UNDP PROJECT DOCUMENT

GOVERNMENT OF ANTIGUA AND BARBUDA

AND

UNITED NATIONS DEVELOPMENT PROGRAMME

Demonstrating the Development and Implementation of a Sustainable Island Resource Management Mechanism in a Small Island Developing State

PIMS 1899

Brief description

The project will play a catalytic role in developing and implementing a comprehensive cross-sectoral ecosystem approach, a strategy for Sustainable Island Resource Management (SIRM), that provides for ecosystem functionality and biodiversity conservation within a landscape that enhances sustainable livelihood options and opportunities for sustained economic development. The initiative will strengthen capacities at the systemic, institutional and individual level to enable the implementation of innovative approaches to sustainable land management and resource use among key stakeholder groups. Enhanced partnerships between the private and public sectors will optimize integrated land and water management practices in the country and especially in four demonstration projects, covering an area of 11.274 ha, with the aim of enhancing and generating global benefits for biodiversity. Given that an island represents a single landscape unit, cross-focal synergies will be capitalized. The GEF incremental contribution to this Project will assist Antigua and Barbuda to **i)** Set up an Environmental Information Management and Advisory System that directly addresses cross-sectoral integration, planning, decision-making and awareness; **ii)** Develop a Strategic SIRM Implementation Plan; **iii)** Realign and strengthen policy, legislation and institutional capacity to support the SIRM Strategy; and, **iv)** Implement the SIRM approach through operational application and by the use of selected on-the-ground demonstrations at targeted hotspot areas. This a four year Project requiring approximately $3 million of incremental assistance from GEF.

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Acronyms

APUA	Antigua Public Utilities Authority
CBA	Cost-Benefit Analysis
CBD	Convention on Biological Diversity
CCA	Caribbean Conservation Association
CBH	Central Board of Health
CEHI	Caribbean Environment Health Institute
CHA	Caribbean Hotel Association
CITES	Convention on International Trade of Endangered Species
CLME	Sustainable Management of the Shared Marine Resources in the Caribbean Large Marine Ecosystem and Adjacent Regions (GEF project)
CMS	Convention on Migratory Species
CNWH	Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere
DCA	Development Control Authority
EAG	Environmental Awareness Group
ECEMS	Eastern Caribbean Environmental Management Strategy
EIA	Environmental Impact Assessment
EIMAS	Environmental Information Management and Advisory System
ESDU	Environment and Sustainable Development Unit, OECS
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information Systems
GoAB	Government of Antigua and Barbuda
IABIN	Inter-American Biodiversity Information Network
IEA	International Environment Agreement
IRF	Island Resources Foundation
IUCN	International Union for Conservation of Nature and Natural Resources
IWCAM	Integrated Watershed and Coastal Management (GEF/UNDP/UNEP Regional Project for the Carib.)
IWRM	Integrated Water Resources Management
LBS	Land-Based Sources (of marine pollution)
LDC	Least Developed Country
MACC	Mainstreaming Adaptations to Climate Change (GEF Caribbean Project)
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)
MEA	Multilateral Environment Agreement
MPA	Marine Protected Areas
NAP	National Action Plan
NEMS	National Environmental Management Strategy
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental Organization
NPA	National Parks Authority
OECS	Organization of Eastern Caribbean States
PAHO	Pan American Health Organization
PDF	Project Development Fund
SGD	St. George's Declaration (of the OECS)
SIDS	Small Island Developing State(s)
SIRM	Sustainable Island Resources Management
SPAW	Specially Protected Areas and Wildlife Protocol (of the Cartagena Convention)
STC	Inter-American Convention for the Protection and Conservation of Sea Turtles
TRG	Technical Review Group
UNCCD	United Nations Convention on Combating Desertification
UNCLOS	United Nations Convention on Law of the Sea
UNDP	United Nations Development Programme
UNFCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organization

SECTION 1: ELABORATION OF THE NARRATIVE

PART I: Situation Analysis

Context and Global Significance

BACKGROUND TO PROJECT

1. Small islands are economically vulnerable as a result of their dependence on outside sources of fuel, food and income generation related to employment. This vulnerability is exacerbated by on-going trade liberalisation and general economic and social globalisation. The physical isolation of small islands in the geographical sense also internalises their dependence on a limited quality and quantity of products and services within a limited land and coastal area. Important ecosystem services upon which islands are critically dependent include biodiversity, fisheries, energy, landscape values, freshwater, vegetation cover, and traditional ecological knowledge. Insularity leads to an obvious strengthening of the linkages between island ecosystem functions and services, and people[1]. These strong linkages can represent a serious threat to ecosystem functions and natural resources where these functions and resources are heavily exploited yet insufficiently valued to warrant focused efforts toward their sustainable management and maintenance

2. The small island state of Antigua and Barbuda supports a range of globally and regionally significant terrestrial and marine habitats and species. Inadequate conservation, planning and management of this small island state's important, yet limited, resources has resulted in both a loss of species diversity and degradation of the functionality of the island ecosystem. During the colonial era watersheds were denuded of native forest and scrubland vegetation. These impacts have been compounded by unsustainable agro-pastoral practices agro-chemicals, overgrazing and uncontrolled fires), the introduction of invasive species, unregulated fishing and sand mining, as well as *ad hoc* coastal and urban construction for residential and tourism developments. The islands are subject to highly variable climatic conditions and hurricanes which damage both key habitats and infrastructure. Land degradation and loss of ecosystem functionality has already reduced the islands' capacity to sustain and provide basic needs (water resources, food security, etc) and increased its vulnerability to changes in climatic conditions. Ensuring the long term stability and sustainability of resources and ecosystem function, integrity, and health to secure their continued contribution to the economic development of these islands, especially in the face of global climate change, demands a comprehensive cross-sectoral ecosystem approach to the management of island resources.

3. Although there is growing awareness of the need to ensure landscape integrity, the necessary trade-offs could be a source of conflict, particularly in the absence of adequate valuation of ecosystem services and functions and integrated management approaches. Conflicts already exist between resource users over land (protection versus development) and water resources (e.g. domestic, industrial and environmental flow). The prioritization of ecosystem functions and sustainable resource management to meet international commitments as well as emerging national legal requirements is creating further conflict with the existing traditional use of land for agriculture, recreation and tourism, building of private residences, sand-mining for construction. Furthermore, the future potential use of land for further economic development (e.g. recreation industry, tourism and more intensive agriculture) is also a source of conflict with the same shift in priorities in favour of environmental issues and sustainable island ecosystem management (e.g. mandatory EIAs, stricter building controls and environmental regulations). Likewise, this is true in relation to coastal and marine related livelihoods and potential future economic development related to marine resources. There is clearly a need to identify a state-of-balance between potential competing needs and to recognise and highlight the actual complementary nature of both aims.

[1] After the 'Millennium Ecosystem Assessment' Chapter 23 – Island Systems

4. This Project will aim to develop a **Sustainable Island Resource Management** approach for Antigua and Barbuda. Such an approach considers the whole island ecosystem and its marine and terrestrial resources as a capital asset which, if properly managed and protected, will continue to yield a flow of vital goods and services (water, productivity, physical shelter, adaptive capacity and resilience, and aesthetics) necessary for sustainable economic development. Such an approach recognizes the value of and hence the need to conserve the biodiversity and associated natural resources and the efficacy of the island ecosystem functions within a landscape that also protects individual livelihoods, provides a fair quality of life and expands opportunities for economic development. Additionally, by improving the management and sustainable use of resources and alleviating the multiple stressors on the environment, the island's natural capacity (i.e. resilience) to withstand climatic variability and/or adapt to changes in the global climate will be restored and maintained. Adopting such an approach requires a cohesive streamlined institutional framework supported by appropriate legislation that promotes inter-sectoral stakeholder participation in the decision making process, thereby facilitating adaptive co-management and maximizing efficient use of the limited human resources. This Project intends to demonstrate how the longer term benefits accrued by the shifts in priority toward maintenance of ecosystem functions, sustainability of natural resources, properly planned economic growth and the protection and diversification of livelihoods will ultimately result in positive trade-offs in comparison to a business-as-usual scenario.

5. As part of the project preparation phase, supported by a GEF PDF-B grant, a status of the environment report was produced that summarised the problems relating to sustainable island ecosystem management (http://www.environmentdivision.info/reports/pdf/Preliminary-Report-SIRMM.pdf). This report helped to define the **Background** and elaborate the **Situation Analysis**.

GEOGRAPHICAL ENVIRONMENT

6. The island state of Antigua and Barbuda, which includes several small nearshore islands and the uninhabited island of Redonda 40 km south west of Antigua, is situated in the eastern arc of the Leeward Islands, in the Caribbean (see Map 1 – separate attachment) The islands are the emergent parts of the Barbuda bank[2], which is one of the largest sub-marine platforms in the Eastern Caribbean (spanning 3,400 sq. km) with water depths ranging from 27 to 33 m. The islands themselves cover a total land area 440 sq. km, and are generally low lying, surrounded by white sand beaches, wetlands and mangroves, shallow water coral reefs and seagrass beds. Antigua occupies an area of 280 sq. km while Barbuda is approximately two thirds this size occupying 160 sq. km and Redonda is 1.3 sq. km.

7. Antigua has three distinct geological zones that traverse the island diagonally (northwest to southeast): the hilly volcanic region in the south west, the flat central plains, and the limestone hills and valleys in the north east[3]. The highest topographical point on Antigua is Boggy Peak in the south west with a maximum altitude of 405 m. Barbuda is flatter by comparison with a maximum altitude of 40 m and average elevation of 4 m above sea level. The island is entirely formed from coralline limestone and there are three geological zones: the highlands limestone region, the Codrington Limestone region, and the Palmetto Point Series, which overlays the other formations in coastal areas. Redonda, by comparison is a steep sided basaltic island that rises directly to nearly 300 m above sea level.

8. The islands are subject to a tropical maritime climate with alternating periods of drought and periods of heavy rains that coincide with the tropical hurricane season. The islands are in the path of the north-east Trade Winds and fairly steady winds blow off the Atlantic from the NE to the SE. The dry cool season occurs between January to April and wet season between September to November when wind speeds are generally

[2] Harris (1965)
[3] Martin Kaye (1959).

lower. While the variation in daily or seasonal air temperatures[4] and humidity is relatively small, precipitation can be highly variable, and these islands often experience severe droughts (approximately every 5-10 years).

9. Rainfall on Antigua is 1050 mm per annum on average [5] and tends to be lower in the flatter eastern and northern regions and higher in the mountainous south west. Barbuda is drier than Antigua with annual average precipitation of 750 to 900 mm. Most rainfall is received in short intense showers much of which simply runs off the islands.

10. Antigua is divided into 86 watersheds. However, for the purpose of land use and water resource planning the island is aggregated into thirteen (13) watersheds. Six of these 13 watersheds have been identified as major catchments based on socioeconomic and agro-ecological conditions. There are no permanent streams, and stream flow in the various ghauts and valley bottoms is short lived and occurs after rainfall events, when some sections may flow for periods of a few months. All the major catchments are dammed at several points to retain stream-flow. However, the according to the definitions used by the United Nations Convention on Combating Desertification (UNCCD), the precipitation and evapo-transpiration rates would place most areas of Antigua and Barbuda within the wetter end of semi-arid or dry sub-humid environments and the main issue of concern on Antigua and Barbuda is land degradation.

11. Hurricanes and tropical storms have been much more frequent (and have caused more damage) in recent years. Since 1995, five serious hurricanes and several tropical storms have resulted in significant damage to infrastructure, as well as to the natural environment vegetation and coastal features such as beaches and reefs. Hurricane Luis in 1995 caused major damage and emphasised the need for better designed and constructed buildings and other infrastructure. In 1999 Hurricane Lenny caused damage to coastal roads that were blocked with landslides while ghauts became raging torrents of water and sediment. The impact was so great that it was sufficient to completely change the land form in some valleys. Antigua experienced over 250 landslides during the passage of Hurricane Lenny, most of which started on the steepest slopes and carried soil, rocks and vegetation with them.

12. Negative climatic influences on the islands' ecosystem functionality and biodiversity are likely to worsen as the anticipated global changes increase climatic extremes. Evidence from instrumental records, proxies, models and ice cores all indubitably show the human-influence on the destabilisation of the global climate[6]. Sea temperatures are predicted to increase further over the next 100 years by between to 1.4-5.8°C[7] (depending on the climate model used). Increases in temperature will be accompanied by a predicted increase in sea level, carbon dioxide (CO_2) levels and UVB radiation. These changes may threaten the future survival of corals, and hence reefs and their associated species that depend on these habitats for shelter and food. Mean sea level may rise between 9 cm up to 88 cm between 1990 and 2100, due to the thermal expansion of water and melting of ice caps, and this may submerge shorelines, as well as coastal and low lying terrestrial habitats. In addition the frequency and ferocity of tropical storms and hurricanes may increase along with the amount of associated rainfall which may threaten the integrity of both coastal and watershed ecosystem functions on the islands. The need to maintain the protective function of natural features such as reefs and coastal wetlands becomes all the more significant in the light of these figures and predictions.

BIOLOGICAL ENVIRONMENT

13. A survey of the world's biodiversity hotspots identified the Caribbean region as one of the highest priorities in any global strategy for biodiversity conservation and sustainable management[8]. The Caribbean islands are recognised for their high levels of endemism and intense species packing per unit area combined

[4] Average monthly minimum temperatures range from 22.4°C in February to 25.4°C in August, while monthly maximum temperatures range from 27.9°C in February to 30.5°C in September

[5] From V C Bird Airport for the period 1960-1999

[6] Levitus et al. 2000, 2001; IPCC 2001

[7] IPCC 2001

[8] Mittermeier, R.A., et al. *Hotspots: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions*. CEMEX and Conservation International. pp. $30. ISBN 968-6397-58-2.

with a high degree of threat[9], and should therefore be considered high-priority biodiversity hotspots that deserve immediate attention from the global community. In another recent study the Lesser Antilles was recognized as a distinct ecoregion and ranked highest priority in need of conservation status (most threatened)[10]. Furthermore, the Lesser Antilles ranks seventeenth on Birdlife International's Critical Priority Areas for Global Conservation. The unique biodiversity of these islands is due to their geographic isolation and environmental conditions, and as the largest of all the Leeward Islands in the Lesser Antilles, Antigua and Barbuda should be further prioritized for protection. In support of this the Leeward dry forests of Antigua and Barbuda have been recognised as regionally important, the Leeward xeric scrub as outstanding, and the mangroves as significant. Moreover all have been designated as being at critical risk.

14. The islands support a wide range of globally important terrestrial and marine habitats including lowland tropical forests, xeric formations and montane forests, sand beaches, mangrove forests, lagoons, sea grass beds, coral reefs[11], etc. and these critical habitats all support a wide variety of other species (as both breeding, feeding and nursery grounds). However, despite the globally significant biodiversity, at present the majority of Antigua and Barbuda's critical habitats remain without protection. There is only one fully designated terrestrial protected area in Antigua and Barbuda (Nelsons Dockyard National Park under the National Parks Act of 1984), although there is a preliminary list of 8 proposed terrestrial sites (see Annex 1). There are two marine parks, one on each of the main islands. Diamond Reef Marine Park (2000 ha) was established off the northwest coast of Antigua in 1973, and Palaster Reef Marine Park (500 ha) is located off the southern tip of Barbuda. Neither of these areas is presently administered or managed as a protected area. A fairly significant marine reserve has been proposed and approved to the south of Antigua at Cades Reef but assistance is needed to finalise the zoning and management plan. Another larger marine reserve is planned for the northeast coast and offshore islands, which supports a number of endemic species and is under tourist pressure. More recently, Codrington Lagoon in Barbuda has been designated as a National Park.

15. Terrestrial vegetation coverage on Antigua is largely secondary growth and only a few areas of primary native growth remain mainly in the mountainous south west region. Barbuda retains significant amounts of native forest which consists mainly of evergreen bush forest (mixture of white cedar, loblolly, cinnamon, bearded fig and shrub species). Between these islands there are 54 vegetation communities, of which 16 are listed as rare, 26 as uncommon and 12 as common. There are 1158 species (149 families) of plants, 45 species of ferns (5 families), including 4 species of gymnosperms (3 families) and 1109 species of angiosperms (141 families). There are over 190 species of flowering plants species worthy of "special conservation concern", 22 of which are identified as endemic to the Lesser Antilles (one of which, *Pectis ericifolia* is endemic to Barbuda), 73 are classified as rare, and several may now be extinct.

16. There are 36 mangrove sites between these islands (estimated total area 49 sq. km) with 4 main species: Red Mangrove (*Rhizophora mangle*), Black Mangrove (*Avicennia nitida*), White Mangrove (*laguncularia racemosa*) and Button Mangrove (*Conocarpus*). The coast of Antigua is markedly indented with numerous islets, creeks and inlets and associated sand bars and wetlands at their inland end. Well-developed mangrove woodlands are found in Parham Harbour, Fitches Creek, and Guiana Island in the north west and at Ayres Creek. Barbuda's outer coastline is less varied than Antigua but the island encompasses Codrington Lagoon, which is a large semi-enclosed salt water lagoon bordered by some of the most extensive mangroves to be found in the Eastern Caribbean[12]. Mangrove wetlands provide the transition for freshwater exiting from the watersheds and its entry to the sea. Several major wetlands have been removed for tourism developments in the last 20 years. Mangroves have also been impacted by drought, which makes them less able to cope with these other stresses, and from the chemical leachate from the main solid waste disposal site in the Creekside watershed.

[9] The Caribbean now maintains only 11.3% of its original biological habitat.
[10] The Nature Conservancy, *Setting Geographic Priorities for Marine Conservation in Latin America and the Caribbean*
[11] Bacon 1984
[12] World Resources Institute, 1987

17. Antigua is bordered by fringing and patch reefs on the east, north and south coasts, and Barbuda has fringing reefs along the eastern shoreline. Other patch reefs occur between the two islands and the total area of reef is estimated to be 25 sq. km. The coral reef systems are important to the country's fisheries and tourism sectors, as well as providing vital coast protection against storm surges and hurricane-related wave systems, but there been a dramatic decline in their status in the past few decades. Marked declines in coral reef health have been observed, particularly on the North Coast of Antigua[13] and coral cover has declined by 8% to 22%o over the last decade[14]. While hurricanes damage is partly responsible, the overall decline in reef health has been attributed to the cumulative affects of human and natural impacts rather than any single catastrophic event. Indeed, the decline is most likely to be the result of increasing sediment loads as an indirect result of land degradation and drought, loss and removal of mangroves, and a direct result of anchor, storm and hurricane damage, as well as natural disease, coral bleaching and predation. There is a need for a comprehensive coral reef monitoring programme to aid in identifying negative trends in coral diversity, distribution and associated species numbers, and to assist in effective management of coral reefs around the islands.

18. Seagrass beds are common in shallow coastal areas around both islands and are an important nursery area for juvenile fish and invertebrate species, as well as binding together highly mobile sands and sediments. The seagrass beds have not been studied in detail; however, declines have been observed in the beds on the Northern coast of Antigua during the 1980s[15]. The country's tourism sector has grown at a rapid pace since then and acres of seagrass beds may have been removed for the creation of sandy beach areas. There is a need for a comprehensive programme to monitor the health of seagrass beds around Antigua and Barbuda and to document the species of fauna that are commonly found in these areas.

19. Antigua and Barbuda is well known for its magnificent white sandy beaches and these have been the focus for the majority of tourism developments. Many of these beaches also serve as a critical habitat for endangered marine turtles including the Green turtle *(Chelonia mydas,* CITES-Appendix I, IUCN-EN), Hawksbill Turtle (*Eretmochelys imbricata* CITES-Appendix I, IUCN-CR) and Leather Back turtle (*Dermochelys coriacea* CITES-Appendix I, EN). The peak turtle nesting seasons is during the summer months and extends through to early fall (October/November)[16]. The 1992 Sea Turtle Recovery and Action Plan (STRAP) reported some forty three known nesting beaches on Antigua and 13 on Barbuda. Many of these are adjacent to privately owned lands and almost all have some level of development. Beach erosion and sand-mining also pose significant threats to nesting sea turtles as they can lead to decrease in the availability of appropriate nesting sites.

20. Although the islands are relatively depauperate in terms of *absolute* numbers of species, they support a significant variety of restricted-range species and endangered terrestrial and marine fauna, while the isolation of the islands leads to higher levels of endemism than for comparably-sized continental areas. Such species include the Wood Tortoise *(Geochelone carbonaria,* CITES-Appendix II) and Queen Conch (*Strombus gigas* CITES-Appendix II). 20 terrestrial reptile species and sub-species have been recorded - 4 of which are extinct. The Racer Snake (*Alsophis antiguae*), is considered one of the rarest snakes in the world and now only exists on Great Bird Island. Other endemic reptiles include: Antiguan Ground snake (*Alsophis antillensis antiguae*), Dwarf Woodslave (*Sphaerodactylus elegantulus*), Green lizard (*Anolis bimaculatus leachi*), Lizard (*Anolis wattsi wattsi*), Lizard (*Anolis nubilus*), Ground lizards (*Ameiva griswoldi* and *Ameiva pluvianotata atrata*) the latter of which is endemic to Redonda.

21. There are 182 species of birds, 20 of which are considered endemic to the West Indies sub-region, and in some cases, are restricted to the Lesser Antilles. The Broad-winged Hawk (*Buteo platypterus insulicola*) and Adelaide's Warbler (*Dendroica adelaidae*) are endemic to Antigua and Barbuda. There are also several habitats considered critical to maintaining the diversity of bird species. Species that depend on wetland

[13] Weiss 1989
[14] Multer 1996
[15] Weiss 1989
[16] Fuller et al. 1992

habitats and which are considered to be at risk include: Black-crowned Night Heron, West Indian Whistling Duck, White Cheeked Pintail, Ruddy Duck, Masked Duck, Clapper Rail, Caribbean Coot and the Magnificent Frigate bird. With respect to the Moist Forest, the Bridled Quail-Dove and the Humming Bird are considered to be at extreme risk. Redonda, and many small islands off the Antiguan mainland, especially those in the North Sound, provide critical nesting habitat for several seabirds. These critical areas need to be given high conservation priority in the country.

22. As is the case on many islands, a number of species have been introduced onto Antigua and Barbuda and this has resulted in extinctions of native or endemic species through competition, predation, diseases and hybridization. The invasive species of the most significance in Antigua/Barbuda is the Indian mongoose (*Herpestes javanicus*) which was introduced to destroy rat populations. The mongoose population rapidly increased and it became a serious pest to reptile and bird species. Another introduced species, Lemon Grass (*Cymbopogon citratus*), has caused a significant alteration to the natural habitat, and poses a serious threat to native forests. The problem is two-fold in that existing grass itself represents a threat while the cultural practice of setting the grass alight increases the threat. The grass is adapted to fire, and setting the grass alight creates the conditions for its further expansion by destroying the peripheral vegetation and preparing the site for seed germination and the subsequent growth and expansion of the grass as it out competes native vegetation.

23. These important habitats and their associated species are not only important in their own right for supporting globally significant biodiversity, they are also part of an ecologically interlinked system that provides Antigua and Barbuda with the island life support functions, which are, in turn, directly linked and essential to a successful and sustainable economy. Individually each of these habitats provides services that are of direct benefit to the national economy. Forested watersheds assist in the retention of soils and maintenance of water resources. Coastal habitats (such as mangrove, wetlands, shallow seagrass beds and nearshore coral reefs) provide shoreline defences and filtration systems that reduce the impact of suspended sediment in the coastal environment. Moreover, the interactions between these key habitats (i.e. forests, watersheds, wetland systems, coastal habitats) are all inextricably linked through such parameters as hydrology, sedimentation, water retention, feeding and breeding grounds, and protective functions. Maintaining the interactive functionality of these systems is therefore a fundamental requirement both for the long term sustainability of the island ecosystem and for the continued economic welfare of the island communities as a whole.

SOCIO-ECONOMIC ENVIRONMENT

24. All the island states of the Eastern Caribbean are generally suffering from economic vulnerability in terms of their dependence on external economic conditions, imports (especially energy) and limited trade and export, with an inordinately high dependence on the tourism sector to sustain their GDP. Antigua is no exception and is probably more dependent on externalities than many of the other SIDS. Consequently market fluctuations and the unpredictability of climatic events and disturbances create a delicate situation that tends toward increasing economic vulnerability.

25. Attempts to adjust and transform the SIDS to face the changes of the new global economy are a serious challenge. Foremost among these challenges are the development of capacity to achieve competitiveness and to maintain economic growth in the face of external conditionalities, while at the same time striving to improve social and human development condition and to reduce poverty. In aligning themselves to meet these challenges, the productive and manufacturing sectors have not fared well, and in areas of technological and human development, island such as the OECS countries continue to lag behind.

26. Antigua and Barbuda became independent in 1981. It is governed by an elected parliament with elections every 5 years. Executive authority is vested in a Cabinet of approximately 10 Ministers headed by a Prime Minister. This small island state has a long history dating back to pre-Colombian times. The islands were

colonized by the British and developed and utilised for different purposes. Subsequent development continued at different rates and the relative level of impact on terrestrial and marine resources increased accordingly. Sugar cultivation was the main economic activity on Antigua during the colonial era and the island was cleared of native scrubland and forest vegetation from all but the upland areas in the south-west where much of the land was unsuitable for sustainable production because it was too steep and only had shallow soils. One result of this was the loss of significant amounts of topsoil that would take geological time scales to recover. Following the collapse of the sugar industry in the 1970s, the livestock industry, particularly the rearing of cattle, achieved prominence on Antigua. Growing populations of ruminants were allowed to roam freely in the watershed areas, devouring what remained of the already sparse vegetation. Today the primary economic driver is the tourism sector providing 81% of national GDP, with associated sectors such as trade and construction also making a significant contribution.

27. Barbuda was not cultivated on a large scale due to the indifferent soil quality and low rainfall. Instead the mainstay of the economy was game and livestock and subsistence farming that provided supplies to the plantations on Antigua. Only a small proportion of the island was cultivated and, while larger trees were cut down and used for house and boat construction, much of the island remained wild although impacted by overgrazing by sheep, goats, horse, deer and pigs. Today Barbuda remains much as it was over 200 hundred years ago, with a population density that is considerably lower than Antigua's. The main economic activities include sand mining and tourism, although the latter is still in its infancy. The barren dry island of Redonda was mined for guano derived phosphates and for variscite ore (peroxide of iron, alumina and phosphoric acid) found layered between the basalt. The ore was mined by blasting from the top down and by the 1890s the upper layer of the island had been removed. Mining was restricted to the northern edge of the island. Mining ceased on Redonda just after the First World War and the island has remained uninhabited ever since.

28. Antigua and Barbuda currently ranks 60 (out of 177) in the UNDP Human Development Index[17], which although below other countries in the Caribbean such as the Bahamas (50) and Trinidad and Tobago (57), is moderately high by comparison with many other OECS islands, such as Dominica (70), St Lucia (76) and St Vincent (87), and second only to St Kitts and Nevis (49)[18]. The population of the whole island state was only 72,000 in 2003 which makes it one of the smallest countries in the world in terms of population size. The islands have an average population density of 152 per sq. km, which is somewhat lower than the OECS average, due mainly to the low population density of Barbuda (about 7 per sq. km.). The average population growth rate for 2000–2005 was 0.69%, with the projected population for the year 2015 at 76,000. It is estimated that 34% of the population lives in the capital city, St. John's (population of 25,000 in 2003)[19] and that the urban population will be 43% by 2015. In 2002 it was estimated that 91% of the population have improved access to fresh water and 95% has access to improved sanitation, which is mainly through the use of septic tanks as there are no municipal sewage disposal facilities. In 2003, the Gross Domestic Product was US$759 million and Gross Domestic Product (GDP) per capita was US$10,123. The percentage contribution of the various sectors of the economy to the GDP in 2003 is shown in Table 1. More specific details regarding the operational nature, management and threats to and from each sector are discussed in greater detail under subsequent sectoral headings below.

TABLE 1: PERCENTAGE CONTRIBUTION OF THE VARIOUS SECTORS OF THE ECONOMY TO THE GROSS DOMESTIC PRODUCT (2003)

Sector	Contribution to GDP (%)
Agriculture	3.7
Crops	1.0

[17] Human Development Report for the Organization of Eastern Caribbean States (OECS) *Building Competitiveness in the Face of Vulnerability* (2002) http://www.oecs.org/webdocs/OECSHDR.pdf
[18] UNDP Human Development Report 2005.
http://hdr.undp.org/reports/global/2005/pdf/HDR05_HDI.pdf
[19] Population Reference Bureau

Livestock	0.8
Forestry	0.1
Fisheries	1.9
Hotels & Restaurants	9.9
Construction	14.0
Electricity & water	2.9
Banks & Insurance	9.5
Transport	11.9
Communications	8.0
Trade	10.0
Real Estate & Housing	7.2
Mining & Quarrying	1.7
Government Services	18.4
Other Services	7.3
Manufacturing	2.3
Less: imputed banking services	6.9

29. A census carried out in 1985 identified types of land utilization and vegetation in Antigua. It showed that there were some 3183 ha of crop land and improved pasture; 9767 ha of rough grazing and mixed scrub/rough grazing; and a further 9569 ha of woodland. Swamps, mangroves and beach sand occupied 876 ha. Urban areas, industrial sites, tourism related uses (hotels, golf courses, historical sites, etc.) and airports occupied a total of 3225 ha. Since this survey, there has been considerable expansion of some rural settlements, which then occupied only 763 ha. This figure could well have doubled with the housing construction programmes of the last ten years. In Barbuda, less than 1 per cent of the land area is occupied by human settlement and related uses (109 ha). Dry forest areas occupied 7,900 ha and swamps and mangroves a further 3,729 ha, most of which is contributed by the Codrington lagoon.

