$1 million would not be sufficient to make a fundamental impact in reducing the risks of climate change related to flooding. Thus the GEF SCCF was considered the best alternative to address the urgent needs of Guyana.

III. IMPLEMENTATION

a. Partnership arrangements

The US$3.8 million in GEF SCCF funds will be used to provide the framework necessary to guide interventions aimed at upgrading the EDWC and inhabited coastal lowlands systems. Doing so will strengthen the process of reducing the negative impacts of climate change that have manifested themselves in the form of extensive flooding over the past two years. The World Bank has been working very closely with the donor community in Guyana in an effort to promote greater participation in climate change adaptation activities. These agencies include IDB, UNDP, DfID, CIDA, USAID and the EU.

Strong linkages have been made between the Bank and the donor community in order to develop a comprehensive flood management strategy in coastal Guyana. Tools developed under the project will be applied by the GoG and the donor community as they work towards implementing sound infrastructure improvements to reduce flood risks that have materialized as a result of climatic changes. It is expected that as the process moves forward, additional funds will be made available for key drainage infrastructure investments that increase the ability to manage water levels during times of increasingly intense rainfall.

b. Institutional and implementation arrangements

The implementation arrangements for the project are aimed to maximize cost effectiveness, promote timely execution and ownership, and ensure transparency amongst stakeholders. This implementation structure will be made of two main components, an Implementation Secretariat (IS) responsible for project oversight and coordination and a Project Execution Unit (PEU) responsible for all administrative and fiduciary aspects. Ultimate authority of project

management lies within the Ministry of Agriculture. The PEU will be responsible for managing the day to day project implementation and for fulfilling procurement and financial reporting tasks.

Implementation Secretariat

The IS will be formed between several government institutions and will comprise a core IS and advisors to the IS. Through the signing of a Memorandum of Understanding, the National Drainage and Irrigation Authority, Civil Defense Commission, Sea and River Defenses and Lands and Survey Commission will form the core IS. Advisory members will include the Ministry of Finance, Ministry of Housing and Water, Environmental Protection Agency, Hydromet Office and international donors (who will be observers). The IS will be chaired by the Minister of Agriculture.

The Permanent Secretary of the Ministry of Agriculture will be the Deputy Chairman of the IS. In this capacity the PS will be responsible for leading most IS meetings and for managing its day to day operations. The Minister of Agriculture will attend IS meetings from time to time, provide strategic leadership and direction to the IS on all climate change related activities, and, serve as an advisor and guide to the IS. Issues outside the direct purview of the IS will be referred to the Minister of Agriculture. An organizational chart of the IS can be found in Annex 6.

The Permanent Secretary of Agriculture will be responsible for convening the IS and for receiving and reviewing the analytical outputs produced by the engineering firm(s) recruited to conduct the CAP studies. Once the IS provides its technical review and validates the analytical outputs, the PEU will be advised to officially accept the work and issue payment to the contracted firm.

Project Execution Unit

The Project Execution Unit housed within the MoA, will manage the fiduciary and administrative aspects of the project. The PEU is currently being utilized by the IDB for the implementation of the Agricultural Services Project. In January 2007, a World Bank met with key members of the PEU and found them to be of satisfactory quality with regard to the implementation of this project. The PEU will manage the procurement process, including issuance of the tenders, financial reporting for the project, and will make payments to the contractors, based on recommendations from the PS of Agriculture and the IS. To simplify the role and responsibilities of the PEU, project procurement and fiduciary activities have been kept at a minimum and the project will be reduced to a minimum of tenders (around 2-4). Bidding documents will be prepared by the PEU prior to project singing.

The MoA has provided the World Bank with a report outlining the composition and structure of the PEU and the IDB has provided the Bank with its capacity assessment of the unit.

c. Monitoring and evaluation of outcomes/results

Monitoring and evaluation has been mainstreamed into all project components and will be conducted at three levels: i) contract compliance; ii) project implementation; and iii) impact monitoring. The Ministry of Agriculture's PEU shall be the lead contracting agency managing procurement, performance monitoring and acceptance certification. The PEU shall engage the services of an engineering firm with expertise in water projects, mapping and surveying to assist in monitoring work completed by the project engineering firm(s) and report on progress achieved. With regard to physical interventions made to increase drainage capacity of the EDWC, the PEU, through the engineering firm will report these increases based on work completed.

The IS shall serve as an advisory and interagency coordinating body under the direction of the Minister of Agriculture. Representing the various government entities within the GoG that maintain the technical expertise in project related areas, the IS shall serve as a technical advisory and technical resource entity for the project. The IS will work with the PEU in reviewing technical work products and shall assist the PEU by providing technical expertise and inputs for project management as needed. The IS, through the PEU, shall assist in identifying those technical personnel within the GoG who will work with contractors in the development of the project in fulfillment of the technology transfer and institutional strengthening components of the project. Additionally, the IS shall provide the PEU with recommendations concerning the institutionalization of project results and data systems with emphasis on the long-term government strategy for supporting the findings and systems produced under the project.

The Bank will closely coordinate with the PEU and shall retain the services of an internationally known hydraulic engineer to follow project implementation and review quarterly progress reports presented to the PEU and IS by the engineering firm. The PEU, with the assistance of the IS, will produce concise semi-annual Progress Reports that will be sent to the Bank for review. These reports will form the basis for Bank supervision missions to assess progress made in the implementation of project activities. Supervision missions will draw lessons learned to date and provide guidance to the World Bank. In addition, the Bank, together with a hydraulic engineer, will conduct a mid-term evaluation of project implementation no later than 1.5 years after the first project disbursement. The mid-term review will focus on: i) progress in achieving project outcomes; ii) institutional arrangements for project implementation; iii) effectiveness and suitability of the monitoring system; and, iv) review of the project implementation plan, disbursement schedule and operation manual.

A final evaluation will be conducted in the last semester of project execution. The key objectives of this final evaluation will be to assess attainment of the expected project results, and to draw lessons learned from project implementation. A list of expected outcomes and results is given in Annex 3.

d. Sustainability and Replicability

Sustainability

The key indicator for sustainability of project activities is follow-on financing to climate change-proof the EDWC and other conservancy systems. The project is expected to serve as a catalyst for follow-on donor investments.

Donor community participation was initiated during a June 2006 meeting hosted by the UNDP. Representatives from the IDB, DfID, USAID, CIDA, and EU participated in the discussion and expressed support for the joint strategy proposed by the Bank and GoG. Coordination with the Donor community continued throughout project preparation. Members of the Donor community were informed of progress in the development of the project since the June 2006 meetings. Based on the December meetings, it is expected that the IDB, along with the EU and CIDA will participate in follow-on physical interventions to improve flood control. The donor dialogue, which will be spearheaded by the Bank country office in Guyana, will be sustained through regular meetings to discuss progress achieved and challenges remaining in the sector. Donors are also expected to attend the IS meetings as observers.

Crucial to the sustainability of the project is the implementation of a comprehensive capacity building program for Guyanese engineers in the use of the information and systems developed under the analytical portion of the project. The NDIA, Lands and Surveys Commission and River and Sea Defense Unit have received extensive technical support and training under previous EU projects. These agencies support modern Geographic Information System (GIS) capabilities and have been trained in data collection, management and analysis as well as in precision geodetic surveying techniques. These entities have played a critical role in the development of this project and will be deeply involved with its implementation. Additional training will strengthen the ability of these engineers to run 1D-2D Flow Models and utilize 3D high resolution topographic data for analysis of local drainage regimes and land use.

Replicability

The project could serve as a template to be replicated in countries with similar geographical attributes. Until now, many countries with similar coastal water management systems to Guyana have not taken into account the impact of sea level rise on their discharge windows. By initiating a dialogue on the need for developing countries to take the impact of rising sea levels, other countries can proactively strengthen their systems and reduce their increasing vulnerability to catastrophic flooding.

The project would also provide a model for incorporating a suite of technologies that would enable other governments to assess big infrastructure projects to ensure that engineering designs are sufficient to withstand and accommodate the effects of climate change. In terms of a demonstration project, it is anticipated that the technologies and practices used in this project could be replicated in other regions facing similar challenges.

e. Critical risks and possible controversial aspects

Critical Risks	**Proposed Measures**	**Risk Level**
System failure – country floods before the system can be repaired	Reducing the risk of system failure is the primary objective of the project. Not carrying out the CAP and the subsequent follow-on upgrading program would result in an increased likelihood of system failure. The EDWC dam and drainage components are stressed by rising sea levels and must be upgraded quickly to protect the vulnerable population and regional agricultural productivity.	H
Delayed implementation of the follow-on program	Bank is already coordinating closely, by conducting joint missions with the IDB on its US$25 million intervention, which will develop a streamlined and comprehensive program that exploits all possible synergies. A shared PEU that is adequately staffed and will be responsible for all procurement under the program will help in avoiding delays. Other donors will be invited to attend IS meetings and donor briefing sessions.	M
Poor implementation capacity at the local level	The GoG has limited technical capacity and will need extensive support to confront the challenges of upgrading the water conservancy systems. Work under the CAP will be structured into two contracts and their execution will be closely supervised by the World Bank and Guyanese technical staff.	S
Limited capacity in procurement and financial management	The PEU, while adequately staffed, has limited capacity and familiarity with Bank procedures. Project has limited procurement and FM related activities. An Action Plan has been agreed to mitigate	S

	the risks and appropriate training will be provided to the PEU by Bank at various points in the implementation cycle.	
Change in Government priority – Government decides the program is no longer a national priority	A key component of the project is to develop awareness among the Guyanese authorities of the risks they face due to the weakness of the EDWC dam and the system's inability to expel rainwater during the wet season. This would maintain momentum generated at project preparation and mitigate potential changes in government priorities.	L
Sustainability of the physical interventions made under the project	Assurances will be sought during negotiations that GoG will allocate sufficient resources to maintain the improvements being made under the project. The likely follow-up upgrading program would also help monitor the maintenance activities.	M
Resistance from key stakeholders	Various national private stakeholders hold vested interests in the EDWC system and might feel threatened if they interpret its activities as potential constraints on their current operations. This risk will be mitigated through consultations, workshops, seminars, and presentations designed to alleviate any misconceptions, explain facts and discuss the urgency of the problem in such a fashion.	M
	Overall Risk	**S**

H=High; S= Substantial; M=Moderate; and L=Low

f. Grant Conditions

The following will be completed by project effectiveness:

a) The execution and delivery of this Agreement on behalf of the Recipient has been duly authorized or ratified by all necessary governmental and corporate action.
b) The Memorandum of Understanding has been executed by all of the parties thereto.
c) The Operational Manual has been approved by the World Bank and adopted by the Recipient.

IV. APPRAISAL SUMMARY

a. Economic analyses

According to the 2005 Economic Commission for Latin America and the Caribbean (ECLAC), total losses to Guyana resulting from the heavy rains of January 2005 amounted to US$465 million, or 59 percent of the country's Gross Domestic Product (GDP). In Region 4, the most densely populated area in the country, 71 percent of residents were affected, while 20 percent of those in neighboring Region 5 were impacted. In lowland areas, flood waters persisted for over a month and the death toll reached 34, of which 27 were due to water borne diseases. The following year, the January 2006 floods took a heavy toll on the inhabitants of Region 5. While many in Region 4 were spared from floodwaters, local flooding caused by the Mahaica and Mahaicony rivers resulted in losses of a significant portion of the region's agricultural production. Severe damages were also experienced by local households and businesses.

The EDWC dam was structurally weakened by both flood events, but the integrity of the system remained intact. Yet, due to the pressure on the dam over the past two years, the system is weaker now than it was prior to 2005 – leaving the EDWC system more vulnerable to collapse. Should similar rains occur in the future, it is increasingly likely that the dam will collapse and flood Regions 4 and 5. Based on the partial flooding of Region 4 in 2005, it is estimated that the

economic loss resulting from a system breach could range between three and four times Guyana's annual GDP. In addition, replacement costs for the EDWC are estimated between US$200-300 million. While the EDWC is being reconstructed, it would be incapable of holding irrigation water necessary for agricultural production. As a result, agricultural production, which accounts for nearly 40 percent of GDP, could fall by over 20 percent annually until a new dam was constructed. Moreover, unpredictable social costs that may result from a breakdown of the rule of law have the potential to be even more damaging.

The economic benefits of interventions aimed at strengthening the infrastructure within the EDWC system cannot be quantified. Furthermore, the main focus of this project is limited to developing tools to improve the GOG's and donor's understanding of the EDWC system and to identify key interventions that may be made in the future to address the issues in a comprehensive fashion. The project is also making some small infrastructure investments, within the limited resources available, to increase the drainage capacity of the EDWC as much as possible in order to reduce the likelihood of system collapse.

The economic analysis found in Annex 9 is therefore limited to considering the pros and cons of the civil works alternatives that would decrease the likelihood of EDWC collapse by relieving pressure on an 8 mile north-eastern portion of the dam which was particularly weakened during the floods of 2005 and 2006. The alternatives were analyzed based on their cost and other relative advantages and disadvantages. Five alternatives were considered and the alternative selected was the least cost, provided the maximum increase in water discharge capacity, and was also the simplest to implement.

Because it is difficult to ascertain the probability of collapse, the financial benefits of interventions aimed at strengthening the critical infrastructure within the EDWC system cannot be accurately quantified, but nevertheless far outweigh the cost. Works aimed at relieving pressure behind the EDWC dam by increasing drainage relief capacity of the system during times of heavy rains will lessen the likelihood of system collapse and an ensuing catastrophic event that would affect the majority of the inhabited population for several months.

b. Technical

A detailed review was made of the technical studies and vulnerability assessments available for Guyana and the region (Annex 12). This includes the findings of the Guyana's UNFCCC Initial National Communications (2002), the Guyana National Vulnerability Assessment (2002), and the Integrated Coastal Zone Management (ICZM) Action Plan (2000). Subsequent technical studies, pursuant to the implementation of the ICZM plan, were evaluated. From this review, critical data gaps were identified which presented an impediment to the implementation of adaptation measures in Guyana.

Preliminary technical work to develop an upgrading program has been carried out over successive years in the form of disaster assessments and upgrading strategies. More recently, a joint World Bank/IDB technical mission worked with the GoG to develop a comprehensive strategy to improve flood control in Guyana. The analytical work completed during the June 2006 mission forms the basis of the strategy proposed under the project.

c. Fiduciary

Working in coordination with the IDB, the Bank and the GoG have agreed to utilize the already existing Project Execution Unit (PEU) housed within the Ministry of Agriculture (MoA) to carry out the procurement and financial management activities under the project. This unit currently performs this function for IDB projects. The procurement and financial management activities under the project are relatively limited due to the size of the project. An initial assessment of PEU capacity, conducted by the World Bank, has concluded that the key members of the PEU have the capacity to implement the project. The unit currently has 2 accountants and a functioning financial management information system. While the PEU staff are not currently operating under World Bank financial management and procurement procedures, the procedures for managing IDB project implementation are almost exactly the same as World Bank procedures. Therefore, the overall risk for procurement and financial management is considered moderate. The unit will, however, require assistance in implementation and supervision to ensure the successful execution of its duties.

The GoG has undertaken certain procurement reforms at a national level, including the passing of a new procurement law. Additional aspects of procurement reform - which are being supported by the ongoing World Bank Public Sector Technical Assistance Credit - have been agreed to by the GoG and a reassessment of the overall system will be made during project implementation. In light of the initial reforms, the relative inexperience of PEU staff in procurement and financial management, the following action plan is proposed: (i) the PEU to be properly staffed for the express purpose of managing and delivering the capital expenditure plan under the project; (ii) a Project Engineer/Manager will be engaged prior to project start; (iii) preliminary training in procurement and financial management to be provided by IDA during project launch.; and (iv) preparation by the PEU, with Bank assistance, of an Operations Manual with a specific chapter on procurement, detailing all the procedures and channels of responsibilities and flow of documentation, as well as copies of standard bidding documents, evaluation and selection, and sample Form 384s and Withdrawal Application; (v) appointment of auditors prior to negotiations; and (vi) FMRs to be used for disbursement purposes will be reviewed and agreed with GOG prior to start of disbursement.

d. Social

The social impacts related to CAP are focused on improving the government's ability to protect over 75 percent of the population of Guyana and its capital, Georgetown, from flooding associated with drainage system degradation and a failure of the EDWC dam. The current condition of the dam is critical and one section is particularly vulnerable to failure during a foreseeable rain event. The fragility of the system is such that a future failure of the dam could occur with only slightly above average rainfalls because of the damage sustained during the past 2 flood events.

While the project does not provide sufficient funds to attempt all the necessary repairs, the project will produce the technical assessments and designs required to affect such repairs. The project will reduce the lead time required by GoG or international donor agencies in preparing an upgrading works program over the near future.

Apart from the disaster vulnerability reduction focus of the project, long-term land use policy development would be advanced as a result of the program. It is abundantly clear that the future of drainage management in Guyana is a mix of technical and land management issues.

Ultimately, the GoG will have to adopt a system of land use management to ensure that the integrity of the drainage system remains high and construction and land use changes do not adversely affect the future of the system. The presence of the Ministry of Housing and Water in an advisory capacity to the IS will help make certain that land-use planning related issues are taken into account comprehensively in all future activities.

During the execution of the project, technical assistance efforts will include the improvement of land use policies in Guyana and will promote close coordination with other international donors to ensure that this theme is integrated into any future flood control efforts. Moreover, the CAP specifically provides the planning tools necessary to make land use management decisions in a region where drainage systems are so critical to basic survival.

Finally, as needed, the project will incorporate findings developed under the GEF sponsored "Socio-Economic Assessment of the Vulnerability of Guyana's Coast" produced for the Guyana Environmental Protection Agency (GEP) in 2000.

e. Environmental Management

Most of the work to be undertaken involves the development of basic data and mapping systems necessary to assess the integrity and operational characteristics of the EDWC management system and coastal lowland drainage system. The project is considered Category B due principally to the widening of the Cuhna Canal, which will increase the discharge capacity of the EDWC. Additional small works to upgrade flood control structures will be undertaken at the beginning of project implementation; while others will be carried out in the coastal lowlands based on the recommendations identified resulting from the use of the analytical tools developed. Key project activities include:

- LIDAR mapping coupled with color aerial photography of the EDWC and coastal lowlands;
- Flood vulnerability and flow modeling;
- Detailed engineering assessments of the EDWC dam;
- Other studies contributing to the analysis of risks to the population particularly in the East Demerara;
- Minor civil works.

Environmental management during the project life will include three basic activities: First, for the small maintenance related works, the environmental requirements will be applied in the form of contract clauses.

The second element is the infrastructure works under component 2 in the form of the rehabilitation of key drainage relief canals. This task is defined as an activity under the project. During development, the actual site of works will be selected for the re-opening of the Cuhna Canal. The engineering design and tender process will be developed and implemented to produce the works. An environmental assessment of the works under consideration will be produced as part of the engineering process and findings of the Environmental Assessment (EA) will be incorporated into the final designs. Both sites will require the construction of a bridge over the canal works which will require traffic management considerations as the roadway affected is the principal route from the capital to the airport and northern interior of the country.