30. Agriculture now contributes only 3.7% to the country's GDP compared to 40% prior to the 1960s and the subsequent collapse of the sugar industry. Nevertheless it is still one of the largest employers despite the small contribution to GDP. Sugar is still cultivated, and other vegetable and fruit crops are grown on small farms, but sea-island cotton is the only profitable export crop. This sector has been constrained by high labour costs, small size of local market, lack of marketing structures and infrastructure, competition from imported foodstuffs, and inadequate water supplies for irrigation as well as a regular succession of severe droughts and destructive hurricanes, and limited land tenure rights. Another of agriculture's constraints is the negative legacy of slavery and plantation agriculture, which continues to exert its effect on public perceptions and agricultural policies.

31. Land tenure is a further social issue which impacts on SIRM. Approximately 30% of land on Antigua is potentially arable, the majority of which is under government control following the demise of the sugar industry, yet only 18% of this land is in active use. Farmers typically rent land from the government or from private land owners on an annual basis. Plots of up to 2 ha can be leased out under the authority of the Agricultural Extension Division. Plots over 2 ha are the responsibility of the Lands Division. If leases are granted then they are usually only for a period of 5 years. Long-term leases of 25 years are available, but the application process is time-consuming and costly. These arrangements discourage farmers from investing in appropriate technology and irrigation and this has curtailed expansion. Meanwhile idle potentially productive agricultural land is lost to other interests such as development and tourism. The realisation of an overall vision for the long term sustainable development of the island necessitates the evolution and adoption of a zoning plan and improvements to land tenure rights.

32. The fisheries sector contributes over half of the agricultural GDP[20]. The fisheries sector is generally small-scale and artisanal in nature, and employs 2% of the nation's population. Most fishing is for local consumption, as Antiguans consume more fish per capita per year live weight (46 kg/101.4 lb) than any other nation or territory in the Caribbean. In 2003 the Fisheries Division recorded 695 fishing vessels, 292 of which were found to be actively fishing. The primary species targeted by the relatively small fleet of active fishing vessels includes a variety of demersal fin fish species, as well as *Panulirus argus* (Caribbean spiny lobster) and *Strombus gigas* (queen conch). The country also has a fairly active sport fishing fleet, which targets pelagic species such as wahoo, mackerels and tunas. There are shrimp and lobster farms, and the Smithsonian Institution has a Caribbean king crab farming facility for the local market. Fin-fish landings in 2000 were 1,481 tons and the lobster catch amounted to 42 tons. There is a growing export of the lobster to the United States and of some fish to Guadeloupe and Martinique. Exports of fish commodities in 2000 were valued at US$1.5 million.

33. The tourism sector has been the single most important factor in the growth of the economy of Antigua and Barbuda, and the direct and indirect contribution is currently estimated to be 81% of GDP. The majority of the tourism in Antigua and Barbuda is beach-based. Diving, snorkelling, yachting and other watersports are all popular attractions. The growth in the transport and construction sectors, and indeed the mining sector, are linked to the growth of the tourism industry. Some of the more important developments have been the construction of marinas and boating related facilities in response to the growth of cruise ship tourism. However, some of the growth of the construction sector has also been for reconstruction arising from the hurricane damage.

34. Other sectors have exhibited differing growth patterns. The communication sector has grown sharply since 1997 due in part to the growth of internet services and increased use of cellular telephones. Over the last ten years, and particularly since 1995, there has also been an increase in offshore business (offshore banks, internet based industries in insurance, gaming and betting) that have benefited from the high quality telecommunications. The manufacturing sector's share of GDP has declined steadily from 4.1% in 1988 to 2.3% in 2004, which has been partly due to labour shortages given the faster growth of the tourism sector. High utilities costs have also had a negative effect. Difficulties in accessing regional or extra-regional markets also limit expansion and cost reduction through economies of scale.

35. It is widely agreed that Eastern Caribbean States suffer a high level of economic and environmental exposure and are the most economically vulnerable in the world (in terms of accessibility, export concentration, convergence of export dependence on imported energy and external finance and capital) and therefore must strive for diversification[21]. Antigua and Barbuda's heavy reliance on tourism leaves the island state vulnerable to market fluctuations and recessions as well as the vagaries of climatic disturbances. A series of hurricanes since 1995 damaged the tourist infrastructure and resulted in fewer numbers of visitors. Unemployment on Antigua (estimated at 7.8% in 1998) shifts seasonally due to hotel closures or low occupancy during the off season. Unemployment is higher in Barbuda.

36. Despite minimal increases in population, overall urban population growth, continued expansion of the tourism sector, as well as increased affluence and mobility and smaller family units, have put increasing pressure on the islands' limited resources, and increased demand for most public services and utilities. This shift in the economy has brought new challenges (land clearing, destruction of mangrove swamps, loss of agriculture lands, sand mining, dredging and water pollution).

37. Currently financial support for environmental management is limited. The financial and economic instruments (FEIs) that could generate revenues to support management activities include:

[20] Horsford 2004b

[21] Human Development Report for the Organization of Eastern Caribbean States (OECS). *Building Competitiveness in the Face of Vulnerability* (2004). http://www.oecs.org/webdocs/OECSHDR.pdf

- Tourist Taxes: Hotel tax, guest tax, hotel guest levy and cruise passenger tax revenue amounted to 7% of total tax revenue in 2003 (US $9.88 M). With the exception of cruise head tax tourism taxes are not directly targeted for conservation efforts, and divers are currently not charged.
- Environmental Tax: Includes a bottle tax and taxes on specific goods (stoves, tires, vehicles, etc.). Proceeds from the bottle tax are used for environmental management; the other is added to the government's consolidated fund.
- The National Solid Waste Management Authority (NSWMA): Utilizes a mix of taxes and levies, and the revenue generated is used to assist with the operation and maintenance of the Land Fill Site at Cookes.
- Fines for Pollution: The Central Board of Health (CBH) fines for littering (Litter Act) and for specific pollution (Public Health Act) and revenue generated is used for operation and maintenance costs.
- Entrance Fees to Protected Areas: The National Parks Authority (NPA) charge individuals visiting Nelsons Dockyard and Shirley Heights, for souvenirs and yacht docking charges.
- Port and Docking Charges: Revenues are not targeted for environmental conservation or management.
- Water Tariff: Revenue generated is targeted for operation and maintenance, and none is used for the maintenance of watersheds. Cost of water is currently been subsidized by the APUA. A number of hotels have recently installed private desalination units which have significantly reduced the revenue to the Authority.

38. However, most of the existing FEI's are not designed to generate revenues to finance programmes and projects in environmental management. While the country is still trying to recover financially from 5 devastating hurricanes within the past 10 years it has relaxed taxation to facilitate the necessary reconstruction of homes and businesses. This has left the treasury financially constrained. The Government is, therefore, finding it difficult to finance the necessary rehabilitation of lands degraded by hurricanes let alone other activities. The Soil and Water Conservation Unit has completely halted its water storage and maintenance activities, as well as some aspects of soil conservation work, due to lack of resources. The Forestry and Environment Division have had several delays in the reforestation programs and other activities such as the development of the national database, and the environmental capacity building activities.

39. Government revenues derived from traditional sources such as import duties are likely to diminish substantially as the requirements of membership in the WTO are implemented. Real revenues from tourism have already suffered from the move by several of the largest hotels to the "all inclusive" mode. Cruise ship tourism brings large numbers of visitors but these only stay for a few hours before returning to their own "all inclusive" ship. There is therefore little prospect in the short term for government revenues available for natural resources management to increase significantly in the near future. At present the prevention of land degradation is predominantly a private sector driven effort as private landowners and farmers are beginning to address rehabilitation and prevention of land degradation. Meanwhile the government is still struggling with its responsibilities on Crown Lands. The proposed Project will investigate suitable mechanisms to internalize the costs of environmental and resources management and protection.

AGRICULTURAL SECTOR

40. The soil resources of Antigua and Barbuda were described in detail following the soil survey carried out by the Regional Research Centre of the University of the West Indies in the early 1960's and mapped at 1:25,000 scale. The deeper marl soils and the alluvial soils of the volcanic area of Antigua are the most productive soils for agriculture and will support production of a range of vegetables and tree crops. Water remains the biggest limitation to agricultural production. Details of soil classifications are given in Annex 2.

41. Centuries of unsustainable agricultural practices, particularly those related to the sugar industry, have reduced the fertility of limited agricultural land and primed soil erosion trends, leading to land degradation and the loss of watershed functions. Despite this, agricultural production and management systems,

influenced by the islands' history of plantation agriculture and climate, as well as by recurrent droughts, exhibit acceptable good soil and water management strategies. A small core of medium sized farms (5 to 15 hectares) have developed efficient, mechanized production technologies and have demonstrated the potential to produce high quality produce competitively. Few steep lands are cultivated, and mixed cropping practices are applied on over 90% of the farmland. Crops are rotated, and there are weed fallow periods (drought periods also frequently translate into fallow periods). These and other good practices have resulted in considerable reduction in soil degradation. Overall, production is good for a country with poor soil quality, low annual rainfall and very limited access to international markets. However, pollution from inorganic fertilizers and pesticides results from high levels of application and there is no adequate monitoring of impacts. Integrated pest management is a national government policy, but inadequate funding has constrained implementation. Antigua reportedly imports more agro-chemicals than any of the other Leeward Islands giving rise to concerns about possible contamination of water resources, through chemical wash or percolation[22].

42. Vegetative cover is affected by the traditional use of fires to clear and prepare land. The traditional preference for slash-and-burn techniques to prepare lands for planting and encourage new growth contribute to the lost of over 0.5 km^2 of grasslands and woodlands every year. The limited forest resources continue to decline due to the continued traditional use of wattle (for fish traps), cedar and mahogany trees (for house and boat building) and charcoal (for cooking).

43. The issue of uncontrolled fires is compounded by the invasive Lemon Grass species (*Citronella* sp.). The grass was introduced in the 1960s to control soil erosion, but it has spread over vast tracts of land in several of the main watersheds and is now a major factor contributing to soil erosion. The grass is burnt to promote new, more palatable re-growth for livestock and to a lesser extent to clear land for cultivation. Many fires are, however, set for no obvious productive motive. These fires often spread out of control with devastating effect on the surrounding remnant natural vegetation. Lemon grass is adapted to survive fires and therefore out-competes native ground cover species. When the grass is burnt it re-grows in clumps and leaves a significant amount of bare soil exposed to wind and water damage.

44. A significant constraint to more widespread adoption of sound agricultural practices is the current tenure system that deters farmers from investing in needed infrastructure to ensure continuous water supplies or marketing systems. Government land policies have helped to keep farms small, with insecure land tenure and plots separated from the farmer's home. All these factors have tended to encourage many who are educated, enterprising and with money, to invest to seek areas other than agriculture as a means of livelihood. Although approximately 30% of land on Antigua is potentially arable, only 18% of this land is in active use. Most of this land is under government control following the demise of the sugar industry, and farmers typically rent land from the Government, usually for periods of up to 5 years, with little security of tenure. Rental agreements of up to 25 years are possible but extremely time-consuming to arrange and heavy in paperwork. This discourages long term investments in soil and water conservation techniques needed to expand the sector and enhance productivity. Many smaller holdings suffer from limited ground water availability, droughts and insect pests, or unfertile depleted soils. Short term solutions to enhance productivity and compensate for the poor soils include growing higher-yielding varieties in preference to traditional, more naturally pest-tolerant crops and the increased use of pesticides, herbicides and fertilizers.

45. Livestock production, which accounts for over 5% of GDP and is an important source of local protein, is characterized by unsustainable practices. Uncontrolled grazing of livestock (sheep, goats, donkeys and cattle) affects vegetative cover. This is widely perceived as one of the country's leading environmental problems. The end of sugar-cane production in the early 1970s resulted in large tracts of land becoming idle. In the absence of enforcement of regulations, a practice emerged whereby the majority of livestock were owned by persons who had no, or at best very little, land on which to raise their animals. Animals were allowed to graze the considerable areas of idle lands vacated by the sugar corporation. In the case of goats, because of

[22] There has been at least one incidence of a fish kill at Potworks Reservoir, the cause of which was not confirmed, but agro-chemical poisoning was strongly suspected

their more diverse feeding habits, the "pasture" areas expanded to encompass much of the scrub and forested watershed lands. There has been very little control on population sizes, except that exerted by natural causes. For many farmers the size of the herd has important cultural significance. Economically, a herd is important not only in terms of productivity but because it is regarded as a "fixed deposit" to be used in times of need as a source of capital. For these "landless" livestock owners, the inputs for maintaining this living "fixed deposit" are supplied by utilization of public (and in some cases - private) land. The owner bears very little of the cost. There is therefore little economic constraint on increasing the animal population. Details of the animal numbers identified by parish in 2002 can be found in Annex 2.

46. There is growing recognition that this practice is not sustainable, especially as urbanisation is increasingly removing available land from use as pasture. Currently, legislation and a registration system for animals, including tagging, is being prepared. However, given the pressure on the land resource base, it is likely that more intensive production systems will have to be introduced in order to maintain sufficient production of animal products on fewer acres of land. An intensive or semi-intensive system, defined in accordance with soil types, climatic conditions and topography, is an important option for the country to explore.

FISHERIES SECTOR

47. Much of the fishing effort is concentrated in the near shore or on the bank between the islands, with relatively few fishers travelling to further fishing grounds (e.g. Nevis and Saba Banks). The government has encouraged modern fishing methods and supported mechanisation and the building of new boats. However there is relatively little information available about the status of these fisheries, particularly the Conch and Lobster fisheries. This lack of information is a concern in itself as there has been consistent uncertainty as to whether the stocks are being over –exploited. This concern is now being addressed through a separate GEF project *Sustainable Management of Shared Living Marine Resources of the Caribbean Large Marine Ecosystem and Adjacent Regions*. The proposed SIRM Project will coordinate closely with this other GEF initiative to ensure synergies are captured between relevant land and marine issues and concerns. This is discussed further under the section on **Baseline** below.

TOURISM SECTOR

48. Tourism is mainly beach-based and this raises conflicts between developers and the need to protect and conserve the islands' natural filtration systems provided by the wetlands and mangroves. Wetlands are frequently adjacent to tourist sites and the land is eagerly sought by developers. The price of the land does not reflect their true value as critical habitats (for fisheries, migratory birds, and for coastal protection). Over the past 25 years, there has been an unprecedented increase in *ad hoc* hotel and residential developments. As well as contributing to the removal and loss of critical wetland habitats, the increase in construction activities are the cause of other damaging resource use patterns including: the removal of natural vegetation and introduction of exotic species, shoreline modifications and alteration of beach habitats, increased sand mining, increased dredging and physical impacts from boating and diving activities.

49. Diving and snorkelling have become increasingly popular activities on the island and approximately 25 000 dives and 100 000 snorkel excursions are made annually in local waters[23]. Many of these snorkelling and diving trips are conducted in large groups with poorly trained guides who do not provide adequate instructions or monitor activities. As a result there are incidences of tourists standing on reefs, bumping reefs, or collecting corals or shells for souvenirs. There are no mooring buoys tourist dive boats and hence the damage caused by anchors is another problem especially at the more popular dive sites.

DEVELOPMENT AND CONSTRUCTION

50. Pressure from the construction industry has resulted in extensive mining of sand from a number of beaches around Antigua (e.g. Pearns Point, Yorks, Ffryes and Darkwood) despite legal restrictions designed to regulate sand removal. This activity affects beach stability and reduces the sediment budget from already

[23] Bunce 1997 in Baldwin 2000

eroding beaches. Some beaches have been so badly mined that they are now no longer beaches but rocky shores. In other places, the removal of sand has threatened to allow the sea to breach the natural shore line. Much of this activity has now been transferred to Palmetto Point in southwest Barbuda. Sand mining at Palmetto Point has created a large crater 7 m deep. The mining has also affected the sand dunes, resulted in the loss of palmetto forests and associated stands of sea grape and mangroves, and has damaged the island's freshwater aquifers.

51. Given the threats to shorelines from hurricanes and storm-generated swells and surges experienced in the last decade, protection of the beaches from damage by sand removal is a pressing concern and a suitably affordable alternative needs to be identified. Shoreline modifications, inadequate setbacks on beaches and the installation of beach stabilization structures such as groynes, breakwaters and seawalls especially around some of the larger hotels have further contributed to beach erosion. One study found that 50% of the beaches monitored showed signs of erosion between 1996-2001[24]. The majority of these beaches were known turtle nesting sites and these have also been disturbed due to artificial lighting.

52. The expanding tourism sector has made it necessary to develop more yachting ports and marinas and developments to accommodate for larger vessels. This has also demanded an increase in dredging activities to maintain and create shipping channels, marinas, and harbours. St. John's Harbour has been dredged on several occasions to allow for expansion and to make way for cruise ship berths. Several marina development projects have also required dredging (McKinnons and the Jolly Harbour Marina). Inadequate control and management of dredging activities and the disposal of dredged spoils has resulted in the loss of wetland habitats, alterations in coastal environments, siltation damage to near shore reefs and negative impacts on tourism and fisheries. The disposal of spoils has caused particular problems. Land disposal has resulted in the loss of habitats whereas disposal at sea has resulted in protests from the fishing community.

WATER RESOURCE AND WASTEWATER MANAGEMENT

53. With the increasing number of people visiting the island on cruise liners and tourism package deals the volume of waste produced has increased and both liquid and solid waste management has become an issue of concern. At present there is only one solid waste disposal facility. The waste dump is poorly located close to a wetland and mangrove area, and leachate from the dump is thought to be affecting the mangrove. Unscrupulous fly tipping of solid waste in wooded and grassland habitat also affects terrestrial wildlife.

54. At present, approximately one third of the domestic water supply is obtained from surface storage or ground water aquifers. The existing reservoirs tend to be shallow and exposed which leads to high rates of evapo-transpiration and a significant loss of already limited surface stored water. This is further exacerbated by sedimentation in the reservoirs as a result of land degradation and soil erosion which is chronically reducing their storage capacities.

55. The low average rainfall and erratic distribution, as well as the shortage of suitable surface or ground water storage areas, have combined to produce a situation where the country regularly experiences severe fresh water shortages. Salt water intrusion into groundwater supplies is a problem in several aquifers, especially during times of drought when water abstraction is excessive. This has led to an increased reliance on expensive desalinated water to supply domestic needs, but has left the agricultural sector with very minimal resources for irrigation. Climatic changes resulting from global warming are predicted to make both the supply and demand situation worse.

56. At present, there are two desalination plants located at Crabbs Peninsular on the North East coast of Antigua, one government-owned and the other privately owned. There are certain environmental difficulties with desalination. Both flash-distillation and reverse osmosis desalination technologies return brine to sea. In order to remove scaling sulphuric acid is injected into pipes, and other chemicals such as chlorine or copper sulphate are used to remove and deter settling organisms such as bivalves. This use of chemicals and the

[24] James 2003

discharge of brine water causes adverse effects on the environment at the point of discharge. Also, the brine returned to sea is warmer than the natural environment.

57. Increased coastline settlements in Antigua have also increased the contamination of nearshore waters from uncontrolled and inadequately treated discharge of waste water. The country lacks any centralized sewage treatment system and sewage is mainly disposed of through septic tanks, pit latrines and pitless latrines, although there are some private sewage treatment plants in hotels. A study by the Caribbean Environmental Health Institute (CEHI) and the Pan American Health Organisation (PAHO) found that only 12% of the 17 private sewage treatment plants assessed were operating, whereas nearly 50% were either in a poor condition or not operational. In the absence of adequate building regulations many of the septic tanks are not properly constructed and this can lead to contamination of streams or groundwater (through overflow or runoff) especially during heavy storms. This problem is especially evident in St. John's, where effluent from septic tanks is discharged either directly or through seepage pits into open drains before eventually being released into the harbour, where the water is visibly severely polluted.

RELEVANT LEGISLATION AND POLICY

58. There are some forty six pieces of legislation in Antigua and Barbuda that govern the management of water resources, watersheds and coastal zones or other aspects of the environment[25]. The key legislation is summarised in Table 2 below and described in further detail in Annex 3.

Table 2: **SUMMARY OF KEY LEGISLATION RELEVANT TO WATER RESOURCES AND COASTAL ZONE MANAGEMENT (**After Laushce, 1986**)**

Relevant Area	Law
Land Use	Town and Country Act (Cap 278, 1948) Town and Country Planning Regulations (SRO No. 24, 1953) Land Development and Control Act (No. 15 of 1977) Antigua Agricultural Development Corporation Act No. 11 of 1978 Crown Lands (Regulation) Act (Cap 130, 1917) The Crown Lands (Land Settlement) Regulations (SRO No. 24, 1930)
Agriculture	The Pesticides Control Act (No 15 of 1973) The Plant Protection Act (Cap 102)
Forestry	Forestry Act (Cap 99, 1941) Forestry Regulations (SRO No. 13, 1941 and SRO No. 42, 1952) The Bush Fires Act (Cap 62, 1901) Bush Fires Act (Cap 303)
Water	The Public Utilities Act (No. 10 of 1973) Watercourses and Water Works Regulations (SRO 23, 1954 and SRO No. 24 of 1961)
Beaches	Beach Control Act (Cap. 297, 1959) Beach Protection (Cap. 298, 1957) Beach Protection (Amendment) Act (No. 1, 1968
Marine	The Fisheries Act (No. 14, 1983) Fisheries (Protection of Lobster) Regulations (SRO No. 3, 1978) Turtle Ordinance (Cap. 333, 1927)

[25] Lausche, 1986

	Maritime Areas Act (No. 23 of 1986) (formerly Territorial Waters Act) Fisheries Regulations (No. 10, 1990)
Wildlife	Wild Birds Protection Act (Cap 115, 1919 Protection of Animals Act (Cap 113)
Protected Areas	The National Parks Act (No. 11 of 1984) National Parks (Amendment) Act (No. 3 of 1986) The Marine Areas (Preservation and Enhancement) Act (No. 5 of 1972) The Marine Areas (Preservation and Enhancement) Regulations (SRO No. 25, 1973) The Marine (Restricted Areas) Order (SRO No. 47, 1973)
Waste Management	Dumping at Sea Act (No. 29 of 1975) Public Health Act (Cap No. 236, 1957) and various regulations The Litter Act (No. 7 of 1983) The Litter (Fixed Penalty Procedure) Regulations (SRO No. 41, 1984) (and Regulations of 1985)

59. Much of this legislation is outdated and needs to be reassembled and realigned in a more coherent manner, and does not reflect the changes required by the regional and international Conventions to which the country is Party. Particular deficiencies relate to: land use, watersheds, biodiversity protection, permits and supervision of mining (e.g. sand), and mandatory EIA requirements for development projects (e.g. dredging, shoreline or marine construction, removal of mangroves, and large scale land clearing). Certain improvements to legislation are in the pipeline, but progress is slow. Two news laws are of particular relevance and consequence to environmental issues and resource management (and are therefore central to the development and implementation of this proposed SIRM Project). These are the Physical Planning Act and the Draft Environmental Protection and Management Bill:

a. Physical Planning Act (2003) supersedes the Land Development & Control Act (1974). This Act makes provision for the orderly and progressive development of land to improve the amenities thereof through the Development Control Authority and Town and Country Planner. In order to ensure the sustainable use and development of land, the plan includes legislation for:

- Restructuring of the DCA to include a more appropriate cross-section of society
- Development planning
- Controls on the development of land (including requirements for EIAs)
- Enforcement
- Environmental protection
- Building regulations, etc.

The Physical Planning Act (2003) (part VI) includes legislation on:

- Plant preservation orders
- Public access to land for recreational purposes
- Public access and rights of way to beaches
- Environmental Protection Areas

In particular, part VI paragraph 56, allows for the preparation of an environmental management plan for the preservation enhancement and management of special features which may include:

- The preservation of marine and terrestrial flora and fauna, including the regulation of hunting and fishing;
- The protection of water supplies, water catchments areas and mineral resources;
- The prevention of erosion landslips and flooding;

- The control of fires;
- The control of pollution;
- Designation of special resource and use areas in the coastal zone; and,
- The use and development of land so as to sustain the local economy of the environmental protection area.

b. The Draft Environmental Protection and Management Bill (2005). This provides for the establishment of the legal and administrative mechanisms to achieve Integrated Sustainable Environmental Management in Antigua /Barbuda. It is the result of an audit of all environmentally related laws that sought to close all recognized gaps. It reforms the laws relating to environmental protection and resource management, and sees to the creation of new legal frameworks and effective administration mechanism for EIAs, pollution, waste management, integrated natural resource management, biodiversity conservation, and national parks management. It establishes mechanisms for meaningful public participation in all aspects of environmental and resource planning, provides for the implementation of a number of treaties and agreements in the area of sustainable development and related matters, and makes provisions for key International Conventions (Climate Change, Ozone Depletion, Marine Pollution, management of hazardous substances, air pollution, Biodiversity, and CITES). The bill outlines an administrative structure, with the National Council for Sustainable Development as the highest administrative body with the task of providing effective and coordinated decision making on policies and programmes. The draft Bill needs to be reviewed to ensure there is no overlap with other draft legislation.

60. These two Acts will almost certainly serve as the umbrella legislations that would effectively address many fundamental environmental concerns. The Acts are designed to facilitate the inter-ministerial cross-cutting nature of environmental issues, while preserving the traditional leadership roles of specific ministries over select areas. The proposed Project will assist Antigua and Barbuda in the implementation of these new Acts by developing the mechanisms for their implementation through integration, institutional strengthening, and capacity building and support.

61. The government has set up a Development Control Authority (DCA) with responsibility for regulating the use and development of land for urban, economic and infrastructure development. This DCA has finalized a National Physical Development Plan, which aims to develop a more integrated approach to land management. It includes conservation and careful management of the upper watershed and it requires stakeholder input and public dialogue. Due consideration is also being given to the establishment of a statutory body to manage water resources and related environmental functions. These government activities clearly demonstrate the priority the government is now placing on ecosystem management and their desire and need for this project. The Government has also been developing several new pieces of planning and environmental legislation that will assist in integrated management of island resources, including the Draft Environmental Protection and Management Bill (2005).

62. Table 3 (below) summarises the status of Antigua and Barbuda in relation to a number of international and regional Conventions and Protocols. In recognition of the importance of integrated planning, the Government of Antigua and Barbuda has taken several initiatives since the aftermath of the Rio Convention on the Environment in 1992 that will help it to meets its sustainability goals. The Government signed several regional and international conventions and agreements.

TABLE 3: STATUS OF ADHERENCE TO CONVENTIONS AND PROTOCOLS

TREATY	STATUS	6	TREATY	STATUS
Cartagena Convention	R		UNCLOS Convention	CP
Oil Spill Protocol	R		UNCCD Convention	R

SPAW Protocol	S		UNFCC Convention	R
LBS Protocol			CNWH Convention	
CMS Convention			STC Convention	
MARPOL Convention	R		CITES Convention	CP
CBD Convention	CP		Basel Convention	CP
S = Signatory to Convention or Protocol				
R = Ratified Convention or Protocol				
CP = Contracting Party to Convention				

64. The Government of Antigua and Barbuda has undertaken significant efforts to fulfil its commitments under these several MEAs. For example, enabling activities within the Convention on Biological Diversity (CBD) are managed out of the Prime Minister's office, and a National Biodiversity Strategy and Action Plan was developed the proposed a programme of action to study, protect and conserve this biodiversity, while at the same time identifying opportunities to exploit such diversity in a sustainable way. The Ministry of Agriculture coordinates activities designed to address the objectives of the Convention to Combat Desertification and Land Degradation (UNCCD) given that the country already experiences extensive land degradation.

65. At a regional level, the Cartagena Convention provides the legal framework for environmental protection in the Caribbean. Through its three protocols it addresses the various aspects of marine pollution and requires the adoption of measures aimed at preventing, reducing and controlling pollution from: ships, caused by dumping, for sea-bed activities, airborne, from land-based sources and activities (LBS Protocol). Parties to the Convention are also required to take appropriate measures to protect and preserve rare or fragile ecosystems (SPAW Protocol), as well as the habitat of depleted, threatened or endangered species, and to develop technical and other guidelines for the planning and environmental impact assessments of important development practices in order to prevent or reduce harmful impacts on the area of application. Antigua and Barbuda are party to the Cartagena Convention and the SPAW protocol, but not the LBS protocols. Although required as a condition of ratification, national laws have, for the most part, not caught up with these accepted regional treaties nor have the national laws and regulations embraced a more holistic and targeted approach such as that promoted in the Cartagena Convention and its protocols.

66. The Member States of the OECS are currently in the process of developing and endorsing the Eastern Caribbean Environment Charter (ECEC) and adopting an Eastern Caribbean Environmental Management Strategy (ECEMS) for the implementation of this Charter. The draft Charter is under discussion prior to signature. In the interim, the countries of the Eastern Caribbean have signed a Declaration of Principles (the St. George's Declaration), which commits all OECS countries to the adoption of an integrated approach to management of natural resources.

67. The St. George's Declaration is based on the Small Island Developing States (SIDS) Plan of Action and sets out 21 principles for environmental sustainability within member states. Governments are now mandated to formulate a local environmental management strategy which will form the blue print for the country's implementation of the St. Georges Declaration. In particular, this Declaration requires each ratifying Member State to *'Formulate, promote and implement integrated development policies, plans and programmes to ensure that environmental management is treated as an integral component of the planning processes in pursuit of sustainable development'*.

INSTITUTIONAL MANAGEMENT AND COORDINATION

68. There are a large number of different institutions that are involved in environmental management and that are responsible for compliance and enforcement of the various legislations and policies. These include

government ministries, statutory bodies, NGO's and community based organisations (CBOs). At the government level the control and development of land and the management of coastal resources is divided among a number of different agencies. The key institutions and their involvement and responsibilities with respect to island resource management are summarised below (Table 4) and described in further detail in Annex 3.

69. However, one substantial concern related to institutional management is the need for closer cooperation and a more integrated management approach between primary stakeholders. Coordination between agencies, and between Government and NGOs has been poorly developed in the past but efforts are now underway for improvement. The Government of Antigua and Barbuda has undertaken to develop a comprehensive **National Environmental Management Strategy** (NEMS) based on the St. Georges Declaration (SGD). The NEMS will act as the primary management strategy governing the implementation of environment initiatives at the government, private and community levels. The NEMS addresses the issues of climate change, land degradation, and biodiversity, and includes the national approach to the implementation of the various international environmental agreements to which Antigua and Barbuda is party.

70. As part of the National Environmental Management Plan, **a National Coordinating Mechanism (NCM)** has developed into a forum for coordinated follow-up, at the national level, to all environmental conventions ratified by the Government of Antigua and Barbuda. The role of the NCM is to strengthen communication links between the relevant ministries and departments of Antigua and Barbuda directly involved with the implementation of the Conventions. It consists of a network of government agencies/ divisions, national focal points, competent authorities, and NGO's, working to together to facilitate a coordinated and timely response to Antigua and Barbuda's treaty obligations as well as providing a forum for discussions on work-programs for government agencies. This forum represents a valuable existing point-of-entry for a GEF Project in relation to coordination between agencies, NGOs and CBOs. The routine coordination of the implementation of the NEMS is the responsibility of the Environmental Division of the Ministry of Works, Transport and Environment, as per its Cabinet mandate. The Environment Division will also act as the national EA for the GEF SIRM Project.

TABLE 4: **SUMMARY OF AGENCY/INSTITUTIONAL RESPONSIBILITIES**

AGENCY	RESPONSIBILITY	COMMENT
Ministry of Agriculture, Lands, Marine Resources and Agro Industries: Land and marine-based natural resources. Lacks support staff, basic equipment and supplies. Weak legislation		
Fisheries Division	Development of fisheries sub-sector; monitoring fish stocks and marine resources; regulatory and policing role; monitoring and preservation of coastal and marine habitats and species	Protection and management of mangrove and raising awareness of beach erosion particularly pertinent to this project. Inadequate resources to exercise powers and functions
Forestry Division	Management of national forest and woodland areas. Establishment of forest reserves. Permits for harvesting and clearing. Biodiversity conservation and eco-tourism development related to forest and woodlands	Restricted by lack of adequate legislation. Exploitation of forest resources virtually uncontrolled. Seriously under-staffed and under-budgeted
Soil and Water Conservation Unit	Soil conservation programme activities. Assistance to farmers with development of irrigation systems	Well-trained and qualified staff. Very limited budget
Land Division	Management and control of all Government lands (including reclamation, land-use and sub-division).	Key in determining conversion of Gov't land (almost 50% of all land) to non-agricultural use
Agricultural Extension Division	Farmer training; allocation of State lands to farmers; leasing arrangements; control of stray stock; land tillage services	Successful (along with Soils Unit) in transfer of soil conservation technologies to farmers
Plant Protection Unit	Plant protection recommendations; plant pest monitoring; plant quarantine at Ports of Entry	
Pesticides Control Board	Importation, use, control and disposal of pesticides. Board = representatives of Min. of Agriculture and Health plus agrochemical importers	Control is ineffective. Board has limited powers. Pesticides and Toxic Substances Act still in preparation
Veterinary and Livestock Division	Animal health and animal production issues. Animal quarantine. Assistance with pasture improvement activities	
Ministry of Works, Transportation and the Environment: Responsible for Antigua Public Utilities Authority (APUA) (water, electricity, telephones), Development Control Authority, Energy and Environment, Public Works (infrastructure maintenance, sea ports, harbours, port authority)		
Environment Division	Coordinate commitments to MEAs; develop/implement National Environmental Awareness Programmes; rehabilitation and protection of environment; development of environmental legislation; coordinate EIAs for development projects. Collaboration with Forestry Division to address issue of land degradation through national urban reforestation programme (nursery for over 5,000 plants).	EIAs not a legal requirement. Assists other agencies to develop own databases on natural resources
Development Control Authority	Regulating use and development of land. Evolving a Physical Development Plan with clear directives on further development of natural resources	Set up after 1st attempt to establish National Land Use Plan rejected by Cabinet (1974). In principle it has effective legislation, but lacks any effective enforcement/compliance

Water Division of APUA	Legal control over all water resources; mandated to supply water to meet municipal needs of country; water quality testing; hydrological surveys; planning/digging of wells; construction of dams	Agricultural lands and protection of agricultural needs/interests are not part of remit (not included in Act that established APUA). No current water development plan exists. No remit to manage watersheds.
Public Works	Roads and drainage (therefore management of flood waters and sediment levels); Beach Protection Act (control and authorisation of removal of material)	No control over methods or quantities of material removed from beaches (yes/no decisions only)- consequently very poor control over sand-mining
Ministry of Finance and Economic Development: Responsible for several divisions (such as inland revenue division and social security) including the Economic Policy and Planning Unit		
Economic Policy and Planning unit	Formulation and implementation of programmes for sustainable development; economic policy review and drafting of new policies; development and implementation of a sound national statistical database to facilitate the economic policy and planning initiatives; translate existing policies into projects and programmes;	Recent restructuring that harmonizes definition of economic policy and planning incentives, seeks to provide for an integrated approach to sustainable development; an objective is to promote inter-sectoral partnerships
Ministry of Tourism and Civil Aviation: Responsible for meteorology, airports and civil aviation, beach protection (policing), control of vendors, National Parks Authority, Heritage Sites, Botanical Gardens, Tourism Corporation, St. John's Development Corporation, Deep Bay Development, A&B Hospitality		
National Park Authority	Financially self-sufficient statutory body established by National Parks Act. Responsible for designation of areas of land/water as National Park.	Country's national landscape remains largely unprotected
Ministry of Health, Sports and Youth Affairs: Responsible for Central Board of Health and National Solid Waste Management Authority		
Central Board of Health	Enforcing environmental sanitation regulations; preventing of spread of infectious diseases; mosquito control; handling of liquid and solid waste; monitoring of water quality at selected beaches for faecal contamination	Practical aspects of solid waste handling now transferred to NSWMA. No routine testing of marine or wetland waters for pollutants. No regular monitoring of domestic water for contaminants.
National Solid Waste Management Authority	Disposal of solid waste; attempting to develop sanitary landfill practices; responsible for dealing with cruise-ship wastes	Unofficial dumping still occurs. No provision for handling toxic chemicals or biologically hazardous wastes
Non-Governmental and Community-Based Organisations: NGOs have played an important role in last 10 years in drawing public attention to important environmental issues (e.g. sand-mining, solid waste management, wetland destruction)		
The Environmental Awareness Group	Involved in: issues of sustainable natural resource management; improving community management of coastal resources; training to stakeholders in conservation practices on reefs; offshore island ecosystems; wetlands	Active in education of teachers and students - especially coastal issues
Gilbert Agricultural and Rural Development Centre	Involved in: courses in sustainable agriculture and rural crafts; training in agro-forestry; established environmentally-friendly farm projects	Collaborates closely with Environment Division in national tree-planting project, and with Forestry Unit in watershed protection project

STAKEHOLDER INVOLVEMENT AND PARTICIPATION

71. Primary stakeholders to, and beneficiaries of, the project will be government agencies with responsibility for natural resource management, land use, and biodiversity concerns, communities in the demonstration project sites, NGOs and CBOS with a focus on these issues, and resource users who will benefit from targeted training within the project in sustainable livelihoods approaches and options. However, given that the project addresses the landscape units of Antigua and of Barbuda, all communities can expect to benefit from this initiative. Similarly, because of the strong replication potential of this project, other island communities, in particular within the Caribbean, are potential beneficiaries and stakeholders. Throughout project implementation, emphasis is to be placed on ensuring and promoting active stakeholder participation. Management systems developed and evolved through the SIRM will aim to strengthen stakeholder ability to manage natural resources. This is viewed as a cornerstone of effective execution and a guarantor of the sustainability of project outcomes.

72. In Antigua and Barbuda, the project builds upon the fact that stakeholders and civil society have already advanced in developing and defining their roles in environmental management, and in making use of opportunities for contributing to decision-making processes in natural resources management and environment, through projects funded by international donor agencies. Although governmental management agencies may have viewed this development with some concern, successful initiatives through which stakeholders groups, NGOs and CBOs have developed good working relationships with government agencies and made significant contributions to the management of natural resources, have laid a good basis for greater partnering. This process of co-management needs to be supported as much as possible, for the long term good of both the stakeholders and appropriate natural resource management.

73. Several **government bodies** will be centrally involved in this project, including: Ministry of Works, Transport and Environment, Ministry of Agriculture and Fisheries, Ministry of Planning, Implementation and Public Service Affairs, Ministry of Finance and Economic Development, Ministry of Tourism, and the Development Control Board. Their respective mandates are described in Table 4 and Annex 4.

74. **Non-Governmental Organizations** (NGOs) have played an increasingly important role over the last decade in drawing public attention to a number of important environmental issues, such as sand mining, solid waste management and the destruction of wetlands. Two NGOs in particular are expected to participate actively in project execution. Firstly, Gilbert's Agricultural and Rural Development Centre (GARDC) which has been active in providing training related to land use and agro-forestry practices to farmers and agricultural extension officers (e.g. use of trees in livestock systems, hillside crop farming, use of multipurpose trees for live fencing, fire/windbreaks and fodder production). GARDC has increased its collaborative efforts with the Forestry Unit of the Ministry of Agriculture, Lands and Fisheries in a watershed protection project, to establish buffer strips around a major water reservoir (Potworks Dam). The Centre is also involved with the Environmental Awareness Group in producing trees for communities and school projects. In 1999, with assistance from an Organic Farming Consultant, GARDC established a number of farm projects that were more environmentally friendly (i.e. composting, cover crops, mulching, bio-pesticides). Secondly, the Environmental Awareness Group (EAG), a national, voluntary, non-profit, non-governmental organisation, focuses on environmental education, awareness, and advocacy. The EAG is active in the promoting the development of policy frameworks that underpin sustainable use and management of natural resources values of and threats to natural resources, and to promote their sustainable use and management. The EAG also supports and undertakes natural resource conservation projects that develop a better understanding of the use and management of natural resources and include endangered species conservation, eco-tourism and training, wetlands conservation, community forestry, and environmental education.

75. With regards to the **private sector** as well as **resource use sectors**, it will be fundamental to project success to ensure that they understand from the outset that the a key objective of SIRM is to integrate developmental and socio-economic issues into an Integrated Ecosystem Management approach. SIRM

specifically strives to balance the needs of ecosystem functions and protection of natural resources with the legitimate demands of economic growth and maintenance of livelihoods. This concept is fundamental to the MDGs, WSSD, the CBD and the St. Georges Declaration as well as the Barbados and Mauritius PoAs. These stakeholders must be given the necessary tools and awareness to appreciate that a robust SIRM will contribute to ensuring the sustainability of livelihoods and to providing for an adequate resource base (e.g. enhanced fisheries productivity, viable landscape values) for sustained economic growth. A key input will be the cost-benefit analysis that provides for an appropriate valuation of ecosystem services and functions.

76. **Resource use and farmer communities** are a key stakeholder group given the need to address unsustainable practices as well as the fact that many members of these communities engage in activities across several sectors. Commercial fishermen, for examples, often derive other income from activities such as farming, or work in the tourism industry. The project aims to provide targeted training to enable more sustainable resource use practices. Commercial fishermen have traditionally been targeted as conducting most of the destructive practices within the marine environment. Traditional subsistence fishing has been conducted around the islands for centuries. The primary gear used is a trap, although there is some use of nets. Although the income generated from fishing is rarely considered subsistence, the cultural value is very significant. Farmers who work larger tracts have been able to adopt more sustainable agricultural practices. The main issues involving the farming community are the misuse of pesticides and overgrazing by livestock. Farmers who work small tracts, however, engage in a wider range of unsustainable practices, which need to be addressed.

77. In the **private sector**, key trades are related to tourism as well as construction. The Tourism Sector established the Hotel and Tourist Association (HTA) in the 1960s to enable hotel owners to present a unified voice when dealing with Government and unions. With the rise in environmental awareness in visitors, the HTA have increased their activities in this area. The hotels would be expected to play an important role in sensitisation of their guests to national and local environmental issues and needs, especially in relation to parks and sensitive areas. Of all stakeholders Tour Guides are the most environmentally aware, and can play an important role in sensitization to project objectives and outcomes However, with the influx of cruise tourist there is a need to ensure that emerging ecotourism attractions, such as the Wallings Forest, are properly managed and that considerations such as carrying capacity are addressed. Another important group of stakeholders are Dive Operators that significantly benefit from the use of the coastal and coral reef areas. Although the tour operators understand environmental issues, they tend not to sensitise their clients since the regulations dealing with these activities are weak and difficult to enforce and as a result, divers often engage in destructive practices such as walking on the reefs and even breaking off pieces of coral. Another group of stakeholders relates to the construction industry, hat is closely associated with tourism development. Unplanned or improperly zoned construction is an area of concern within the SIRM, an issue that will be addressed by the zoning plans. However, it is important to ensure that the necessary trade-offs are understood in view of the need to maintain ecosystem services and functions as well as landscape values. More sustainable approaches to sand mining will also be addressed.

78. Yachtsmen also constitute stakeholders to the project. Antigua has been a major seafaring destination since the 1700s. Boats will anchor in traditional anchorages or go into harbour but, in between, they may anchor to fish or snorkel. Since there are no mooring facilities on or adjacent to the coral reefs, the boats tend to anchor on the reefs or live bottom. This group tends to be aware of environmental issues and have repeated call for the installation of moorings. Yachts also present a problem in relation to waste disposal (both liquid and solid) and sewage and bilge discharges from private vessels are now considered to be a serious problem in the Caribbean.

79. Stakeholder participation has been an integral part of the development of this Project and is now crafted carefully into its Outcomes and Outputs. The **Stakeholder Participation Plan (Section IV - Part III,** below**)** provides more specific details of the scheduling and involvement of stakeholders into each Project Outcome and Output. Stakeholders participated actively in throughout the preparatory phases. In addition to targeted consultations with specific stakeholder groups, several events ensured wide-ranging stakeholders

participation. A high-level launch was held in June 2005, followed by an inception workshop in September. Both events provided all stakeholders with an opportunity to review proposed design strategies and to share specific concerns or recommendations. The final draft of the proposal was circulated and the object of detailed consultations during a four-day period, both in Antigua and Barbuda.

LINKS TO UNDAF SITUATION ANALYSIS

80. Three of the major environmental problems to be addressed under the SIRM, 1) Decline in water quality and quantity 2) Loss of biological diversity, habitats and ecosystem integrity, and 3) Loss of soil fertility and productivity constituting land degradation, are well articulated in the Sub-Regional Country Assessment (SRCA) for Barbados and the Eastern Caribbean including Antigua. In discussing Antigua's environment the SRCA states that "Concern about a number of environmental issues includes water supply management; coastal and marine degradation, uncontrolled land use practices…"[26] However, while these challenges are identified in the SRCA and the Sub-regional Common Assessment (SCA), it is the United Nations Development Assistance Framework (UNDAF) that provides the response mechanism. The UNDAF details various cooperation strategies intended to increase collaboration between the UN system and the governments. It is hoped that a stronger and more integrated network of development partners across the sub-region will be achieved.

81. Objective number 5 of the UNDAF is intended to 'support sustainable environmental management'[27]. The strategy to accomplishing this calls for UNDP to lead interventions to strengthen environmental management. UNDP through GEF will support an OECS project on ecosystem management to develop national, long-term integrated island strategy for the conservation and management of globally significant biodiversity through this eco-region. These initiatives correspond directly to MDG 7 target 9 and the sub-region's MYFF Goal 3 Service Line 3.4 and 3.5.

THREATS AND ROOT CAUSES

82. Initially, the largest single impact on the land resources of Antigua was due to the sugar industry. However, the patterns of resource use that followed have had a cumulative impact on both terrestrial and marine resources and now pose a serious threat to island ecosystem function. Inadequate control of resource use, in combination with cyclical weather patterns, has resulted in a decline in water availability and quality, severe land degradation (impoverished soils, decreased infiltration), the loss of watershed function (siltation of the water courses, increased runoff) and smothering and pollution of coastal and marine habitats. The integrity and functionality of the island's ecosystem has thus been degraded by the unsustainable use patterns and this has reduced its capacity to cope with variable weather patterns. Barbuda has so far managed to avoid the same level of development as experienced on Antigua but the pressure is mounting.

83. Annex 5 summarises the identified threats (and their associated root causes) to the sustainability of island resources and the maintenance of ecosystem functions within a landscape that supports economic growth alongside human welfare and protection of livelihoods. The Annex also explores the key management issues and barriers that are constraining the mitigation or removal of the root causes, and defines the most pragmatic solutions to address these issues and barriers. This process of threats and root causes analysis linked to key barriers and management issues provides the basis for the development of an effective GEF intervention and assistance strategy. The following text presents these key threats and discusses some of their causes:

Limited Water Availability

84. Water is essential for human welfare, economic growth and the maintenance of biological resources and ecosystem functions. In Antigua and Barbuda, human demand and environmental need for water exceed current resource supplies. This is further exacerbated by climate variability causing frequent droughts and

[26] *Sub-Regional Country Assessment of Barbados and the OECS.* The United Nations Development System for the Eastern Caribbean, January 2005. pp33.
[27] United Nations Development Assistance Framework for Barbados and the OECS, 2002. pp27.

low rainfall. Poor resource management in relation to capture, storage, over-abstraction and distribution along with failure to protect watershed functions are central causes of this threat. The country is starting to become more dependent on desalination which is expensive and can create further impacts. Part of the problem stems from the failure to recognise the need to protect critical watersheds and to maintain water resource availability. When this results in predictable water shortages, too much focus is then given to immediate technological solutions to secure water supplies for domestic and commercial demands without really addressing the root problem which is wastage and poor management of existing water resources. Watersheds suffer further from inadequate protection as a consequence of ineffective coordination of management approaches between stakeholders (APUA, end-users, environmental concerns, etc), and much of this can be traced back to a general absence of awareness (at all levels) of the need to protect watershed functions within an overall regime of water resource management as a mechanism to conserve and maintain water resources for all sectors.

Pollution from Waste Materials

85. Pollution from agro-chemical run-off and domestic/commercial wastewater is threatening ground water supplies. The absence of a municipal wastewater treatment plant has led to a rapid increase in septic tanks and soak-aways, yet these are usually poorly built and rarely maintained leading to inevitable contamination of the water table as well as downstream coastal waters. In the larger conurbations there are associated health risks. There is one solid waste disposal site on Antigua which is not properly lined and sealed so that leachates of toxic materials and other potential chemical wastes also enter into the ground water and are suspected to be impacting on sensitive coastal habitats such as mangroves. Waste handling and disposal is already beyond the handling capacity of the responsible agencies. One primary driver behind this problem is the inevitable further urban expansion and general development which, in the absence of proper planning for waste management, will only serve to exacerbate this problem in the near future placing water resources, coastal habitats and human welfare under even greater threat. This is partly because existing legislation and enforcement are inadequate and do not focus on the problem. Furthermore, there are insufficient funds to implement and manage national waste treatment and disposal. Waste management at the private level is piecemeal and is not regulated nor does it have to meet specific criteria for levels of treatment, recycling, disposal, etc. Other causes of this threat include uncontrolled and unregulated use of agro-chemicals such as pesticides and fertilisers, and the loss of natural filtration systems such as wetlands, mangroves, etc which would normally provide a valuable level of protection to the coastal ecosystem and the marine environment.

Land Degradation with associated Loss of Terrestrial Biodiversity, Productivity and Function

86. Early deforestation for sugar crops, subsequent overgrazing and land clearance along with droughts and introduction (followed by poor management) of exotic grass species have resulted in loss of vegetative cover. Failure to protect this vegetative ground cover in the watershed has resulted in the loss of top soils and subsequent increased sedimentation, and impaired watershed functions. Exposed bare soils, without the binding soil/root complex and its absorbent capacities, reduces the retention of rainwater, and increases run-off and the loss of critically important island resources into the coastal area. The intense precipitation that follows the drought season every year triggers flash flooding and appreciable topsoil movement and landslides. The mobilised sediments clog up intermittent stream-ways, coastal estuaries and waters, and surface storage facilities (ponds, dams), reducing water storage and stream-way capacity, while increasing the potential for flooding. Added to the run-off is the chemical wash from farms which pollutes ground and coastal waters with adverse implications for human health and flora and fauna. Associated with this loss of vegetation and soil cover are consequent reductions in biodiversity and inevitable losses in ecosystem functions (e.g. land productivity, water retention and storage, etc). There is a critical absence of understanding in relation to the inter-dependencies between ecosystem functions, species and biological habitat types. As one example, traditional agricultural practices such as burning and loose grazing are leading to degradation of certain habitats along with the loss of ecosystem function and an associated loss of sustainability and viability of the land to support productive agricultural practices at the same level of intensity. This lack of understanding and policy level awareness has created and maintained a situation whereby sensitive functional terrestrial habitats that are critical to the maintenance of both biodiversity and ecosystem function have little or no protection in law.

Degradation of Coastal and Marine Resources with associated Loss of Biodiversity Productivity and Function

87. Inappropriate and poorly controlled coastal development is degrading and destroying coastal habitats important to the maintenance of biological resources and the overall protection of the coastline. Examples include poorly planned construction of marinas and cruise-ship facilities as well as general trends toward coastal development for tourism purposes without due or sufficient consideration given to the maintenance of the environment and the long-term welfare of neighbouring communities. Poorly managed recreational and tourism-related activities are impacting on the welfare of marine habitats and species as well as on water quality (e.g. anchor damage, impacts from unregulated diving and snorkelling, discharges and wastes from boats, etc). Reef health has declined as a result of the chronic and cumulative impact of sediment loads resulting from land degradation (leading to washing away of soils) and mangrove removal (lack of natural filtration and capture of sediments). On reaching the coast the sediments decrease water clarity (lower light levels for photosynthetic reactions in plants and symbiotic organism) and can smother sensitive coastal habitats (e.g. coral reefs and seagrass beds) which has implications for fisheries resources. All of these impacts have left the coastal environment more vulnerable to the effects of natural impacts from storms and hurricanes, and to other environmental variables such as sea temperature fluctuations, coral bleaching and a suite of coral diseases. As was the case with land degradation threats (above), part of the cause of this problem is that the inter-dependencies between the marine species, habitats and ecosystem functions such as coastal protection and fisheries are still poorly understood, especially at the policy level. Again, this has led to inadequate legal protection for species and habitats and a general failure to control over-exploitation of marine resources. One obvious example of this is the excessive removal of beach sand for the construction industry and for individual domestic construction projects with no control of quantities removed or methods used. This has led to localised but severe impacts to beaches that fulfil an ecosystem function (recreational and coastal protection) as well as a biodiversity function (species habitats and nesting sites). Land-based sources of pollution are also causing impacts within the coastal zone and damaging ecosystem functions.

Increasing Economic Vulnerability

88. The national economy is highly dependent on those ecosystem functions which support and encourage tourism (landscape values, security, accessibility, clean water and effective sanitation, secure recreational facilities, high standard of living and absence of poverty, etc). Current patterns of resource use (poorly managed water resources, loss of soil fertility, land degradation, coastal degradation, short-term development in the absence of long-term planning, etc) will inevitably result in loss of those very ecosystem functions, goods and services which maintain tourism and support economic growth within a number of sectors. Conversely, any over-enthusiastic, misplaced and dogmatic application of environmental conservation across the board (i.e. a 'fences-and-gates' approach) without due consideration of economic and human development needs would be equally threatening to the long-term sustainability of ecosystem functions within an integrated management approach. National ratification of various MEAs often require legally binding commitments to fairly stringent conservation measures which are viewed by some sectors as a threat to economic growth. In order to address economic vulnerability within Antigua and Barbuda its is necessary to respond on the basis of the inseparable linkages between carefully planned economic growth, maintenance and diversification of livelihoods, sustainable ecosystem management, and the protection of landscape values and biodiversity essential to the well-being of both the island indigenous population and to its tourist visitors. Short-term planning and management in relation to issues such as coastal development, sand-mining, agricultural practices, water resources, sanitation, etc. are no longer acceptable if economic growth and human development are to be maintained and improved on the islands and if economic vulnerability is to be reduced. Such short-term planning related to economic development has certainly taken precedence regardless of the very real potential for long-term harmful impacts to ecosystem functions and the overall sustainability of island resources and economic growth. This is reflected in the absence of restrictions on development and the very low priority given to EIAs and SIAs. Land that is of high value to agriculture and ecosystem function (fertile soils, good grazing, water retention or high biodiversity value) is being lost to development. As a consequence of all these issues there is now a real threat of losing those landscape values that are critical to the on-going success of tourism as well as to the quality of life of the permanent

population. Local farmer's markets have also failed (often through no fault of their own) to compete in supplying the demand for fruit, vegetables and other agricultural produce, much of which are imported as a result of a need for quality and reliability of supply. This overall failure to recognise the need for a longer-term vision and island management strategy that includes diversification of the economic base and associated livelihoods is a primary cause of this overall threat and needs to be addressed through a more proactive movement toward island self-sufficiency and resource sustainability linked to improvements in human welfare and economic independence.

Associated Global Climate Change Issues

89. Antigua and Barbuda are exposed to natural phenomena such as frequent droughts and occasional hurricanes, and these have negatively affected the habitats and populations of a wide range of species. Periods of drought result in a decline in vegetation coverage of the country's landscape, and can in turn lead to soil erosion during periods of intense rainfall. This may impact negatively on near shore marine and coastal ecosystems as the loose soil may be washed into the marine environment. Smothering of nearshore reefs or sea grass beds is possible as suspended sediments begin to settle, eventually leading to coral reef decline. While there is little that can be done nationally to reduce the incidence of these events, current lack of planning and contingency at the ecosystem and related infrastructural level leaves the island unnecessarily exposed to much greater threats than should be acceptable. Inadequate water resource management, storage and distribution mean that water supplies are extremely vulnerable to the effect of extreme events such as hurricanes which may fill storage dams with soil and debris. When this situation is linked to poor sanitation and inadequate waste treatment, the potential for cross-mixing between water supplies and liquid waste such as domestic and commercial sewage creates a disastrous health scenario. Sitting of septic tanks along coastlines liable to flooding exacerbates this problem of hygiene. Inappropriate planning allowing degradation and removal of natural coastal defences (reefs, mangroves, etc) further increases the risk factor. Absence of watershed protection and proper management of ground and surface water resources leads to problems during the inevitable periods of drought, especially where a number of sectors (including the environment and the ecosystem itself) are competing for scarce water resources.

KEY BARRIERS AND ASSOCIATED MANAGEMENT ISSUES THAT WOULD NEED ADDRESSING IN ORDER TO PROMOTE SUCCESSFUL SUSTAINABLE ISLAND RESOURCE MANAGEMENT

90. Sustainable island resource management requires a cross-sectoral integrated approach to the management of the whole ecosystem with the full collaboration and active participation of the various institutions (e.g. planning, forestry, agriculture, soil conservation, fisheries, and water resources) and the primary resource users (e.g. farmers, livestock owners) and other stakeholders (e.g. hoteliers, dive and tour operators). The inadequate management of island resources on Antigua and Barbuda to date is in part due to complicated institutional arrangements with poorly defined division of responsibilities, weak or outdated legislation, as well as absence of an appropriate management strategy and plan for land and coastal resources. This is compounded by limitations related to cross-sectoral integration, human resources, financial support, and enforcement capabilities.