Finally, as a result of the analysis of regional hydrologic conditions, the project will develop a series of engineering interventions which will be designed to optimize the drainage and flood control system of the coastal lowlands. The project will take these interventions through the pre-feasibility design phase for follow-up by the government or other donors under follow-on projects. During the development of these designs, the project will also produce an EA of the interventions identified.

The environmental impacts resulting from the execution of project activities are limited to those activities contemplated under component 2, *Investments in Specific Adaptation Measures.* The remaining components pertain to scientific and engineering studies or administrative and institutional strengthening activities and will not result in physical impacts to the project area.

Impacts expected from Component 2

Two types of activities are contemplated under the *Investments in Specific Adaptation Measures* component. The first is largely in support of maintenance requirements associated with water control structures in the EDWC. Works of this nature will involve the repair of sluice gate doors, repairs to operating mechanisms, replacement of stairs and platforms associated with control structures and similar activities. Under no circumstances will any intervention be made to the dam and structures will be repaired as is without modification to their discharge characteristics. Impacts are restricted to those resulting from site activities and the disposal of waste materials from rehab operations.

The other category of works contemplated under this component is the increase to the drainage relief capacity of the EDWC system. This involves the rehabilitation of the Cuhna relief canal on the western edge of the EDWC. This canal was used historically as a relief structure. The canal is not associated with the irrigation or potable water supply functions of the EDWC system.

Impacts anticipated from the rehabilitation of this canal are related to the need to construct a bridge in the main road from the capital to the northern interior are of the country and the impacts associated with excavation activities in the project area. The lands are otherwise vacant and no relocation activities will be required as a result of project. The constriction activity will be limited to the existing ditch right-of-way alignment. The ditch is for relief purposes only and will not impact the water use activities of the conservancy.

Additional civil works may be contemplated based on the findings of the engineering studies and availability of funds in the project. These would likely be in the form of contributions to improved water level management in the EDWC through additional drainage upgrading or improved flood management in inhabited areas through localized drainage improvements. These opportunities will be evaluated as they are identified and environmental compliance requirements will be identified as projects are selected.

While not expected to have an adverse impact on conservancy, an additional site-specific analysis will also be completed for the improvement of water flow systems within the EDWC.

Impacts expected from Components 1 and 3

Components 1 and 3 do not produce direct impacts as they do not involve any construction activity. These activities relate to engineering data development studies and institutional strengthening activities. However, work contemplated under component 1 *Pre-feasibility Studies for Engineering Design of Workss,* will result in the preparation of works bidding packages for

future execution through the GoG as funding becomes available. This will, in all likelihood involve the participation of a donor agency.

Therefore, as an activity under this project, appropriate environmental planning and required environmental assessments will be completed for the works under policies established by the Bank for the engineering designs and bidding documentation developed under the key interventions

Environmental Analysis

A key output of the analytical work will be an engineering tool that is to be used to as a foundation for determining the environmental impacts of follow-on interventions. With the development and use of a detailed digital elevation model, local watershed characteristics and drainage regimes will be mapped and modeled, creating the basis for future engineering interventions. A separate report will be developed, based on the analytical work undertaken in the project, which will specifically addresses the likely environmental impacts of future interventions. Expected hydraulic impacts, as well as changes in water quality, natural habitats, land use, livelihoods and analysis of alternative strategies will be considered. Based on this information, an intervention strategy will be developed.

f. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[X]	[ ]
Pest Management (OP 4.09)	[ ]	[X]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[X]
Involuntary Resettlement (OP/BP 4.12)	[ ]	[X]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[ ]	[X]
Forests (OP/BP 4.36)	[X]	[ ]
Safety of dams (OP/BP 4.37)	[X]	[]
Projects in Disputed Areas (OP/BP/GP 7.60)	[ ]	[X]
Projects on International Waterways (OP/BP/GP 7.50)	[ ]	[X]

No relief is sought from Bank safeguard policies and those that will apply to the project which include Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Forests (OP/BP 4.36) and Safety of dams (OP/BP 4.37).

Environmental Assessment (EA) (OP/BP4.01)

An environmental impact assessment has been developed and publicly disclosed through the Infoshop in Washington and within Guyana, on the Environmental Protection Agency's website. This framework includes: a) a description of the project; b) a description of the safeguards triggered and project mechanisms to ensure compliance with each; c) Terms of Reference for analytical work that will result in an engineering tool that is to be used as a foundation for determining the environmental impacts of follow-on interventions; d) procedures and requirements for sub-project specific EAs to be conducted during project implementation; and e) a description of the project's strategy for public consultation, during both project preparation and implementation.

Natural Habitats (OP/BP 4.04)

A portion of the project takes place within the East Demerara Water Conservancy. This is a man made structure that is considered a natural habitat. No adverse impacts to the conservancy are envisioned under the project. At the same time, by improving the drainage capacity of the EDWC and assessing the weak portion of the EDWC Dam, the project aims to ensure that this natural habitat remains intact.

Forests (OP/BP 4.36)

The southern portion of the East Demerara Water Conservancy is bordered by a forest. No physical work is envisioned within 10 miles of this forest and no adverse impacts to the forest are envisioned under the project. Moreover, improvements in water flows within the EDWC are expected to have no impact on the bordering forest.

Safety of Dams (OP/BP 4.37)

The EDWC is bordered to the north by a 30 mile long earthen dam constructed some 150 years ago. The dam has been heavily stressed particularly during the past two flood events (2004-5, 2005-6). While no civil works are to be conducted on the dam, a detailed engineering assessment of the dam and its associated drainage structures is to be completed under the project. This will provide the engineering and safety guidance to the GoG for the design and development of any dam strengthening programs.

The engineering analysis developed under the present project will provide the technical basis for the Government to fulfill the requirements for an expert assessment of the weakened portion of the EDWC Dam provided under this safeguard. Upon receipt of the dam safety assessment, and as part of implementation of the project, the World Bank will contract independent experts to assess and to validate the quality of the report.

g. Policy Exceptions and readiness

No policy exemptions are sought at this time.

ANNEX 1: COUNTRY AND SECTOR BACKGROUND
Guyana: Conservancy Adaptation Project

Country Background

Guyana is situated on the north coast of South America and experiences two rainy seasons annually. Historically, the strongest of these occurs between the months of June and July, with the lesser rainy season occurring between December and January. These rainy seasons permit Guyanese farmers two annual harvests of their key export crops, sugar cane and rice. Harvest and sale of these crops accounts for approximately 27 percent of the nation's GDP.

Of the over 750,000 citizens inhabiting Guyana, over 500,000 live near or below sea-level in a 25 kilometer wide band along the Atlantic coast. To compensate for high levels of rainfall and the low elevation of the populated regions, the colonial powers (Netherlands 1616-1814 and England 1814-1966) developed an intricate drainage system requiring constant monitoring and maintenance. Over the past three decades, the drainage system – composed of a network of dams, canals and sluices – has seen its operational capacities decline.

Description of Region 4 and EDWC System

The principle region of focus for the GEF financed Guyana: Conservancy Adaptation Project (CAP) is Region 4, which is home to the East Demerara Water Conservancy (EDWC). Region 4 is bounded by the Demerara River to the west, the Mahaica River to the east the Atlantic Ocean in the north, and the Guyana highlands to the South. Apart from a small zone along the Demerara River, the major part of Region 4 historically drained to the Mahaica River.

The region's principle physical water management structure, the EDWC dam, was built in the late nineteenth century. The EDWC system has major national significance as it serves as the integral component of a system that provides potable water to the inhabitants of the coastal lowlands, flood protection to a significant proportion of the population, and irrigation water for agricultural production in Region 4.

North of the EDWC are the coastal lowlands of Region 4. They occupy some 470 km^2 (120,000 acres) and contains a population of roughly 500,000 people, or about 75 percent of the country's population. Land use includes agricultural and large urban/suburban areas supporting housing and businesses. Georgetown, the capital of Guyana, is also located in Region 4.

The EDWC covers an area of about 335 km^2 and has a total catchment of 582 km^2. The typical operating level for the EDWC is 17.53m-GD (GD= +17.40 m-msl) and stores upwards of 340 million m^3 of water. The EDWC dam runs for some 64 km and also provides flood protection for the northern coastal lowlands and Georgetown.

The EDWC dam crest has an average elevation of 18.29 mGD (60 ft,) and captures water from the westward flowing creeks, particularly from the west bank tributaries of the Mahaica River. The EDWC drains westerly into the Demerara River, east to the Mahaica River, and the Atlantic Ocean to the north. Water drains through a number of sluices and canals and current state of these drainage structures/systems is as follows:

Demerara River

The EDWC drains into the Demerara River through the Cunha Sluice, the 5 Gate Sluice, the Cuffy Sluice and the Diamond Sluice. The Demerara River has a relatively high flow rate and conveyor capacity and can absorb any level of discharge from the EDWC without any effect on the river level. The sluices that permit the EDWC to drain into the Demerara River are in the best condition of any of the system's sluices and canals. However their discharge flow rates are below their initial capacities due to a general lack of maintenance and repair, resulting in overgrowth of internal waterways and nonuse of all but the 5 Gate Sluice. This lack of maintenance has been further exacerbated by the interdiction of numerous private land owners who have altered the direction and flow of the sluice feed canals for private production reasons. As it now stands, the 5 Gate Sluice – which is working at less than 70 percent capacity - acts as the systems only safe drainage structure.

Mahaica River

The EDWC drains into the Mahaica River through the Maduni Sluice and the Big and Small Lama Sluices. These sluices were designed to bring in additional water during the dry seasons, not to purge excess water during times of heavy rainfall. The Machaica River is much smaller than the Demerara River and flows into Region 5. Limited in depth and width, the Mahaica River is not sufficiently large to act as a discharge valve. Any significant release of water from the eastern side of the EDWC into the river will result in flooding of Region 5 coastal lowlands. The decision to discharge through these sluices would only be made out of fear of potential failure of the EDWC dam. Flooding of Region 5 in January 2006 was exacerbated by the GoG's decision to release EDWC waters through the Maduni Sluice, the Big and Small Lama Sluices.

Atlantic Ocean

As originally designed, the EDWC drained into the Atlantic Ocean via the Nabaclis Canal and the Shanks Canal. The Nabaclis Canal and the Shanks Canal have both been severely cutback by local agricultural interests and as a result have very limited flow rates. Due to the overgrowth in the agricultural lowlands, and bridge interdictions in the populated lowlands, the Nabaclis can no longer be considered a viable outlet. Reconstitution of this structure would essentially be new construction, with the added difficulty of land tenure challenges. With respect to the Shanks Canal, much of the structure remains somewhat intact, although several interdictions exist in the agricultural lowlands. In addition to the land tenure difficulties involved, an Amerindian settlement exists where the canal meets the Atlantic Ocean. Any intervention on behalf of the project would therefore raise major resettlement issues. It has been decided, therefore, that the Shanks Canal will not be part of the Bank's upgrading program.

Overview of Flood Risk

Other than at its low crest level, the EDWC dam is known to be in poor structural condition. This has been confirmed by numerous inspections carried out by the Task Force for Infrastructure Recovery (TFIR) and the United Nations Disaster and Coordination team (UNDAC). The dam currently has little or no freeboard during floods and has insufficient capacity during droughts. The current situation will only be further exacerbated by the influence of climate change on sea-levels, which are projected to increase, thus diminishing the window for expunging/discharging excess water from the EDWC. Further compounding the problem is the projected change in rainfall patterns. With overall rainfall levels expected to decrease, but individual rainfall events

increasing in intensity, it will become more and more difficult to manage water levels when water accumulation is increasing.

The floods of 2005 and 2006 demonstrated that Guyana's coastal drainage and irrigation system is insufficient to discharge excess waters during heavy rainfall. In neither flood was the EDWC dam breached; however serious overtopping did occur. Comparison of flood level with a crest survey undertaken by the Land and Surveys Commission suggest that 10 percent of the length of the dam was overtopped in 2005. It is a matter of good fortune that such overtopping did not result in a major breach. Critical works can provide a temporary respite from the risk of a catastrophic failure of the EDWC system. However serious deficiencies will remain in the system to the disaster preparation and management capacities of the state institutions responsible for the monitoring, operation and maintenance of the system.

ANNEX 2: MAJOR RELATED PROJECTS FINANCED BY THE BANK and/or OTHER AGENCIES

Guyana: Conservancy Adaptation Project

Project	Latest Supervision (ISR) Ratings (bank financed projects only)	
	(IP[1])	(DO[2])
Guyana - El Nino Emergency Assistance Project (P057271), approval date: 10/22/1998 , closing date: 03/29/2002	S	S
Guyana – Water Sector Consolidation Project (P088030), approval date 07/28/2005, closing date 03/31/2010	MU	S

Other Development Agencies
Guyana - Coastal Zone Flood Management Project (IDB)
Guyana – Agriculture Services Support Project (IDB)
Guyana – Sea Defense Project (EU)

[1] IP Implementation Progress
[2] DO Development Objective

ANNEX 3: RESULTS FRAMEWORK AND MONITORING

Guyana: Conservancy Adaptation Project

Project Development Objectives	Outcome Indicators	Use of Outcome Information
a) Reduce the vulnerability of catastrophic flooding in Guyana's low-lying coastal area that is currently threatened by sea level rise resulting from global climate change.	a) Hydraulic engineering foundation critical for flood control management developed by end of project (EOP) b) Identification of at least 10 key drainage regimes for follow-on intervention c) Increase in the drainage relief capacity of the East Demerara Water Conservancy (EDWC) to the Demerara River by 35% by EOP	• To inform the mid-term review of success achieved in the physical reduction of vulnerability to flooding • To be used by trained engineers in Guyana to more effectively manage water flows • To guide future GoG, Inter-American Development Bank (IDB) and other donor' intervention that should lead to a system that can discharge excess rainwater more effectively
Intermediate Results	**Results Indicators for Each Component**	**Use of Results Monitoring**
Component one: Pre-investment studies for engineering design of works		
i) Detailed topographic and land-use mapping	• Light detection and ranging (LIDAR) data capture of Coastal Lowlands for Region 3, 4 and 5 completed, for input into 3D Digital Elevation Model (DEM) • DEM model developed	To track quarterly progress of the analytical work undertaken, completed to assess the level of achievement in the development of decision making tools
ii) Hydrologic modeling of coastal lowlands	• 1D-2D model developed to identify key drainage regimes	
iii) EDWC hydraulic modeling	• 1D-2D model developed to identify/ map key interventions to be made within conservancy to improve water flow to the Demerara River	
iv) Assessment of EDWC system integrity	• Measurements taken and dam safety analysis completed to highlight areas in critical need of repair • Leveling and Bathymetry completed	
vi) Operational capacity building	• # of key staff trained in use of DEM • # of key staff trained in use of Flow Models • # of staff trained in use of monitoring equipment	

Component two: Investments in specific adaptation measures		
i) Increased discharge capacity of key relief canal from EDWC to Demerara River	• Percentage of key canal widened, in compliance with national and project level environmental and safety requirements • Discharge capacity doubled (to be confirmed in first year)	To track quarterly progress of the physical work undertaken, completed to assess the increase in drainage relief capacity of the EDWC achieved
ii) Improvement of water flow system within EDWC	• % Increase in discharge capacity to the Demerara River • Internal Hydraulic Flow Model completed by project year 1 (PY1) and report presented on results	
iii) Upgrading of EDWC water control structures	• 100% of repairs identified at appraisal executed by EOP	
iv) Selected Equipment Purchase and Installation	• Key monitoring, communications, and other equipment purchased by PY1, installed by PY2, and fully operational by PY3	
v) Major infrastructure civil works and operational improvements	• To be developed by the Implementation Secretariat (IS) and the GoG upon completion of hydraulic engineering foundation	
Component three: Institutional Strengthening and Project Management		
i) Contingency Plan for flood events	• Contingency Plan developed with clear lines of responsibility by end of PY1 and operational by PY2	To track quarterly progress of institutional analysis completed and contingency plan operationalized and of the donor commitment completed to assess the increase in outside participation to the flood control sector
ii) Institutional Analysis of the Drainage Sector	• Institutional analysis concluded and recommendations proposed to GoG	
i) Development of flood control thematic committee	• IS formed and operational by PY1 • At least 10 committee meetings held by EOP with at least 80% attendance • Prioritization strategy to improve water management capacity developed by IS by PY3 and presented to donors by EOP • 3 Annual Reports provided by IS by EOP	
ii) Donor meeting to be held at project completion	• Donor meeting held at EOP with representatives from at least 5 different donors in attendance • Amount of pledges made	

Monitoring and evaluation has been mainstreamed into all project components and will be conducted at three levels: i) contract compliance; ii) impact monitoring; and iii) project implementation. The Project Execution Unit (PEU) and the engineering firm contracted for analytical work will liaise with the IS and will input information as to progress achieved. With regards to physical interventions made to increase drainage capacity, the PEU with the IS, through the engineering firm will report these increases based on work completed.

The Bank will closely coordinate with the PEU and retain the services of an experienced Hydraulic Engineer to follow project implementation and review progress reports provided by the engineering firm. In addition, the Bank will conduct supervision missions to assess progress made in the implementation of project activities. Supervision missions will draw lessons learned to date and provide guidance to the Bank. In addition, the Bank, together with the Hydraulic Engineer, will conduct a midterm evaluation of project execution. The midterm review will be conducted no later than 1.5 years after the first project disbursement. The midterm review will focus on: i) progress in achieving project outcomes; ii) institutional arrangements for project implementation; iii) effectiveness and suitability of the monitoring system; and, iv) review both the project implementation plan and project operational manual.

A final evaluation will be conducted in the last semester of project execution. The key objectives of this evaluation will be to assess attainment of the expected project results and to draw lessons learned from project implementation.