91. The main management issues and related key barriers have been identified in Annex 5 and are consolidated and discussed as follows:

Management and Coordination

92. Responsibility and management of interrelated and closely linked elements of the overall island ecosystem and its resources are fragmented and uncoordinated. Land management is disconnected and handled unsystematically in relation to the 15 or so different agencies within 8 separate Ministries that 'share' responsibilities for various aspects of spatial planning. The exact responsibilities of individual agencies have been poorly defined even within the enacted legislation. Until now, various attempts have been made to assign specific responsibilities to Ministries and newly-created Authorities but none of these have effectively

captured the need for a coordinated and cross-sectoral approach and the fragmentation of agency responsibility remains a crucial issue acting as a barrier to effective SIRM. This situation has created anomalies whereby, for example, an agency (APUA) can have legal rights over all water resources but has no legal obligation to maintain and protect those water resources or their associated watersheds. The absence of a national land use plan both reflects and exacerbates this problem. A Physical Planning Act came into law in 2003 and this may provide a valuable vehicle for moving forward with a more integrated planning, zoning and development strategy. Furthermore, a National Coordination Mechanism has been adopted to address issues relating to the various environmental conventions and treaties to which the country is a signatory. This body may also provide a basis for the development of more cross-sectoral communication and joint management approaches.

Information and Awareness

93. The information gathering, analysis and reporting process in relation to SIRM is equally as fragmented and uncoordinated as the management process. This is hardly surprising as the one is an inevitable requirement and foundation for the other. Currently there is a limited amount of information available on island resources, and environmental and climatic variability, and this absence of information equates to an overall inadequate understanding and awareness of island ecosystem functions and their interrelated nature. For example, monitoring of rainfall is piecemeal and quite inadequate for the purposes of managing watersheds and water resources, especially from the predictive point-of-view. Monitoring of pollution is likewise inadequate and fragmented which prevents any real identification of national trends or hotspot concerns. What on-going monitoring does exist is frequently not addressing the real issues within the context of SIRM (e.g. ground water distribution, hydrology, environmental flow, monitoring of agricultural practices and associated threats, etc). This limitation on available data and their analyses constrains effective decision-making and prevents effective stakeholder participation. The government now realises the importance of better data collection and handling as well as improved access in order to support policy-making and management decisions. Consequently, some advances have been made toward developing an effective GIS capacity but there is now an urgent need for further staff recruitment and training in this context.

Fiscal Policies and Financial Instruments

94. Fiscal policies fail to address some of the fundamental concepts related to SIRM. The economy of Antigua and Barbuda is heavily dependent on its natural resources (landscape and seascape, fisheries, healthy watersheds, vegetative cover, etc). Logic would therefore dictate that environmental planning and management for the maintenance and protection of such natural resources would be a paramount imperative for all residents and for the nation's government. However, current financial support for environmental management is far too limited to address the key issues of management and coordination. There is an inequality between what the beneficiary gains from ecosystem functions and natural resources, and what that same beneficiary pays back into their maintenance and protection. Yet there are a number of existing financial and economic instruments (FEI) available that could generate the necessary revenues to support the required IRM management activities, and a number of options for developing new FEIs. At present there are no land use taxes, no charges levied against environmental degradation, and no financial inducements to adopt best practices in land use or construction. This lack of incentives and deterrents and the paucity of effective enforcement present further barriers to effective SIRM. The government is generally struggling to achieve a sustainable long–term economic stability in the face of necessary relaxation in taxation (related to hurricane damage over the last 10 years), the potential reduction and loss of import duties under WTO requirements as well as the growing popularity of the 'all-inclusive' vacation which reduces the amount of money entering the local economy, etc. This means that, even were awareness to be enhanced regarding the high priority of SIRM, and the need for further expenditure in this area, there is little potential for increased funding under the present economic scenario. It is therefore a matter of some extreme urgency that the country finds appropriate mechanisms to internalise the costs of environmental and resource management as a means to avoiding any further economic deterioration and with a view to promoting long-term sustainable economic growth.

Capacity and Training

95. Antigua and Barbuda share the same constraints as most small islands in the context of having limited human resources and capacity. This impairs the institutional capability to collect and process information, to monitor the status of island resources and ecosystem functions, to ensure compliance with regulations and legislation, to provide accurate and up-to-date advice to policy-makers and managers, and to develop more appropriate management practices. One or two senior personnel have multiple responsibilities for a number of MEAs and for all national issues related to environment and development. There is an urgent need to address this problem although it is accepted that there is no easy solution to the human resource issue. However, considerable improvements can be made in relation to training that would help to spread responsibility and capability over a wider area. Better facilities and financial support to the responsible agencies would encourage more interest from career-seekers.

Contingency for Environmental Variability and Extreme Events

96. Other than prediction followed by some level of preparedness there is little that can be done to lessen the direct impact from extreme events such as tropical storms, hurricanes or other severe climatic conditions such as droughts. However, one obvious constraint to mitigating the effects of these events is the lack of infrastructural planning and the use of best practices to provide as much protection as possible to water resources and to avoid high-impact land degradation associated with these extreme events. Once more, the maintenance and protection of ecosystem functions coupled with contingency planning would be of enormous value. Key issues and constraints in this respect include the absence of appropriate and robust water collection, storage and distribution systems that can withstand storms and hurricanes; inadequate recognition of the need to provide natural protection within watersheds (vegetated strips and proper training of storm-water run-off, etc); degradation and removal of natural coastal defences and sediment filters such as mangroves, wetlands and coral reefs, etc.

Alternative Options for Sustainable Practices and Self-Sufficiency

97. Little attention has been focused on options and possibilities for alternative technologies or livelihoods, or to the adoption of best practices for SIRM. There is a clear and urgent need to develop these within the specific context of Antigua and Barbuda and to demonstrate their efficacy in action, on the ground. Obvious examples that would address some key issues related to SIRM would include sustainable watershed and water resource management, effective management of wastewater treatment, environmental management systems that can be adopted by the tourism industry, and the management and protection of important natural landmarks that support significant biodiversity while maintaining livelihoods.

Legislation, Regulation and Policy

98. This key issue is dealt with last as it is fundamental in influencing all of the preceding constraints in effective SIRM. Weak or misdirected legislation and policy along with the absence of logical self-regulatory approaches within the private sector, represent overall constraints to management, fiscal support for SIRM, institutional activities and capacities (including information gathering and processing for awareness and decision-making). They also fail to capture the need for specific regulations that address such issues as construction codes and development guidelines in support of SIRM issues (e.g. use of best practices and the need to include ‘extreme-event’ contingencies into the planning and infrastructure process). One obvious example can be found in the current laws relating to land tenure which discourage good land husbandry practices and fail to provide incentives for the application of best practices and appropriate technologies. Problems with leasing land for any reasonable period of time discourage farmers and create a situation whereby potentially productive land is easily lost to developers and with it the ecosystem functions and natural resource value of that land. In view of the critical importance of landscape and seascape values and a clean environment to the economic stability of the islands and to the sustainability of tourism, it is difficult to understand why the tourism industry has not adopted a self-regulatory approach in order to protect its own interests. As with the management issues mentioned above, vehicles such as the Physical Planning Act and the NCM may provide a useful springboard for addressing these critical issues and constraints related to policy and legislation.

BASELINE ANALYSIS

99. The previous sections have identified the background situation within the country in relation to ecosystem functions and the need for SIRM, as well as the main threats to island resources and ecosystem functions along with their primary causes. These are then considered within the context of barriers, constraints and management issues that have to be addressed in order to realise an effective SIRM approach.

100. This baseline analysis considers efforts currently underway through other initiatives to resolve these concerns, how synergies and coordination can be developed between these initiatives and the SIRM Project for the mutual benefit of all objectives, and the likely 'business-as-usual' scenario in the event of no incremental intervention and assistance.

101. As described above, emerging policy frameworks seek to provide for setting up legal and administrative mechanisms in support of integrated environmental management in the two islands. The Draft Environmental Protection and Management Bill (2005) reforms the laws relating to environmental protection and resource management, and sees to the creation of new legal frameworks and effective administration mechanism for EIAs, pollution, waste management, integrated natural resource management, biodiversity conservation, and national parks management. It also contains provisions for leading international multilateral environmental agreements.

102. Additionally, the Physical Planning Act (2003) aims to ensure the sustainable use and development of land with provision for key areas such as land access, development planning, and targeted management approaches. The newly established Development Control Authority (DCA), with responsibility for regulating the use and development of land for urban, economic and infrastructure development, is in the process of finalizing a National Physical Development Plan.

103. To date the DCA Act has been passed by Parliament (2004) but the institutional and the information requirements for the full implementation of the Act are still to materialize. Under the budgetary allocations for 2006-2007 there is not adequate funding for the finalization of the land use plan and local area plans that are required to give full effect to the Act. Moreover, until these activities are completed, issues related to biodiversity protection and sustainable use will not be adequately addressed. The pace of the implementation of the activities using government resources will not be adequate to reduce the rate of biodiversity loss.

104. This Project will provide the funding required for the timely development of the necessary plans and programs under the DCA Act. These programs are consistent with the project activities under the SIRM and for the basis of future actions recommended in the National Biodiversity Strategy and Action Plan (NBSAP).

105. The development of the Draft Environmental Management Legislation has taken the past four years to complete and is being considered as part of the co-financing for the SIRM project. Consideration of the Bill in Parliament will take place in late 2006 - early 2007. The project will seek to implement some of the institutional requirements and programs under the Act. Other activities that will be required include the development of regulations, public awareness, and the establishment and improvement of enforcement capacity. The SIRM project will enable the legal and institutional arrangements necessary for the implementation of the various conventions to be established within the next three years, well before the 2010 target for the CBD convention.

106. Without the GEF funding, the establishment of the legal and institutional arrangements for the Environmental Management Legislation will be developed very slowly and in the absence of comprehensive and integrated resource information, institutional capacity, appropriate skills (e.g. GIS, mapping). Nonetheless, these efforts indicate the priority government is assigning to development of integrated management approaches.

107. Very pertinent to the SIRM Project are the linkages to the National Environmental Management Strategy (NEMS) and to the NCM (National Coordination Mechanism) - See **Background** section on **Institutional Management and Coordination** above. The effective implementation of the NEMS will require strong coordination between all sectors. The proposed SIRM Project would address the key issues Antigua and Barbuda needs to resolve in order to achieve the standards set by NEMS. The SIRM Project is compatible with many of the tenets of the NEMS and the wider St. Georges Declaration, as all policies inherently advocate the ultimate establishment of mechanisms for integrated ecosystem management and enhanced civil society participation. The specific NEMS principles that are in line with proposed Project are as follows:

- Coordinated inter-sectoral planning and priorities
- Mainstreaming environment into sectoral planning and management
- Strengthened legislation, regulations and policies influencing natural resource use
- Demonstrating protected areas management
- Developing sustainable financing for government to carry out environmental services, monitoring and enforcement
- Raising public awareness of ecosystem management
- Invasive species management

108. The NCM has become an established and respected forum that has already significantly improved communications within the Government sector, identified avenues of information exchange and delineated the availability of resources between agencies. There is however still the need to strengthen the inclusion and active participation of civil society and the business sectors, and address certain institutional, logistical and technical issues. Notwithstanding these challenges, the NCM is a suitable mechanism to facilitate the enhanced inclusion of civil society in national development processes, especially those that target natural resources management. The initial conceptualisation of the NCM mandated a coordination system relating to the totality of environmental conventions. The time has come for the expansion of the scope of works if a sustainable island resource management mechanism is the goal. The Draft Environmental Protection and Management Bill (2005) may provide the National Coordinating Mechanism with legal status. The proposed SIRM Project will aim to support the strengthening of the NCM, and to use the NCM as an advisory body for Project activities, that can evolve into a robust inter-sectoral consultative body.

109. Efforts to put in place legal and administrative structures to advance integrated management approaches, are however, constrained by insufficient financial flows. Although there are a suite of financial and economic instruments (FEIs) that could generate requisite revenues, these have not been fully identified nor developed. Revenues from existing tax schemes are, for the most part, not targeted at environmental and conservation management. For example, revenue generated by the Water Tariff is geared at operation and maintenance, not on integrated watershed management. Key agencies, such as the Soil and Water Conservation Unit and the Forestry and Environment Division have been forced to limit or halt important activities due to lack of resources. An additional issue of relevance is the high cost of national recovery from devastating hurricanes, which has prompted a relaxation of taxation to assist reconstruction efforts.

110. On a sectoral basis, the need to apply sustainable practices is still limited to a few independent stakeholders and certainly not descriptive of overall national trends. In the agricultural sector, for example, a small core of medium sized farms (5 to 15 hectares) have developed efficient, mechanized production technologies and have demonstrated the potential to produce high quality produce competitively. However, land tenure arrangements conspire against a replication of these approaches at other scales, and there is insufficient institutional and individual capacity to upscale good practices. Other sectors, such as tourism and construction, advance short-term goals in the absence of a shared national vision and strategy for sustained and sustainable environmental and economic growth.

111. The Government is undertaking small projects that aim to raise awareness of sustainable watershed issues in areas such as Bendal's and Diamond Hole. These projects will undertake restoration of the

catchment areas, replanting and reforestation, and increasing the level of local and national awareness. Such activities will be of enormous value to the SIRM project in helping to identify best practices and lessons as well as constraints when dealing with watershed issues at the community level.

112. In terms of targeted initiatives, the Amenity Area project in Codrington Lagoon, Barbuda, supported by the Caribbean Regional Environment Programme provides an important basis for Demonstration Project 3, and aims to highlight benefits of sustainable uses of natural resources in and around the Codrington Lagoon. It calls for development of protected area legislation including a Local Area Plan for the Lagoon. The initial CREP project will establish the baseline legal framework for the Lagoon while the SIRM is designed to establish the development of management plans and a participatory management system to govern the Lagoon and surrounding areas so that it may sustainably contribute to the social and economic well-being of all Barbudians while protecting unique and globally significant biodiversity (the Codrington. Lagoon is a Ramsar Site). The Codrington Lagoon National Park has now been declared under the National Parks Act of the Government of Antigua and Barbuda. The project has made the financial resources available for the establishment of a management framework for the Codrington Lagoon. This included the establishment of a stakeholder board, created linkages between the various stakeholders groups in both islands. The stakeholder board and other management tools developed through the SIRM project will be utilised to evolve the management framework to a fully functional and established Park. Without the GEF assistance, the Park will most likely be a paper park until a significant amount of funds is injected into the park. The SIRM project will aim to build on Management Framework established under the CREP's project. The SIRM will provide institutional support, monitoring, surveillance and economic instruments in order to ensure a real chance for sustainability.

113. In addition to the above initiatives, the UNDP Country Programme provides assistance in the development of Good Governance arrangements that include the provision of technical assistance to support the mobilization of civil society groups (economic, social and educational) and to build their capacity to participate in the reform process through training workshops. In these workshops, which have been utilized by the women's forum, the Rastafarian Movement (a minority grouping), the Church and the Chamber of Commerce, the Constitution is explained in simple layman's language and participants are guided in examining clauses that are particularly relevant to their constituency. Out of these workshops, groups have drafted their submissions to the Constitutional Review Commission. Assistance is also provided to the senior level public officers whose duties and obligations to the State are explicitly identified in the Constitution

114. As part of a UNEP-GEF multi-country assistance programme, Antigua and Barbuda has also undertaken a National Capacity Self-Assessment (NCSA). The primary objective of NCSA is to identify country level priorities and needs for capacity building to address global environmental issues, in particular biological diversity, climate change, and land degradation, with the aim of catalyzing domestic and/or externally assisted action to meet those needs in a coordinated and planned manner. An important part of the NCSA process has been the determination of the role of civil society and ways in which they can effectively participate in the decision-making process. The Environment Division Community Groups Capacity Building Programme (ED-CCBP) was developed as a mechanism for the meaningful involvement of Non-Governmental Organisations (NGOs) and Community Based Organisations (CBOs) in the activities of the NCSA. Within the context of the SIRM Project, the involvement of these groups in the NCSA process should have increased the capacity of the NGOs and the CBOs to participate in the decision making process and project implementation during the currently proposed Project.

115. As described in Stakeholder Involvement – above – several NGOs are playing an important role in advancing the objectives of sustainable environmental management. The Environmental Awareness Group, for example, works with a broad array or stakeholder at all levels, and has developed a Strategic Plan that prioritizes areas of work such as environmental education, capacity building and research and conservation. For its part, Gilbert's Agricultural and Rural Development Centre (GARDC) has been active in providing training related to land use and agro-forestry practices to farmers and agricultural extension officers and has increased collaborative efforts with the Forestry Unit. One of the Projects that arose from the NCSA was the

GARDC Sustainable Livelihood Project for Rural Communities that sought to enhance the capabilities of GARD Center to provide a high level of practical training in agricultural technologies that are environmentally sustainable and provide opportunities for enterprise development. Two demonstrations within this project that are particularly relevant to SIRM are i) traditional cropping systems that have proved to be environmentally sound, and ii) integrated pest management. The Project will also be providing training on sustainable livelihoods. The Centre is also involved with the Environmental Awareness Group in producing trees for communities. Strong partnerships with NGOs such as these will catalyze the training and capacity building components of the SIRM project. There are a number of other areas of mutual interest between NGOs and the SIRM project, and opportunities for collaboration using EAG and GARDC expertise and human resources in cooperation with GEF funding will important.

116. These strategies are very much in line with identifying alternative approaches and best available technologies as will be promoted by SIRM. Experiences can be transferred and lessons can be built on to further develop such concepts into real 'on-the-ground alternatives for sustainable agricultural practices.

Regional Initiatives

117. There are several ongoing GEF regional projects that are of relevance to the SIRM proposal. The UNDP/UNEP/GEF Regional Project on *Integrated Watershed and Coastal Area Management* (IWCAM), in addition to demonstrating and replicating geographically targeted national solutions to common Caribbean SIDS issues, will be providing assistance to the development of an Integrated Water Resource Management plan in each participating country which will complement a SIRM strategy and provide some guidance on the protection of vital ecosystem functions within the watershed. In addition the IWCAM Project will assist in the identification of impact indicators for measuring IWCAM efficacy and to support a programme of monitoring which can drive policy reforms. Some assistance will also go toward national policy and legislative reforms and institutional improvements with an emphasis on assisting countries to meet their commitments required in the ratification process for important regional legal agreements such as the Cartagena Convention and its protocols (especially the Protocol on Land-Based Sources of Pollution). In the case of Antigua and Barbuda, the IWCAM-related demonstration will focus on the retroactive fitting of sewage treatment facilities within the capital of St. John. Clearly this IWCAM project is one area of assistance and development of improved management and governance approaches that closely connects with SIRM Project aims. However, the SIRM Project is very specifically focused on national priorities and associated demonstrations whereas the IWCAM was designed, in essence, as a regional demonstration with national implications and demonstrations. THE SIRM Project and its Outcomes and Outputs have been specifically designed to complement the IWCAM Project and to ensure that both initiatives gain from each other's experience and activities, and share their knowledge and lessons.

118. Another UNDP GEF project that relates to natural resources and ecosystem functions beyond the coastline and into the marine environment is the *Sustainable Management of the Shared Living Marine Resources of the Caribbean Large Marine Ecosystem (CLME) and Adjacent Regions*. The overall objective of the project is to develop an integrated management approach that will meet the WSSD target for sustainable fisheries. This Project will have four Components that include development of a Transboundary Diagnostic Analysis as the basis for formulation of a regional Strategic Action Plan. These activities will include the identification of critical knowledge gaps to effective transboundary management of living marine resources, and seek to address these. It also calls for the implementation of governance reforms (institutional, legal, and policy) for LMR management. These activities and reforms will be highly relevant to the development of effective fisheries management approaches within the SIRM strategy. There is a high degree of complementarity between the two initiatives as CLME encompasses LMR within the territorial waters and EEZs of each country and out into the high seas while SIRM focuses on the land and immediate coastal areas in relation to natural resource and ecosystem function maintenance and protection. The SIRM Project would aim to work closely to ensure coordination and complementary activities in relation to information management, governance reforms, monitoring evaluation and the selection of indicators. These are all areas where economies of scale and opportunities for sharing workloads and information would dictate close

cooperation and assistance. The CLME project is currently going through its PDF phase and can be expected to enter its Full Project phase within the next 18-24 months.

119. The OECS Fisheries Management and Development Strategy and Implementation Plan is another marine resources (fisheries) initiative that borders on the objectives of the SIRM project. The goal of this OECS initiative is to ensure the achievement of the optimal use of available resources to generate sustainable economic and social benefits. This will be achieved through a well developed and diversified regional fisheries sector, reflecting stakeholder participation and fisher safety with increased investment in sustainable production and marketing, resulting in social and economic well-being of fishers and the wider community is realised. As with the GEF CLME Project, the system boundary for this initiative tends to lie mostly outside of that for the SIRM Project yet some of the management issues and barrier removal activities clearly overlap (e.g. improved institutional arrangements and reviews of responsibilities related to fisheries, enhanced stakeholder participation, improvements in knowledge and information handling, market diversification and development of a sustainable production base). Again, close cooperation will be encouraged within areas of mutual interest.

120. The OECS Protected Areas and Associated Livelihoods Project (OPAAL) aims to contribute to the conservation of biodiversity of global importance in participating countries by enhancing the effective management of protected areas (PAs). Outputs include relevant governance reforms, strengthening of PA plans, and studies on solutions to the barriers of financial sustainability of PAs. The Fisheries Division of Antigua and Barbuda are managing Antigua's OPAAL sites and have recently managed to get a significant section of the eastern coastal waters declared as a Marine Reserve. This area stretches to include all of the offshore islands east of Antigua where important biodiversity is found. Once again, the system boundary overlaps with SIRM but does not duplicate it to any extent. However, some of the focal areas for barrier removal are similar and close cooperation and coordination on certain activities will be beneficial and essential.

121. UNDP Barbados and the OECS supports an Environmental and Disaster Management Assistance Portfolio. The Disaster Management Assistance Portfolio is categorized within the Crisis Prevention and Recovery Practice Area. One project related to this portfolio is that of Disaster Management in the Caribbean: The project seeks to reduce vulnerability to loss of life and property damage in the Caribbean in the long run and immediately realize and embed Comprehensive Disaster Management (CDM) as a viable process for disaster management in the Caribbean region through development of a regional CDM strategy, strengthening of the Caribbean Disaster Emergency Response Agency (CDERA) to efficiently implement CDM at the regional level and building support for CDM at the national level. It is expected that a number of countries will incorporate CDM into their overall development strategies with a reinforced CDERA as regional implementation agency of CDM, which will lead to diminished losses to lives and the financial amounts of destruction for the long term period. The SIRM Project will explore synergies and options for mutual cooperation and development in relation to extreme events contingency planning for protection of livelihoods, human health and related ecosystem functions.

122. The Mainstreaming Adaptation to Climate Change (MACC) Project is a five-year Global Environmental Facility (GEF)-funded project for the Caribbean region. Additional support for MACC activities is being provided through the Canadian, French, and Dutch governments. The MACC Project follows the successful CPACC (Caribbean Planning for Adaptation to Global Climate Change) Project, which was designed to increase national and regional capacity to monitor sea level and key climatic indicators, and to plan for adapting to the effects of global climate change on coastal and marine resources. MACC will build on CPACC´s achievements and aims to integrate climate change and variability into sectoral agendas such as tourism, agriculture, fisheries, and infrastructure. The benefits and opportunities for cooperation are obvious, and there will undoubtedly be a significant amount of valuable information and specific initiatives arsing from MACC that will be of value to SIRM. This will present an excellent opportunity for one GEF focal area to gain benefit from another across related issues and through the integration of long-term management approaches. Integrating the effects of climate change (and the inevitable

relationship with environmental variability) into sectoral agendas is a decisive input towards establishment of a comprehensive SIRM strategy.

Situation without the GEF Increment

123. Despite all of the aforementioned associated initiatives, there is still an urgent need to coordinate and integrate an overall approach to SIRM and to the maintenance of ecosystem functions within an intended landscape of economic growth and individual human development and welfare. Given the small size and limited availability of natural resources within a relatively isolated geographical area, and the existing threats to Antigua and Barbuda's ecosystem function and integrity, the goods and services these ecosystems provide (such as clean water, soil stability, soil fertility, coastal productivity, etc.) all have a finite capacity and a high degree of vulnerability. It is surprising that so little priority has been accorded to the management and protection of resources. The island only has one terrestrial protected area and so far two poorly enforced marine protected areas. The remaining biodiversity of the islands, including some extremely rare and endemic species, remain unprotected and subject to a multitude of different threats. Land degradation and loss of watershed function already means the island ecosystem is already no longer self-sufficient. The islands are increasingly reliant on desalination to meet the demand for domestic water supplies and to support the tourism sector, while there is limited provision to meet agricultural needs. The country is heavily dependent on imported food stuffs and this endangers its economy, especially in the event of decreased tourism revenues and widening WTO agreements. The heavy dependence on tourism makes the island very vulnerable to market fluctuations and recessions. A more diverse economic base would help to overcome this problem as well as acting as a buffer against changes in the economies or policies of other countries as well as vagaries of climate change. Unfortunately, the institutional and legal capacity, and well as financial and human capacity, that would be necessary to manage these changes has not been adequately developed. There is a need to find a more equitable balance between the competing needs of the domestic sector, agriculture and tourism sectors, and biodiversity/ecosystem welfare to ensure sustainable use of biodiversity and the natural resource base. For this to happen the island state needs to take into account the long-term non-monetary but vital capital assets provided by the islands' ecosystem through development of alternative and sustainable resource use practices that enhance productivity and provide for socio-economic growth.

124. The 'Business-As-Usual' scenario that can be predicted even with the aforementioned baseline initiatives leaves too many gaps within proposed management strategies, governance reforms and capacity strengthening as well as inadequate overall awareness of the importance of SIRM and therefore presents a very real risk that ecosystem functions and natural resources will fail to be maintained and protected at the island ecosystem level, even if specific resources or issues may be addressed. The SIRM Project creates the necessary linkages across all sectors and recognises (and will attempt to address) the overall risk to economic stability. The synergies that can be created between these various initiatives can best be achieved through the SIRM Project acting as an umbrella for all sectors.

125. **In the absence of the proposed GEF intervention** Antigua and Barbuda would have limited capacity to protect vital capital assets through adoption of a comprehensive sustainable island resource management approach. Resources would continue to be inadequately or poorly managed, in a fragmented manner, by government agencies with overlapping or ill defined areas of responsibility, with limited financial backing and political support, and only weakly framed by complex, outdated legislation. The inadequate integration, coordination and collaboration between the various agencies would hinder their ability to implement effective on-the-ground solutions to address the complexity of interlinked threats as they may seem too complex to tackle. Efforts may be wasted through overlapping mandates, or in a worst case scenario, no action may be taken as it was considered to be someone else's responsibility. The gaps in, and lack of, critical baseline data and limited ability to share information between the various management agencies, would continue to constrain management efforts and hinder the decision-making processes. Critical inter-linkages in island ecosystem functionality may fail to be understood.

126. The islands may continue to focus on short-term economic development as opposed to long-term investment in and protection of the island ecosystem functionality and integrity that critically underpins the

whole economy and society. The tourism sector may continue to expand putting increasing pressure on the islands' resources. Poor agro-pastoral practices would add to the cumulative effect of centuries of unsustainable land management. The vegetation from the upper watersheds would continue to be denuded, lessening the holding capacity and retention of water and soil resources, while mangroves and wetlands would be lost from the lower watersheds, resulting in the loss of the natural filtration and protection systems. Continued loss of vegetation and root complexes would lead to further soil instability, soil loss and land slides during periods of heavy rains. Waterways and reservoirs would be blocked and lose storage capacity. The islands will become increasingly dependent on desalination to meet the growing demand for freshwater, and agricultural production would be constrained. There would be limited diversification of livelihoods away from unsustainable uses of land and marine resources.

127. Ultimately, the continued degradation of the islands' resources may lead to deterioration in water quantity and quality, leading to reduced productivity, a potential collapse in fisheries, retrogressive alterations to the coastline, loss of top soil and soil exhaustion with resultant lack of fertility, and a serious reduction in water retention capacity with inevitable impacts on the availability and sustainability of water resources available for drinking and irrigation purposes. This would inevitably impact negatively on economic growth as well as day-to-day livelihoods and subsistence, which could be disastrous in the absence of integrated, robust management approaches. If the carrying capacity of the island is exceeded and the environment is further degraded, then tourists may look elsewhere for their island idyll and this critical sector may no longer be a viable. All of these potential failures in ecosystem functions and services and the knock-on effects throughout all sectors and stakeholders would nullify the efforts and achievements of nearly all of the aforementioned baseline activities in relation to these specific islands.

The GEF Increment

128. **The GEF alternative** will focus on addressing the key management issues and barriers whose continued presence is a threat to ecosystem functions and services and to the overall maintenance and sustainability of natural resources. The ultimate goal would be a Sustainable Island Resource Management approach to protect the vital island ecosystem assets to ensure that the goods and services upon which the island is so dependent continue to be provided for future generations. The robust cross-sectoral stakeholder engagement that characterizes the proposal, as well as components such as the Cost-Benefit Analysis, provide for building up broad support not only for the SIRM strategy but most importantly, for the necessary trade-offs that its application will necessarily imply. Only through such a comprehensive, highly participatory process will it be possible to adequately demonstrate the overall, long-term benefits of integrated ecosystem-based management approaches, and to justify the inevitable trade-offs.

129. Information collection and management is critical to the decision-making process and for monitoring and enforcement purposes and would need to be an essential foundation to an effective Alternative approach. Some other initiatives are undertaking their own specific and focused knowledge capture and data collection components and these could become part of the greater effort of SIRM through a more integrated GIS and information packaging system. Information is also a basic requirement of awareness programmes and attempts to sensitise decision-makers and some of the information that would be available from other initiatives would be very valuable in this context.

130. Reforms in governance, particularly related to legislation and policy, will also be an essential component to the effective development of a SIRM mechanism including through, institutional realignment and rationalisation. Once more, other initiatives are addressing this concern but at a very focused and sectoral level. Effective coordination between this SIRM Project and such initiatives will ensure that such reforms are integrated and coordinated to achieve an effective end-product at the 'island' (i.e. national) level and not only the sectoral level.

131. In order for such reforms to be effective they would need to be supported by capacity building for institutions, and training for individuals and groups that will be taking on new responsibilities, along with a certain amount of capital improvements.

132. SIRM is a new concept which contains some tried-and-tested approaches but also has a number of innovative opportunities and potentials. Many of the proactive and concrete deliveries will provide valuable lessons and best practices that need to be captured for review and for possible replication and transfer (both in-country and to other SIDS). In this context, a sustainable island ecosystem management approach will be demonstrated through the delivery of on-the-ground examples of management strategies and mechanisms at site level projects, that will address the management and technical issues that have to be solved at a national level. Antigua and Barbuda will trial strategies to promote integrated cross-sectoral co-management and to develop new mechanisms and identify innovative technologies, thereby maximizing the utility of indispensable natural resources. This small twin island state will then in itself serve as a model example of integrated management of small island states and the shared problems which they need to address with considerable urgency.

PART II: Strategy

PROJECT RATIONALE AND POLICY CONFORMITY

Strategic Rationale

133. Small island developing states face a common suite of challenges related to their limited terrestrial size, constraints on human capacity, dependence on world markets, and vulnerability to extreme climatic events. These factors heighten the importance of the maintenance and protection of ecosystem health, integrity and functionality, which underpins socio-economic structures and options. Achievement of this objective is, however, constrained by the sectoral approach to governance and economic development that still, despite decades of calls for inter-sectoral management schemes, characterises human societies. Again, the specific characteristics of SIDS conspire to make these sectoral divides more impacting given that ultimately SIDS operate as a single landscape unit.

134. The GEF Alternative seeks to develop an enabling environment for integrated ecosystem management in the nation island of Antigua and Barbuda, and also to develop and demonstrate the application of integrated ecosystem management approaches through selected demonstration projects. It recognizes as its ultimate goal that environmental management must contribute to maintaining the integrity of ecological systems as the base upon which socio-economic development and welfare depend. The project will mainstream ecosystem conservation and management objectives and considerations into relevant productive sector practices as well as policy and institutional frameworks. In recognition of the fact that implementation of such an integrated ecosystem approach will necessitate changes to traditional livelihoods and ongoing development trends, the project will moreover also identify alternative sustainable livelihood options and provide training and targeted management guidance. Cost-benefit analyses will demonstrate the cost of business-as-usual and the long-term benefits to be derived from an approach that provides for protection and maintenance of ecosystem functions and services. The project will therefore address both ecosystem considerations that deliver global benefits as well as sustainable development issues related to livelihood options and economic well-being.

135. The GEF Alternative will address current resource use and management practices in such key areas as agriculture, forestry, and tourism, with a view to developing robust policy and regulatory frameworks, strengthened and streamlined institutional arrangements, targeted training and capacity building, and management guidance that will enable government, private sector and civil society to put in place an ecosystem-based management strategy. Active stakeholder participation in both the overall process as well as in the demonstration projects will be a vital component of project development and success.

136. The integrated ecosystem management approach that is the project's goal will evidently build up and catalyze a range of important synergies between focal areas. The development of a national resource management zoning plan will establish use categories that will provide for protection and conservation of critical habitats (e.g. wetlands and mangroves) while at the same time ensuring that agricultural and grazing activities are undertaken in appropriate terrain. Benefits to water systems will be accrued through improved watershed management approaches. Considerations related to sustainable land management, water resource management, and biodiversity protection will be mainstreamed into national development plans and priorities through policy / institutional review and reform and through the elaboration of the Sustainable Island Resource Management Strategy. Sustainable land management practices that will address land degradation trends will also generate key cross-focal gains including, i) reduction in the use of pesticides and fertilizers, leading to improved watershed and coastal water quality, and associated ecological and public health benefits; ii) abandonment of slash-and-burn techniques thereby limiting the spread of lemon-grass fuelled fires which are progressively encroaching on the little remaining forest; iii) adoption of agricultural practices that minimize soil erosion and reduce sedimentation which is currently impacting on the island's water storage capacity (a constraint to agricultural and industrial growth as well as a public health and social concern) as well as on coastal habitats like coral reefs and seagrass beds, while also contributing to

decreasing the severity of floods; iv) rehabilitation of degraded watersheds (and those areas currently invaded by lemon grass) with native species in order to enhance soil and water conservation and increase habitat cover; v) better practices in water conservation to increase the society's resilience to recurrent drought, increase the amount of water available for ecosystem flow, and reduce the use of desalinization plants which generate impacts on the coastal areas, and, vi) adoption of better practices for wastewater disposal with associated improvements in island-wide water quality (e.g. in relation to surface storage units, groundwater, coastal areas, etc), again generating benefits to ecosystem and public health.

137. Above all, the GEF Alternative will develop an innovative integrated ecosystem management approach that is cost-effective in that it covers the range of primary resource uses and practices in a SIDS, and that will be highly replicable and provide important lessons and best practices for other island states. A major incremental objective of this project will be replication of project lessons and best practices through linkages with parallel regional GEF projects (such as IWCAM and MACC), regional bodies (such as OECS and Caribbean), and specific dissemination activities.

GEF Operational Program and Strategic Objective Conformity

138. The outcomes, outputs and activities proposed under this project are fully consistent with the priorities of the GEF Operational Program 12 (OP12) on Integrated Ecosystem Management. Specifically, the project is compatible with the focus of OP12 on facilitation of "*inter-sectoral and participatory approaches to natural resource management planning and implementation on an ecosystem scale*" and will deliver benefits to the GEF focal areas of Land Degradation, Biological Diversity, and International Waters including through:

- Development and adoption of sustainable land management practices;
- Promotion of multi-functional landscapes;
- Conservation of biological diversity, through the protection of critical habitats;
- Conservation and sustainable use of watersheds and coastal zones; and,
- Prevention of the pollution of globally important terrestrial and aquatic ecosystems.

139. However, only benefits accrued to the focal areas of biodiversity and land degradation will be measured and monitored within the project.

140. The project is consistent with GEF Land Degradation Strategic Objective SO 1 *Promoting the country partnership framework approach for removing barriers to SLM and foster system-wide change* by developing a holistic, integrated and sustained program that addresses root causes of land degradation and mainstreams SLM into national priorities and development frameworks. It comprises a series of interventions that comprehensively address a suite of elements required to sustain an integrated ecosystem-based management approach, including policy and institutional reforms, capacity building, and enhanced resource flows in support of project objectives. The project aims to create an enabling environment through review and realignment of policy, regulatory and institutional frameworks to support integrated ecosystem management (Outcome 3), building upon updated ecological, social and economic information that will guide cross-sectoral management planning (Outcome 1), and supported by an appropriate nation-wide Sustainable Island Resource Management Zoning Plan (Outcome 2). The project will undertake a capacity assessment of relevant institutions and actors within both the private and public sectors, and provide training and targeted management guidance. Moreover, the site-specific pilot demonstration projects are consistent with Strategic Objective 2, *Upscale successful SLM practices for the control and prevention of desertification and deforestation through new operations*, as these will develop and validate alternative approaches for addressing key issues and barriers to the integrated sustainable management of island resources. Their cross-sectoral focus will encourage and support inter-institutional collaboration at the site level thereby assisting in the transition to the actual integration and mainstreaming of SIRM approaches at the national level.

141. The initiative addresses three priority problems identified within the Land Degradation Operational Strategy 15 (OP 15): unsustainable agricultural practices such as slash-and-burn techniques, overgrazing, and

deforestation both through timber extraction for construction and fuel, and uncontrolled fires. Many of the root causes of identified threats within this Project are related to economic distortions and disincentives, loss of social capital, malfunctioning governance, lack of institutional capacity, and weak or inappropriate laws and policies, all of which are considered to be eligible for GEF funding in relation to addressing Land Degradation.

142. The project is also consistent with the GEF Biodiversity Strategic Objective 1, *Catalyzing Sustainability of Protected Areas* as Outcome 2 will provide for a National Zoning and Management Plan that will enable the designation of national parks, special protected areas, and fisheries conservation zones; Outcome 3 will provide for a reform of relevant policy, regulatory and institutional frameworks that in support of enhanced protection of biodiversity and critical habitats; Outcome 4 will provide for requisite training and capacity building; and Demonstration Project. Two will develop an integrated co-management model for replication. The initiative thus fosters broad based integration of biodiversity conservation within the country's development agenda through the development of systemic and institutional capacities of line ministries and regional councils, targeted investments in conservation, and creation of an enabling environment based on a joint national vision for the coast.

143. Cross-focal area deliverables of the project include development of institutional mechanisms to facilitate integrated and cross-sectoral management practices; identification and promotion of sustainable financial mechanisms; development of conflict resolution mechanisms among resource users and other stakeholders; and facilitation of partnerships between the public and private sector as well as community stakeholders in support of project outcomes.

144. The project fits both the GEF and UNDP portfolio particularly in view of the fact that there will be no allocation for OP12 in GEF 4, yet the thrust of this focal area is encouraged to be maintained in GEF 4 through integrated and synergistic projects. Integrated projects are well poised to address MDG goals, in particular those related to poverty alleviation, as indeed is the case with this project with its emphasis on identification of alternative sustainable livelihoods and provision of training in appropriate resource use practices. Additionally, initiatives of this nature enable better integration in fulfilment of Multilateral Environment Agreements, a heavy burden for SIDS with limited human and financial resources. The biodiversity benefits will, moreover, assist Antigua and Barbuda to address priority issues and concerns in this area and so compensate for a low RAF allocation. The Project also responds to GEF's cross-cutting and biodiversity as well as capacity-building strategic priorities as outlined in its Strategic Business Plan FY04-FY06.

145. At a regional level, the project complements other ongoing GEF initiatives, in particular: IWCAM, LDC-SIDS Portfolio Project, SLM[28], MACC, OPAAL, and CLME. The project will both build upon lessons derived from these initiatives, and provide inputs. In particular, close coordination will be ensured with the IWCAM demonstration project.

PROJECT GOAL, OBJECTIVE, OUTCOMES AND OUTPUTS/ACTIVITIES

146. The **Goal** of the project is **to ensure the sustainability and maintenance of island ecosystem integrity, health, and function through integrated planning and management of island resources**.

147. The **Objective** of the project is **to evolve and implement a Sustainable Island Resource Management (SIRM) approach in Antigua and Barbuda to stabilize and maintain ecosystem functions, thereby providing a basis for continued sustainable economic development**.

148. The key management issues and barriers to the sustainability and maintenance of island ecosystem, and to the development and implementation of an effective SIRM have been identified and discussed under

[28] Preventing Land Degradation in Small Island Ecosystems in the Caribbean through Sustainable Land Management

the previous section. The Project will aim to achieve its objective and overcome these management issues and barriers through four main outcomes.

- An Environmental Information Management Advisory System for use in Planning, Decision-making and Improved Targeted Awareness
- A Strategic Sustainable Island Resource Management Plan
- Realignment of Policy, Legislation, and Institutional Capacity to Support the SIRM Plan.
- Implementation of the SIRM Strategic Plan, including four on-the-ground demonstration projects

PROJECT OUTCOMES AND OUTPUTS:

OUTCOME 1. EASY AND RELIABLE ACCESS TO INFORMATION FOR ENVIRONMENTAL MANAGEMENT BY ALL STAKEHOLDERS

149. Development and implementation of an integrated strategy to maintain island resources and ecosystem integrity necessitates an understanding of the current status and functionality of whole island ecosystem. A fundamental first step in developing a SIRM strategy is therefore the compilation, analysis and synthesis of a complex of information on the key environmental resources (physical, chemical, biological), current resource patterns (demographics, social, economic) and patterns of environmental variability. At present much of the existing information about the islands resources is inaccessible and this major hindrance limits decision-making and inter-institutional collaboration, as well as stakeholder awareness and participation. There is therefore a need to improve the modalities of information compilation and exchange. There are also critical gaps in the types of data available which equate to gaps in the understanding of interdependence and ecosystem function. The establishment of a centralised Environmental Information Management Advisory System (EIMAS) will improve the integration and accessibility of data for SIRM. The improved ability to share datasets will maximise their utility in a cost-efficient manner as well. The system will provide a powerful tool for monitoring of the status of these resources and stress reduction efforts over the long term, and to inform planning and decision-making. Awareness raising campaigns will ensure support for, and meaningful cross-sectoral participation in, the development of the SIRM approach.

1.1 - Environmental Information Management System (EIMAS) and mechanism for data for use in planning and decision-making established

150. The EIMAS will be developed by the Ministry of Environment Division of the Ministry of Works, Transportation and the Environment in collaboration with the Information Technology Department in the Office of the Prime Minister. Existing paper and electronic based sources of information on the biological, physical and social environment will be compiled from the different institutions and these will provide the initial basis for the EIMAS. The design and structure of the EIMAS database will be developed with the capability of storing and managing both spatially referenced datasets (e.g. soils and habitat maps) on the biological, physical and social environment (e.g. demographics, administrative boundaries and land use patterns) as well as non-spatially referenced sources of information. Data formats will be established and standards will be set with a view to easing the capture and addition of new datasets (e.g. long term monitoring data). The main EIMAS facility will be housed in the Information Technology Department of the Office of the Prime Minister. The main EIMAS will serve as the central information 'hub' for the various agencies and will provide the necessary facilities to ensure equitable access to the information for registered NGOs and CBOs and interested members of the general public. This will include the responsibility for maintaining both hard and soft copies (e.g. of reports etc) and for providing requested information to ensure a two-flow of information is maintained. Other key agencies will be provided with the resources (e.g. personnel, training, hardware and software) to access, input and extract data and summary reports, thereby improving inter-institutional participation and collaboration. Suitable mechanisms to finance the long term maintenance of the EIMAS will be identified through Output 3.4. Workshops will be held to sensitize relevant stakeholders.

1.2 - Baseline assessments and mapping of island ecosystem resources, function and usage patterns

151. A review and analysis of the existing datasets will determine the interoperability and utility of the datasets from Output 1.1 and will identify the additional baseline data requirements and datasets that need

updating (through a gap analysis) in order to support a SIRM approach. Specific baseline surveys and assessments will then be undertaken to determine: (a) the extent and status of biological and physical resources (i.e. terrestrial and marine habitats using ground-truthed remote sensing data, invasive and introduced species, soil types, topography, hydrology, watershed function, surface and ground water resources, coastal erosion and shoreline stability); and, (b) current land and marine resource use patterns, using stakeholder consultation and participatory GIS and resource mapping techniques (e.g. to locate dive sites and fishing grounds).

1.3 - Modelling of island ecosystem resources and identification of key resources required for sustaining island ecosystem integrity and functionality

152. The data compiled from the baseline surveys and mapping (from Outputs 1.1 to 1.2 above) will be analysed and used to generate an island ecosystem model that will include thematic maps illustrating key characteristics including: (a) Exposure and erodability index to understand potential soil loss (based on detachability of soil particles and steepness of slope); (b) Water resource distribution and hydrological models; (c). Extent and status of functional habitats (i.e. those required for ecosystem function) in need of restoration / maintenance (e.g. restoring vegetation around stream-ways and on steep slopes, forest cover in upper watersheds); (d). Environmentally sensitive habitats[29] in need of protection (i.e. areas of high biodiversity, breeding, feeding, foraging grounds, etc.); (e) Extent of cover by invasive species (i.e. *Citronella* sp.); (e). Patterns of resource use; and, (f) Areas of conflict that may require specific mitigatory measures (e.g. agro-pastoral land adjacent to forest reserves, roadways blocking the natural passage of stream-ways). Information for this Output will also be used in the development of planning and zoning maps under Output 2.1 (below). The results of these analyses will assist in the spatial design of the monitoring programme (Output 1.5) and in zoning the islands in the development of a Sustainable Integrated Island Resource Management Zoning Plan (SIRMZP) and SIRM Implementation Strategy (Outcome 2).

1.4 - Environmental variability and extreme events forecasting

153. The baseline environmental data will be analysed and recommendations will be made on environmental variability and extreme events, their likely effects and possible contingencies and mitigations. The output will be linked to forecasting for disaster mitigation and climate change.

1.5 - Long term monitoring programme for island ecosystem status and function established

154. A comprehensive long term island ecosystem monitoring programmes (i.e. data collection, analysis and reporting) will be designed, using the data and analysis of the baseline surveys (Output 1.2 and Output 1.3) to assess the status of: (a) Biological resources (e.g. coral reefs, seagrass beds, mangroves, forestry resources and vegetation cover, beaches); (b) Ground water and coastal water quality; (c) Water resources (fresh water lens, aquifers, water storage); (d) Land degradation trends (Soil erosion, overgrazing and sedimentation in watersheds); (e) Physical environmental variability, (e.g. meteorology, sea water temperature, tides, sea level, etc.); and, (f) Socio-economic parameters. The responsibility for the monitoring programmes will necessarily be appropriately divided between the government agencies with primary responsibility for the resource, although CBOs and NGOs or the private sector may be appointed where deemed more suitable or cost-efficient. The data collected will be stored centrally within the EIMAS and made available to the different agencies thereby promoting data sharing and maximising the potential utility of the data. Monitoring reports will be produced on a timescale appropriate to the monitoring programme. Suitable mechanisms to finance the long-term monitoring programme will be identified through Output 3.4.

1.6 - Targeted Awareness and Sensitisation

155. A strategic programme of awareness and sensitisation will be developed in partnership with national NGOs and with the financial support of the private sector to ensure widespread cross-sectoral understanding of the implications of SIRM and meaningful participation in SIRM by civil society. This programme will

[29] Environmental sensitivity mapping is a method of integrating and summarising the environmental and / or cultural assets at a given location. The assets may be weighted depending on their importance or significance. The environmental sensitivity map can then be based on the total score, rather than the total number of assets.

develop parallel programmes to (a) sensitise policy and decision-makers (both private and public sector), to the benefits of the SIRM approach in relation to resource conservation and management as well as the economic advantages; (b) raise awareness at the institutional/ technical management level awareness to ensure that Managers and Directors understand how to interpret policy and how this is delivered; (c) raise public awareness of SIRM issues within the community, to foster support and action on the part of the community; and, (d) introduce SIRM issues and discussions into the educational establishment to ensure future stakeholders are aware of the requirements of SIRM. Appropriate packages and delivery mechanisms will be developed which are suitable for the target audience (e.g. preparation and publication of documentation on the zoning plan, with associated activity guidelines, in the form of leaflets and posters). The Media (radio, TV and newspapers) will be used to raise awareness and to consolidate the message as 'genuine and globally accepted'. Governmental agencies will be assisted to identify their key stakeholders in collaboration with NGOs and CBOs. The potential of embedding the training courses prepared during the Project in a local institution (e.g. higher education colleges) will be investigated.

OUTCOME 2. A SUSTAINABLE ISLAND RESOURCE MANAGEMENT PLAN DEVELOPED AND IN PLACE

156. Under Outcome 2 the project will aim to develop a SIRM Strategy based on the combined Outputs from Outcome 1. The first stage in the development of the SIRM process will be the development of a zoning plan for island resource management, in consultation with stakeholders. In order for this to be effective and to be fully embraced by all sectors, the SIRM Zoning Plan and Strategy will be pragmatically linked to national economic and development considerations supported by extensive stakeholder consultations. In this context the economic advantages of a long-term SIRM approach, as well as the costs of 'no-action' would need to be demonstrated. This will be achieved, in the first instance, through a cost-benefit analysis which will aim to illustrate the advantages of adopting a SIRM approach rather than maintaining the 'baseline'. This would be further supported by an assessment of alternative livelihoods and technologies in support of a SIRM with emphasis on self-sufficiency and sustainable economic growth linked to the maintenance of ecosystem functions and services. A final component of the 5 year SIRM Strategy would be the development of contingencies to mitigate the effects of environmental variability and extreme events on ecosystem functions. This would focus on the identification and adoption of best practices and technologies for protecting various ecosystem services from damage and contamination. All of these Outputs will be coordinated and elaborated into an agreed SIRM Plan for formal adoption by the Government.

2.1 Sustainable Island Resource Management Zoning Plan (SIRMZP) Prepared

157. A Sustainable Island Resource Management Zoning Plan (SIRMZP) will be prepared for Antigua and Barbuda (including Redonda). The zoning plan will designate different categories of land and marine resource use. Each zoning category will have an associated set of activity guidelines and regulations (e.g. defining the specific requirements for EIA etc.). The zoning plans and activity guidelines will be developed for each island using the results of Outcome 1 and through extensive consultation with stakeholders on the islands. In particular, this Output will be carefully coordinated with the Physical Planning Act and the National Physical Development Plan through detailed consultations with the DCA and its members, and with relevant government agencies responsible for the monitoring of the Act and the Plan. The same terminology will be used to describe the zones on all of the islands so as to minimise confusion. The categories used in the zoning plan may include:

- Residential Use Zone
- General Use Zone (e.g. commercial / industrial)
- Agricultural Lands
- Grazing Lands
- National Park
- Special Protected Areas (e.g. for turtle nesting beaches, mangroves, reefs etc)
- Fisheries Conservation Zones (e.g. no take zones for spawning aggregations etc.)
- Recreational / Tourism Zone
- Unclassified

158. The zoning plans will incorporate designated protected areas and appropriate coastal set-backs and will consider the need for additional water storage, as well as for solid and liquid waste disposal. Special areas (such as functional, sensitive and critical habitats, as identified in Outcome 1) may be provided extra protection by the inclusion of additional 'buffer' zones. The plans may also consider creating zones for specific activities (e.g. offshore areas permitted for disposal of dredging spoils). As mentioned above, the plans will be developed through extensive stakeholder consultation. Workshops will be organised in both Antigua and Barbuda to consult with stakeholders at staged intervals in the development of the plan. A draft zoning plan will be prepared and distributed prior to the final workshop for approval.

2.2 Comparative cost-benefit analysis of SIRM Zoning and Management Plan

159. A comparative cost-benefit analysis (socio-economic and environmental) will be undertaken to illustrate the advantages of adopting an SIRM approach in the context of sustainable economic development, poverty alleviation, and resource management. The findings will also provide the financial basis to support decision-making for sustainable land use planning. The costs of particularly damaging / unsustainable resource use activities (e.g. sand mining) will be compared against more sustainable alternatives (e.g. a stone crushing plant). The analysis will encompass an economic valuation of ecosystem services as necessary tools of integrated ecosystem management and land-use planning. The analysis will also study the impacts of environmental stress and degradation and assess their socio-economic consequences. This will include the total economic valuation of these consequences including lost recreation values, water quality/public health, reduced agricultural productivity, and reduced fish populations. Efforts will also centre on enhancing capacity for cost-benefit analysis of ecosystem-based management, habitat restoration, and so on. New insights and information generated by the Project's monitoring and demonstration activities will be incorporated.

2.3 Advisory Brief for Commercial Resource and Livelihood Sustainability

160. A review of current livelihood options will be undertaken to consider strategies to address the need to move toward sustainable self-sufficiency in relation to agricultural production, fisheries, sand for construction, etc. while improving livelihoods and incomes, and promoting sustainable economic growth. The Brief would include analysis of alternative agricultural practices, consider improved technologies, and identify high earning niches. The Brief would also include economic assessments and predictions of long-term supply and demand, and provide options and recommendations for action. The brief would be used as an input to a National Economic Development Plan. This Brief will be developed in consultation with relevant government agencies, such as the Forestry, Fisheries and Agricultural Extension Divisions, and other stakeholders. The Brief will be closely linked to the targeted training and capacity building programme described in Output 4.3.

2.4 Strategy and Contingency Plan to address Environmental Variability and Extreme Events within the Islands in direct relation to Ecosystem Functions and Services

161. This will focus on two components related to Environmental Variability and Extreme Events. The first will be forecasting and prediction for extreme events such as hurricanes, flooding, droughts and climate change. It would use data from the baseline and monitoring programmes (Output 1.4), capture data from outside the islands (i.e. from Caribbean regional programmes), and define contingency plans and precautionary approaches and strategies. The second component would look at identifying and capturing improvements (methods, practices and technologies) that address protection and conservation of water resources, mitigating possible impacts from sewage and wastewater, proper training of floodwater, and other potential impacts from events such as storms, hurricanes and droughts. This component would also consider the effects of environmental variability, in particular those that relate to sea level rise and global warming, and review and identify any possible contingencies that can be taken to protect ecosystem functions and natural resources in relation to these expected changes. The end-products could be used as an input or set of guidelines for part of a National Economic Development Plan. This Output will cooperate closely with the GEF Regional Project on *Mainstreaming Adaptation to Global Change* (MACC) which aims to increase national and regional capacity to monitor sea level and key climatic indicators, and to plan for adapting to the

effects of global climate change on coastal and marine resources. This output will also coordinate closely with the UNDP and OECS joint efforts under their Environmental and Disaster Management Assistance Portfolio

2.5 Strategic Plan for SIRM submitted to government and adopted

162. A Strategic Plan will be prepared to accompany the final draft zoning plan. The plan will be developed in consultation with local stakeholders, and will follow the principles identified in the National Environmental Management Strategy (NEMS)[30] to allow the country to meet these priorities concerns. There is a close synergy between the SIRM approach, the NEMS and the OECS regional agreement (the St. Georges Declaration) from which the NEMS evolved. All proposed policies and intents inherently advocate the ultimate establishment of mechanisms for integrated ecosystem management and enhanced civil society participation. Further details regarding the linkages between the Project and NEMS are discussed under the Baseline (above). The plan for SIRM will capture development goals and needs in terms of economic development, social improvements and resource management. It will also identify potential areas of conflict and define a suitable mechanism and plan for conflict resolution. The final draft zoning plan and SIRM plan will be submitted to the Government for approval. The Strategic Plan for SIRM is expected to be reviewed every 5 years.

OUTCOME 3. POLICY AND INSTITUTIONAL REFORMS PROVIDE A FRAMEWORK FOR IMPLEMENTATION OF THE SIRM PLAN

163. This outcome will review the existing policy and legislative framework, and relevant institutional structures and responsibilities, as well as capacity building needs, required to support the SIRM Plan. An integrated analysis these frameworks, with a focus on responsibilities, mandates, revenues and capacity, will identify the reforms and realignments necessary to implement SIRM. Such reforms should address the need for inter-sectoral cooperation and coordination to achieve mutual aims of resource conservation, maintenance of ecosystem function, economic growth, and improvements to individual livelihoods. Sustainable financial schemes in support of the additional activities required to implement and maintain SIRM mechanisms will be explored. This Outcome will be coordinated closely with the Draft Environmental Protection and Management Bill (2005). This Bill provides for the establishment of the legal and administrative mechanisms to achieve Integrated Sustainable Environmental Management in Antigua /Barbuda. Detailed consultations will be undertaken with those agencies that developed this bill, as well as those that will be ultimately responsible for its monitoring and compliance.

3.1 Review of the policy, legislation, and regulations related to SIRM across the different sectors

164. Current policy and incentive/regulatory frameworks will be reviewed and analyzed, with a view to identifying gaps and overlaps, and conflicting policies or mandates that would need to be formed in order to support sustainable watershed, coastal and marine management objectives. This review will consider the adequacy of policies and legislation for integrated island ecosystem management as they pertain to (a) Forestry; (b) Agriculture and Soils, including use of agrochemicals; (c) Water resources; (d) Land use rights and practices; (e) Fisheries; (f) Environment and conservation, including management of protected areas; (g) Mining (dredging, dumping, sand extraction); (h) Waste (solid and liquid) management; (i) Development Planning; and, (j) Health (as it relates to environmental quality). This review will be fully streamlined with relevant activities undertaken within the Demonstration Projects. For example, land tenure arrangements will be assessed building upon their review within Demonstration Project No 1 (Body Ponds Watershed), and policy requirements for establishment of zoning plans as called for in Demo No 2 (Ridges to Reef) will be considered. The review of the water tariff scheme as required by Demo No. 4 (Waste Water Disposal Best Practices) will also be incorporated.

[30] The NEMs is an OECS initiative that seeks to establish national mechanism for the implementation of the Barbados Plan of Action for SIDS. This is described in more detail in the Baseline section.