		Arrangements for Results Monitoring					
		Target Values			Data Collection and Reporting		
Outcome Indicators	**Baseline**	**YR1**	**YR2**	**YR3**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Hydraulic engineering foundation, critical for flood control management analyzed and understood by GoG by EOP	TBD (during first year)	25% of foundation developed Digital Elevation Models (DEM)	100% of foundation developed (Flow Models developed for EDWC and coastal lowlands)	80% of hydraulic engineers trained fully understand the engineering foundation	Annual	Engineering Firm Progress Reports and EOP Survey	Project Execution Unit
Identification of at least 10 key drainage regimes for follow-on intervention	0	10% complete DEM constructed	Flow Models Developed	10 key drainage regimes identified and pre-engineering studies completed	Annual	Engineering Firm Progress Reports	Project Execution Unit
Increase in the drainage relief capacity of the EDWC to the Demerara River by 35% by EOP	TBD (during first year)	Increase of 10% of discharge capacity (to be confirmed at appraisal) - cumulative	Increase of 30% of discharge capacity (to be confirmed at appraisal) - cumulative	Increase of 35% of discharge capacity (to be confirmed at appraisal) - cumulative	Annual	Engineering Firm Progress Reports	Project Execution Unit

Component 1: LIDAR data capture of Coastal Lowlands for Region 3, 4 and 5 completed, for input into 3D Digital Elevation Model	0	LIDAR flown over Region 3, 4 and 5	-	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
3D Digital Elevation Model developed	0	-	DEM created for Region 3, 5 and 4	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
1D-2D model developed to identify key interventions to be made within conservancy to improve water flow to the Demerara River	0	30% complete	100% complete	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
Measurements taken and dam safety analysis completed to highlight areas in critical need of repair	0	Dam safety study complete, sections in need of repair included in annual report	-	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
Leveling and Bathymetry of EDWC completed	0	100% Measurements taken	-	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
Number of key staff trained in use of Digital Elevation Models, and Flow Models, Monitoring Equipment	0	10 GoG engineers trained on use of LIDAR and DEMs	10 GoG engineers trained on methodology to develop flow models	10 GoG engineers fully trained on use of Flow Models and monitoring equipment	Annual	Engineering Firm Progress Reports	Project Execution Unit

Component 2: Percentage of key canal widened, in compliance with national and project level environmental and safety requirements	0	25% complete	100% complete				
Percentage of discharge capacity increased of key relief canal from EDWC to Demerara River	TBD (during first year)	0	Discharge capacity doubled (to be confirmed in first year)	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
Percentage of discharge capacity increased from EDWC to the Demerara River	TBD (during first year)	0	Discharge capacity increased by 30% (to be confirmed in first year) – cumulative	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
Internal Hydraulic Flow Model completed by PY1 and report presented on results	0	100% completed and report presented	-	-	Annual	Engineering Firm Progress Reports	Project Execution Unit
100% of repairs identified at appraisal executed by EOP	0	20% completed	75% completed	100% completed	Annual	Engineering Firm Progress Reports	Project Execution Unit
Key monitoring, communications, and other equipment purchased by PY1, installed by PY2, and fully operational by PY3	0	Key equipment purchased	Equipment installed	Equipment fully operational	Annual	Engineering Firm Progress Reports	Project Execution Unit
Major infrastructure civil works and operational improvements	0	TBD	TBD	TBD	Annual	IS and Engineering Firm Reports	Project Execution Unit

Component 3: Contingency Plan developed with clear lines of responsibility by end of PY1 and operational by PY2	0	Contingency Plan developed	Completed and Operational	-	Annual	IS Progress Reports	Project Execution Unit
Institutional analysis concluded and recommendation proposed to GoG	0	0	50% completed	100% completed and proposed	Annual	IS Progress Reports	Project Execution Unit
Implementation Secretariat formed and operational by PY1	Participants TBD at appraisal	Committee formed and operational	-	-	Annual	IS Progress Reports	Project Execution Unit
At least 10 committee meetings held by EOP with at least 80% attendance	0	2	6	10	Annual	IS Progress Reports	Project Execution Unit
Prioritization strategy to improve water management capacity developed by Implementation Secretariat and presented to donors by EOP	0	10% Complete	30% complete	100% complete, and presented to donors	Annual	IS Progress Reports	Project Execution Unit
3 Annual Reports provided by committee by EOP	0	1	2	3	Annual	IS Progress Reports	Project Execution Unit
Donor meeting held at EOP with representatives from at least 5 different donors in attendance	0	0	0	Donor Meeting held	Annual	IS Progress Reports	Project Execution Unit
Number and value of pledges made	0	0	0	TBD	Annual	IS Progress Reports	Project Execution Unit
Donor meeting held at end of project	0	0	0	Meeting held	Annual	IS Progress Reports	Project Execution Unit

ANNEX 4: DETAILED PROJECT DESCRIPTION
Guyana: Conservancy Adaptation Project

Component 1: Pre-Investment Studies for Engineering Design of Works

The objective of this component is to provide the hydrologic baseline necessary for contemplating rational interventions aimed at increasing the current discharge capacity coastal drainage and irrigation system. This objective will be achieved through:

Sub-component 1.1: System Mapping – Use of Topographic and Bathymetric Mapping to Support Modeling

The assessment of dam safety and analysis of drainage improvements will require extensive state-of-art hydrologic and hydraulic modeling of the flood flows. This sub-component details the topographic and bathymetric surveys required to support the modeling. For practical purposes, the geographical coverage is limited to the populated coastal lowlands Regions 3, 4, and 5. The mapping of the EDWC and regions 3, 4 and 5 will be accomplished through the following activities:

1. *Light Detection and Ranging (LIDAR) Topography and Aerial Photography*: Using airborne LIDAR coupled with Color Aerial photography, a high-resolution, high-precision topographic model of Region 4 and inhabited areas of Regions 3 and 5 will be developed. Raw data shall be processed and refined to produce a digital elevation model representing:

    - The bare land form;
    - Foot prints of structures, roads and other man made features and trees;
    - Ditch and bank alignments;
    - Land use.

    These data will be augmented, where necessary, with ground surveys. The model will be developed using the national geodetic grid and first order ground control points. Model outputs will include raw and finished datasets. Finished datasets will be produced in a digital elevation model (DEM) or other suitable non-proprietary digital format (e.g. geotiff) suitable for use in ARCGIS 8.3 (ESRI). Each pixel shall represent a 1 m^2 ground surface. Vertical precision shall be within 15 cm. Land use in the region is largely agricultural, with sugar cane and rice as the predominant crops. Aerial missions will be flown after harvest when dense grass cover is minimized. This also coincides with the dry season when water levels will be at their minimum.

2. *Global Positioning Satellite (GPS) Horizontal Control Benchmarks*: The objective of this activity is to establish satellite derived (WGS84 datum and spheroid) reference control points tied to the Guyana National Geodetic Network. Using the National Geodetic Control Network, permanent horizontal control points shall be referenced using precision GPS survey techniques. Two control points shall be selected in region 4 to include one at the Timehri airport and the other to be determined by the Lands and Surveys Commission. For regions 3 and 5, the contractor shall work with the Lands and Survey Commission to select one stable and permanent benchmark in each region for GPS referencing. The benchmarks selected for referencing shall be established geodetic control points already tied to the Guyana Vertical Datum.

3. *Ground Control Points*: Working with the Lands and Surveys Department of the Ministry of Agriculture (MoA) and the Sea Defense Division of the Ministry of Works, a series of ground control points for the ortho-rectification of photographic imagery and registration of the digital elevation mode will be established. The vertical datum to be used shall be the Guyana Lighthouse datum. Horizontal coordinates shall be expressed in meters UTM zone 21. The spheroid and horizontal datum reference is WGS84 and the EGM96 ellipsoid. Ground control points shall be tied to the Guyana National Geodetic reference network. As a result of previous activities, a series of control points have been installed in region 4 that will be integrated into the ground control network.

4. *Leveling and Bathymetry:* Horizontal and vertical accuracies for leveling and bathymetric surveys shall conform to class 1 level 2 standard and shall be tied to the national geodetic control network unless otherwise specified.

5. *Dam Crest:* A survey will be made to ascertain the level of the crest of the EDWC dam. This survey shall consist of a first-order survey with stations located at 50-meter intervals.

6. *Dam Cross-Sections:* At 500-meter intervals, cross-sections of the dam structure will be created. This cross-section shall be taken to coincide with the elevation station taken at the dam crest and the location shall be horizontally referenced against the Guyana geodetic grid system. This cross section shall be sufficiently long to incorporate the relevant upstream and downstream conditions. In addition to cross sections taken at the standard interval, additional cross sections shall be taken in areas where reinforcements have been made to stabilize the dam structure. The consultant shall document and measure the extent and physical condition of the reinforcements

7. *Conservancy Transects:* A topographic survey to develop a contour representation of the bottom of the storage area of the EDWC will be conducted. Data shall be collected along a sampling grid of 2 km X 2 km. Depth shall be measured from the water surface with an accuracy standard of ± 5 cm. Horizontal precision shall be within 30 meters. Water surface shall be calibrated against the vertical control points established in the navigation channels

8. *Bathymetric Survey of the Channel System:* A bathymetric survey of the channel drainage system associated with the EDWC will be conducted. This survey shall include:

    - Canal and channel cross sections taken at 500 meter intervals. This will also include the canal sections downstream of water control structures;

    - Longitudinal profiles (thalweg) of all channels and canals;

    - Cross sections and longitudinal profiles of the water courses associated with the Mahaica River from the Lama and Maduni sluice gates to the mouth of the Mahaica River.

    Locations along the rivers and canals where local energy losses are significant will be identified and documented.

    - *Vertical Control Stations:* Existing staff gauges are to be re-leveled and new gauges installed and leveled within the EDWC along the northern fringe and

existing creeks, and in the downstream canals. These gauges will be referenced against Guyana Datum to a second-order vertical level of precision.

Sub-component 1.2: Assessment of EDWC System Integrity

The EDWC dam is constructed of earth and organic material (pegasse), depending on the section involved. It has been intervened by numerous small water control structures, many of which have been abandoned over the years. Deterioration of the dam, coupled with severe stress events have served to weaken the structure. During the floods of 2004-05, the dam was briefly overtopped due to excessive rainfall and it is clear from aerial surveys and field inspections that the structure is creeping, particularly along the northeastern portion of the dam. This is the portion where pegasse was the principal material of construction. The objective of this sub-component is to produce a comprehensive engineering analysis and design for the critical upgrading of the dam and its associated water control structures consisting of the following:.

1. A comprehensive evaluation of the geotechnical conditions and structural integrity of the EDWC dam.

2. Locate, map and evaluate all water control structures associated with the dam including structures in and out of service.

3. Develop engineering designs, plans and an implementation program for critical repairs to the dam, according to accepted geotechnical engineering practices. Design parameters shall be consistent with a 10,000 year return period.

4. Develop engineering designs, plans and an implementation program for repairs and modifications of the water control structures (outlets). Design parameters shall be consistent with a 10,000-year return period.

5. Identify and catalogue local/regional sources of suitable construction materials and logistic options.

6. Develop an assessment of the evolution of the storage capacity of the EDWC, considering the rate of sedimentation, particularly due to the accumulation of organic debris. Assessment shall identify relationship between dead and live storage capacity of the system and provide an estimate of the useful life of the system.

7. Assess and identify additional works and equipment necessary for dam operation, maintenance and monitoring to ensure the safety of the system.

8. Develop a comprehensive operation, maintenance and monitoring plan for water management and dam safety.

9. Produce required environmental assessments relating to the dam upgrading project including physical works, material extractions, transportation and other relevant aspects of the project.

10. Produce required environmental assessments relating to the dam upgrading project including physical works, material extractions, transportation and other relevant aspects of the project.

11. Prepare bid specifications, tender packages and notifications required under World Bank and Inter-American Bank procurement regulations

Sub-component 1.3: Flow Modeling of the EDWC System and Coastal Lowlands for Flood Control Management

The detailed hydrodynamic modeling of the EDWC and its environs is necessary to ascertain the effectiveness of the modified drainage conditions to reduce the risk of flooding. Modeling will determine the extent to which the internal drainage and outlet structures are capable of operating to keep the design stages within acceptable bounds, consistent with established flood risk management practices. Detailed modeling will also serve as a powerful tool to establish and/or modify operational strategies and practices, as deemed necessary to guarantee the integrity and safety of the embankment. The modeling of the EDWC System will consist of the following activities:

1. Review of the existing hydro-meteorological monitoring network to determine its suitability for calibration and validation of the hydrologic and hydraulic models;

2. Installation of additional monitoring stations (rainfall and runoff) as deemed necessary to support appropriate modeling;

3. Data collection for at least two wet seasons to obtain a time series of rainfall, flood stages, and discharges of high quality;

4. Development of the rainfall-runoff transform in the EDWC and Mahaica river basin suited to local drainage conditions;

5. Development of a 1D-2D hydraulic model of flow within the EDWC and the Mahaica River downstream of the confluence with the Maduni River. The model should be capable of accounting for wind setup;

6. Calibration/validation of the hydrologic and hydraulic model using the 2005, 2006, and 2007 flood data;

7. Establishment of downstream boundary conditions consistent with the effect of the tides on the outlet works;

8. Production model runs should use 1,000-yr and 10,000 design frequencies. The output from the model should be the static freeboard corresponding to the applicable design storms and boundary conditions;

9. At a minimum, production runs should consist of the following three scenarios: (1) existing conditions, (2) modified internal conveyance conditions, and (3) modified internal conveyance and outlet conditions;

10. Using the model, device and execute a suitable series of production runs to develop recommendations to improve the operational rules and management practices.

The modeling of the coastal lowlands will consist of the following activities:

1. Using the digital elevation model, develop a 1D – 2D hydraulic model for the coastal lowlands of Region 4 in order to conduct a micro-drainage analysis;

2. The ensuing micro-drainage analysis will be used to map actual water flows in the region, drainage sinks, drainage inputs and outputs, effects of damaged or abandoned drainage structures and local impoundments;

3. The micro-drainage analysis and mapping will be used to develop recommendations for a rationalized drainage network to reduce the potential for flooding;

4. This will then be developed into a micro-drainage management plan specifically designed to integrate with the existing irrigation system and optimize the ability to manage floodwaters in rural and urban areas.

Sub-component 1.4: Pre-feasibility Studies – EDWC dam and Coastal Lowlands Drainage and Irrigation Analysis and Works Identification

The pre-feasibility studies will rely on the analyses conducted in subcomponent 1.2 and 1.3. The studies shall be in a digital format suitable for use in ESRI ArcGIS mapping software.

1. *EDWC dam*: A section of the EDWC dam, located between Non-Pareil and Flagstaff, is in critical need of upgrading. This section is constructed of pegasse and is located in a section of the EDWC where the stability of the foundation is suspect. The objective of this activity is to perform the feasibility analysis to study two alternatives: (1) Maintain the existing alignment, and (2) move the alignment further north, to coincide with the Crown dam. Under this activity, a feasibility study to analyze the cost-benefits of the two alternatives will be conducted and a recommendation made as to which of the two options is to be chosen for the medium-term solution. This study will include the required hydraulic and geotechnical investigations, and other related field studies required to supplement data collected via the analyses conducted under subcomponent 2.2 and 2.3

2. *Coastal Lowlands*: Once completed, a series of recommendations for drainage works to reduce potential future flooding, prioritize these works, cost and develop contractor terms of reference for the execution of these works. Works and designs shall be developed to maximize the use of existing structures and systems, gravity-based drainage methods, and to minimize the use of pumps as drainage control where possible.

Component 2: Investments in Specific Adaptation Measures

Near-term works under this program include the expansion of the Cuhna discharge structure on the west side of the EDWC, improvement of flow conveyance to the Demerara outflows, and repairs to several water control structures within and outside of the EDWC. These works are designed to improve the operation of the EDWC system through the augmentation of existing drainage relief capacities to facilitate improved EDWC water level management during critical rainy periods. The intervention works consist of repairs to water control structures and safety appurtenances which require upgrading work to cope with the need for increased discharge capacity.

Improvements to the discharge capacity of the EDWC system are designed to augment existing outflow capacity and seek to decrease the reliance on the Lama and Maduni water control structures for the management of water levels in the EDWC. The additional discharge capacity envisioned for the Cuhna outlet will not eliminate the potential need for Lama and Maduni sluices; however, it is expected to make a significant contribution to the overall discharge

capacity of the system and assist in decreasing the dependence on the two aforementioned structures.

At the conclusion of the coastal lowlands drainage analysis, a series of infrastructure improvements for flood control are anticipated. Based on the costs of these improvements, the project will undertake one or more of these activities based on the availability of funds and priority established together with the GoG.

Sub-component 2.1: Widening of Key Drainage Relief Canals

The Cuhna outlet is located on the western side of the EDWC, north of the 5 Gate Sluice along the eastern bank of the Demerara River. The structure is designed to discharge under the Airport Road, through a culvert, directly to the river. Discharge is affected by the daily high tide and possible encroachment by the existing highway crossing. Works shall include engineering analysis and design to substantially increase the relief capacity at Cuhna outlet, including canal and sluices. The activity will maximize the design capacity of the expanded structure consistent with site conditions and local/regional land use constraints. Designs shall consider the possibility of future expansion of the discharge capacity of the system.

The sub-component will cover the design of the associated roadway improvements in accordance with the requirements of the sluice modifications and road construction practices as specified by the Ministry of Public Works. The following activities will be undertaken:

1. A project-level environmental assessment will be prepared. This assessment will consider the impact of the construction and improvements to the Cuhna outlet and the adjacent bridge and roadway. The assessment will also include considerations for the management of specific impacts associated with the deepening of the canal structure and the increase of water flow anticipated from the amplification of the relief structure. The physical impacts resulting from the modification of the adjacent bridge and roadway shall include a traffic management plan and noise reduction considerations to be implemented during the construction phase. An environmental management plan will also be prepared for site works implemented during the construction phase;

2. Assessment of the relief capacity of the structure under various postulated design conditions, subject to the constraints;

3. Engineering design of the modified Cuhna outlet, including upstream control structure, canal, downstream control structure and associated highway crossing;

4. Detailed construction drawings and specifications

Using the prepared designs and plans, the improvements to the Cuhna canal will be executed. A contractor will develop and prepare an organizational plan and management schedule and will manage the construction site in conformance with national and project level environmental and safety requirements.

Sub-component 2.2: Improvement of Water Flow System with EDWC

Under this sub-component the flow model described in sub-component 2.3 will be used to support the development of short-term improvements to the discharge capacity of the system. This model shall be developed using existing data, supplemented with hydrographic surveys of the associated creeks and drainage canals coupled with consideration of the capacity of outlet structures. The objective is to improve the general flow of water within the EDWC to the appropriate outlet structures.

The computational tool shall consist of a pseudo two-dimensional hydraulic model of the hydraulic infrastructure of the EDWC and shall be used for the design of internal waterways to effectively convey water to the western boundary of the EDWC. The downstream boundary conditions shall be taken at the confluence with the Demerara River and shall consider tidal influences derived from the observations made at Georgetown and Timehri. The analysis shall include:

1. Simulation of the hydraulic flow conditions in the EDWC as they existed during the flood of January - February 2006;

2. Simulation of the hydraulic flow conditions in the EDWC with the internal drainage improvements and the additional relief capacity in place, to assess the effectiveness of the interventions.

The outputs of this analysis shall include:

1. Results of the hydrographic survey of the creeks and canals within the EDWC, the outlet canals and associated hydraulic structures;

2. A report presenting the results of the simulations;

3. A drainage improvement plan delineating the creeks to be cleared and up to three waterways to be created to enhance internal water flows. One of these waterways shall transverse the EDWC from the Lama sluice area to the 5 Gate area. The plan shall include:

    - Recommendations for the management of excavated material within the EDWC boundaries.

    - 1:25,000 map showing creeks and proposed waterway locations to be improved/created;

    - Cross sectional designs for waterway construction;

    - Management plan for the disposal of recovered material.