165. This review will also consider the adequacy of the Draft Environmental Protection and Management Bill (2005) alongside other existing legislation including the Physical Planning Act (2003) and other pending legislative proposals such as the Draft Forestry and Wildlife Act. Additionally, the review will also focus on compliance and enforcement issues in order to determine the causes for ineffective enforcement or weak compliance, which can range from inadequate monitoring systems to insufficient resources to lack of enforcement powers. Options for monitoring, enforcement and penalty systems will be explored and proposed for non-compliance with existing and new policies. These reviews will be undertaken in close collaboration with the proposed relevant activities which constitute the GEF IWCAM[31] project. The Project will also strive to identify any applicable governance reform measures that may have been tried and adopted by other SIDS and which may be appropriate or may provide some guidance to the reform measures needed within Antigua and Barbuda to address SIRM.

3.2 Review of Institutional Framework for SIRM Implementation

166. A review and analysis of the institutional structure, responsibilities, mandates, and revenues of the relevant institutions / sectors dealing with environmental and natural resource management will be undertaken. This review will further consider the requirements of the relevant agencies for effective implementation of SIRM, such as planning, monitoring, regulation and enforcement (e.g. EIA, SIA, SEA, support for EMS, eco-certification, and environmental auditing), building upon existing and ongoing capacity assessments and relevant activities within the GEF IWCAM project. The assessment will also further cover key private sector or community groups expected to assume responsibilities in the implementation of the SIRM (e.g. for co-management arrangements), as well as for the Demonstration Projects. It will identify training needs in all areas, as required by, e.g., the long-term monitoring programme, EIMAS sustainability, and Advisory Brief on Livelihood Options, as well as potential for training-trainers in support of Output 4.3. Key potential areas for increased cooperation between government agencies, as well as between government and civil society organizations will be explored. The relationships between government agencies and social organizations (trade organizations, NGOs and CBOs) will be analysed.

3.3 Reforms recommended for the streamlining of policy, legislation and institutional arrangements

167. An integrated analysis of the reviews of the policy and legislation (Output 3.1) and institutional arrangements and strengths (Output 3.2) will be undertaken in order to identify linkages, areas of overlap or poorly defined mandates, as well as cross-cutting issues that require and / or would benefit from an integrated cross-sectoral approach. This integrated analysis will identify and recommend specific reforms required to streamline the inter-sectoral management of natural resources and ecosystems, and will aim to ensure that responsibilities are clearly defined, particularly those areas that require collaboration (e.g. management of land and water resources in the watersheds and coastal areas). These reforms will specifically address requirements for the effective implementation of the Demonstration Projects. In particular these reforms will address enforcement issues, as well as the need for information management and data sharing (from Outputs 1 above).

168. Policy analysis and proposals for policy development will focus on such key issues as:

- management of public and common natural resources
- integrated watershed management
- land management
- land use rights and practices
- regulation of wetland and coastal development and degradation, including through strengthened EIA processes
- regulation of livestock management and grazing practices

[31] Integrated Watershed and Coastal Area Management project, a regional initiative implemented by UNDP and UNEP and discussed in the Baseline.

- fishing practices
- reduction of pollution, particularly untreated effluent from tourism infrastructure into the coastal waters and agro-chemicals from the agricultural sector

169. The project will work with the relevant government authorities for the development, approval and introduction of these policies into the policy and legislative frameworks.

3.4 Identification of suitable financial economic instruments and other sustainability mechanisms to support SIRM

170. Identification of fiscal instruments and financial strategies and mechanisms to generate revenues (e.g. taxation, tourist taxes, PES, user fees, microfinance schemes, and incentives), and retain revenues to support environmental management and conservation activities, including those used to support co-management schemes. A study will be undertaken to assess the 3feasibility of implementing these instruments and mechanisms to ensure the financial sustainability of SIRM in Antigua and Barbuda. The study will work with, and build upon, relevant activities and developments within the Demonstration Projects. Adequate financial support will be needed to ensure SIRM specific activities, such as data management, monitoring, and enforcement, are continued beyond the lifetime of the Project. Incentives for adoption of sustainable resource and land use practices, and for support to land use and zoning policies, will be developed, both at the national level as well as within the specific demonstration projects. The most suitable financial and fiscal instruments will be proposed to the National Coordination Mechanism (NCM) and relevant government authorities as part of a Financial Strategy to Support SIRM for their consideration, approval and implementation.

OUTCOME 4. REQUIREMENTS FOR IMPLEMENTATION OF THE SIRM PLAN IN PLACE, AS WELL AS MECHANISMS FOR CAPTURE OF LESSONS AND BEST PRACTICES

171. The purpose of this Outcome is to ensure effective Project Implementation and the long term success of SIRM. A Project Management and Coordination Unit will be established along with an Inter-Sectoral Committee which will act as the coordination mechanism for sustainable island resource management. The relevant institutions will be provided with skills and capacity to implement SIRM and to monitor effectiveness. A range of specific integrated management solutions will be demonstrated at pilot sites previously identified as Hotspots and Sensitive Areas.

4.1 Project Coordination Unit and Coordination Mechanisms for SIRM

172. A Project Management Unit (PMU) will be established within the Ministry of Works, Transport and Environment with overall responsibility for project implementation. The Project Manager will define and establish a Project Coordinating Committee to ensure streamlined project executing, with participation of the demonstration project coordinators and any other government representatives or stakeholders deemed appropriate or necessary.

173. The existing National Coordination Mechanism (as described in the Baseline above) will serve as in inter-ministerial committee and provide the necessary cross-sectoral coordination mechanism for integrated sustainable island resource management. With regards to this project, the NCM will responsible for reviewing and taking policy decisions and will meet as often as is necessary or on a 6 monthly basis.

174. A Project Board, with responsibility for oversight of the project, and integrated by the Project Manager and the Project Coordinator, and a representative of UNDP, will meet twice during the first semester after inception, and thereafter on a 6 monthly basis.

4.2 Inter-sectoral Training and Capacity Building Programme for SIRM

175. An inter-sectoral training and capacity building programme and work plan will be developed (based on capacity and training needs identified in Output 3.2.) to ensure institutions and organisations have the

necessary skills and capacity. Training will be developed in close coordination and consultation with relevant government agencies, as well as with key sectors such as tourism, agriculture, and fisheries, within the framework of the development of the Advisory Brief for Commercial Resource and Livelihood Sustainability (Output 2.3). Furthermore, the Project will work closely with island and regional NGOs to ensure that training builds on their existing programmes as well as to engage their expertise in this area where appropriate. Training will also be closely linked with the execution of the demonstration projects, which will develop targeted, on-the-ground management approaches to address priority issues and needs. The pilot farms to be developed within Demonstration One will provide opportunities for development of training materials as well as for their validation. Key areas for development of training programmes include:

- Sustainable agro-pastoral practices including reduced use of agrochemicals and erosion minimization techniques
- Reforestation with native species
- Invasive species management, particularly *Citronella sp.*
- Fire control and management
- Sustainable fishing practices
- Ecotourism options
- Conflict resolution techniques
- Data collection and monitoring, including of key indicators of ecosystem health, etc.

176. Training materials will be developed and the possibility of establishing relevant training courses within local institutions (e.g. higher education institutions) will be explored. Consideration will be given to the possibility of incentives to ensure that the personnel provided with the training are retained within government agencies beyond the duration of the project (i.e. modified employment terms and conditions). Training and capacity initiatives will be linked to sub-regional and regional activities (e.g. GEF IWCAM project and its IWRM components).

4.3 - Implementation of Site Specific Demonstration of Integrated Ecosystem Management in Critical Pilot Sites previously Identified as Hotspots or Sensitive Areas

177. Site-specific pilot projects will be implemented to demonstrate alternative approaches for addressing key issues and barriers to the integrated sustainable management of island resources. The pilots will demonstrate solutions to cross-sectoral issues and barriers at sites of national importance that have also been identified as either an environmental Hotspot or Sensitive area. The cross-sectoral nature of the demonstrations will encourage and support inter-institutional collaboration at the site level thereby assisting in the transition to the actual integration and mainstreaming of SIRM approaches at the national level. In all demonstration projects, incentive schemes will be defined in order to encourage adoption of best practices and support for SIRM objectives. Best practice lessons from the site level demonstrations will be captured and used to adjust national level approaches. A brief description of each demonstration is presented below and the full descriptions are included in **Appendix 1** along with work-plans and budgets. These demonstrations will also provide valuable inputs to other ongoing GEF initiatives in the region such as IWCAM and the Caribbean Large Marine Ecosystem project.

4.3.1 DEMO 1) Sustainable land use practices for the conservation of soil and water resources and rehabilitation of the Body Ponds watershed on Antigua

178. The ecosystem integrity and functionality of Antigua has been impacted by a history of unsustainable land use (loss of native vegetation, monoculture, overgrazing, spread of invasive species, uncontrolled fires) and this has impaired ecosystem stability and health, and reduced the ability of the island to cope with cyclical weather patterns. The threat is likely to worsen given the predicted increases in environmental variability with global climate change. The purpose of this project is to demonstrate soil and water conservation strategies to restore / maintain watershed functionality (through promotion of alternative agro-pastoral techniques, invasive species management (*citronella sp*), and habitat restoration) within the Body Ponds watershed. This watershed is the largest watershed on Antigua and is important for agriculture

and livestock farming. The watershed is now heavily eroded and overrun by lemon grass (*Citronella* sp.) especially in the upper hilly areas. Vegetation and soil layers are very dry during the drought season which promotes forest and grass fires. There is unregulated topsoil and sand mining in the streambeds. Ground water is threatened with contamination as a result of the improper use of agricultural chemicals by farmers.

179. The poor condition of the land has left the watershed vulnerable to extreme climatic events and watershed function is impaired and in need of rehabilitation and protection. The project will demonstrate and promote alternative strategies to: (a) Manage and control fires, (b) Achieve sustainable livestock management, (c) Restore / rehabilitate habitats, (d) Protect stream-ways, ground water aquifers and water storage facilities, (e) Reduce soil erosion, and (f) Manage invasive plant species, in particular lemon grass. In addition, pilot farms will be established to demonstrate alternative agricultural livelihoods through promoting practices that: (i) minimize the use of agro-chemicals, (ii) land clearance techniques without the use of fire, (iii) improve irrigation and water supply, (iv) improve product range, yield and earnings, and (v) improve competitiveness and marketing.

4.3.2. DEMO 2) Development of an integrated 'ridges to reefs' co-management approach for the conservation of resources in the South West region of Antigua

180. Antigua and Barbuda as a small island developing state is entirely dependent on the integrity and productivity of the ecosystem. The majority of protected areas on Antigua and Barbuda exist on paper without management plans, dedicated management authority, financial support or the required infrastructure for their implementation, monitoring and enforcement. The south coast of Antigua contains several of these areas: Wallings Forest (WF), Fig Tree Drive Forest (FTDF), Boggy Peak (BP) and Cades Reef (CR). These assets are all of great national importance from an economical, social, historical, and biodiversity perspective, and form part of a wider landscape that is in need of special conservation management (Doiggs, Barta, Rendezvous, and Christian Valley). The purpose of this project is to establish an interlinked network of marine and forest protected areas, with appropriate co-management, to ensure the integrated management of the resources, whilst providing a chain of ecotourism destinations that generate revenues to support management activities and benefit the local community.

4.3.3. DEMO 3) Integrated Planning and Management for the sustainable use of Codrington Lagoon (Barbuda)

181. The island ecosystem of Barbuda has not been subject to the same intense levels of development as experienced by Antigua. This situation may soon change due to the increasing demand for residential accommodation and tourist developments. A central feature of the island is Codrington Lagoon which is a unique and highly vulnerable component of Barbuda's ecosystem that is of national economic and cultural importance. It is one of the largest lagoons in the Lesser Antilles and serves as a habitat and nursery for a range of marine species due to the sheltered lagoon, extensive fringing mangroves, and sea-grass beds. The lagoon also supports one of the world's largest colonies of Frigate birds (*Fregata magnificens*) which have become a prized tourist attraction. At present the lagoon is used for a variety of activities. The lagoon is impacted by over harvesting of marine resources, cutting of mangroves for charcoal production, and waste dumping near the coastline. The status of the lagoon is under further threat from pressures to develop the waterfront on the outskirts of Codrington Village for residential purposes. The proximity of these lands to the lagoon, their exposure to storm surges, and the current lack of a central sewage system on the island are of particularly concern. If Codrington Lagoon is to remain healthy, any development along the waterfront needs to be carefully planned and regulated particularly regarding accessibility to water, and proper liquid and solid waste disposal to preserve and protect this fragile marine ecosystem. The purpose of this project is to implement integrated planning and management strategies to ensure that development needs are met in a sustainable manner, and that conservation requirements are provided for.

4.3.4. DEMO 4) Promoting best practices in water conservation and waste water disposal and grey water re-use in the North West tourism zone Antigua

182. North West Coast of Antigua is the main tourism zone on the island, with the greatest concentration of hotels and the highest levels of water use. This area is however within the Cedar Grove Watershed (W1) which is a drought risk zone with limited ground water stores and the lowest annual rainfall compared to other watersheds. There are no municipal waste water disposal facilities along this coast and many of the hotels have both private desalination plants and waste water disposal systems. The NW tourism area has however been identified as an environmental Hotspot due to the high levels of liquid and waste contamination (nutrients, microbiological and chemical pollution; suspended solids; solid wastes). The systems used by the hotel may not be suitably located, managed or maintained. The purpose of this demonstration project is to minimise both point and non-point sources of pollution (from poorly maintained septic tanks and private waste water disposal systems), whilst promoting water conservation and grey-water re-use schemes. The project will promote public private partnerships, and encourage the adoption of environmental management systems in hotels along this stretch of coast. The project will investigate the possibility of implementing a Blue Flag eco-certification scheme for the beaches within the NW zone. The project will investigate the feasibility of implementing a grey-water scheme for the excess water produced by hotel for re-use for municipal and / or agricultural purposes. Although this demonstration initiative will not be addressing the area of St. John itself, it will ensure close coordination and linkages, as appropriate, with the IWCAM demonstration project, *Mitigation of Groundwater and Coastal Impacts from Sewage Discharges from St. John.*

4.4 - Monitoring and Evaluation

183. As part of the development of a Sustainable Island Resource Management Strategy and Plan, it will be essential to identify measurable indicators of conditions and changing trends in biodiversity, ecosystem function, socio-economic parameters, etc. The regular and sequential collection of data relating to these indicators would then need to be elaborated into a long-term monitoring and data collection/analysis programme for SIRM. This requirement will be covered under 1.5 above.

184. There is also a need for specific monitoring and evaluation related to measurement of the success and delivery of the GEF SIRM Project itself. Key performance indicators for each Outcome (along with their sources of verification) are listed within the Logical Framework (see **Section II – Strategic Results Framework and GEF Increment** – below). These should be reviewed and compared with the Project Work-plan by the Project Board at its first meeting for amendment/addition and adoption. Further meetings of the Project Board should reconsider project status and delivery against the adopted indicators to identify any shortfalls in delivery. As such, the monitoring and evaluation components will be key inputs to an adaptive management approach. A plan will be developed for providing the baseline (i.e. the initial project condition determined by the indicators), which will be completed during the first year of implementation. These same indicators will also be used to assess success and delivery during the Mid-Term and Terminal Evaluation process. As an on-going process, the Project will undertake the usual standard GEF/UNDP monitoring and reporting processes (quarterly reporting, Project Implementation Review/Annual Project Review, minutes of Project Board meetings, etc.). These monitoring and evaluation requirements are described in more detail in the Project Monitoring and Evaluation Plan and Budget (see Part IV – below). This M&E process is an integral and essential responsibility of Project Management and Coordination.

4.5 - Capture of lessons and best practices (from Demos and Full Project), and implementation of a transfer and replication mechanism

185. Lessons, best practices and alternative technologies and strategies arising from the Demonstration Projects which identify possible solutions and mitigations to the threats and root causes which are acting as barriers to sustainable island resource management at a national level will be captured, and guidelines developed where appropriate. Effective replication strategies and mechanisms for transferring and replicating the lessons and practices arising from the demonstration projects will be developed. The project also aims to ensure that these lessons and best practices are disseminated at the regional and global level (especially in relation to other SIDS) through appropriate knowledge networks or other regional initiatives such as IWCAM, MACC, CLME, and LDC-SIDS.

COST-EFFECTIVENESS OF GEF INTERVENTION

186. In proposing the above Objective and Outcomes, due consideration has been given to cost-effectiveness and alternative options.

187. Options that respond to the need to stabilize and maintain ecosystem services and functions at a landscape level are very limited. Antigua and Barbuda has to adopt a long-term strategy toward Sustainable Island Resource Management and Ecosystem Functions if i) ecosystem functionality and integrity is to be maintained, ii) the remaining biodiversity of the islands is to survive, and iii) the economic growth of the islands is to be sustained. A collapse in ecosystem functions and continued degradation and loss of natural resources will inevitably result in gradual economic collapse along with the deterioration of health and social structures. This same scenario is true of many of the world's SIDS and, to this effect; Antigua and Barbuda will lead the way in demonstrating successful SIRM. Other options include:

- **No action – Business-as-usual**: This is not an acceptable option either at the national or global level. Nationally this would lead to economic and environmental disaster. Globally the world would lose both a significant area of biodiversity and a unique opportunity to test and evolve SIRM within a workable and controllable scenario where the threats may be high but the system boundary is discrete enough for a GEF intervention to have a positive effect. Furthermore, Government commitment is high as can be seen from the level of co-funding.

- **Individual sectoral initiatives**: This would fragment any real progress and fail to achieve the essential level of integrated management that is necessary for SIRM to be functional and sustainable. All activities within the watershed and coastal areas of a small island are interlinked as are its ecosystem functions. An island like Antigua is effectively a single super-ecosystem and must be treated as such (likewise Barbuda). The two islands cannot be treated independently as they share a common legislative and institutional management structure.

- **The proposed assistance and intervention**: This is the only realistic approach to any donor-assisted initiative that aims to develop and achieve a working example of SIRM. Moreover, given that SIDS constitute wholly interlinked single landscape units, such an integrated approach is ultimately the only viable means of ensuring long-term ecosystem stability and integrity, and therefore continued provision of the functions, services and resources on which the islands' socio-economic well-being depends. Initiatives that address specific issues or areas in a fragmented, non-articulated manner or that are sector-specific pose risks as the tightly woven relations characteristic of a SIDS translate into a range of externalities that may constrain achievement of stated objectives. An integrated approach that aims to address the suite of key issues that impact on the ecosystem – ranging from resource use practices to proper zoning to enabling policy environments – provides a best-case comprehensive response.

- The proposed project strategy is judiciously structured to ensure that all developments and reforms are based on best-available information, and that an appropriate enabling environment exists for mainstreaming SIRM considerations into the broad governance framework. Firstly, a comprehensive database of information relating to island resources and ecosystem functions, and that will also include key socio-economic components such as demographic trends, will be established and institutionalised. Based on this, land management strategies (including zoning and land-use control) will be developed through a highly participatory process and adopted. Only then will an initial SIRM Strategy and Plan drafted. To support this Plan, necessary reforms to legislation, institutional capacity and mandates, and overall government policy will be undertaken and adopted, again through robust stakeholder consultations. In parallel, broad capacity assessments will be carried out, followed by targeted training programmes, in order to ensure that the requisite skills and abilities are in place.

Most importantly, the project will also undertake a review of sustainable financial mechanisms, drawing on lessons and experiences from initiatives in other regions and countries, in order to identify viable schemes for ensuring adequate resource flows in support of SIRM. The inclusion of 4 selected demonstrations is important to this process as it aims to deliver real solutions to on-the-ground problems that exist (in varying degrees and differing scenarios) throughout Antigua and Barbuda and, indeed, throughout the SIDS of the Caribbean and the rest of the world, thereby generating not only lessons, but engaging stakeholders directly and proving that SIRM delivers tangible benefits.

188. Additionally, this Project is considered to be the most cost-effective approach in view of:

- The financial and institutional commitment being made by the Government of Antigua and Barbuda by way of co-funding ($1.5 million of which a significant amount is additional funds to support posts and activities rather than just in-kind contributions). This is significant for a SIDS and demonstrates the high priority assigned to this initiative. Although this is not an indication of cost-effectiveness in its own right, this degree of commitment does augur well for robust project implementation and, most importantly, for sustainability of project outcomes. Such sustainability will demonstrate that the GEF increment was judiciously allocated to Antigua and Barbuda, and will heighten its replicability value.
- The value-for-money of this Project in consideration of its role as a cutting-edge demonstration of SIRM with enormous potential for further replication among other islands, many of which are of critical importance to global biodiversity, and many of which are suffering the same potential fate (loss of valuable resources and critical ecosystem functions) in the absence of any guidance or lessons on SIRM.

PROJECT INDICATORS, RISKS AND ASSUMPTIONS

189. In the context of this Project indicators can be separated into 1. Ecosystem function indicators that address *Process*, *Stress Reduction* and *Environmental Status* and, 2. Project success and delivery indicators that identify measurable benchmarks within the Project itself. As part of the development of an SIRM Strategy and Plan, it will be essential to identify measurable indicators of conditions and changing trends in biodiversity, ecosystem function, socio-economic parameters, etc. The regular and sequential collection of data relating to these indicators would then need to be elaborated into a long-term monitoring and data collection/analysis programme for SIRM. This requirement will be covered under Output 1.5 (Establishment of a long-term monitoring programme for island ecosystem status and function). Output 4.2 deals with the necessary Training and Capacity Building for data collection and monitoring of key indicators of ecosystem health. In this context, the SIRM Project will coordinate closely with the IWCAM Project which has a significant set of activities assigned to the identification and adoption of indicators for coastal and watershed management, particularly impact indicators for measuring process, stress reduction and environmental status. The SIRM Project recognises the opportunities here for economies of scale and for sharing experience, training and workload as well as information.

190. For the assessment of overall Project success and delivery, the Logical Framework Matrix provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification.* The Logical Framework also provides associated *Risks* and *Assumptions*. The first main Indicator would be the adoption by the country of a SIRM mechanism with the associated legislative and policy reforms. This assumes there will be the political will to support the adoption of such an approach, to revise the legislation and policies accordingly, and to allocate requisite financing. It assumes that private sector, for example the tourism trade, as well as resource users such as farmers and fishermen, will come to understand, accept and adopt the SIRM approach, despite trade-offs that may be required. This also assumes that it will be possible to identify suitable financial mechanisms to generate sufficient revenues to allow the Government to support the new activities in the long term. The second indicator for the adoption of SIRM will be an active ecosystem monitoring programme to determine the effectiveness of the new interventions, to

aid decision making, and for adaptive management. The success of the long term monitoring programme will in part depend on stakeholder participation to assist in these tasks. The third overall indicator will be the acceptance of necessary trade-offs between maintenance of ecosystem functions and services, and land and resource use practices and trends, as a necessary long-term condition for sustained and sustainable economic development. This is based upon the assumption that SIRM can contribute to and enhance economic development and that the resource management approach implemented is of long-term benefit to the local communities and key stakeholder groups. Specific indicators, in particular impact indicators, will correspond to specific targets within the biodiversity and land degradation focal areas as required by an OP12 project.

191. As detailed in the Project Monitoring and Evaluation Plan (**Part IV**), although success indicators for each outcome are listed within the Logical Framework for this submission, these would be reviewed along with the Project workplan by the Project Steering Committee at its first meeting (Inception Phase) to identify any necessary areas of amendment/addition and adoption that may have arisen as a result of changes over time while developing and submitting the Project, and to agree and finalise the annual workplan. Further meetings of the Steering Committee should reconsider project status and delivery against the adopted indicators to identify any shortfalls in delivery. These same indicators will also be used to assess success and delivery during the Mid-Term and Terminal Evaluation process. At the Inception workshop, an Impact Measurement Template will be presented and reviewed for adoption. Appropriate indicators will be drawn for the Logical Framework and will be related to the measurement of global benefits achieved by the Project (rather than simply Project Implementation progress). A template/example of such table is provided in the Monitoring and Evaluation Plan (**Part IV**).

192. The individual Risks and Assumptions are discussed below by Outcome.

Outcome 1: Easy and Reliable Access to Information for Environmental Management by all Stakeholders

RISK/ASSUMPTION	MITIGATION STRATEGY
Existing datasets are made available to the Project and sufficient capacity to compile and integrate datasets.	Government agencies made aware of the purpose of the project and sensitised to the need to develop and EIMAS, the need to share information for cost-effectiveness, and the potential island wide benefits that will be accrued.
No sensitivity / copyright issues restricting access to existing datasets for inclusion into EIMAS	Full recognition for data sources and analysed dataset guaranteed with agreements to clearly reference and acknowledge all sources of data included in EIMAS.
Sufficient capacity available to undertake initial baseline surveys and mapping, to analyse data, create thematic maps and generate island ecosystem model.	Capacity assessments will be undertaken at project start, and appropriate training and capacity building will be provided through the Project
Acceptance of the need to include extreme event prediction and management as well as on-going environmental variability into SIRM process	Stakeholders' meetings during the PDF process have raised this awareness. Further awareness raising activities will take place within the Project
Agencies prepared to coordinate monitoring approaches and work together to develop integrated cross-sectoral planning and zoning approach.	Agencies already coordinating through both formal and informal mechanisms. Further coordination mechanisms are built into the Project
Training provided and resources assigned (including human) and continue to be available for effective monitoring and for EIMAS to operate	Project has significant resources allocated to identifying long-term funding. Monitoring, training and the identification of resources is addressed by the Project
Policy level commitment and associated sustainable funding made available.	Majority of co-funding already formally identified and committed within national budget.

Policy makers are prepared to ask for guidance and willing to use information analyses even if not favourable.	Project aims to target policy makers specifically to raise awareness of SIRM issues and need to use data analyses, cost-benefit analyses, and recommendations in policy decisions
Media willing to assist in publicising the need and benefits of SIRM. No negative publicity surround SIRM generated through course of project.	Project aims to raise awareness of the cross-sectoral benefits of SIRM issues and will provide ample opportunity for public involvement and stakeholder consultation to respond to feedback, even where negative.

Outcome 2: Policy and Institutional Reforms Provide a Framework for Implementation of the SIRM Plan

RISK/ASSUMPTION	MITIGATION STRATEGY
NCM can adopt the Zoning Plan in the face of any objections from individual agencies or the private sector.	Sufficient stakeholder consultation will assist in this process. Ultimately high-level government support will be necessary and the Project will need to concentrate on fostering this support. Use of the results of the cost-benefit analysis should help to convince senior policy-makers
Stakeholders are able to accept trade-offs and understand long-term benefits of Zoning Plan	
Cost-Benefit Analysis will find clear economic benefits to an SIRM approach	The Cost-Benefit Analysis will constitute a comprehensive review of the value of ecosystem functions and island resources. It is beyond doubt that these sustainable resources, functions, and services will have a high value and enormous economic and social importance
Viable and sufficient alternatives to existing livelihoods and resource use practices can be identified, and Government recognizes the need to include these in development planning and to promote the need for self-sufficiency.	There are already some clear alternatives which have not been explored properly or implemented so far. The Cost-Benefit Analysis and Project awareness campaigns should convince government and stakeholders of their importance and necessity. Where trade-offs are inevitable, the Cost-Benefit Analysis should provide adequate justification.
Resource users, private sector, and communities accept proposed alternatives or modifications to resource use practices	
Adequate baseline data on environmental variability available to make initial predictions and develop contingency plan.	If adequate data are not available then there are provisions within the Project work-plan and budget to capture such data
Government recognises need and is prepared to adopt a realistic Plan	Government commitment to this Project already indicates support for such a Plan. Further support will be solicited and ensured through various project activities.

Outcome 3: Requirements for Implementation of the SIRM Plan in Place, as well as Mechanisms for Capture of Lessons and Best Practices

RISK/ASSUMPTION	MITIGATION STRATEGY
Government prepared to accept that review process is intended to realign overall policy and legislation toward an SIRM approach. Effective cooperation from relevant agencies and departments	Sufficient awareness and sensitisation will be undertaken prior to the activities intended under this Outcome. Government should be convinced of the need through the CBA and other demonstrations of SIRM

Government prepared to accept that review process is intended to realign overall institutional strategy and financing toward an SIRM approach, and to identify capacity and training needed to effect this realignment. Effective cooperation from relevant agencies and departments	essentials
Genuine government intention and support to undertake reforms. No 'u'-turns associated with elections and possible new government	Election Cycles always represent a problem to GEF Projects. Stakeholder participation and awareness targeting must include all parties and not just government officials
Sufficient financial incentives and actual revenues can be generated and allocated to support SIRM	This is an integral part of the Project and cannot be pre-empted at this stage. Suffice to say that there are dedicated activities to address this concern
Mechanisms can be evolved to encourage private sector involvement and funding. Willingness on part of both parties (public and private sector). Clear vision of advantages and incentives	Private-public sector partnerships will be a strategic aim of the Project. Establishment of such partnerships seems to be a growing trend in the country, with understanding of clear benefits.

Outcome 4: Requirements for implementation of the SIRM Plan in place, as well as mechanisms for capture of lessons and best practices

RISK/ASSUMPTION	MITIGATION STRATEGY
The National Coordination Mechanism is able and willing to assume its role as the equivalent of the project's inter-ministerial/sectoral committee	Government commitment is already evidenced through significant co-funding, and awareness and sensitisation activities, as well as the CBA, should convince all members of the importance of active participation in project implementation
Relevant agencies and stakeholders are prepared to allocate appropriate staff for training and capacity building	Agencies are keen for staff to receive training as long as this is done under conditions of 'Train-and-Retain' whereby staff agree to remain with the government for a designated period after the training
Implementation of demonstration projects reveals appropriate lessons and practices that are replicable.	It is inherent that the Demo process will find lessons and best practices that can be used elsewhere both nationally and in other SIDS. The Demos are designed for that specific purpose.
Demos work to plan and are completed and produce lessons and best practice guidelines that applicable at the national level	This will depend on the EA, IA and the Independent Evaluation process ensuring that the Demos remain on schedule and deliver as expected. There may be a need for interim assessment and progress-chasing for the Demos and this has been catered for within the project budget if required.
Lessons and Practices are transferable and appropriate for driving models, and in guidelines. Governments willing to adopt models and guidelines. Change of government may = change of heart	Only appropriate lessons, practices and technologies would be selected for replication and transfer. If these are successful there would be little reason for the government to oppose their use. Stakeholder participation and awareness targeting will include all parties and not just government.

EXPECTED GLOBAL, NATIONAL AND LOCAL BENEFITS

193. Global benefits accrued by this project are:

i) Protection and conservation of critically important biodiversity, including endemic and migratory species, as well as key habitats such as wetlands, mangroves and coral reefs;
ii) Restoration of ecosystem resilience and stability that enable provision of functions and supporting, regulating and provisioning services;

iii) Reduction in negative socio-economic impacts that impair poverty reduction efforts and may lead to conflicts over resource use or between resource users and other stakeholders; and,
iv) Replicability of the SIRM approach and associated demonstration projects to SIDS which face similar threats, barriers and root causes to sustainable ecosystem management, and priority issues such as general land degradation, poor water resource management and inadequate wastewater handling. It is expected that this project will represent a flagship for SIRM that can be fine-tuned and balanced to suit most if not all SIDS around the world.

194. A key global benefit that a project of this nature and scope is ideally poised to deliver refers to the issue of trade-offs. The prioritization of ecosystem functions and sustainable resource management entails potential conflict with business-as-usual scenarios. The SIRM strategy central to this proposal will identify a state-of-balance between potential competing needs and demonstrate either the complementary nature of both aims, or the long-term benefits accrued by putting in place an integrated management approach. It will thus demonstrate how trade-offs can be reduced or at least, mitigated.

195. National benefits will be ultimately accrued across all sectors and within both the private and public arenas given that each island is a single landscape unit. An effective SIRM with long-term management and protection of ecosystem functions and services will provide the islands' with the necessary long-term stability that is essential for human welfare and economic development. Improvements to key areas such as sanitation, water quality and access, and land-use and productivity, will raise standards of living and general quality of life throughout these two islands. Tangible improvements will become first evident at the local level, especially in association with the demonstration projects. Local communities will be empowered with more management responsibilities for their localised resources as well as through guidance and capacity building in sustainable management approaches that will generate broader options. Linkages between sectors and focal areas signify that benefits will be cross-cutting, such as:

196. Improved agricultural practices that not only minimize land degradation trends and pollution impacts but reduce operation costs through reduced use of agrochemicals and more judicious use of scarce water resources, and,
197. Enhanced productivity and sustainability of fisheries through use of appropriate practices, and protection of critical habitats through reduction in pollution and sedimentation loads.

COUNTRY OWNERSHIP: COUNTRY ELIGIBILITY AND COUNTRY DRIVENNESS

198. The Government of Antigua and Barbuda has demonstrated its commitment implementing sustainable integrated planning and management approach to island ecosystem through its involvement in several initiatives. The Government has signed regional and international conventions and agreements as shown in Table 3 which lists the major Multilateral Environmental Agreements relevant to Antigua and Barbuda along with their status regarding signature and ratification.

199. Antigua ratified the Convention on Biological Diversity on the 9th March 1993. A Biodiversity Enabling Activity has been implemented and resulted in the preparation of a National Biodiversity Strategy and Action Plan. Antigua and Barbuda became a Party to the United Nations Convention to Combat Desertification (UNCCD) in 1997. In fulfilment of Party obligations, a National Action Plan[32] was prepared in 2005. This NAP identifies the main factors affecting land degradation in Antigua and Barbuda to be:

- Variability in rainfall patterns
- Poor land management practices (e.g. soil and sand mining)
- Residential and industrial activities in watersheds
- Land preparation practices for farming and construction purposes
- Naturally occurring land slides

[32] http://www.unccd.int/

- Degradation of forested areas
- Impacts from recent hurricanes

200. The NAP identifies the need for a land management plans to cover three sub-areas: Watershed management, Pasture and Range management, and Coastal management. The proposed SIRM approach would integrate these three sub-areas into a single management approach addressing island resources and island ecosystem functions as a whole.

201. At a regional level, the Cartagena Convention, the leading regional agreement on marine resource management for the Wider Caribbean Region, entered into force on 11 October 1986 for Antigua and Barbuda. The country has ratified this convention as well as its two active Protocols on Specially Protected Areas and Wildlife and Cooperation in Combating Oil Spills. At a sub-regional level, Antigua and Barbuda are signatory to The St. George's Declaration, which commits all OECS countries to the adoption of an integrated approach to management of natural resources, and has prepared a National Environmental Management Strategy (NEMS).

202. The country is eligible to receive technical and financial assistance form the United Nations Development Programme as well as other agencies within the international system.

SUSTAINABILITY

203. The Project will result in the establishment of a SIRM mechanism supported by effective government capacity to manage the islands' ecosystems despite limited staff numbers. The establishment of the EIMAS, along with the necessary advanced technological resources, will provide both the foundations and the tools needed for long term integrated planning and management of the island ecosystem. The EIMAS will provide a structured system to organise and make accessible both existing and new information about the island's resources. The expertise to analyse and interpret different data types, built through the Project's training programme, will improve understanding about island ecosystem function and empower policy makers and senior managers to plan and make better decisions about how best to utilise the island ecosystem over the long term. Recommended reforms to the institutional structure and mandates, supported by pertinent changes in legislation, policy and regulations, and the development of an island-wide zoning plan will clarify and streamline the management of island resources and thereby maximise both the effectiveness of actions, as well as cost effectiveness through avoiding duplication of efforts. The motivation for implementing these changes and justification for continued support for SIRM will be made evident through the cost benefit analysis which will indicate the total economic benefits to be gained through adopting this approach including direct financial benefits as well as the less tangible benefits (e.g. aesthetic landscape values etc). The preparation of a Strategic Plan for SIRM, further targeting of capacity building (based on comprehensive capacity and training needs assessments) combined with schemes to generate stable financial flows in support of SIRM, and direct contributions towards the National Economic Development Plan will allow the government to continue SIRM-related activities after termination of the project.

204. Strong stakeholder involvement, buy-in, and partnerships between the government and the private sector will also support the sustainability of the project's outcomes and goals. Stakeholder consultation and participation in, for example, the process of zoning the islands and the development of regulations and guidelines, will engender ownership, while increased awareness of the uniqueness of the proposed SIRM approach will develop national pride and ensure continued support. The engagement of resource users and private sector in the SIRM development process, as well as the Cost-Benefit analysis backed up by robust information system, will lend credence to the need to implement integrated ecosystem-based management approaches, thus minimizing the perceived cost of necessary trade-offs. This will be decisive in ensuring broad support for, and therefore sustainability of, the SIRM strategy. The demonstration projects will require the direct involvement of local stakeholders and CBOs in the management of natural resources in their immediate vicinity. This will also provide the relevant agencies with the opportunity for regular contact with the local communities and improve their understanding of local concerns. The resulting co-management of

island resources at the grassroots level will reduce on-going impacts from economic activities. The piloted and demonstrated best practice for protected areas management, agriculture and land management, invasive species and tourism planning and self regulation, will be critical tools for use and replication and updating by the island stakeholders.

205. Revenue generation will be critical to the long-term sustainability of any island resource management system. Each of the demonstration projects includes the development of financial instruments and mechanisms to generate and retain revenues to cover the additional costs incurred for monitoring and management of the islands resources in the long term. The suitability of several alternative schemes will be explored through the different demonstrations such as imposing visitor's fees and taxes or creating park trust funds. Collectively the demonstrations thereby provide the Government with the opportunity to test the viability of these possible alternatives before the schemes are up-scaled to the national level.

206. The Project will also address island wide sustainability issues from the perspective of encouraging self-sufficiency and economic growth. For example, the growth of the agricultural sector will depend on the increased sale of fruit and vegetable products to hotels and cruise-ships. However this will only be possible and sustainable if there is a reliable supply of products, which in turn depends upon a more stable water resource management strategy, to be assisted by the project. Financial instruments will be introduced within the water resource sector to transfer the benefits of clean water access (at the downstream reception end) and make them available for management of the resource upstream where threats are greatest.

207. The Project's demonstration areas, management plans and strategies for these demonstration areas to be developed with full stakeholder participation will provide examples of good, sustainable management of ecosystems, and of critical globally significant biodiversity. Promoting environmental mainstreaming in the tourism sector will be a particularly important demonstration for Island activities. Demonstration four will specifically examine how the tourism sector can actively assist in SIRM through encouraging them to take on the responsibility for minimising their environmental impact through self-regulation.

REPLICABILITY

208. Antigua and Barbuda provides an example of an island system that is under increasing stress from unsustainable demands on its resources, continuous degradation of key components and habitats (including watersheds, wetlands and coastal areas), and inadequate resource use practices. This results in multiple stresses on the ecosystem, which are magnified by the fact that each island is essentially a single landscape unit. As a SIDS, this situation is not unique to Antigua and Barbuda but rather, descriptive of most if not all SIDS. Moreover, due to the geographic, socio-economic, and political similarities between many of the small island developing states in the Caribbean, and particularly in the OECS, development of approaches and mechanisms that enable a SIDS to successfully resolve many or most of the challenges associated with integrated ecosystem-based management will provide extremely useful and innovative models for other small island states. The demonstration projects will emphasise the identification of approaches and tools that are sound lessons and working practices and that can be transferred and replicated both within the region and through the SIDS of the world. As noted earlier, the project will link up closely with other ongoing projects in the Caribbean, in particular projects of a regional scope that will provide for dissemination of information and best practices as well as for the evolution of strengthened knowledge networks. Within the GEF portfolio, these include the LDC-SIDS Portfolio Project and SLM project in Land Degradation, the MACC project in Climate Change, and the CLME and Caribbean SIDS regional project on Integrated Watershed and Coastal Area Management projects in International Waters. The role of this project as an affiliated project to IWCAM is recognized and understood. Effectively, this project will act as a demonstration activity to the IW SIDS Regional project, but one that stands alone in view of its size and complexity. Nevertheless, the replicability and transfer of lessons is inherent and expected.

PART III: Management Arrangements

Overview

209. The project will be implemented by UNDP and executed by the Environment Division of the Ministry of Works, Transportation and the Environment under NEX, in accordance with the existing Standard Basic Assistance Agreement between the Government of Antigua and Barbuda and UNDP. During execution of the FSP the Environment Division, will have lead responsibility for project management and oversight. Additionally, the Environment Division, together with the Forestry Division of the Ministry of Agriculture, Lands and Fisheries and the Barbuda Council, will take a lead in the execution of the four demonstration projects that fall within their respective sectors or jurisdiction (Outcome 4.4).

210. A **Project Coordination Committee (PCC)** will be established in order to ensure streamlined execution between the main project outputs and the activities to be developed in the four individual demonstration projects. The PCC will be chaired by the Project Manager who will also determine the periodicity of its meetings. Core members of this Coordination Committee will consist of the Demo Project Coordinators. Temporary members will include agencies and NGOS that may be involved in the implementation of particular project activities, not linked to the demos. For example, with respect to output 2.1 the DCA may be asked to attend coordination meeting since they will be the lead agency to implement this activity.

211. The existing **National Coordinating Mechanism (NCM)** will serve as an inter-sectoral coordination body for the present project, and assist in addressing the complex issues related to the development of a SIRM mechanism. It consists of a network of government agencies/ divisions, national focal points, competent authorities, and NGO's, working to together to facilitate a coordinated and timely response to Antigua and Barbuda's treaty obligations as well as providing a forum for discussions on work-programmes for government agencies. UNDP may participate with observer status. Through the project, participation in the NCM of civil society and the private sector will be strengthened. The Draft Environmental Protection and Management Bill (2005) may provide the National Coordinating Mechanism with legal status. The proposed Project will aim to support the strengthening of the NCM.

212. A **Project Board** will be establishment with oversight responsibilities for project implementation (see paragraph 211 below).

213. In order to accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF project publications, including among others, project hardware and vehicles purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgment to GEF. The UNDP logo should be more prominent -- and separated a bit from the GEF logo if possible as, with non-UN logos, there can be security issues for staff.

Implementation and Management Activities

214. The Project Management Unit (PMU) will be headquartered within the Environment Division of the Ministry of Works, Transportation and the Environment in Antigua. The PMU will include the Project Manager, Project Coordinator, Administrative Assistant and other technical staff within the Environment Division. The Project Manager will have general oversight of the project, and will be the main liaison with government agencies and the NCM. The Project Coordinator will have responsibility for the daily implementation of project activities, and completion of agreed workplans in a timely manner. The project and its coordinator will have dedicated access to all the technical capabilities of the staff within the Division (as calculated in the co-financing). The PMU will have responsibility for project implementation and management of resources on a day-to-day basis, as well as for the preparation of work plans, budgets, project proposals, and progress reports. The Project Coordinator will have lead responsibility for execution of the Project.

215. The Project Manager as well as the Project Coordinator will be paid for by the Government of Antigua and Barbuda as part of the co-financing agreement. The three specialized Focal Points (Forestry Division (Demos 1 and 2), Barbuda Council (Demo 3) , and Environment Division (Demo 4) are responsible for executing the demonstration projects (Outcome 4.4), using procedures and norms for implementing activities as set out by the Project Coordinator. The Demo Project Coordinators will report directly to the Project Coordinator on all matters relating to the Project. Each of the three agencies will designate and pay for the respective demonstration Project Coordinator as part of government co-financing. In addition, designated Environment Division staff will provide technical inputs and coordination assistance to the agencies. An Administrative Assistant to support the work of the Project Manager and Project Coordinator will be provided for by the project.

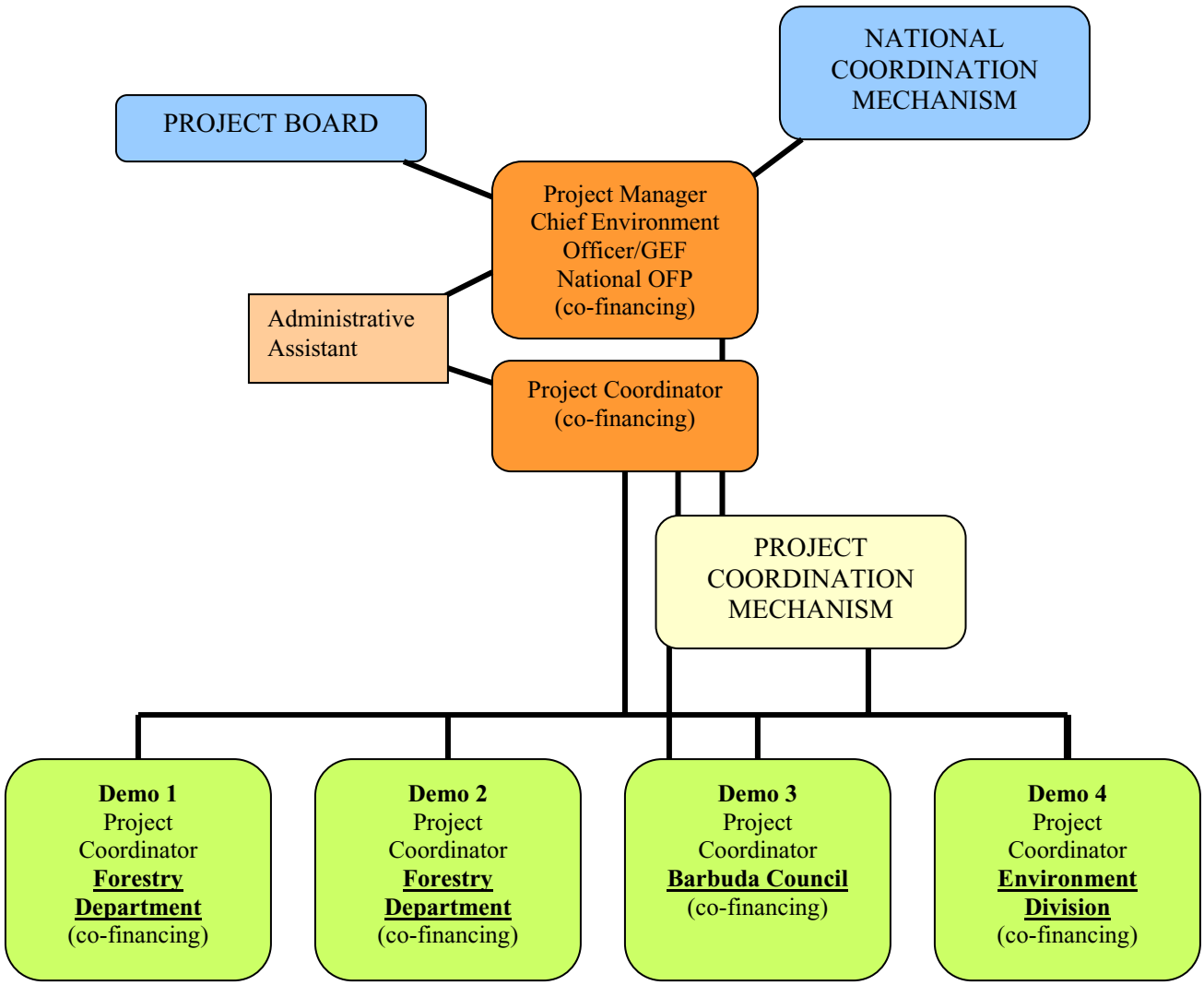
216. In addition to the participation of the various PMU members, the following institutions or persons have been identified as key contributors to the Project:

- Ministry of Tourism and Civil Aviation ;
- Ministry of Finance and Economic Development;
- Ministry of Health, Sports and Youth Affairs;
- Ministry of Agriculture, Lands and Fisheries;
- Ministry of Planning, Implementation and Public Service Affairs;
- Development Control Authority; and,
- Ministry of Education.

Coordination and Oversight Activities

217. The **Project Board** will be integrated by the Project Manager and the Project Coordinator, and a representative of UNDP. The PB will meet twice during the first semester after initiation of project activities, and twice yearly thereafter. The Project Manager will chair the PB. The Project Coordinator will act as Secretary. The Project Board is an important component of the overall Monitoring and Evaluation plan of the Project.

218. Execution of the Project will be carried out on the basis of annual work plans. The PMU is in charge of designing and implementing the activities in the annual work plans. The Project Board will approve and review the work plans and corresponding budgets, and monitor and evaluate results and lessons learned. In addition, any decisions that require modification of the outputs and activities of the Project, or changes to legal structures and mechanisms, will be of the responsibility of the Project Board. The Chair of the PB will provide regular reports to the NCM on the progress of the Project.


NATIONAL COORDINATION MECHANISM
PROJECT BOARD
Project Manager Chief Environment Officer/GEF National OFP (co-financing)
Administrative Assistant
Project Coordinator (co-financing)
PROJECT COORDINATION MECHANISM
Demo 1 Project Coordinator Forestry Department (co-financing)
Demo 2 Project Coordinator Forestry Department (co-financing)
Demo 3 Project Coordinator Barbuda Council (co-financing)
Demo 4 Project Coordinator Environment Division (co-financing)

PART IV: Monitoring and Evaluation Plan and Budget

219. Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures. M&E will be provided by the project team and the responsible UNDP Country Office (UNDP-CO, Barbados) with support from UNDP/GEF (see Section 1 below), though the Project Board, or by Independent Evaluators in the case of the Mid-Term and Terminal Evaluations (see Section 2 below). The Logical Framework Matrix in **Section II** (**Strategic Results Framework and GEF Increment**) provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification*. The Work-plan and Budget in **Section III** (below) provide delivery and disbursement targets. These elements form the basis on which the Project's Monitoring and Evaluation system will function.

220. The following sections outline the principle components of Monitoring and Evaluation. The Project's Monitoring and Evaluation approach will be discussed during the Project's Inception Report so as to provide a means of verification, and an explanation and full definition of project staff M&E responsibilities.

Project Inception Phase

221. A Project Inception Workshop will be conducted with the full project team, relevant government counterparts and National Focal Points, co-financing partners, the UNDP-CO (Barbados) and representation from the UNDP-GEF Regional Coordinating Unit (Panama) as appropriate.

222. A fundamental objective of this Inception Workshop will be to assist the project team to understand and take ownership of the project's goals and objectives, as well as finalize preparation of the project's first annual work plan on the basis of the project's logframe matrix. This will include reviewing the logframe (indicators, means of verification, assumptions), imparting additional detail as needed, and on the basis of this exercise finalize the Annual Work Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes for the project. Any changes to the outputs or activities defined in the logframe will need to be approved by the Project Board. Any changes to established outcomes or the objective will need to be submitted to GEF for consideration and approval, after approval by the Project Board.

223. Additionally, the purpose and objective of the Inception Workshop will be to: (i) introduce project staff to the UNDP-GEF *expanded team* which will support the project during its implementation, namely the responsible UNDP Country Office and Regional Coordinating Unit staff; (ii) detail the roles, support services and complementary responsibilities of UNDP-CO and RCU staff vis à vis the project team and Project Board; (iii) provide a detailed overview of UNDP-GEF reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Tripartite Review Meetings, as well as mid-term and final evaluations. Equally, the Inception Workshop will provide an opportunity to inform the project team on UNDP project related budgetary planning, budget reviews, and mandatory budget re-phasing.

224. The Inception Workshop will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed again, as needed in order to clarify for all, each party's responsibilities during the project's implementation phase.

Monitoring Responsibilities and Events

225. The Inception Workshop will present a Schedule of M&E-related meetings and reports. This will have been developed by the Project Coordinator in consultation with UNDP through the Project Board.

226. Such a schedule will include: (i) tentative time frames for Tripartite Reviews, Steering Committee Meetings, (or relevant advisory and/or coordination mechanisms) and (ii) project related Monitoring and Evaluation activities.

227. *Day to day monitoring of implementation progress* will be the responsibility of the Project Coordinator based on the Project's Annual Work Plan and its indicators. The Project Team will inform the relevant UNDP-CO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

228. The Project Coordinator will fine-tune the progress and performance/impact indicators of the Project in consultation with the full Project team at the Inception Workshop with support from UNDP-CO and assisted by the UNDP-GEF Regional Coordinating Unit, and these will be discussed and agreed upon during meetings of the Project Board. Specific targets for the first year implementation progress indicators together with their means of verification will be developed at this Workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the Annual Work Plan. The local implementing agencies will also take part in the Inception Workshop in which a common vision of overall project goals will be established. Targets and indicators for subsequent years would be defined annually as part of the internal evaluation and planning processes undertaken by the Project Team, and agreed with the Executing and Implementing Agencies.

229. *Periodic monitoring of implementation progress* will be undertaken by the UNDP-CO through the provision of quarterly reports from the Project Team. Furthermore, specific meetings can be scheduled between the Project Team, the UNDP CO and other pertinent stakeholders as deemed appropriate and relevant (e.g. Project Board members, Focal Points, Co-funding partners, etc). Such meetings will allow parties to take stock and to troubleshoot any problems pertaining to the Project in a timely fashion to ensure smooth implementation of project activities. A Mission Report will be prepared by the Project Team in coordination with the UNDP CO, and circulated (no less than one month after the Mission) to the Project Team, all PB members, UNDP-GEF and any accompanying stakeholders.

230. *Annual Monitoring* will occur through the **Tripartite Review (TPR).** This is the highest policy-level meeting of the parties directly involved in the implementation of a project. The Project will be subject to Tripartite Review (TPR) at least once every year. The first such meeting will be held within the first twelve months following the Inception Workshop. The project proponent will prepare an Annual Project Report (APR) and submit it to UNDP-CO and the UNDP-GEF regional office at least two weeks prior to the TPR for review and comments.

231. The APR will be used as one of the basic documents for discussions in the TPR meeting. The Project Coordinator and Team will present the APR to the TPR, highlighting policy issues and recommendations for the decision of the TPR participants. The Project Coordinator and Team also inform the participants of any agreement reached by stakeholders during the APR preparation on how to resolve operational issues. Separate reviews of each project component may also be conducted if necessary. Details regarding the requirements and conduct of the APR and TPR are contained with the M&E Information Kit available through UNDP GEF.

Terminal Tripartite Review (TTR)

232. The terminal tripartite review is held in the last month of project operations. The Project Coordinator is responsible for preparing the Terminal Report and submitting it to the relevant UNDP-COs and GEF's Regional Coordinating Unit. It shall be prepared in draft at least two months in advance of the TTR in order to allow review, and will serve as the basis for discussions in the TTR. The terminal tripartite review considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as a vehicle

through which lessons learnt can be captured to feed into other projects under implementation of formulation. The TTR should refer to the Independent Terminal Evaluation report, conclusions and recommendations as appropriate.

233. The TPR has the authority to suspend disbursement if project performance benchmarks are not met as per delivery rates, and qualitative assessments of achievements of outputs.

Project Monitoring Reporting

234. The Project Coordinator in conjunction with the UNDP-GEF extended team will be responsible for the preparation and submission of the following reports that form part of the monitoring process. Items (a) through (e) are mandatory and strictly related to monitoring, while (f) through (g) have a broader function and the frequency and nature is project specific to be defined throughout implementation.

Inception Report (IR)

235. A Project Inception Report will be prepared immediately following the Inception Workshop. It will include a detailed First Year Work Plan divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year of the Project. This Work Plan will include the proposed dates for any visits and/or support missions from the UNDP-CO or the Regional Coordinating Unit (RCU) or consultants, as well as time-frames for meetings of the Project's decision making structures. The Report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the Annual Work Plan, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 months time-frame.

236. The Inception Report will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project related partners. In addition, a section will be included on progress to date on project establishment and start-up activities and an update of any changed external conditions that may effect project implementation, including and unforeseen or newly arisen constraints.

237. When finalized, the report will be circulated to project counterparts who will be given a period of one calendar month in which to respond with comments or queries. Prior to this circulation of the IR, the UNDP Country Office and UNDP-GEF's Regional Coordinating Unit will review the document.

Annual Project Report (APR) and Project Implementation Review (PIR)

238. The APR is a UNDP requirement and part of UNDP's Country Office central oversight, monitoring and project management. It is a self-assessment report by project management to the Country Office and provides CO input to the reporting process and the ROAR (Results Oriented Annual Report), as well as forming a key input to the Tripartite Project Review. The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. These two reporting requirements are so similar in input, purpose and timing that they have now been amalgamated into a single Report.

239. An APR/PIR is prepared on an annual basis following the first 12 months of project implementation and prior to the Tripartite Project Review. The purpose of the APR/PIR is to reflect progress achieved in meeting the project's Annual Work Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work. The APR/PIR is discussed in the TPR so that the resultant report represents a document that has been agreed upon by all of the primary stakeholders.

240. A standard format/template for the APR/PIR is provided by UNDP GEF. This includes the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome

- The constraints experienced in the progress towards results and the reasons for these
- The three (at most) major constraints to achievement of results
- Annual Work Plans and related expenditure reports
- Lessons learned
- Clear recommendations for future orientation in addressing key problems in lack of progress

241. The UNDP/GEF M&E Unit will analyse the individual APR/PIRs by focal area, theme and region for common issues/results and lessons. The Reports are also valuable for the Independent Evaluators who can utilise them to identify any changes in project structure, indicators, work-plan, etc. and view a past history of delivery and assessment.

Quarterly Progress Reports

242. Short reports outlining main updates in project progress will be provided quarterly to the local UNDP Country Office and the UNDP-GEF regional office by the project team.

Periodic Thematic Reports

243. As and when called for by UNDP, UNDP-GEF or the Implementing Partner, the project team will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the project team in written form by UNDP and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learnt exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. UNDP is requested to minimize its requests for Thematic Reports, and when such are necessary will allow reasonable timeframes for their preparation by the project team.

Project Terminal Report

244. During the last three months of the project the project team will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met, or not achieved, structures and systems implemented, etc. and will be the definitive statement of the Project's activities during its lifetime. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the Project's activities.