Sub-component 2.3 Upgrading of Flood Control Structures

Several flood control structures within the EDWC have deteriorated over the years and are in need of upgrading to increase discharge capacity, made necessary as a result of sea level rise. Under this sub-component a survey of the flood control structures will be carried out to identify those repairs needed to place the flood control structures in safe working order. These repairs include gates, appurtenances, and safety structures such as rails, stairs, etc. Repairs shall be limited to the operational and safety components of the structure and shall not extend to the foundation or abutments. The contractor shall prepare a bill of quantities for each structure to be repaired. Once the structures are surveyed and repairs are identified, the contractor shall work together with the EDWC supervisor to prioritize the works and execute repairs. Based on the survey and priority scheme, a final set of works shall be developed for approval and execution. Additional infrastructure upgrades will be implemented based on the results of analytical work completed in Component 1.

Coastal drainage works will be identified and developed during the system analysis conducted under sub-component 1.4. Based on costs identified and priorities established together with the GoG, selected works will be constructed under the program. Works will be identified under the project and required engineering and safeguard studies will be completed under the project as needed.

Sub-component 2.4: Selected Equipment Purchase and Installation

Equipment purchased under this sub-component shall be provided to support the management of the EDWC in fulfilling their responsibilities. The responsibilities include the monitoring of water levels within the EDWC, capturing flood control related data, maintaining and, when required, repairing the system. The vertical control staff gauge stations referred to in subcomponent 2.1 will be equipped with water level recorders capable of storing 30 days worth of data taken at 10 minute intervals. The water control level recorders shall be pressure sensing devices with onboard data storage capable of being downloaded to a laptop computer. Specific equipment requirements (quantity and technical specifications) will be determined during the execution of the project. In general, the equipment will consist of:

- Hydrologic monitoring equipment (recording weather stations, staff gauges, discharge measuring equipment, pressure-type water level recorders and sediment load measuring equipment);
- Airboat - for management supervision and emergency access;
- Two pontoon-mounted 65-foot boom excavators, to clear internal waterways;
- Communications support equipment, safety equipment, diesel generators and portable pumps (to be determined).

Component 3 – Institutional Strengthening and Project Management

The objective of this component is to strengthen the institutional framework for flood control within the context of the national emergency management sector headed by the Civil Defense Commission. The project will also support an institutional consolidation of flood control in

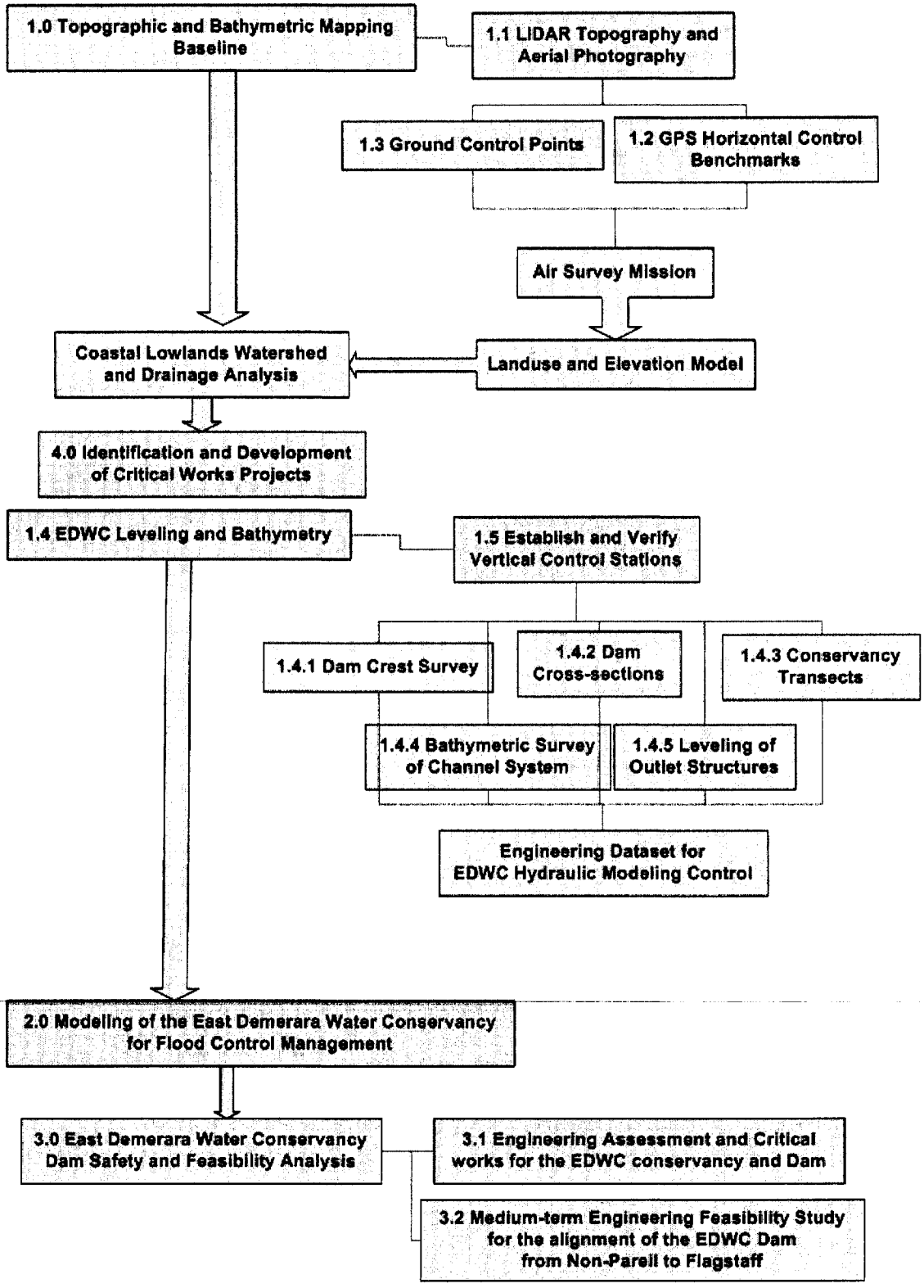
Guyana to help create consensus around a medium and long term intervention strategy to help the country adapt to sea level rise. This work will center around specific products, including:

- *Contingency plan for flood events*
- *Consolidation of flood control actors*
- *Monitoring and evaluation of project progress*
- *Project management*

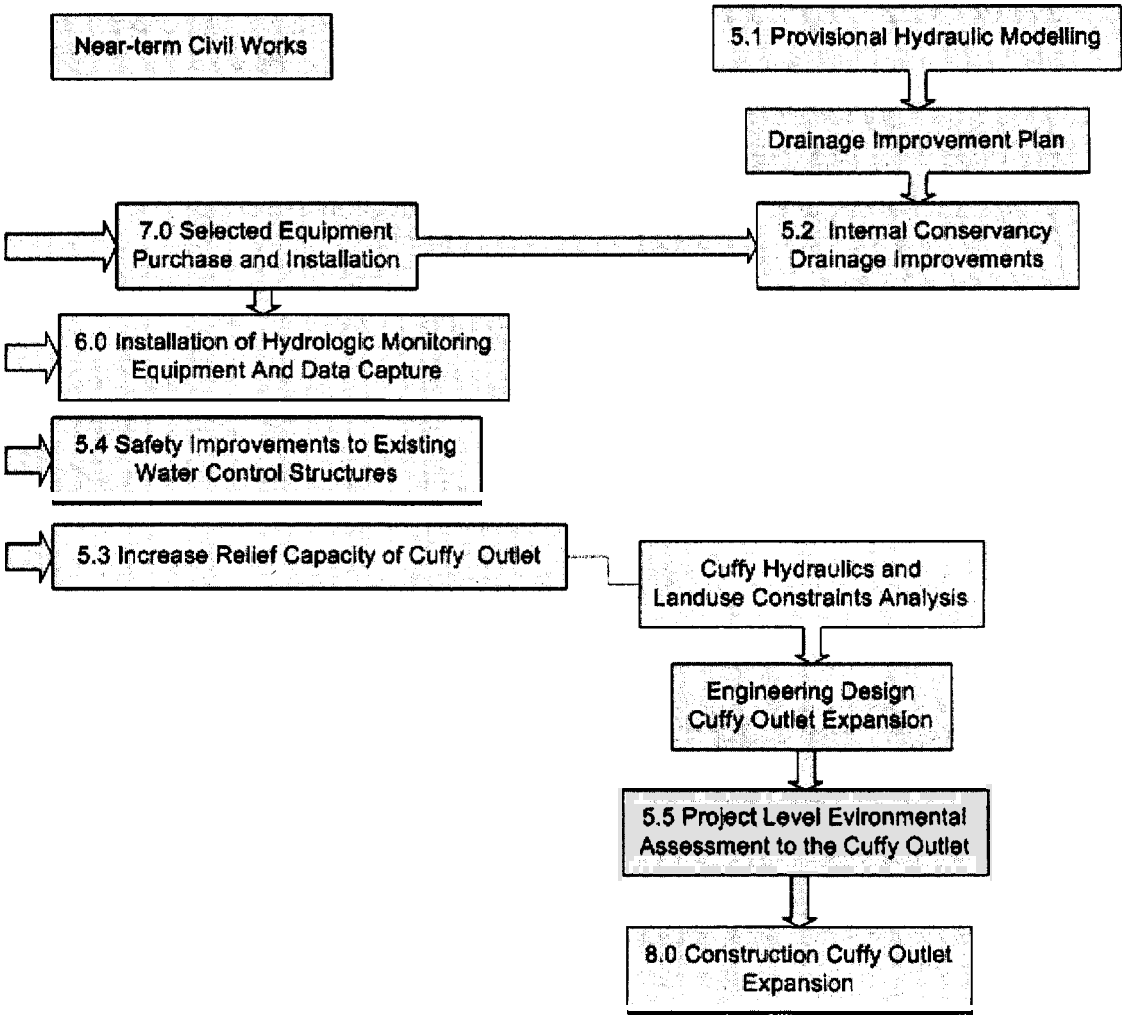
The key outcome of this institutional analysis and project management will be improved GoG effectiveness in rationalizing the emergency response and general maintenance phases of flood control, in addition to medium and long term adaptation plans. A contingency plan will be prepared outlining the steps that would be taken to respond to a catastrophic event which takes place while the improvements are being implemented. The contingency plan will also include a plan for the provision of water supply under both flood and drought emergencies. With clear lines of responsibility in times of urgent need as well as times of calm, the GoG will be better equipped cope with the challenges posed to the country's coastal lowland drainage and irrigation system by the climate change induced sea level rises.

.

Guyana Conservancy Adaptation Project
Mapping and Analysis



Guyana Conservancy Adaptation Project
Near-Term Civil Works Component



ANNEX 5: PROJECT COSTS

Guyana: Conservancy Adaptation Project

The cost of the CAP would be about US$5.0 million, to be spent over a period of 3 years. The project would involve two tenders, to be executed by an international engineering firm with expertise in EDWC drainage systems. The firm will conduct all studies and assessments. They will also design, contract out, and supervise the ensuing infrastructure adaptation works. A breakdown of the investments and activities to be supported under the CAP is summarized in the table below:

Component	GEF Funds ($'000)	Government ($'000)	Total ($'000)
1 - Pre-investment studies for engineering design of works			
1.1 - System Mapping : Use of Topographic and Bathymetric Mapping to Support Modeling	1,300		1,300
1.2 - Assessment of EDWC System Integrity	250		250
1.3 - Flow Modeling of EDWC System and Coastal Lowlands for Flood Control Management	300		300
1.4 - Pre-feasibility Studies - EDWC dam and Coastal Lowlands Drainage Analysis and Works Identification	150		150
TOTAL COMPONENT 1	2,000		2,000
2 - Investments in specific adaptation measures			
2.1 - Widening of Key Drainage Relief Canals		1,200	1,200
2.2 - Improvement of Water Flow System within EDWC	250		250
2.3 - Upgrading of Flood Control Structures	950		950
2.4 - Selected Equipment Purchase and Installation	500		500
TOTAL COMPONENT 2	1,700	1,200	2,900
3 - Institutional strengthening and project management			
3.1 - Development of Contingency Plan	50		50
3.3 Consensus Building and Project Management	50		50
TOTAL COMPONENT 3	100		100
TOTAL	**3,800**	**1,200**	**5,000**

ANNEX 6: IMPLEMENTATION ARRANGEMENTS
Guyana: Conservancy Adaptation Project

The implementation arrangements for the project are aimed to maximize cost effectiveness, promote timely execution and ownership, and ensure transparency amongst stakeholders. This implementation structure will be made of two main components, an Implementation Secretariat (IS) responsible for project oversight and coordination and a Project Execution Unit (PEU) responsible for all administrative and fiduciary aspects. Ultimate authority of project management lies within the Ministry of Agriculture. The PEU will be responsible for managing the day to day project implementation and for fulfilling procurement and financial reporting tasks.

Implementation Secretariat

The IS will be formed between several government institutions and will comprise of a core IS and advisors to the IS. Through the signing of Memoranda of Understanding, the National Drainage and Irrigation Authority, Civil Defense Commission, Sea and River Defenses and Lands and Survey Commission will form the core IS. Peripheral members will include the Ministry of Finance, Ministry of Housing and Water, Environmental Protection Agency, Hydromet Office and international donors (who will be observers) and will be chaired by the Minister of Agriculture.

The Permanent Secretary of the Ministry of Agriculture will be the Deputy Chairman of the IS. In this capacity the PS will be responsible for leading most IS meetings and for its day to day operations. The Minister of Agriculture will attend IS meetings from time to time, provide strategic leadership and direction to the IS on all climate change related activities, and, serve as an advisor and guide to the IS. Issues outside the direct pursue of the IS will also be referred to the Minister of Agriculture.

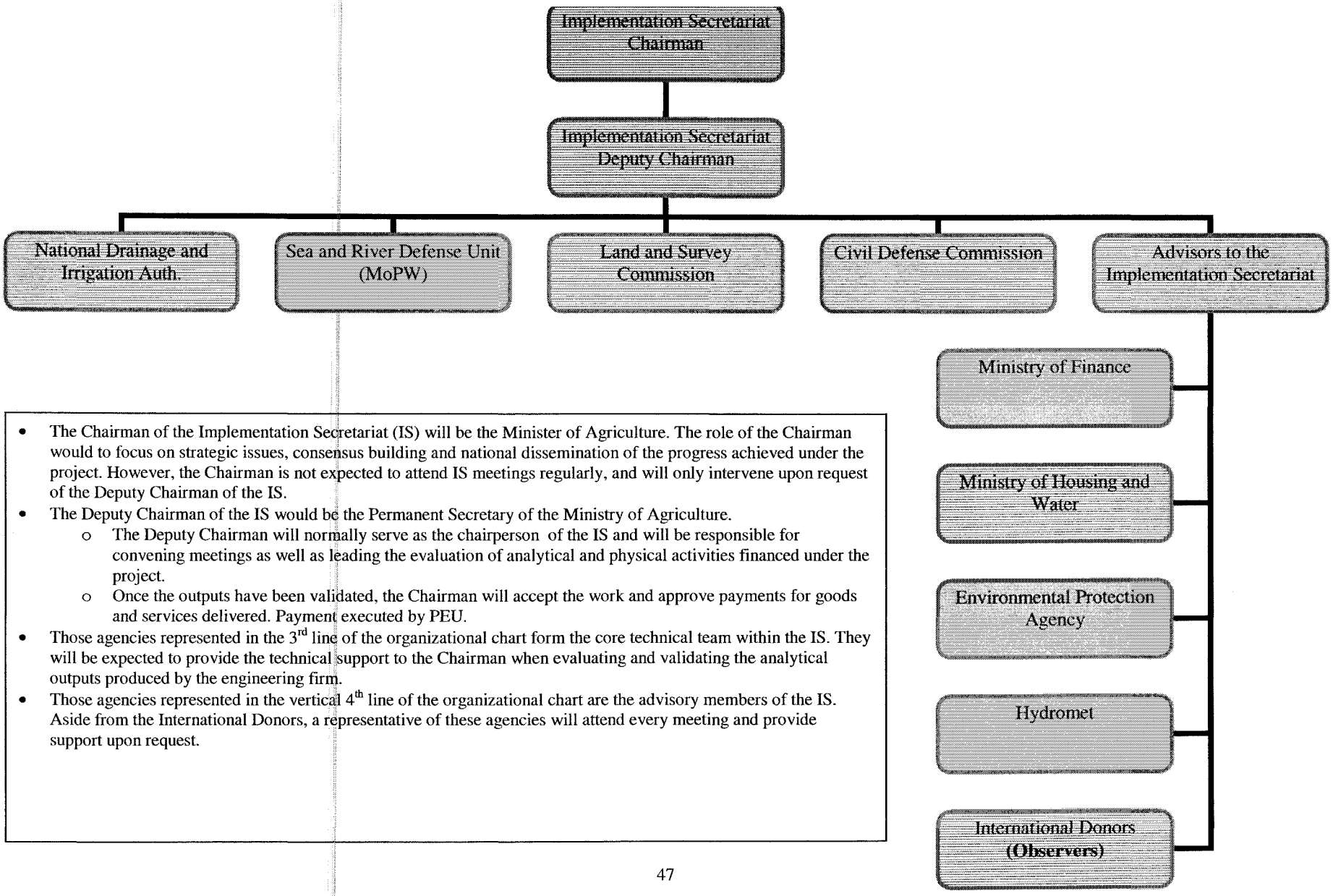
The Permanent Secretary of Agriculture will be responsible for convening the IS and for receiving and reviewing the analytical outputs produced by the engineering firm recruited to conduct the overall studies. Once the IS validates the analytical outputs and officially accepts the work, the PEU will be authorized to pay the contracted firm.

Project Execution Unit

The Project Execution Unit housed within the MoA, will manage the fiduciary and administrative aspects of the project. The PEU is currently being utilized by the IDB for the implementation of the Agricultural Services Project. In January 2007, the World Bank met with key members of the PEU and found them to be of satisfactory quality to implement this project. The PEU will manage the procurement process of the tenders, the financial reporting of the project, and will make payments to the contractors, based on recommendations from the PS of Agriculture and the IS. To simplify the role and responsibilities of the PEU, project procurement and fiduciary activities have been kept at a minimum and the project will comprise of only a few tenders. Bidding documents will be prepared by the PEU prior to project signing.

The MoA has provided the World Bank with a report outlining the composition and structure of the PEU and the IDB has provided the Bank with its capacity assessment of the unit. The Bank used this as its baseline for assessing the capacity of the PEU and concurs with the IDB's assessment that the PEU has sufficient capacity to carry out the project

Organization Chart of the Implementation Secretariat



- The Chairman of the Implementation Secretariat (IS) will be the Minister of Agriculture. The role of the Chairman would to focus on strategic issues, consensus building and national dissemination of the progress achieved under the project. However, the Chairman is not expected to attend IS meetings regularly, and will only intervene upon request of the Deputy Chairman of the IS.
- The Deputy Chairman of the IS would be the Permanent Secretary of the Ministry of Agriculture.
    - The Deputy Chairman will normally serve as the chairperson of the IS and will be responsible for convening meetings as well as leading the evaluation of analytical and physical activities financed under the project.
    - Once the outputs have been validated, the Chairman will accept the work and approve payments for goods and services delivered. Payment executed by PEU.
- Those agencies represented in the 3rd line of the organizational chart form the core technical team within the IS. They will be expected to provide the technical support to the Chairman when evaluating and validating the analytical outputs produced by the engineering firm.
- Those agencies represented in the vertical 4th line of the organizational chart are the advisory members of the IS. Aside from the International Donors, a representative of these agencies will attend every meeting and provide support upon request.

ANNEX 7: FINANCIAL MANAGEMENT AND DISBURSEMENT ARRANGEMENTS
Guyana: Conservancy Adaptation Project

Working in coordination with the Inter-American Development Bank (IDB), the World Bank and the Government of Guyana (GoG) have agreed to utilize the already existing Project Execution Unit (PEU) housed within the Ministry of Agriculture (MoA) for the execution of the CAP. The PEU was established for the IDB financed Agricultural Support Services Project which recently began implementation. The role of the PEU is limited to procurement and financial reporting activities. The financial management risks associated with the use of the Grant proceeds are mitigated by the fact that a relatively high proportion of the grant would be disbursed on the basis of direct payments thereby providing the IDA the opportunity to vet the payment supporting documents. Furthermore, the risks are also mitigated because the PEU is an on-going entity established with the support of the IDB.

Summary Conclusions of Financial Management Assessment: On the basis of the assessment of the capacity of the PEU, performed by a World Bank procurement analyst in January 2007, a desk review conducted by the Financial Management Specialist, the overall conclusions are that the PEU is staffed with a full compliment of personnel and has a functioning financial management information system. A PEU capacity assessment, conducted by the IDB, was also reviewed and found to be adequate. The conclusions of both these assessments is that while PEU is not well versed in World Bank financial management procedures, the guidelines are very similar to IDB requirements. The PEU will require some assistance in implementation and supervision to ensure the successful execution of its duties, although it currently has the financial management capacity to implement the project.

Accounting and Reporting: The PEU will be responsible for producing the Interim Financial Reports (IFR) on a semi-annual basis to be submitted to the IDA. In accordance with IDA (and other donor's) guidelines, the IFRs are expected to provide information for monitoring the financial, implementation and procurement process of the Project. The IFRs will also provide information about the PEU's periodic expenditures by project components and disbursement categories, both by reporting period and cumulatively. They will also include supporting schedules comparing planned versus actual expenditures. These financial reports would also provide the basis for preparing the schedules on the project that would be included in the annual audit report.

Auditing arrangements: Under the CAP, project financial statements would be audited annually. The audit reports would be prepared in accordance with International Standards on Auditing, by independent auditors and in accordance with the Terms of Reference (TOR) acceptable to the Bank. The PEU will need to present TOR and a letter of appointment of the external auditor during negotiations for Bank review and approval. The audit report would include supporting schedules providing sufficient information on the project (i.e. Sources and Uses of Funds, Statement of Expenditures (SOE). The annual audit report will be required to be submitted to the Bank no more than 4 months following the end of the fiscal year.

Disbursement Arrangements: The following disbursement methods will be available under the grant: (a) Direct Payments and (b) reimbursements.
Given the number of contracts involved, it is expected that the prevailing disbursement method will be Direct Payments for those eligible expenditures for contracts for works, goods and consultant services. Operating Expenses will be reimbursed to the recipient upon request to the Bank.

Supporting documentation should be provided with each application for withdrawal as set out below:

For requests for reimbursement: Statement of Expenditure-for all operating expenses; and

For requests for direct payment: records evidencing eligible expenditures, e.g., copies of receipts, suppliers/contractors' invoices.

As all direct payments will be for contracts subject to prior review by the Bank, it is expected that at the time of payment request, the contracts would have been reviewed by the Bank and the No Objection has been issued prior to the request for payment."

Budgeting Process: An annual budget would be prepared by the IS on the basis of a consolidated annual investment plan developed by the IS.

Financial Management Action Plan

Action	Responsible Entity	Completion Date
1. Audit Arrangements		
TOR and Draft Letter of Appointment for the auditors	IS	By negotiations
2. Reporting		
Submit to the Bank a sample format of the IFR to be used for disbursement purposes	IS	By negotiations

Category	**Amount of the Grant Allocated (expressed in USD)**	**Percentage of Expenditures to be Financed (inclusive of Taxes)**
(1) Works	950,000	100%
(2) Goods	1,850,000	100%
(3) Consultants' services	950,000	100%
(4) Operating Expenses	50,000	100%
TOTAL AMOUNT	3,800,000	

Supervision Plan

It is recommended that a financial management supervision mission visit the PEU at least once a year to monitor the performance of its financial management systems

ANNEX 8: PROCUREMENT
Guyana: Conservancy Adaptation Project

a. General

Procurement for the CAP would be carried out in accordance with the World Bank's "*Guidelines: Procurement under IBRD Loans and IDA Credits*" dated May 2004; and "*Guidelines: Selection and Employment of Consultants by World Bank Borrowers*" dated May 2004, and the provisions stipulated in the Legal Agreements. The various items under different expenditure categories are described in general below. For each contract to be financed by the Grant, the GoG and the World Bank has agreed on a Procurement Plan including i) the different procurement methods or consultant selection methods, ii) the need for pre-qualification, iii) estimated costs, iv) prior review requirements, v) and implementation time frame. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Procurement of Works: Works procured under the CAP would include, *inter alia*: civil works required for the widening of key drainage relief canals and flood control structures as well as small coastal lowland works as funds remain available. Procurement will done using the Bank's Standard Bidding Documents (SBD) for international competitive bidding (ICB) processes and national SBD agreed with or satisfactory to the Bank for works procured using national competitive bidding (NCB).

Procurement of Goods: Goods procured under the project would include, *inter alia*: communication equipment, and the purchase and installation of selected engineering equipment. The procurement will be done using the Bank's SBD for ICB and national SBD agreed with or satisfactory to the Bank for NCB and shopping.

Selection of Consultants: Consultants will be contracted to support the institutional strengthening component for engineering design and other pre-investment activities, for construction and implementation supervision, and to prepare specific studies such as the baseline and after project studies. Short lists of consulting firms for services estimated to cost less than US$100,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Operating Costs: Operational costs such as office rental, utilities/communications, salaries of incremental staff will be financed by the Grant in accordance with an annual plan agreed upon between the GoG and the World Bank. All such operating costs will be procured using the GoG's administrative procedures which were reviewed and found acceptable to IDA.

Training: The project will finance training for the National Drainage and Irrigation Authority, Civil Defense Commission, Land and Surveys Commission and Ministry of Public Works' – Sea and River Defense unit in the use of the digital elevation and flow models.

The procurement procedures and SBDs to be used for each procurement method, as well as model contracts for works and goods procured, will be presented in the Project Operational Manual.

Thresholds: Thresholds recommended for the use of the procurement methods specified in the project procurement plan are identified in the attached table, which also establishes the notional

thresholds for prior review. The agreed procurement plan will determine which contracts will be subject to Bank prior review.

b. Assessment of the Ministry of Agriculture's Project Execution Unit's Capacity to implement procurement

Procurement activities will be carried out by the Inter-American Development Bank financed Ministry of Agriculture (MoA) Project Execution Unit (PEU) and coordinated through the Implementation Secretariat (IS) created under the project. With regards to procurement aspects, the PEU has been constituted under the Agriculture Services Support Project and has existing institutional capacity, but needs guidance in Bank procurement procedures.

The Government of Guyana (GoG) has undertaken a reform of procurement aspects at a national level including the passing of a new Procurement law. Further aspects of procurement reform - which are being supported by the ongoing Bank supported Public Sector Technical Assistance Credit - have been agreed upon by the GoG and a reassessment of the overall system will be made during project implementation. In light of these initial reforms undertaken, the creation of the PEU, the experience of their staff in procurement and the corrective measures which have been agreed with MoA and World Bank (see Action Plan below), the overall project risk for procurement is AVERAGE.

Action Plan

In order to reduce the procurement implementation risks, the following action plan is proposed:

- The PEU to be properly staffed for the express purpose of managing and delivering the IS's capital expenditure plan
- Contracting of the Project Engineer/Manager
- Preliminary training in procurement to be provided by IDA during project launch.
- Preparation by the IS of an Operations Manual with a specific chapter on procurement, detailing all the procedures and channels of responsibilities and flow of documentation, as well as copies of standard bidding documents, evaluation and selection, and sample Form 384s and Withdrawal Application.

c. Procurement Plan

A draft procurement plan for project implementation was prepared which provides the basis for the procurement methods and the prior review thresholds. This draft plan has been agreed between the Recipient and the Bank on June 15 and is available at the MoA's offices in Guyana. It will also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Bank annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Table A: Project Costs by Procurement Arrangements (US$ thousands)

Goods and Works	Procurement Method				
Expenditure Category	**ICB**	**NCB**	**Other**	**N.B.F**	**Total Cost**
1. Works		950		1,200	2,150
2. Goods	1,800		50		1,850
3. Operating Expenses		50			50
Total	1,800	1,000	50	1,200	4,050

Table B: Project Costs by Procurement Arrangements (US$ thousands)

Consultant Services	Procurement Method				
Expenditure Category	**QCBS**	**CQ**	**Other**	**N.B.F**	**Total Cost**
A. Firms	900				900
B. Individuals	50				50
Total	950				950

d. Frequency of Procurement Supervision

In addition to the prior review supervision to be carried out by the Bank, it is recommended that two supervision missions take place during the first year of implementation to carry out post review and provide procurement guidance as needed. Subsequent procurement supervision missions will take place once a year, provided capacity has improved. The Bank will retain an engineering expert to assist in the oversight of the engineering work.

e. Details of the Procurement Arrangements Involving International Competition

1. Goods, Works, and Non Consulting Services

(a) List of contract packages to be procured following ICB and direct contracting:

1	2	3	4	5	6	7	8
Ref. No.	**Contract (Subcomponent)**	**Estimated Cost**	**Procurement Method**	**P-Q**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**
Goods	Topographic Mapping (1.1)	$1,300,000	ICB		No	Prior	02/1/2008
	Selected Equipment Purchase (2.4)	$525,000	ICB		No	Prior	02/5/2008

(b) All ICB and all direct contracting will be subject to prior review by the Bank. The Procurement Plan specifies other procurement methods and prior review thresholds.

2. Consulting Services

(a) List of consulting assignments with short-list of international firms.

1	2	3	4	5	6
Ref. No.	**Description of Assignment**	**Estimated Cost**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission Date**
	Modeling of EDWC for Flood Control Management; EDWC Dam Safety; Coastal Lowlands Drainage Analysis; Installation of Hydrologic Monitoring Equipment and Data Capture (1.2; 1.3; 1.4; 2.2)	$900,000	QCBS	Prior	2/15/2008

(b) Consultancy services estimated to cost above US$100,000 equivalent per contract (firms) and all single source selection of consultants (firms and individuals) regardless of contract amount as well as individual consultant contracts estimated to cost above US$50,000 will be subject to prior review by the Bank. The Procurement Plan specifies procurement methods and prior review thresholds, as outlined in the table below.

(c) Short lists composed entirely of national consultants: Short lists of consultants for services estimated to cost less than US$100,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Thresholds for Procurement Methods and Prior Review (in US$ thousands)

Expenditure Category	Contract Value ($'000) (Threshold)	Procurement Method[3]	Contracts Subject to Prior Review
Works	>1,000	ICB	All
	100-1,000	NCB	>$500 All <$500 None
	<100	3 Quotations (Shopping)	None
	Regardless of value	Direct Contracting	All
Goods	>100	ICB	All
	25-100	NCB	First
	<25	Shopping	None
	Regardless of value	Direct Contracting	All
Consulting Service.- Firms	>100	QCBS,QBS,FBS,LCS, CQS	All
	<100	QCBS,QBS,FBS,LCS, CQS	TOR only (by TTL)
	Regardless of value	Single Source	All
Consulting Service. Indiv.	>50	Comparison of 3 CVs in accordance with Chapter V of Guidelines	All (by TTL)
	<50	"	TOR only (by TTL)
	Regardless of value	Single Source	All (by TTL)

[3] Note: QCBS = Quality and Cost-Based Selection; QBS = Quality-Based Selection; FBS = Fixed Budget Selection ; LCS = Least-Cost Selection; CQS = Selection Based on Consultants' Qualifications

ANNEX 9: ECONOMIC ANALYSIS
Guyana: Conservancy Adaptation Project

According to the 2005 Economic Commission for Latin America and the Caribbean (ECLAC) damage assessment, total losses to Guyana resulting from the heavy rains of January 2005 amounted to US$465 million, or 59 percent of the countries Gross Domestic Product (GDP). In Region 4, the most densely populated area in the country, 71 percent of residents were affected, while 20 percent of those in neighboring Region 5 were impacted. Damages were the result of flooding due to above average rainfall and overtopping in some areas of the EDWC dam. In lowland areas, flood waters persisted for nearly a month and the death toll reached 34, of which 27 were due to water borne diseases..

The following year, the January 2006 floods took a heavy toll on the inhabitants of Region 5. While many in Region 4 were spared from floodwaters, because the Mihaica and Mihaicony rivers overtopped severely, a significant portion of agricultural production was lost, in addition to the damage incurred to households and livelihoods.

In both cases, the EDWC dam was structurally weakened, but the integrity of the system remained intact. Yet, due to the pressure on the dam over the past two years, the system is weaker now than it was prior to 2005 – leaving the EDWC system more vulnerable to collapse than ever before. Should similar rains occur in the future, it is increasingly likely that the dam will collapse and flood Regions 4 and 5.

The consequences of a dam breach would be catastrophic. The majority of the populated coastal zone, including the capital city, would remain submerged for several months, impacting homes and livelihoods. The inability to expunge water from saturated soils would put significant pressure on the social structure of the country and could lead to a disintegration of the rule of law.

Based on the partial flooding of Region 4 in 2005, it is estimated that the economic loss resulting from a system breach could range between three and four times Guyana's annual GDP. In addition, replacement costs for the EDWC are estimated between US$200-300 million. While the EDWC is being reconstructed, it would be incapable of holding irrigation water necessary for agricultural production during the dry seasons. As a result, agricultural production, which accounts for nearly 40 percent of GDP, could fall by over 20 percent annually until a new dam was constructed. Moreover, unpredictable social costs that may result from a breakdown of the rule of law have the potential to be even more damaging

It is clear, therefore, that the economic benefits of interventions aimed at strengthening the infrastructure within the EDWC system cannot be quantified. Furthermore, the main focus of this project is limited to developing certain tools to improve the GOG's and donor' understanding of the EDWC system and identify key interventions that may be made in the future, and while doing so to also make some small infrastructure investments within the limited resources available to increase the drainage capacity of the EDWC as much as possible to reduce the likelihood of system collapse that would affect the majority of Guyana's population for several months. The economic analysis was therefore limited to considering the pros and cons of the civil works alternatives that would decrease the likelihood of EDWC collapse by relieving pressure on a 8 mile north-eastern portion of the dam which was particularly weakened during the floods of 2005 and 2006. The alternatives considered, their cost and relative advantages and disadvantages are as follows:

Alternative 1 -Reconstitute Shanks Canal from northern dam to Atlantic Ocean

- Cost – US$5 million
- Would require Involuntary Resettlement

Alternative 2 - Increase water flow at Land of Cannan Sluice gate by lowering the sil

- Cost – US$6 million
- Uncertain impact until internal conservancy flows are modeled

Alternative 3 - Strengthen weakened dam with temporary repairs

- Cost – US$10 million
- Temporary repairs may not be sufficient to relieve pressure.
- Reputational risk.

Alternative 4 - Widen Cuffy Canal

- Cost – US$1.2 million
- Benefit – Double discharge capacity from 80 m3/sec. to 150 m3/sec.

Alternative 5 - Reconstitute Cuhna Canal

- Cost – US$1.2 million
- Benefit – Increase discharge capacity from 25 m3/sec.to 150 m3/sec.
- Temporary bridge construction less expensive and easier to complete with less traffic interruptions than the Cuffy Canal

Alternative 5 was selected based on least cost, maximum improvement in discharge capacity, and ease of implementation.

ANNEX 10: SAFEGUARD POLICY ISSUES
Guyana: Conservancy Adaptation Project

Integrated Safeguards Data Sheet

I.A.1. Project Statistics

Country:	Guyana
Project ID:	P103539
Project:	Conservancy Adaptation Project (CAP)
Task Team Leader:	Francis Ghesquiere

I.A.2. Project Objectives:

The objective of the CAP is to reduce the vulnerability of catastrophic flooding in Guyana's low-lying coastal area that is currently threatened by sea level rise resulting from global climate change.

This objective will be achieved through a) strengthening the Government of Guyana's (GoG) and donor understanding of the East Demerara Water Conservancy (EDWC) system and coastal plain drainage regimes while identifying key drainage regimes for follow-on intervention; b) implementing infrastructure investments aimed at increasing the drainage capacity of the EDWC; c) strengthening institutional capacity of the GoG to manage water levels in the EDWC and to guide interventions aimed reducing Guyana's vulnerability to floods.

At project completion, the GoG will be in possession of a master plan for future upgrading of the EDWC for flood control management. Possible interventions for at least 10 key drainage regimes would have been identified and presented to the donor community, and the drainage relief capacity of the EDWC to the Demerara River by will be increased by at least 35 percent.

I.A.3. Project Description:

The project will finance the development of the technical foundation for a master plan of future interventions within the EDWC and lowland drainage systems, as well as specific upgrading works and operational improvements aimed at enhancing the flood control capacity of the EDWC. The tools developed under the analytical component of the CAP will be used by the GoG and donor agencies to guide future investments.

Component 1 - Pre-investment studies for engineering design of works (US$2.0 mil): The objective of this component is to provide the hydrologic baseline necessary for contemplating rational interventions aimed at increasing the current discharge capacity of the flood control system. The key outcome of these pre-investment studies will be a topographic model of the inhabited coastal plain to be used as the basis for hydrologic analysis of the region under projected climate scenarios. The results from this component will pinpoint key areas of intervention to increase discharge capacity critical for flood zone management. Pre-engineering designs will be completed for a set of prioritized interventions. An environmental assessment will be completed for each of these prioritized interventions. Specialized staff within the following agencies will be trained in the application of the analytical tools produced: National Drainage and Irrigation Authority, the Lands and Surveys Commission, the Ministry of Works

River and Sea Defense Division, the Guyana Environmental Protection Agency and the Civil Defense Commission.

Component 2 - Investments in specific adaptation measures (US$ 2.7 mil - US$1.5 mil and $1.2 million Government of Guyana): The objective of this component is to counteract the effects of sea level rise, which has decreased the GoG's ability to manage water levels of the EDWC system. The investments will improve the ability of the Government to manage water levels behind the EDWC dam during heavy rains by improving internal water flows in the EDWC and increasing EDWC drainage relief capacity to the Demerara River and eventually the Atlantic Ocean. By the end of project, activities under this component should result in an increased drainage capacity of the EDWC to the Demerara River by roughly 35 percent (the exact figure will be finalized during the first year of implementation). The GoG, through the NDIA, will direct additional investment in the strengthening of drainage and irrigation infrastructure based on the engineering foundation to be developed under Component 1.

Component 3 - Institutional Strengthening and Project Management (US$0.3 mil): The objective of this component is to strengthen the institutional framework for flood control within the context of the national emergency management sector headed by the Civil Defense Commission. The project will finance activities to better assess the current needs of the actors involved in the flood control and emergency management and will work together with the concerned parties to develop a national framework for a more streamlined approach to hazard and risk management in the country. The project will also support consultations with civil society and the donor community to create consensus around a medium and long term intervention strategy to help the country adapt to sea level rise. The key outcome of the analysis and project management component will be improved Government effectiveness in managing floods and other emergencies. With clear lines of responsibility in times of urgent need as well as times of calm, the GoG will be better equipped to manage flood control policy.

I.A.4. Project Location:

The project will focus on activities in Region 4, the most populated region of the country. This is the area downstream of the EDWC dam and EDWC system. Mapping and system analysis will be conducted in coastal regions 3, 4 and 5 to provide the analytical basis for managing coastal hydrology.

Environmental Classification: **B** (Partial Assessment)

Comments: The project will finance some small civil works which to widen a drainage canal. Two candidate canals have been selected and both will require significant upgrading and the construction of a bridge along a major north-south corridor. An environmental assessment will be required if these works are selected. It has therefore been classified as category "B" for the purpose of OP 4.01 Environmental Assessment.

Other works include minor repairs to existing infrastructure and will be subject to environmental management contract clauses provided to the executing agency for inclusion in civil works contracts.

All other components are analytical in nature and will develop data and tools for the evaluation of the performance of the drainage network in the EDWC and adjacent coastal areas.

Policy Triggered:

Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)
(*) Yes
( ) No
( ) TBD

Natural Habitats (OP 4.04, BP 4.04, GP 4.04)
(*) Yes
() No
( ) TBD

|Forestry (OP 4.36, GP 4.36)
(*) Yes|
() No
( ) TBD

Pest Management (OP 4.09)
( ) Yes
(*) No
( ) TBD

Cultural Property (OPN 11.03)
(*) Yes
() No
( ) TBD

Indigenous Peoples (OD 4.20)
( ) Yes
(*) No
( ) TBD

Involuntary Resettlement (OP/BP 4.12)
( ) Yes|
(*) No
( ) TBD

Safety of dams (OP 4.37, BP 4.37)
(*) Yes
() No
( ) TBD

Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)
( ) Yes|
(*) No
( ) TBD

Projects in Disputed Areas (OP 7.60, BP 7.60, GP7.60)*
( ) Yes
(*) No

Section II - Key Safeguard Issues and Their Management

II.D.1a. Describe any safeguard issues and impacts associated with the project. Identify and describe any potential large scale, significant and/or irreversible impacts.

Environmental Assessment (EA) (OP/BP4.01)

An environmental management framework will be developed and publicly disclosed through the Infoshop in Washington and within Guyana. This framework includes: a) a description of the project; b) a description of the safeguards triggered and project mechanisms to ensure compliance with each; c) Terms of Reference for analytical work that will result in an engineering tool that is to be used as a foundation for determining the environmental impacts of follow-on interventions; d) procedures and requirements for sub-project specific EAs to be conducted during project implementation; and e) a description of the project's strategy for public consultation, during both project preparation and implementation.

Civil works funded under this project may include the widening of the Cuffy and/or Cuhna outlet structures. These activities will require the construction of a bridge along a major north-south thoroughfare. Environmental impacts will be limited to the construction sites and will result in a temporary impact to local traffic. An Environmental Assessment will be conducted during the engineering design stage of the project component to address these issues. These two structures lead directly to the Demerara River. The only function of these canals is to provide relief capacity to the EDWC system to protect the EDWC dam during the two rainy annual seasons. These canals are not associated with the irrigation or potable water supply functions of the EDWC system. While not expected to have an adverse impact on conservancy, an additional site-specific EA will be completed for the improvement of water flow systems within the EDWC. Remaining civil works are limited to repairs to existing structures and are classified as category C. These works will be contracted using appropriate environmental management clauses to assure contactor compliance with accepted environmental practices.

A key output of the analytical work will be an engineering tool that is to be used to as a foundation for determining the environmental impacts of follow-on interventions. With the development and use of a detailed digital elevation model, local watershed characteristics and drainage regimes will be mapped and modeled, creating the basis for future engineering interventions. A separate report will be developed, based on the analytical work undertaken in the project, which will specifically addresses the likely environmental impacts of future interventions. Expected hydraulic impacts, as well as changes in water quality, natural habitats, land use, livelihoods and analysis of alternative strategies will be considered. Based on this information, an intervention strategy will be developed.

Natural Habitats (OP/BP 4.04)

A portion of the project takes place within the EDWC. This is a man made structure that is considered a natural habitat. No adverse impacts to the conservancy are envisioned under the project. At the same time, by improving the drainage capacity of the EDWC and assessing the weak portion of the EDWC Dam, the project aims to ensure that this natural habitat remains in tact.

Forests (OP/BP 4.36)

The southern portion of the EDWC is bordered by a forest. No physical work is envisioned within 10 miles of this forest and no adverse impacts to the forest are envisioned under the project. Moreover, improvements in water flows within the EDWC are expected to have no impact on the bordering forest.

Safety of Dams (OP/BP 4.37)

The EDWC is bordered to the north by a 30 mile long earthen dam constructed some 150 years ago. The dam has been heavily stressed particularly during the past two flood events (2004-5, 2005-6). While no civil works are to be conducted on the dam, a detailed engineering assessment of the dam and its associated drainage structures is to be completed under the project. This will provide the engineering and safety guidance to the GoG for the design and development of any dam strengthening programs.

The engineering analysis developed under the present project will provide the technical basis for the GoG to fulfill the requirements for an expert engineering assessment of the weakened portion of the EDWC Dam provided under this safeguard. Upon receipt of the dam engineering and safety assessment, and as part of implementation of the project, the World Bank will contract independent experts to assess and to validate the quality of the report.

II.D.1b. Describe any potential cumulative impacts due to application of more than one safeguard policy or due to multiple project component.

No negative long term impacts are expected to materialize as a result of the project. By improving the drainage capacity of the EDWC and assessing the weak portion of the EDWC Dam, the project aims to ensure that this natural habitat remains in tact.

II.D.1c Describe any potential long term impacts due to anticipated future activities in the project area.

The project is expected to have no adverse impacts.

II.D.2. In light of 1, describe the proposed treatment of alternatives (if required)

Not required

II.D.3. Describe arrangement for the borrower to address safeguard issues:

While four safeguards are triggered under this project, only two will need to be addressed in depth. The man-made natural habitat of the EDWC will benefit from the project through the increased discharge capacity of the system. This will reduce the risk of a dam breach that would negatively affect the natural habitat. A forest does border the southern portion of the EDWC, but because investments will be made nowhere in the proximity of the forest, the project will have neither negative nor positive impacts. The sites of physical work to take place under the project have been surveyed by Bank technical staff. Based on their assessment, the likelihood of cultural resources to be found at the project sites is extremely low. However, "chance find" procedures will be included in the contract for this work.

Regarding the environmental assessment the engineering firm contracting to carry out the analytical work will be responsible for developing site specific environmental assessments for the widening of outlet canals and improvement in water flows behind the EDWC. Additionally, their work program will include a separate report on the possible environmental impacts of future drainage sector improvements. Both the engineering firm and the Implementation Secretariat will be responsible for ensuring that these measures are following during physical work.

Safety of Dams will also be addressed by the engineering firm. The firm will be responsible for completing the dam safety analysis and proposing short and medium term interventions aimed at strengthening the dam. The Implementation Secretariat will ensure that these outputs are complete and will be supported with technical expertise provided by the World Bank.

II.D.4. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

Relief Drainage Improvements - the primary beneficiaries' population located to the north of the EDWC dam as the improved relief capacity will reduce the risk of catastrophic dam failure and subsequent flooding. This area represents over 70 percent of the countries population, local authorities, and local civil society that have been closely involved in the development of the proposed strategy. If the improvement of the Cuhna canal is to be considered, the Barama Lumber Company is the only activity directly affected by the works. Additionally, Ministry of Works will be closely involved with any constructions associated with the north-south roadway.

E. Safeguards Classification:

[ ] S1. Significant, cumulative and/or irreversible impacts; or significant technical and institutional risks in management of one or more safeguard areas;
[X] S2. One or more safeguard policies are triggered, but effects are limited in their impact and are technically and institutionally manageable;
[ ] S3. No safeguard issues;
[ ] SF. Financial intermediary projects, social development funds, community driven development or similar projects which require a safeguard framework or programmatic approach to address safeguard issues.

Environmental Assessment/Analysis/Management Plan:
Expected: March 15, 2007 ---------- Actual: March 13, 2007

Date of receipt by the Bank---------- 1/12/2007
Date of "in-country" disclosure---------- 1/24/2007
Date of submission to InfoShop ---------- 1/24/2007
Date of distributing the Exec. Summary of the EA
to the Executive Directors (For category A projects) ---------- N/A

Resettlement Action Plan/Framework:---------- N/A

Indigenous Peoples Development Plan/Framework: ---------- N/A

Pest Management Plan:---------- N/A

Dam Safety Management Plan:---------- N/A

ANNEX 11: PROJECT PREPARATION AND SUPERVISION

Guyana: Conservancy Adaptation Project

	Planned	Actual
PCN review	4/25/06	4/25/06
Initial PID to PIC		11/29/06
Initial ISDS to PIC		11/29/06
Appraisal	1/25/07	2/02/07
Negotiations	1/25/07	3/15/07
Board/RVP approval	11/08/07	
Planned date of effectiveness	11/15/07	
Planned date of mid-term review	3/15/09	
Planned closing date	12/31/10	

Key institutions responsible for preparation of the project: Ministry of Agriculture, Government of Guyana

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Francis Ghesquiere	Task Team Leader	LCSUW
Marc Forni	Economist	LCSUW
Jorge Kamine	Counsel	LEGLA
Judith Morroy	Procurement Analyst	LCSPT
Gerald Meier	Environmental Spec.	Consultant
Emmanuel N. Njomo	Financial Mgmt. Spec.	Consultant
Ross A. Gartley	Extended Term Consultant	LCSUW
Hank Ogink	Hydraulic Engineer	Consultant

Bank funds expended to date on project preparation:

1. Bank resources:
2. Trust funds:
3. Total:

Estimated Approval and Supervision costs:

1. Remaining costs to approval:
2. Estimated annual supervision cost: US$ 75,000

ANNEX 12: DOCUMENTS IN THE PROJECT FILE
Guyana: Conservancy Adaptation Project

1. Augustinus, P., G., E., F. 2004. The influence of the trade winds on the coastal development of Guyana's at various scale levels: a synthesis. Marine Geology 208, Pp 145 – 151.

2. Carton, J. A., and S. A. Grodsky, 2005. Sea level rise and the warming of the oceans in the Simple Ocean Data Assimilation (SODA) ocean reanalysis. Journal Of Geophysical Research, Vol. 110, doi:10.1029/2004JC002817.

3. Chung – yen Kuo 2006. Determination and characterization of 20 century global sea level rise. PhD Dissertation, Report No. 478, Geodetic Science and Surveying, Department of Geological Sciences, The Ohio State University , Columbus Ohio.

4. Government of Guyana, Environmental Protection Agency. 2000. Final Report On A Socio-Economic Assessment Of The Vulnerability Of Guyana's Coast.

5. Government of Guyana, Environmental Protection Agency. 2002. Guyana's National Vulnerability Assessment to Sea Level Rise.

6. Government of Guyana, Environmental Protection Agency. 2000. Integrated Coastal Zone Management Action Plan 2000.

7. Government of Guyana. 2002. Guyana Initial National Communication In Response To Its Commitments To The UNFCCC 2002.

8. Houghton, J., T., *et al.* ed. 2001. Climate Change 2001: The Scientific Basis. The Press Syndicate Of The University Of Cambridge, United Kingdom, Pp. 881.

9. Mott Mott MacDonald, 2005. Government of Guyana Task Force for Infrastructure Rehabilitation: Draft Report On Conservancy Flood Management Modelling.

10. Mott MacDonald. 2005. Report of Visit By Dams Specialist.

11. Mott MacDonald. 2004. Guyana Drainage and Irrigation Systems Rehabilitation Project Hydrology and Water Resources: Final Report.

12. Mott MacDonald. 2005. Government of Guyana Task Force for Infrastructure Recovery Infrastructure Rehabilitation Short to Medium Term Plan: Final Report 12 July 2005.

13. Mott Macdonald. 2005. Government of Guyana Task Force for Infrastructure Rehabilitation Conservancy Flood Management Modelling: Model Update Report

14. Nogués-Paegle, J., et al. 2002. Progress in Pan American Clivar Research: Understanding The South American Monsoon. Meteorologica 27 (1 y 2) Pp. 1-30.

15. Nurmohamed, N., O, Van Duin. 2005. UNDAC Mission to Guyana - Geotechnical and Hydraulic Assessment – Concept.

16. Rogers, J. 1987. Precipitation Variability Over the Caribbean and Tropical Americas Associated With the Southern Oscillation. J. Climate 1 172-182.

17. Rowel, D., P. 1998. Assessing Potential Seasonal Predictability with an Ensemble of Multidecadal GCM Simulations. J. of Climate , Vol. 11, Pp109-120.

18. Royal Haskoning, Delft Hydraulics. 2004. Institutional Capacity Building Activities on Guyana Sea Defences, Bathymetric Survey Report. Haskoning Nederland Bv, Reference 9M5198.21/RG019/FRW/Guy.

19. Royal Haskoning, Delft Hydraulics. 2004. Institutional Capacity Building Activities on Guyana Sea Defences, Levelling Report. Haskoning Nederland Bv, Reference 9M5198.21/RG019/FRW/Guy.

20. Royal Haskoning, Delft Hydraulics. 2004. Institutional Capacity Building Activities on Guyana Sea Defences,Volume 1 Executive Summary - 9M5198.21/H4095.

21. Royal Haskoning, Delft Hydraulics. 2004. Institutional Capacity Building Activities on Guyana Sea Defences,Volume 2 Flow Modelling Report - 9M5198.21/RG047 / H4095.

22. Royal Haskoning, Delft Hydraulics. 2004. Institutional Capacity Building Activities on Guyana Sea Defences,Volume 3 Wave Modelling Report - 9M5198.21/RG047/WL / H4095.

23. Royal Haskoning, Delft Hydraulics. 2004. Institutional Capacity Building Activities on Guyana Sea Defences,Volume 4 Morphology Modelling Report - M5198.21/RG047/WL / H4095.

24. Seth, A., F. Giorgi, 1996 Three-dimensional Model Study of Organized Mesoscale Circulations Induced by Vegetation. J. Geophysical Research, 104(D3) 7371-7391.

25. Seth, A., B. Rojas, B. Liebmann, and J. H. Qian. 2004. Daily rainfall analysis for South America from a regional climate model and station observations. Geophysical Research Letters, Vol. 31, L07213, Doi:10.1029/2003gl019220.

26. Singh, B. 1997. Climate Changes In The Greater And Southern Caribbean. International Journal of Climatology, Vol. 17, 1093-1114.

27. World Bank. 2005. Guyana: Preliminary Damage and Needs Assessment Following the Intensive Floods of January 2005.

28. Vörösmarty, C.J., M. Routhier, A. Wright, T. Baker. C.A. Fernandez-Jauregui, M.C. Donoso, 1998. A Regional Hydrometeorological Data Network for South America, Central America, and the Caribbean (R-HydroNET v1.0).

29. HR Wallingford, 2005. Guidelines for Socio-economic Flood Damage Evaluation. FLOODsite Project Report, Contract No:GOCE-CT-2004-505420

ANNEX 13: STATEMENT OF LOANS AND CREDITS
Guyana: Conservancy Adaptation Project

Project ID	FY	Purpose	Original Amount in US$ Millions				Cancel.	Undisb.	Difference between expected and actual disbursements	
			IBRD	IDA	SF	GEF			Orig.	Frm. Rev'd
P088030	2006	GY (CRL) Water Sector Consolidation Proj	0.00	0.00	0.00	0.00	0.00	9.88	1.90	0.00
P076722	2004	GY: HIV/AIDS PREVENTION & CONTROL	0.00	0.00	0.00	0.00	0.00	8.60	3.44	0.00
P074762	2003	GY Public Sector Tech. Assistance Credit	0.00	4.76	0.00	0.00	0.00	1.66	1.09	0.65
		Total:	0.00	4.76	0.00	0.00	0.00	20.14	6.43	0.65

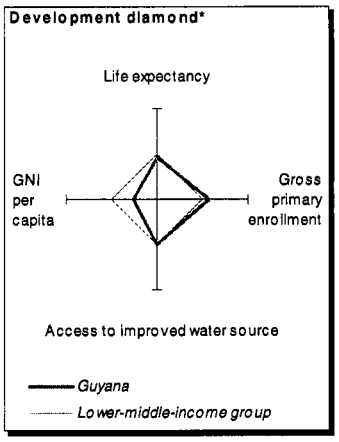
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
1998	Guyam Bank	0.00	1.00	0.00	0.00	0.00	0.50	0.00	0.00
2006	Guyana Goldfield	0.00	4.75	0.00	0.00	0.00	4.75	0.00	0.00
	Total portfolio:	0.00	5.75	0.00	0.00	0.00	5.25	0.00	0.00

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
	Total pending commitment:	0.00	0.00	0.00	0.00

ANNEX 14: COUNTRY AT A GLANCE
Guyana: Conservancy Adaptation Project

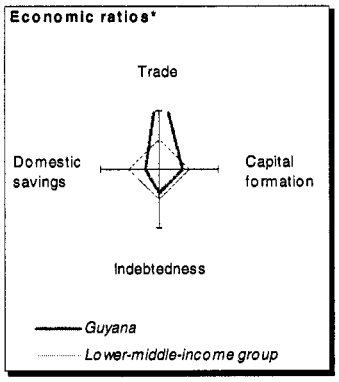
POVERTY and SOCIAL	Guyana	Latin America & Carib.	Lower-middle-income
2005			
Population, mid-year *(millions)*	0.75	551	2,475
GNI per capita *(Atlas method, US$)*	1,010	4,008	1,918
GNI *(Atlas method, US$ billions)*	0.76	2,210	4,747
Average annual growth, 1999-05			
Population *(%)*	0.2	1.4	1.0
Labor force *(%)*	1.1	2.2	1.4
Most recent estimate (latest year available, 1999-05)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	28	77	50
Life expectancy at birth *(years)*	64	72	70
Infant mortality *(per 1,000 live births)*	48	27	33
Child malnutrition *(% of children under 5)*	14	7	12
Access to an improved water source *(% of population)*	83	91	82
Literacy *(% of population age 15+)*	..	90	89
Gross primary enrollment *(% of school-age population)*	129	119	114
Male	134	121	115
Female	125	117	113



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

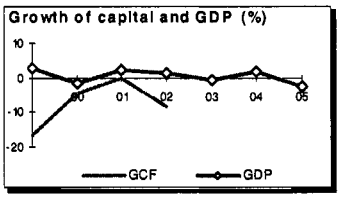
	1985	1995	2004	2005
GDP *(US$ billions)*	0.45	0.62	0.79	0.78
Gross capital formation/GDP	35.8	31.7	23.6	..
Exports of goods and services/GDP	48.1	101.2	95.8	..
Gross domestic savings/GDP	22.0	22.3	13.7	..
Gross national savings/GDP	..	15.4	20.0	..
Current account balance/GDP	-21.3	-14.4	-4.6	..
Interest payments/GDP	2.9	5.0	1.7	..
Total debt/GDP	335.3	340.4	169.4	..
Total debt service/exports	27.7	16.3	5.7	..
Present value of debt/GDP	..	..	64.6	..
Present value of debt/exports	..	..	59.2	..

	1985-95	1995-05	2004	2005	2005-09
(average annual growth)					
GDP	2.1	1.2	1.6	-2.8	..
GDP per capita	2.4	0.9	1.4	-2.9	..
Exports of goods and services	8.4	0.5	..	..	..

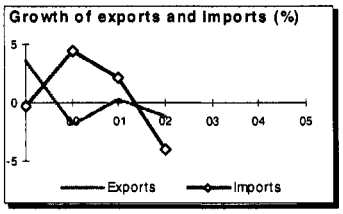


STRUCTURE of the ECONOMY

	1985	1995	2004	2005
(% of GDP)				
Agriculture	26.8	41.2	31.3	..
Industry	24.6	32.6	27.0	..
Manufacturing	13.9	11.4	9.6	..
Services	48.5	26.1	41.7	..
Household final consumption expenditure	59.9	62.7	59.0	..
General gov't final consumption expenditure	18.1	15.0	27.2	..
Imports of goods and services	61.9	112.1	105.7	..



	1985-95	1995-05	2004	2005
(average annual growth)				
Agriculture	3.2	1.3	2.9	..
Industry	2.2	1.0	-0.2	..
Manufacturing	0.9	0.4	2.3	..
Services	1.3	2.1	1.9	..
Household final consumption expenditure	-0.9	3.5	..	..
General gov't final consumption expenditure	4.8	10.8	..	..
Gross capital formation	9.0	-4.9	..	..
Imports of goods and services	7.4	1.5	..	..



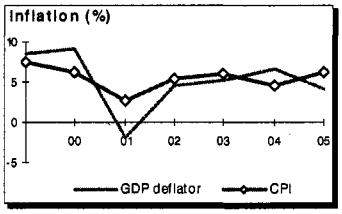
Note: 2005 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

PRICES and GOVERNMENT FINANCE

	1985	1995	2004	2005
Domestic prices				
(% change)				
Consumer prices	..	12.2	4.7	6.3
Implicit GDP deflator	14.5	12.4	6.7	4.2
Government finance				
(% of GDP, includes current grants)				
Current revenue	40.0	35.1	39.6	..
Current budget balance	-36.6	10.0	7.4	..
Overall surplus/deficit	-54.4	-3.9	-0.7	..

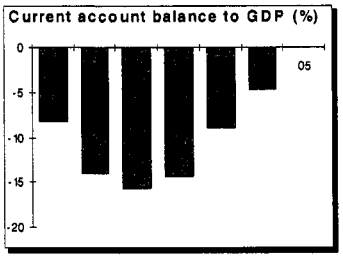


TRADE

	1985	1995	2004	2005
(US$ millions)				
Total exports (fob)	214	496	589	..
Rice	73	77	55	..
Sugar	66	126	137	..
Manufactures	21	105	..	..
Total imports (cif)	226	535	646	..
Food	5	44	..	..
Fuel and energy	..	90	169	..
Capital goods	66	188	136	..
Export price index *(2000=100)*	88	121	115	..
Import price index *(2000=100)*	..	98	122	..
Terms of trade *(2000=100)*	..	124	95	..

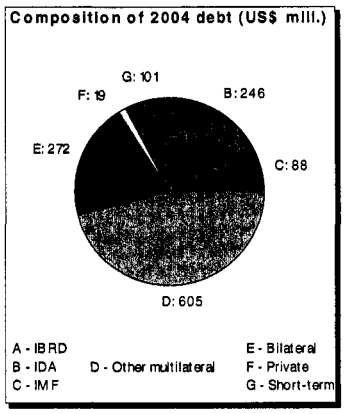
BALANCE of PAYMENTS

	1985	1995	2004	2005
(US$ millions)				
Exports of goods and services	262	629	753	..
Imports of goods and services	313	698	831	..
Resource balance	-51	-67	-77	..
Net income	-40	-54	43	..
Net current transfers	..	..	84	..
Current account balance	-97	-89	-36	..
Financing items (net)	..	87	..	..
Changes in net reserves	..	2	..	..
Memo:				
Reserves including gold *(US$ millions)*	..	269	225	..
Conversion rate *(DEC, local/US$)*	4.3	142.0	198.3	2016



EXTERNAL DEBT and RESOURCE FLOWS

	1985	1995	2004	2005
(US$ millions)				
Total debt outstanding and disbursed	1,521	2,116	1,331	..
IBRD	65	35	0	0
IDA	27	203	246	226
Total debt service	73	109	49	..
IBRD	6	9	1	0
IDA	0	2	3	6
Composition of net resource flows				
Official grants	8	21	74	..
Official creditors	52	5	46	..
Private creditors	-5	-10	-1	..
Foreign direct investment (net inflows)	2	74	30	..
Portfolio equity (net inflows)	0	0	0	..
World Bank program				
Commitments	9	22	0	..
Disbursements	3	18	7	2
Principal repayments	2	7	2	4
Net flows	1	11	5	-2
Interest payments	4	5	2	2
Net transfers	-4	6	3	-4



Note: This table was produced from the Development Economics LDB database. 8/13/06

ANNEX 15: ADDITIONAL FINANCING
Guyana: Conservancy Adaptation Project

The Guyana CAP requests US$3.8 million of Global Environment Facility Special Climate Change Fund (GEF SCCF) funding. For projects requiring between US$1 million and US$5 million, the SCCF will finance up to one-third of the costs of the project.

The US$20 million project goes well beyond this requirement with the Government of Guyana willing to commit US$15 million to the project, through the National Drainage and Irrigation Authority (NDIA) and other government agencies involved in sea defense and flood control.

The GEF contribution represents the additional costs resulting from climate change. Investments in the East Demerara Water Conservancy (EDWC) drainage infrastructure have historically been made for two reasons. First, as an old and complex drainage system, regular maintenance and repairs are required to ensure the system remains functioning. Second, as the water needs of the country expand, investment must be made in the expansion of the network of drainage canals and water storages. These two recurring costs have been financed by the GoG, which has been able to maintain a system that worked satisfactorily, despite the relatively unorganized and ad-hoc approach that has been taken in the past.

As a result of sea level rise, a third cost to the system has materialized. Due to the existing and anticipated rise in sea level, system upgrades must now be made to enhance the existing discharge capacity to compensate for the shrinking drainage window. Strengthening the system to adapt to a shorter drainage window caused by sea level rise will require significant investment in the current drainage and irrigation system. Without the US$3.8 million GEF investment, the NDIA would continue to maintain the status quo of EDWC, not taking into account the increased stress on the existing system and the need to increase the discharge capacity.

The GEF contribution is also expected to serve as a catalyst that would bring in additional resources from bilateral and multilateral sources to support adaptation measures. Once an engineering foundation has been built for upgrading the EDWC, the donor community will be able to engage in a long-term investment program that adapts to the negative effects of climate change on the system. Considering the scale of the challenge, this approach is most appropriate to address the obstacles faced by Guyana as a result of the impacts of climate change.

ANNEX 16: GEF STAP REVIEW

Guyana: Conservancy Adaptation Project

Professor Bhawan Singh, PhD

The objective of the proposed Conservancy Adaptation Project (CAP) is to assist the Government of Guyana in adapting to on-going and future global climate changes by mitigating the risk of catastrophic flooding of its vital coastal areas. This will be achieved through an increase in drainage relief capacity and the development of a long-term physical adaptation program designed to improve the drainage relief capacity of the East Demerara Water Conservancy (EDWC) and coastal lowlands systems.

Much of the land now in use in northern Guyana along the Atlantic coast lies in the coastal zone below the mean high tide level of around 54 ft Guyana Datum (GD). This land was reclaimed from tidal areas and is protected by an intricate network of seawalls, dykes, polders and drainage structures. Guyana's agrarian economy, based mainly on sugarcane and rice, which contributes over 35 percent to the GDP, is highly dependent on this coastal drainage and irrigation system as are the homes and businesses of the region.

The East Demerara Water Conservancy (EDWC), variously constructed of clay, earth and organic material (pegasse), is the major conservancy system in Guyana. The EDWC is a freshwater impoundment located in Region 4, 15 miles south of the most densely populated section of Guyana along the Atlantic coast. It is bounded to the north by a 40 mile earthen dam structure built some 150 years ago and to the south by the natural topographic rise composed largely of ancient coastal dune formations. The area consists of an impoundment of approximately 550 hectares and ranges in depth from 12 to approximately 15 feet along the dam. Drainage of the EDWC has been managed through the use of gravity based systems augmented with pumps, but the system has suffered from the impacts of sea level rise over the past century. Recently, a series of severe storms during the two rainy seasons, the strongest between June and July and less intense season between December and January, have further stressed the drainage and water storage system and, at the present time, the reclaimed coastal areas are highly susceptible to flooding. Given the forecasted impacts of global climate change and sea level rise, the risk of future flooding, even during normal weather events, is increasing significantly.

Over two-thirds of Guyana's 750,000 citizens live near or below sea-level along the coast below the EDWC dam. They are concentrated in a 30 mile band along the coast, between Georgetown and the Mahaica River, protected from the Atlantic Ocean by the Guyana sea defense network. The EDWC serves as a source of all drinking water for, Georgetown, the capital, and the other major urban centers, but primarily serves to supply agricultural irrigation water during the dry seasons.

However, the EDWC conservancy relief canals are currently operating with severe limitations as changes in landuse and local increases in sea level have greatly limited their effectiveness. The degradation of the EDWC system has been compounded by a number of recent severe weather events, such as the floods of 2004-2005. Overtopping of the Dam during these rains, in addition to significant dam creeping, has weakened the integrity of an already vulnerable system.

The scope and urgency of the threat of a failure of the EDWC system is further exacerbated by the effects of climate change on the regional water cycle. Apart from the reduced effectiveness of the canal drainage system, increases in sea level have reduced the time available for canal

discharge operations. Furthermore, while climate models suggest that climate change is gradually reducing the annual rainfall to the region, there is concern that intensity of storm events will increase, thereby creating a condition for delivering more water over shorter periods of time.

The CAP project is intended to finance specific upgrading works and operational improvements aimed at enhancing the water management capacity of the EDWC during critical flood periods and provide a comprehensive analytical tool to plan future interventions within the system. The tools developed under the analytical component of the project are expected to be leveraged by the International Development Bank (IDB) to develop a more involved and comprehensive US$25 million flood management project. It is also expected that other donors, who have expressed interest in the program, will participate as the program evolves in the future.

The CAP project being proposed to the GEF (Global Environmental Facility) consists of three major components:

1. *Infrastructure civil works and operational improvements*: The project will finance key infrastructure interventions to the EDWC. Works to be financed by the GEF will focus on improving the ability of the Government of Guyana to manage water levels behind the EDWC dam during heavy rains by improving internal water flows in the EDWC and increasing EDWC drainage relief capacity to the Demerara River. Improvements to the EDWC dam are not contemplated under this GEF grant, on account of its broad scope and high cost. But the initial civil works and operational improvements under this CAP project, namely the engineering safety assessment and analysis of the dam structure, is expected to be used to leverage a larger IDB initiative to undertake major improvements to the EDWC system.

   The GEF fund being solicited is expected to finance a number of urgently needed infrastructure interventions within the EDWC, so as to alleviate coastal flooding problems in the near term. The interventions envisioned include:

   - *Widening of key drainage relief canals:* the Cuffy Canal, which currently operates under capacity due to restrictions caused by sedimentation and vegetation growth, and possibly widneing of the Cuhna Canal, based on feasibility and availability of funds.
   - *Improvement of the water flow system within EDWC:* Due to vegetation overgrowth and clogging within internal waterways behind the EDWC dam, water is backed up in the north eastern part of the EDWC and this impedes the flow of water westward to the Demerara drainage structures, as originally designed. For example, the five-door sluice, one of the principal water control structures is presently operating at 70 percent efficiency. It is anticipated that improving internal EDWC flows will increase discharge efficiencies at this structure to near 100 percent. GEF funds are therefore being sought to develop a rationalization plan aimed at allowing the Government of Guyana to carry out the necessary upgrading works within the EDWC, to level the hydraulic gradient and to improve the drainage relief capacity to the Demerara River. It is expected that he effect of these improvements will significantly increase the western discharge capacity of the system and thus reduce the risk of flooding.
   - *Repair of water control structures*: a number of sluice gates behind the EDWC are not operating efficiently, and in many cases leak water from behind the EDWC dam. These structures are to be repaired to so as to improve their efficiencies.

2. *Component 2 – System Analysis and Hydrologic baseline.* The GEF fund being solicited is expected to finance a second component consisting of a variety of analytical works aimed at

providing the hydrologic baseline necessary for contemplating rationale interventions to the EDWC flood control system. These analyses are intended to find out how drainage regimes in the populated areas of the coastal lowlands behave, where flood waters originate or where interventions are going to be effective. Presently, emergency interventions are now being made without a full understanding of how the current flood control regime functions. Furthermore, years of neglect coupled with unregulated landuse change has greatly perturbed the original network of drainage canals and their ability to efficiently remove excess water, which has resulted in increased flooding of the coastal lowlands. It is also expected that the results from this component will provide the hydrologic baseline critical for flood zone management and the design of effective interventions. The analyses contemplated include:

- *Detailed Topographic and Landuse Mapping*: This sub-component of the CAP will allow for a detailed topographic and landuse mapping of the EDWC and coastal drainage and irrigation systems, and landuse using the construction of digital elevation maps (DEMs) in combination with aerial photography coupled with LIDAR (light detection and ranging) technology. Where necessary, conventional land survey techniques will also be used to augment data production. Survey work will be tied to the national geodetic grid and vertical datum.
- *Hydrologic Modeling of Coastal Lowlands* – Under this sub-component of the CAP, using the LIDAR derived topographic DEM as baseline, assumedly simple hydrologic models will be developed so as to identify and assess water flows within the EDWC and surrounding regions. These hydrological model simulations are expected to facilitate the identification of flood risks and optimum drainage options for flood management and to assist in evaluating the impact of future landuse changes on the drainage and flood control system.
- *Assessment of* EDWC *System Integrity*: Under this sub-component of the CAP, an engineering evaluation of all EDWC structures, including dams, canals, levies, sluices and sluice gates, is to be conducted to determine which parts of the system are not operational, which need repairs and what needs replacement, so as to allow the system to operate at maximum capacity. Furthermore, it is expected that this sub-component will be used as a basis for follow-on efforts on the part of the Inter American Development Bank and other donors for long-term upgrading works.
- *EDWC Hydraulic Modeling*: Under this sub-component, it is envisaged that within the EDWC, measurements and data will be collected to produce a system flow model. This model, supposedly, will be used to develop improved management procedures using refined operational parameters and to identify the improvements in drainage infrastructure needed to protect the system from failure. These flow models are also expected to help identify key bottlenecks for effective drainage and purging. The intended hydraulic model of the EDWC system will be developed, hopefully, to evaluate the most effective measures that can be taken to increase the drainage relief capacity of the EDWC
- *Pre-feasibility studies for coastal lowland interventions:* In this sub-component, it is proposed that, based on the results of the hydrologic modeling, and scenario analysis, a number of key interventions will be prioritized and presented to the Government of Guyana and the donor community to further improve coastal flood controls related to the EDWC.
- *Operational Capacity Building:* In this sub-component, it is expected that the development of an extensive training program will be undertaken so as to allow the pertinent Government of Guyana agencies to better understand, operate and maintain the EDWC and coastal lowland drainage relief systems.

3. *Component 3- Project Management and Donor coordination:* In this component it is expected that the GEF will finance broad consultations with donors, Government and civil society, in order to create consensus and develop a prioritization strategy in relation to drainage and flood control in the EDWC and surrounding coastal regions.

The proposed Conservancy Adaptation Project (CAP) is being developed in close collaboration with key donor partners. Over the past year, the Department for International Development (DfID) of the United Kingdom, the Canadian International Development Agency (CIDA) and the Inter-American Development Bank (IDB) have participated in discussions with the Guyanese government concerning the need to remediate and adapt the country's water conservancy systems to meet the increased flood hazard brought about, supposedly, by climate change. In response to the 2005 floods, DfID donated roughly US$2 million to the Government of Guyana to implement recommendations made by the 2005 World Bank's Needs Assessment.

The CAP project cost is estimated at US$ 5 million, which is to be totally borne by the GEF. Also, the IDB, with over US$25 million available for the upgrading of Guyana's water conservancy systems, has expressed interest in working with the World Bank to create a comprehensive and long term upgrading and management strategy for the country's water conservancy systems.

It has been established that climate change and climate variability and climate-driven sea level rise pose a significant threat to the sustainable development of low-lying coastal zones as in Guyana. Of particular concern are the projected rise in sea levels and the increase in the intensity and frequency of extreme weather events such as intense and heavy rainfalls and storm surges to which Guyana is particularly vulnerable. Climate change threatens the stability and integrity of marine and coastal systems. The coastal zone of Guyana has been recognized as most vulnerable to the impacts of climate change and sea level rise, and as requiring greater attention by the international community. The IPCC TAR highlights the vulnerability of countries like Guyana, on account of its geographic characteristics. Given the severity of the expected climatic shifts and sea level changes, the low level of its economic development which restricts its ability to cope with expected changes without great economic stress, and its limited capacity to undertake appropriate risk reduction or adaptation measures, climate change impacts may severely affect the sustainable development prospects of Guyana.

Present rates of sea level rise and projected environmental impacts associated with global climate change therefore pose a significant threat to Guyana its economy and people. Recent flooding events demonstrate the immediate vulnerabilities of Guyana to climate driven events and weaknesses in the current infrastructure. This project is designed to provide some immediate infrastructure improvements to cope with the local effects of sea level rise and provide a technical baseline for the continued management and adaptation of the local drainage and flood control network.

Overall, the project appears to be rather ambitious given the level of financing and the level of economic and knowledge capacity of Guyana. This latter void is expected to be filled by contracting out to international consultants. It is claimed that the project would likely involve four contracts, to be executed by an international engineering firm with expertise in EDWC drainage systems. The firm is expected to conduct all studies and assessments. They are also expected to design, contract out, and supervise the ensuing infrastructure adaptation works.

However, the project has a lot of merit and responds to a number of pressing needs in relation to adaptation to greenhouse gas (GHG) climate change for key sectors, namely water resources, agriculture and coastal infrastructure in Guyana.

There is general agreement within the engineering community that the EDWC and its dam are fragile and in serious risk of failure if proactive actions are not taken and operations continue as they have been historically managed. The floods of 2005 and 2006 brought to light the extreme urgency for upgrading protective drainage structures, particularly in the EDWC system, and the urgent need for strengthening, the EDWC dam.

The continued deterioration of the EDWC system will have catastrophic consequences; potentially displacing 75 percent of the Guyana's population. This includes the loss of the capital city, Georgetown and other urban centers and the loss of the country's principal export products, sugarcane and rice. Considering the impacts of climate change, together with the deteriorated condition of the system, the scope of actions required to address this challenge is beyond the capacity of the Government of Guyana without outside technical and financial assistance. Hence the justification for immediate funding by the GEF and other major donor agencies. Moreover, the project appears to fit very well within the context of the goals of the GEF. Current and anticipated collaboration with other donor agencies, such as the Department for International Development (DfID) of the United Kingdom, the Canadian International Development Agency (CIDA), the Japanese Thematic Climate Change Policy and Human Resource Development (PHRD) and the Inter-American Development Bank (IDB) further enhances the appeal of the project for GEF funding.

The Guyana Conservation Adaptation (CAP) project is estimated to US$ 5 million, which is to be totally borne by the GEF. Also, the IDB has ear-marked US$25 million for the upgrading of Guyana's water conservancy systems and has expressed interest in collaborating with the World Bank to create a comprehensive and long term upgrading and management strategy for Guyana's water conservancy systems.

Furthermore, the government of Guyana together with the Wider Caribbean region, has previously had fruitful links with the World Bank/GEF in similar projects in the past (CPACC, MACC). There is also ample evidence of political will on the part of the Government of Guyana to seriously address environmental issues as evidenced by their participation and fulfillment of their multiple MEA obligations (UNCCD, CBD, NBSAPs, and UNFCCC).

The Climate Convention guidance to the GEF on adaptation has in the past supported initial studies, vulnerability and adaptation assessments, and capacity building. More recently, the United Nations Framework Convention on Climate Change (UNFCCC) requested that the GEF support pilot and demonstration projects in the field of adaptation. Under its strategic priority "Piloting an Operational Approach to Adaptation", the GEF supports projects that provide real benefits and may be integrated into national policies and sustainable development planning. In addition, the GEF supports adaptation activities through the Least Developed Country Fund and the Special Climate Change Fund. The Guyanese CAP/EDWC project qualifies in both instances.

The proposed Conservancy Adaptation Project is to be supported under the Special Climate Change Fund, with emphasis being placed on the implementation of physical adaptation measures and the planning of future physical interventions based on the results of an analysis of the drainage management system. The integration of technology and analytical methods for the design of interventions under this project are transportable and this project can serve as a demonstration for the development of adaptation interventions that can be implemented in similar

contexts (e.g. delta regions, coastal zones, river systems) throughout the world. The execution of the project will be coordinated with activities being developed within CARICOM's Community Climate Change Center (CCCC), currently implemented through the World Bank/GEF.

In accordance with the GEF/SPA guidelines the CAP project proposal which integrates adaptation planning and assessment that will hopefully be practically translated into national policy and sustainable development planning, as stipulated by the UNFCCC, further strengthens the merits of the proposal. Furthermore, in step with the SPA guidelines, the CAP project includes: (i) activities within a natural resources management context that generate global environmental benefits; and (ii) adaptation measures that provide other major developmental benefits. Also, the SPA requires that the majority of benefits translate into protection of global biodiversity and prevention of land degradation. The SPA guidelines also stipulate that, "activities should be country driven, cost- effective and integrated into national sustainable development and poverty reduction strategies". The project clearly demonstrates that these elements are integrated. Finally, the project meets the guidelines for co-financing which depend on the delivery of global environmental benefits, additional costs associated with actions necessitated by climate change, and the degree of capacity building. By reducing the risks to global commons, the project supports the design and implementation of specific adaptation measures that will enhance the resilience of vulnerable, globally-important ecosystems and biodiversity, and infrastructure and peoples, as to be found along the coastal zone of Guyana.

Also, the project, based on the information provided on pages 43-44, appears to be well-structured and scientifically and technically sound, and clearly demonstrates that its intent is to make efficient and integrated use of the capacity built in past operations in the Caribbean (CPACC, MACC, and ACCC) and limited human and financial resources to advance with practical steps on the actual implementation of adaptation measures. The project also provides an opportunity to seek synergies in support of various multilateral environment agreements and promotes and facilitates more effective coordination.

The CAP project complements the goals of the other previously-funded GEF climate change projects (CPACC, MACC) and applies the lessons and information gathered from these previous GEF-funded projects by piloting the implementation of adaptation measures in Guyana that has already taken mainstreaming decisions that seek to execute specific measures to address the impacts of climate change on water resources and coastal zone flooding, biodiversity and land degradation, through the detailed design and application of near-term pilot adaptation and follow-up long-term measures. The project is also expected to pioneer the establishment of institutional and operational frameworks for addressing holistically multiple convention objectives in accordance with national priorities, thereby serving as a model for other regions and countries. Finally, one of the main goals of the project is to make efficient and integrated use of the limited human and financial resources for these technical areas and illustrate how adaptation measures can be effectively implemented at the national and community levels, and this is advantageous.

The institutional and implementation arrangements and the monitoring and evaluation plans of the project are well detailed and are highly commendable. Other issues include linkages to other programs and action plans (DfID, IDB, IAB, and CIDA) and a clear identification of global environmental benefits and minimal impacts of the project on the environment locally. Furthermore, critical risks and possible controversial aspects of the project are clearly defined and discussed. Also, Institutional Strengthening, Capacity Building and Sustainable Development Strategies are clearly defined and discussed.

The Guyana CAP project also appears to closely adhere to established World Bank/GEF principles, namely independence, impartiality, transparency, disclosure, ethics, partnership, competencies and capacities, credibility, and utility.

Furthermore, the project seems to meet the operational guidelines of Climate Change Adaptation projects funded by the GEF, namely interventions that increase resilience to the adverse impacts of climate change of vulnerable countries, sectors, and communities. The CAP project also clearly demonstrates how adaptation planning and assessment can be practically translated into national policy and sustainable development planning. Also the project incorporates activities to be funded that are country-driven, cost-effective and integrated into national sustainable development and poverty-reduction strategies. The adaptation measures identified in the project will also be guided by such preparatory work as the first national communications of Guyana, NAPAs, and other relevant country studies.

The CAP project also responds to the SPA portfolio of the GEF, in that it is designed to maximize the opportunity for learning and capacity building and will be representative of particularly vulnerable regions, sectors, geographic areas, ecosystems, communities. The project also demonstrates that experiences and lessons from the CAP/SPA project would be applicable in a wide context and that the experience from the CAP/SPA could be used to develop good practices and estimates of the costs of adaptation to better mainstream adaptation into the full range of GEF activities.

Moreover, the CAP pilot project also includes activities within a natural resources management context that generate global environmental benefits, and adaptation measures that provide other major development benefits such as water resources management and flood control, agriculture, biodiversity, health and built infrastructure. The CAP project of Guyana also appears to meet existing eligibility criteria for GEF funding, such as country drivenness, ecological and financial sustainability, replicability, stakeholder involvement; M&E, etc. The fact the CAP project demonstrates the requisite GEF components of incrementally and co-financing (IDB, IAB) clearly shows that it consistent with GEF practices and overall portfolio experience is also an advantage.

Safeguard policies required for GEF-funded projects, which include Environmental Assessments and policies designed to prevent unintended adverse effects on third parties and the environment, are also integrated in the project proposal. Specific safeguard policies identified in the CAP proposal aim to address natural habitats, cultural property, involuntary resettlement, indigenous peoples and the safety of dams. Also, the safeguard policies identified in the CAP proposal appears to provide a platform for the participation of stakeholders in project design, and to be an important instrument for building ownership among the local population of Guyana.

The Guyana CAP project also seems to meet the GEF requirements relating to policies on business products and instruments, which establish rules for lending instruments, country economic and sector work, technical assistance, grants, guarantees and other Bank products. Also, the CAP project closely adheres to fiduciary policies of the World Bank, in that it spells out relevant rules governing financial management, procurement, and disbursement and selection of consultants. The management of the CAP project also adheres to GEF criteria on such areas as project monitoring and evaluation.

Furthermore, the Guyana CAP project appears to meet World Bank criteria relating to disclosure policies in that it demonstrates widespread sharing of information which is essential for development and which stimulates public debate, broadens public understanding, and enhances

transparency and accountability. These disclosure policies will hopefully also strengthen public support for the CAP efforts to improve the lives of people in Guyana, which in turn will facilitate coordination among the many parties involved in development, and will improve the quality of the assistance projects and programs.

The CAP project also contains a section on project preparation and supervision, but it is not clear (Incomplete Appendix 11), how the Inspection Panel of the World Bank will be able to ensure compliance with Bank policies. The Bank wishes to have an independent body to which individuals and communities can turn if they believe that their rights or interests have been or could be directly harmed by a Bank-financed project.

Recommendations

1. The project, though very deserving, is highly ambitious, given the tasks identified, the limited budget from GEF (US $ 5 million) and the local skills capacity for such an undertaking. Longer term more efficient and permanent infrastructure remediations to the EDWC would have been the ideal solution, but excessive costs ($ US 200 to 300 million) would militate against this. So the approach taken is a piece-meal one, given the costs and the urgency of the problem. However, the project proposal can be strengthened by giving a greater priority to the pressing infrastructure upgrades that are required to reduce the risk of flooding and loss of human lives and ecosystems and built infrastructure. Besides, the Component Two of the project relating to System Analysis and Hydrologic Baseline, seems highly technical and involved and costly (LIDAR measurements, DEM construction, hydrological modeling), demanding specialized expertise that may not be available locally and would call for the intervention of foreign consultants. If foreign consultants are to be used, as described in the project it would be worthwhile, given the complexity of the tasks (1-D and 2-D hydrological flow models) to involve local University level personnel (University of Guyana). As a matter of fact, it would be preferable to use simple flow models based on historical and GCM scenarios data and empirical-statistical relationships pertaining to rainfall-runoff relationships and flooding. This alternative would greatly simplify the undertaking, reduce the costs and allow for greater participation and ownership by the host country, Guyana.

2. The document contains a number of broad and sweeping statements relating to flooding problems and the EDWC, without providing sufficient proof or evidence. For instance, based on very limited historical data sets (2005 and 2006 for extreme rainfalls), the claim is that these extreme events may be due to GHG climate change (pages 9-10). Also, the tone of the document assumes that GHG climate change and its impacts are inevitable, which may well be the case, but caution must be exercised in such assumptions because of the high uncertainty, deriving from the level of GHG forcing, spatial issues and climate models imperfections. Furthermore, the project, supposedly, attempts to undertake hydrological modeling of the EDWC using historical data on climate and sea levels. No mention is made of taking future/scenarios climate and sea level changes which are critical in the design of the planned infrastructure works for the future. Besides, Governments are being asked to integrate climate change issues into Environmental Impacts Assessments (MACC, CIDA-ACCC)

3. The sectors that are targeted as the focus of the study, namely water resources, agriculture, drainage and flood protection and coastal infrastructure and peoples are critical for the well-being of Guyana. However, the document does not provide adequate information in terms of institutions and capacity for undertaking the engineering and impacts studies in these sectors and there is a lack of details relating the precise methodologies that are to be used to

undertake hydrological flow models (Subcomponent 1.2 p 36). Besides details on Component 2 relating to Drainage and Flood Control Analysis in the EDWC system are very sketchy, and there are no identified timelines and one gets the impression that the planning of the project would evolve as it progresses.

4. The document provides details of budget allocations for the 3 activity components, namely Intervention Works and Operational Improvements for the EDWC, Drainage and Flood Control Analysis and Project Management and Donor Coordination (pp 35-43), for the GEF project proposal. However, there is no guarantee of the $ US 25 million IDB project to dovetail Component Two of the GEF project and this is a concern.

5. It would appear from the project proposal to the GEF, that a large part of the funding for Component Two (Drainage and Flood Control Analysis) will be handled by foreign consultants, since the tasks call for highly specialized expertise and equipment in mapping and hydrological modeling. This raises the issue of capacity building and in-house expertise. Besides, once foreign consultants are done with a project follow-up and local ownership become issues.

6. The identification of critical risks and possible controversial aspects (native land claims) are to be commended. However, it is stated that there are no controversial aspects related to the project. This statement is very strong and must be justified, especially in view of the fact that major native settlements are located within or in the vicinity of the project area. Also, the fact that social and environmental impacts of the project are considered is also highly commendable (pages 61-63).

7. There a number of syntax and grammatical errors that needs to be corrected to improve the quality of the project proposal. Examples are use of Climactic instead of climatic, use of GoG and GOG interchangeably, page 30, paragraph 1, page 43: last line of paragraph 4.

8. There are a number of abbreviations and acronyms that are mentioned in the project document that are not defined (ITCZ, IDA, ECLAC...). It is recommended that a list of Abbreviations and Acronyms be inserted in the project proposal.

9. The project document has many incomplete sections (In-Country disclosure: p 65, and Annexes 11, 12 and 13), which should be addressed in order to ensure a complete and comprehensive evaluation of the proposal.

In spite of the above observations and comments, the Guyana CAP/EDWC project fits into the criteria of projects eligible for GEF funding for adaptation activities through the Least Developed Country Fund and the Special Climate Change Fund. Besides, the project addresses a number of very pressing and critical issues relating to climate change impacts and adaptation for water resources management, flood and drainage control, coastal zone infrastructure and livelihoods of people and the sustainable development of Guyana.

Though the project, in its present form needs some improvements, it is well-founded and justified and therefore GEF funding is highly recommended.

Bhawan Singh
Bhawan Singh, Ph D (Climatologist).
STAP Roster Expert: Trinidad and Tobago
September 25th, 2006.

Response to STAP Reviewer Comments

Generally, the comments received were quite positive and constructive. The vulnerabilities of the Guyanese coastal lowlands are well known and the urgency of the need to address the drainage system is a source of general agreement.

Overall, the project seeks to provide improvements to infrastructure while setting the stage for other donors and the Government of Guyana to continue with system improvements using the data and tools developed under this initial project. Close coordination with the GoG and donor agencies will assure a coordinated approach and maximum yield from the GEF investment.

The following address the Recommendations section of the comments document::

1. *Local skills capacity and technical complexity* – The Bank has studied the local capacity within the GoG and has included as partners with two agencies (the Lands and Surveys Commission and the Ministry of Works, River and Sea Defense) which have received extensive technical support form previous European Union projects. Additional partners will be included by project appraisal. Both agencies now involved support modern GIS capabilities and both have been trained in data collection, management and analysis as well as in precision geodetic surveying techniques to improve their technical capabilities. Both entities are considered critical partners to the project and allow the GEF project to build on the results of EU institutional strengthening efforts.

   Rationale for technical analysis - No adequate topographic baseline currently exists for evaluating the coastal drainage of Guyana and until one is developed, internal flood control management will remain a matter of guesswork and response to localized empirical observation rather than integrated system planning. Additionally, at present it is impossible to evaluate the effects of development activities on the system. The tools developed under the project will allow for the informed management of future development and landuse by managing its impact on flood control and drainage management. Understanding the local micro-topography enables the determination of water sources and flow regimes that must be captured or otherwise managed to reduce flooding and manage drainage efficiencies.

   The use of LIDAR and hydraulic flow modeling is designed to provide the hydraulic baseline for the future design of infrastructure works in both the conservancy and coastal lowlands of the system. LIDAR was chosen as the most accurate and cost effective technology for developing this critical topographic base on a large scale at very high resolutions. The acquisition and processing of the data into a digital elevation model (DEM) format is technically complex is to be left to companies specializing in this area. The use of DEMs for hydraulic analysis and landuse planning is compatible with the GIS systems already in place in Guyana. As part of the technical assistance portion of the program, Guyanese technicians will work closely with the contractor in the development of the LIDAR based DEM and modeling and shall be trained extensively in their use as a modeling and planning tools.

   The modeling to be developed under the project is not in support of general rainfall runoff models based on future climate scenarios. The model contemplated under this project is a hydraulic flow simulation allowing for the identification of topographic chokepoints in the drainage system and the development of engineering designs to

improve internal hydraulic flows. Once developed, the system can be designed and tested, in the virtual world, against any future hydrologic regime which may be modeled using the techniques referred to in the comments.

2. The flood events of 2005 and 2006 are not attributed to global climate change. However, the inability to remove water, as was historically the case, has been exacerbated by the change in discharge parameters of the tidal cycle. Rainfall is a relatively minor factor in the process when one considers the estimated 1.8 foot rise in sea level experienced since 1951. Developing this project will allow the GoG to evaluate future scenarios concerning rainfall as they are developed in the research community.

   As the far as EDWC is concerned, the analysis to be completed there is structural integrity and internal system hydraulics as opposed to hydrologic. In other words, the project seeks to improve discharge efficiencies by improving flow characteristics within the system. The data developed on the EDWC provide a basis for the evaluation of the system's response to changes in regional hydrology by providing key data allowing for the calculation of EDWC useful head and other performance parameters.

3. Institutional relationships and specific timelines as well as organic institutional capacity will be further developed during the appraisal mission. It is the intent of the project that the major technical components will be carried out by international firms under contract to the GoG with the active participation of the GoG within a technical assistance framework.

4. Donor participation and broad consultations to leverage of the GEF program will be further developed during the project appraisal phase and throughout project implementation. While at this time there is no guarantee concerning the IDB project, the technical engineering baseline provided will provide a critical tool for any donor participating in the water sector. Donor meetings have and will continue to be a priority for the development of the project and donors will be actively involved during the entire process. Additionally, from the opposite perspective, the GEF project is leveraging the EU contribution to the sector by continuing the development of the same agencies previously involved and making extensive use of the data developed under their program.

5. Capacity building is a major component of the project and the Bank is sensitive to the need to institutionalize the results. As discussed under 1, GoG participation is a matter of the TA component of the project but also, integrating the broad government consultations and donor community participation serves to emphasize the value of the results as a planning tool allowing them to reinforce support for the institutions trained during the project. This allows not only future support form GoG resources but helps assure continued support for the products and institutional capabilities developed thorough the Donor network as well.

6. Text in the pad has been amended to reflect that no native lands will be affected by project activities as they lie outside the domain of the drainage systems being considered under this project.

7. and 8. Addressed in the editing of the PAD.

9. Sections to be finished resulting from meetings and interchanges to be developed during the next appraisal mission.

GUYANA

- SELECTED CITIES AND TOWNS
- REGION CAPITALS
- NATIONAL CAPITAL
- RIVERS
- MAIN ROADS
- RAILROADS
- REGION BOUNDARIES
- INTERNATIONAL BOUNDARIES

NOVEMBER 2004