Technical Reports (project specific- optional)

245. Technical Reports are detailed documents covering specific areas of analysis or scientific specializations within the overall project. As part of the Inception Report, the project team will prepare a draft Reports List, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the Project, and tentative due dates. Where necessary this Reports List will be revised and updated, and included in subsequent APRs. Technical Reports may also be prepared by external consultants and should be comprehensive, specialized analyses of clearly defined areas of research within the framework of the project and its sites. These technical reports will represent, as appropriate, the project's substantive contribution to specific areas, and will be used in efforts to disseminate relevant information and best practices at local, national and international levels.

Project Publications (project specific- optional)

246. Project Publications will form a key method of crystallizing and disseminating the results and achievements of the Project. These publications may be scientific or informational texts on the activities and achievements of the Project, in the form of journal articles, multimedia publications, etc. These publications can be based on Technical Reports, depending upon the relevance, scientific worth, etc. of these Reports, or may be summaries or compilations of a series of Technical Reports and other research. The project team will

determine if any of the Technical Reports merit formal publication, and will also (in consultation with UNDP, the government and other relevant stakeholder groups) plan and produce these Publications in a consistent and recognizable format. Project resources will need to be defined and allocated for these activities as appropriate and in a manner commensurate with the project's budget.

INDEPENDENT EVALUATION

247. The project will be subjected to at least two independent external evaluations that will be initiated by UNDP and coordinated by the UNDP CO, as follows:-

Mid-term Evaluation

248. An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation. The Mid-Term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

Final Evaluation

249. An independent Final Evaluation will take place three months prior to the terminal tripartite review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

Audit Clause

250. The Government will provide the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

LEARNING AND KNOWLEDGE SHARING

251. Results from the project will be disseminated within and beyond the project intervention zone through a number of existing information sharing networks and forums. In addition:

252. The project will participate, as relevant and appropriate, in UNDP/GEF sponsored networks, organized for Senior Personnel working on projects that share common characteristics. UNDP/GEF shall establish a number of networks, such as Integrated Ecosystem Management, eco-tourism, co-management, etc, that will largely function on the basis of an electronic platform.

253. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned.

254. The project will identify, analyse, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identify and analysing lessons learned is an on- going process, and the need to communicate such lessons as one of the project's central contributions is a requirement to be delivered not less frequently than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting on lessons learned. To this end a percentage of project resources will need to be allocated for these activities.

TABLE: INDICATIVE MONITORING AND EVALUATION WORK PLAN AND CORRESPONDING BUDGET

Type of M&E activity	**Responsible Parties**	**Budget US$** *Excluding project team Staff time*	**Time frame**
Inception Workshop	Project Manager and Project Coordinator UNDP CO UNDP GEF	$20,000	Within first two months of project start up
Inception Report	Project Team UNDP CO	None	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	Project Manager and Project Coordinator will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members	To be finalized in Inception Phase and Workshop. $15,000	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	Oversight by Project GEF Technical Advisor and Project Manager and Project Coordinator Measurements by field officers	To be determined as part of the Annual Work Plan's preparation. $15,000	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	Project Team UNDP-CO UNDP-GEF	None	Annually
TPR and TPR report	Government Counterparts UNDP CO Project team UNDP-GEF RCU	None	Every year, upon receipt of APR
Project Board Meetings	Project Manager Project Coordinator UNDP CO	None	Following Project IW and subsequently twice annually
Periodic status reports	Project team	$5,000	To be determined by Project team and UNDP CO
Technical reports	Project team Hired consultants as needed	$15,000	To be determined by Project Team and UNDP-CO
Mid-term External Evaluation	Project team UNDP- CO UNDP-GEF RCU External Consultants (i.e. evaluation team)	$30,290 (includes rates, DSA and flights)	At the mid-point of project implementation.
Final External Evaluation	Project team UNDP-CO UNDP-GEF RCU External Consultants (i.e. evaluation team)	$45,290 (includes rates, DSA and flights)	At the end of project implementation
Terminal Report	Project team	None	At least one month

	UNDP-CO External Consultant		before the end of the project
Lessons learned	Project team UNDP-GEF RCU (suggested formats for documenting best practices, etc)	$20,000	Yearly
Audit	UNDP-CO Project team	$4,000 (average $1000 per year)	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	UNDP Country Office UNDP-GEF RCU (as appropriate) Government representatives	$15,000 (average one visit per year)	Yearly
TOTAL INDICATIVE COST *Excluding project team staff time and UNDP staff and travel expenses*		US$ 184,580	

IMPACT MEASUREMENT TEMPLATE

255. Appropriate indicators will be drawn from the Logframe Matrix and will be related to the measurement of global benefits achieved by the project rather than project implementation progress. An Impact Measurement Template will be developed for the Inception Workshop and will be fine tuned and detailed through the Inception Workshop.

PART V: Legal Context

256. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Antigua and Barbuda and the United Nations Development Programme, signed by the parties on 26 August 1983. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

257. The UNDP Resident Representative in Barbados is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

a) Revision of, or addition to, any of the annexes to the Project Document;
b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility.

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

PART I: Incremental Cost Analysis

258. The full detailed Incremental Cost Assessment Matrix upon which the following text and calculations are based is appended to this section (below).

National Environmental Objective

259. The Government of Antigua and Barbuda assigns priority to the development of integrated approaches to land and resource use management approaches, as evidenced by emerging policy and legislative frameworks and the establishment of inter-sectoral bodies such as the National Coordination Mechanism (NCM). However, this imperative is constrained by fragmented institutional, policy and regulatory frameworks, and insufficient incentives for the private sector to support actions to mitigate environmental impacts and put in place more sustainable practices, despite being a beneficiary that derives value from ecosystem functions such as water resources, clean coastlines, protection from storms, agricultural productivity and general landscape values.

Global Environmental Objective:

260. The objective of this Project is to evolve and implement a Sustainable Island Resource Management approach in Antigua and Barbuda so that ecosystem function is stabilised and maintained for the future, thereby providing a basis for continued sustainable economic development. The global significance of this objective is threefold.

1. A SIRM approach will provide protection and conservation-targeted management for a number of endemic and threatened species as well as a number of habitat types of critical importance to global biodiversity. The Caribbean islands are recognised for their high levels of endemism and intense species packing per unit area combined with a high degree of threat, and are therefore considered a high-priority biodiversity hotspots that deserve immediate attention from the global community.

2. Although there is growing support for the concept of the Island Ecosystem (as a semi-discrete unit), there are no working examples of a SIRM approach mainstreamed into government policy, legislation and institutional operations. This Project would provide a testing-ground for the operational application of the SIRM approach within an island system that is facing fairly serious ecosystem degradation in the absence of any such intervention. Using Antigua and Barbuda as a demonstration it is hoped that an active SIRM mechanism can be developed that encompasses and operates in parallel with the need to protect cultural expectations, individual livelihoods and the potential for economic growth, and an improved standard and quality of life. A successful demonstration of the application of SIRM within these parameters would provide the SIDS of the world with an urgently needed model from which they can capture appropriate lessons and best practices for replication within their individual contexts.

3. In the absence of accurate and comprehensive information and long-term monitoring programs, impacts of inadequate land/coastal management and degradation of ecosystem functions and services leading loss of globally significant biodiversity, cannot be quantified nor planned for. This results in ad hoc and insufficient protection of species, such as the Frigate Birds sanctuary in Barbuda. This is a common situation for all Caribbean SIDS. Through the project, comprehensive data on the status biodiversity and ecosystem functions would be collected, analyzed and monitored, presenting an opportunity to develop appropriate SIRM planning. Data would be of vital use in the assessment of the status of certain species and biological habitats at the regional and global level. The GEF Increment would support establishment of an effective EIMAS would provide lessons and best practices for other SIDS, most of which are in urgent need of similar mechanisms to support SIRM. Modelling techniques would be perfected that would also be transferable at the inter-island level.

Baseline Scenario

Outcome 1

261. The various government agencies, Fisheries Division, Forestry Unit DCA and Lands Department all collect baseline information and monitoring activities. These are however ad hoc and not coordinated, although some attempts have been made at integrated data management through the Environment Division. Efforts to develop a centralized system have met with funding and manpower constraints. Current data collection, storage and management is piecemeal with little or no sharing or integration of data. Information on many parameters associated with ecosystem function and the maintenance of biological resources is not being collected or monitored. There is limited information on environmental variability or the effects of extreme events on resources or ecosystems. Gaps in data prevent any effective modelling, prediction or development of an effective SIRM Plan. Lack of reliable and consistent data constrains accurate policy decisions or effective management. For example, the Public Works Department require modelling and prediction of water catchment and storm run-off in order to plan for flood control and storm-water training, as well as to provide for adequate infrastructural development given that, for example, roads can have a direct effect on water-flow as well as accessibility to sensitive sites. Considerable monitoring of water supplies has been undertaken, but there is a need to link this to other ecosystem functions. Assessment of GIS was undertaken as part of Disaster Mitigation Project, which was funded by the OAS. However this assessment needs to be updated. Additionally there needs to be a retraining of agencies as there has been some attrition and transfers that have affected the capacity of the government to develop a national GIS database. Limited assessments have been conducted on either specific biodiversity of specific locations. There has been no complete assessment of the entire country.

262. The National Office for Disaster Services is directly involved in prediction and planning for extreme climatic events which will have important significance for environmental variability and extreme event forecasting in relation to ecosystem maintenance and resource management. However, the baseline does not current include a specific strategy and detailed contingency plans for addressing environmental variability in relation to dealing with variables such as storm deluges and droughts and their effective on ecosystem functions or the need to protect ecosystem services from hurricanes through alternative infrastructure. Variability in the environment at a natural cyclic level and at a more extreme level (storms, droughts, hurricanes) is relatively unrecorded and unaccounted for in current or planned data analysis.

Outcome 2

263. Antigua and Barbuda has a National Environmental Management Strategy based on a set of principles (St George's Declaration) adopted by OECS countries. However this strategy does not yet have real substance within policy, legislative, or institutional frameworks at the national level. Existing frameworks do not reflect an appreciation of the requirement to maintain ecosystem functions as a fundamental part of socio-economic welfare. Effective land-use and coastal management is affected by the absence of adequate zoning plans despite the fact that Government has spent some $180,000 so far on planning and zoning. The Development Control Authority (DCA) has strategies for zoning areas these do not necessarily embrace the SIRM concept or give sufficient balance to the maintenance of ecosystem functions and services. Land-use designation is fragmented and poorly integrated. Commercial development issues are not effectively considered within the context of SIRM. However, DCA does undertake some monitoring and compliance exercises in relation to development and associated issues which have a baseline cost. The need for detailed zoning is reflected, for example, the Soil and Water Conservation Division's requirements for zoning and land-use planning for soil and water conservation and maintenance which demands, however coordinated efforts with other agencies such as the Divisions of Land, Environment, Forestry and DCA.

Outcome 3

264. The Physical Planning Act and the Draft Environmental Protection and Management Bill seek to establish bases for an integrated approach to natural resource management, but effective implementation is constrained in the absence of comprehensive and integrated resource information, institutional capacity, and appropriate skills (e.g. GIS, mapping). The Physical Planning Act makes provision for the orderly and progressive development of lands to improve amenities and includes legislation addressing the protection of water supplies, controls on land development (including EIAs which are not a legal requirement at present),

environmental protection areas, control of fires, and prevention of landslip and erosion. The draft Environmental Protection and Management Bill provides for the establishment of the legal and administrative mechanisms to achieve integrated sustainable environmental management but is still under review. Both the Act and the Bill need further work and need to be better integrated in their application and enforcement as well as in their management approaches. The Government in cooperation with the OECS have allocated $100,000 to the preparation of these two legal documents. The Government agencies are also making some headway towards improving institutional arrangements (in cooperation with OECS) but this needs a clearer focus and integration into the SIRM concept. Institutional responsibilities are fragmented and also overlap, and capacity to carry out stated mandates is highly constrained or absent. The NEMS was supposed to address the need for reforms but there has been no funding available. Financial sustainability and revenue mechanisms are the weak point within the baseline

Outcome 4

265. Specific training needs have been developed by government agencies and NGOS addressing, for example, sustainable agricultural practices and reforestation approaches. The Ministry of Agriculture is directly concerned with stock control and arable land management which has major implications for vegetation and soil conservation. They monitor farming practices and would be responsible for the adoption and promotion of alternative farming and agricultural techniques and practices. Current legislation and policy is weak, especially in relation to land tenure issues and control of harmful practices. However, in order for an SIRM Strategy and Plan to be operationalized within Antigua and Barbuda there is a need for more extensive training and capacity building across all sectors as well as improved awareness of the purpose of SIRM and the need to protect ecosystem functions.

266. There is an absence at SIDS level of applicable and pertinent case studies, models and demonstrations of how to address particular threats and root causes, and how to remove barriers to their mitigation. In fact, there is a global absence of good examples of SIRM and mechanisms for maintenance and protection of island ecosystem functions. The country is prepared to spend some $400,000 on supporting such demonstrations in its own national interests. In the context of one particular demonstration in Barbuda (Codrington Lagoon, a National Park and a Ramsar site) the CREP Project has already contributed $70,000 but management problems and other issues have left the Project's objectives undelivered as yet. The Barbuda Council is currently closely involved in reviewing the development policies for the island of Barbuda and particularly in relation to Codrington Lagoon. Some work has already been undertaken on resource management within the lagoon and it has recently been declared a national park but there is insufficient infrastructure or financing to run this Park or to monitor its welfare. The Council is attempting to address legislative and policy needs to this effect (but with financial constraints and the need for specialised guidance) and will need to look at institutional arrangements, manpower and training needs. Additionally, several regional agencies and bodies are working with Antigua and Barbuda on baseline-related issues. The Caribbean Conservation Association (as part of the Caribbean Regional Environment Programme) is providing assistance also to identifying and adopting/designating protected areas and protection of endemic species. The Government of Spain has also provided Antigua and Barbuda with some funding ($250,000) to address watershed management issues and GEF will be assisting ($500,000) with the development of an Integrated Water Resources Management strategy through the GEF/UNDP/UNEP IWCAM project.

Total Baseline attributable to the SIRM Project proposal: $10,440,000

The GEF Increment

267. The GEF alternative will focus on addressing the key management issues and barriers whose continued presence is a threat to ecosystem functions and services and to the overall maintenance and sustainability of natural resources. The ultimate goal would be a Sustainable Island Resource Management approach to protect the vital island ecosystem assets to ensure that the goods and services upon which the island is so dependent continue to be provided for future generations. The robust cross-sectoral stakeholder engagement that characterizes the proposal, as well as components such as the Cost-Benefit Analysis, will demonstrate the

overall, long-term benefits of integrated ecosystem-based management approaches, and to justify the inevitable trade-offs.

268. In order to achieve Project objectives, GEF is requested to provide assistance on four fronts.

1. Specialist support will be provided to develop an EIMAS focusing on capturing and processing pertinent information and feeding that information into the planning and decision-making process. Targeted training will be given to appropriate agencies and personnel, and capacity needs will be addressed at the institutional level. Baseline information will be collected for all ecosystem functions, biodiversity units, and socio-economic considerations to inform an integrated resource management mechanism. Data will be analysed, and results and conclusions packaged, so as to be user-friendly and easily reviewed at the policy level. The information process will be two-way process with policy-makers requesting specific inputs and data so as to address specific issues, and consulting with their technical support so as to gain insight to the implications of certain approaches and policies. This information will be updated through a long-term monitoring process to ensure that conclusions are current and pertinent, and to capture trends and deviations from the norm (especially in the context of natural environmental variability and extreme events). As well as providing advice to policy makers, a programme of targeted awareness will ensure that all sections of society receive appropriately packaged and targeted information explaining the importance of SIRM, the need to maintain ecosystem functions for everyone's benefit, and associated actions necessary to achieve these aims. The incremental cost for achieving this aim has been calculated at $1,394,770 of which GEF would provide $400,020 (GEF contribution = 29%).

2. Based on the conclusions of the baseline survey, and of associated consultations with all sectors and stakeholders, a Sustainable Island Resource Management Plan will be drafted. Important elements of such a plan will include land and coastal zoning, economic growth predictions, tourism and other land-use carrying capacities, options for alternative livelihoods, and commercial activities (including advice and financial support mechanisms for alternatives). The SIRM will include predictive contingency for environmental variation and extreme events, and will capture the formal recommendations and requirements of the NEMS and associated legislations. The incremental cost for achieving this aim has been calculated at $950,120 of which GEF would provide $203,920 (GEF contribution = 21%).

3. To support the adoption and operational application of the SIRM, a review and realignment of policy and associated legislation will be necessary, as will an assessment of enhanced institutional capacity needs. Mandates and responsibilities of existing institutions will be considered and recommendations made regarding practical realignment and reform for the more effective management of ecosystem functions. As with the information management outcome described above, targeted capacity building and training will be provided to strengthen the efficacy of certain institutions to carry out their enhanced or new roles. Sustainable funding mechanisms will need to be identified and agreed if the SIRM is to be operationally maintained in the long term. The incremental cost for achieving this aim has been calculated at $929,170 of which GEF would provide $141,420 (GEF contribution = 15 %).

4. For an SIRM Strategy and Mechanism to be evolved, adopted and made operational, there will need to be a dedicated task force of administrative and technical personnel to carry the objectives forward. The Project will provide effective coordination and an integrated inter-ministerial steering mechanism so as to achieve this aim. Indicators of delivery benchmarks and success will be adopted as will standard UN/GEF monitoring approaches. Practical consideration will be given to the need for a formal authoritative body for SIRM with due focus given to the possibility of realigning existing entities to take on this role as required. Most importantly, a set of targeted demonstration activities will be undertaken focused on specific hotspot areas around the islands where SIRM issues are critical. These demonstrations will provide on-the-ground working examples of how the maintenance of ecosystem functions (balanced with the protection of livelihoods, the welfare of communities and the need for economic growth) can be realistically and pragmatically achieved and mainstreamed. Such demonstrations will provide invaluable lessons for transfer and replication both to

Antigua and Barbuda, and to other SIDS around the world. The incremental cost for achieving this aim has been calculated at $4,425,170 of which GEF would provide $2,250,570 (GEF contribution = 51%).

Alternative:

269. The proposed Incremental interventions by GEF are specifically designed to build on existing baseline commitments and initiatives by the Government of Antigua and Barbuda as well as other donor agencies. The Alternative end-of project landscape would be a functional and operational Sustainable Island Resource Management mechanism where by institutional responsibility, supported by specifically focused policy and legislation, is realigned so as to mainstream SIRM and provide for the protection and sustainable management of island ecosystem functions. Existing individual sectoral efforts would be integrated and coordinated toward this one goal, which would represent a much more cost-effective approach to overall island governance simply on the basis of economies of scale. The total Alternative cost attributable to the SIRM Project proposal would be $18,139,230 out of which 57.6% represent the existing baseline, 25.9% represent the co-funding and 16.5% represents the GEF funding request.

Systems Boundary:

270. The system boundary for the Project would the land-base and territorial waters of Antigua and Barbuda, including the island of Redonda.

Summary of ICA Totals:

SIRM PROJECT ICA RESULTS BY OUTCOME					
OUTCOME TITLE	**BASELINE**	**GEF**	**CO-FUNDING**	**INCREMENT**	**ALTERNATIVE**
1. Environmental Information Management Advisory System	$1,971,250	$400,020	$994,750	$1,394,770	$3,366,020
2. A Sustainable Island Resource Management Strategy	$2,932,500	$203,920	$746,200	$950,120	$3,882,620
3. Policy and Institutional Reforms Provide a Framework for Implementation of the SIRM Plan	$2,538,750	$141,420	$787,750	$929,170	$3,467,920
4. Requirements for implementation of the SIRM Plan in place	$2,997,500	$2,250,570	$2,174,600	$4,425,170	$7,422,670
	$10,440,000	**$2,995,930**	**$4,703,300**	**$7,699,230**	**$18,139,230**

INCREMENTAL COST MATRIX

Cost/ Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
Outcome 1: Easy and Reliable Access to Information for Environmental Management by all Stakeholders.			
Domestic Benefits	• Ad hoc, non-coordinated efforts to collect baseline information and undertake monitoring activities. No nation-wide comprehensive biodiversity assessment • Piecemeal data storage and management with little or no sharing or integration of data. • Limited information on environmental variability or the effects of extreme events on resources or ecosystems. • Lack of reliable and consistent data constrains accurate policy decisions or effective management. • Limited manpower and funding resources constrain GIS assessment	Establishment of an Information Management Advisory System for natural resources and critical ecosystem functions, as well as related socio-economic issues. It would: • Be both proactive (providing information for policy development) and reactive (responding to the needs of senior decision-makers). • Act as central 'clearing-house' for information. • Be more cost-effective than developing and storing individual datasets at the sectoral level. • Focus on filling critical gaps regarding bio-physical interdependence and ecosystem functions.	• Specialist support to develop an EIMAS • Cross-sectoral capacity building and training at the institutional level. Planning and implementation of baseline assessments. • Adoption of appropriate indicators for ecosystem function and natural resource assessment and monitoring. Training and capacity building in monitoring methods and techniques. Establishment of an effective long-term monitoring programme. • Inclusion of predictive mechanisms for environment variability and contingency response to extreme events. • Modelling of the island ecosystem(s). • Awareness campaign
Global Benefits	Accurate and comprehensive information enable informed management and maintenance of ecosystem functions thereby contributing to effective protection of critical habitats and biodiversity	Comprehensive data on the status biodiversity and ecosystem functions in Antigua and Barbuda presenting an opportunity to develop appropriate SIRM planning. Data would be of vital use in the assessment of the status of certain species and biological habitats at the regional and global level.	An effective EIMAS would provide lessons and best practices for other SIDS, most of which are in urgent need of similar mechanisms to support SIRM. Modelling techniques would be perfected that would also be transferable at the inter-island level
	$450,000: Equivalent costs for Environment Division		

Costs	\$33,750: Equivalent costs for Forestry Division \$125,000: National Office of Disaster Services contribution to Prediction and Contingency Planning \$250,000: Development Control Authority (on-going Environmental Information needs, mapping requirements, information on ecosystem, monitoring, awareness, etc) \$150,000: Lands Division – Mapping, assessments and monitoring \$62,500: Soil and Water Conservation Division – Mapping of watersheds, aquifers, monitoring of supplies, etc \$750,000: Public Works Department – Stream-way and water run-off mapping, modelling, prediction, monitoring, maintenance of storm drains, etc \$150,000: Ministry of Agriculture – Stock and arable management, land mapping, monitoring of farming practices, improvements, etc. **OUTCOME TOTAL: \$1,971,250**	**Baseline: \$1,971,250** **Incremental: \$1,394,770** **OUTCOME TOTAL: \$3,366,020**	**GEF: \$400,020** **CO-FUNDING: \$994.750** ***CASH*** Intl/Reg Orgs: \$80,000 Gov't: \$242,000 Private Sector: \$80,000 Bilateral (Zaragoza) \$75,000 **\$477,000** ***IN-KIND*** Intl/Reg Orgs: \$16,700 Gov't: \$448,900 Communities: \$6,900 Private Sector: \$45,250 **\$517,750** **OUTCOME TOTAL: \$1,394,770**

Cost/ Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
Outcome 2: A Sustainable Island Resource Management Plan Developed and In Place			
Domestic Benefits	• The National Environmental Management Strategy lacks substance as yet within national policy, legislation or institutional responsibilities. • No effective mainstreaming of resource management needs or approaches within national government policies or strategies. • No real concept of the requirement to maintain ecosystem functions as a fundamental part of socio-economic welfare • Absence of effective land-use management guided by zoning plans	A Sustainable Island Resource Management Plan linked to economic and development requirements and considerations. This would capture the primary objectives of the NEMS and provide a long-term mechanism (supported by policy, legislation and institutional capacity) that ensures the continuing welfare of the islands' critical ecosystem functions and services, as the basis for sustained economic growth and protection of biodiversity and	• Preparation of a zoning plan focused on SIRM but within the context of maintaining and promoting economic growth and sustainable livelihoods. • Cost-benefits analysis of SIRM approach versus a business-as-usual-scenario • Assistance with identification and promotion of alternative sustainable livelihoods and commercial activities. Incorporation of environmental variability and predictive

		landscape values	modelling of extreme events into an SRIM approach. • Operational application of the NEMS through a focused SIRM approach.
Global Benefits	No effective examples of an SIRM approach for SIDS although it is essential for the long-term economic well-being of these countries as well as for providing for the ecosystems and biodiversity which they support, much of which is rare and endemic.	This would benefit global biodiversity both at the system boundary level of this particular Project and also through transfer and replication to other SIDS with their own unique levels of biodiversity threatened by similar issues of land and coastal degradation and resource exploitation.	Protection and management of ecosystems which support significant and rare biodiversity. General protection of an entire island ecosystem through informed, judicious zoning plans and development of a long-term SIRM Plan, an innovative approach which is highly replicable
Costs	$337,500: Equivalent costs for Environment Division $22,500: Equivalent costs for Forestry Division $125,000: National Office of Disaster Services contribution to strategy and contingency planning for climatic/environmental variability $250,000: Development Control Authority - on-going management planning and zoning for development, land-use designation benefits, commercial development issues, etc. $485,000: Lands Division -management, zoning and planning; livelihoods and tenure issues, etc. $62,500: Soil and Water Conservation Division – zoning and planning for water and soil conservation, benefits analyses, etc $1,500,000: Public Works Department – zoning and planning of island infrastructure including run-off, storm drains, roads, buildings along coasts, etc $150,000: Ministry of Agriculture – Zoning and planning for stock and arable management, land mapping, monitoring of farming practices, improvements, etc. **OUTCOME 1 TOTAL : $2,932,500**	**Baseline: $2,932,500** **Incremental: $950,120** **OUTCOME TOTAL: $3,882,620**	**GEF: $203,920** **CO-FUNDING: $746,200** ***CASH*** Intl/Reg Orgs: $40,000 Gov't: 258,000 Private Sector: $40,000 $**338,000** ***IN-KIND*** Intl/Reg Orgs: $5,200 Gov't: $340,000 Communities: $8,500 Private Sector: $54,500 $**408,200** **OUTCOME TOTAL: $950,120**

Cost/ Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
Outcome 3: Policy and Institutional Reforms Provide a Framework for Implementation of the SIRM Plan			
Domestic Benefits	• Implementation of emerging policy frameworks that seek to put in place integrated management approaches are constrained by insufficient information, institutional capacity, and appropriate skills • Institutional, policy and legislative structures characterized by fragmented responsibilities and roles, and overlapping mandates • Capacity to carry out stated mandates is highly constrained or absent. The NEMS was supposed to address the need for reforms but there has been no funding available. • Financial sustainability and revenue mechanisms are the weak point within the baseline	• An integrated policy and legislative approach to island resource management that nests within overall government development priorities and that mainstreams SIRM concerns. • Enhanced capacity to manage, monitor and control the welfare of ecosystem functions and island resources. • Identification and development of suitable financial mechanisms and incentive schemes to support SIRM objectives	• Reform of existing legislation as necessary, including revision of the Physical Planning Act and the Draft Environmental Protection and Management Bill. • Reform of institutional structures to harmonize and streamline mandates and responsibilities. • A clearer definition of responsibilities and mandates for SIRM and more specific ecosystem function management. • Identification of realistic funding mechanisms in support of reforms
Global Benefits	Still inadequate examples of effective integrated policy and legislation with supportive financial mechanisms that can be applied within the SIDS scenario	A successful demonstration of SIRM within one SIDS which provides valuable lessons and best practices for other SIDS thereby providing support to critical ecosystem protection and biodiversity conservation at the global level	Development of clearer guidelines on institutional and legislative arrangements necessary to support SIRM. More effective and feasible institutionalisation of SRIM at the global level based on transferable models
Costs	$562,500: Equivalent costs for Environment Division $56,250: Equivalent costs for Forestry Division $125,000: Barbuda Council-reforming policy, legislation and institutional structures related to parks and protected areas $375,000: Development Control Authority - Input to reforms, development of compliance and enforcement, monitoring of development associated issues, etc. $150,000: Lands Division – Policy and legislative issues related to livelihoods and tenure, etc. $500,000: Public Works Department – Development of	**Baseline: $2,538,750** **Incremental: $929,170**	**GEF: $141,420** **CO-FUNDING: $787,750** ***CASH*** Intl/Reg Orgs: $185,000 Gov't: $115,000 Private Sector: $30,000 Bilateral (Zaragoza) $100,000

	policies and legislation for construction and infrastructure development and maintenance, etc $150,000: Ministry of Agriculture –Policy and legislation relating to stock and arable management, land designation, monitoring of farming practices, best practices and appropriate farming techniques, etc. $500,000: UNDP IWCAM Project: Assistance to Government in developing Planning and Zoning to improve watershed management, etc. $120,000: OECS/A&B Gov't legislation for environmental management and protected areas **OUTCOME TOTAL: $2,538,750**	**OUTCOME TOTAL: $3,467,920**	$**430,000** ***IN-KIND*** Intl/Reg Orgs: $1,900 Gov't: $317,900 Communities: $3,200 Private Sector: $34,750 **$357,750** **OUTCOME TOTAL: $929,170**

Cost/ Benefit	Baseline (B)	Alternative (A)	Increment (A-B)
Outcome 4: Requirements for Implementation of the SIRM Plan In Place, as well as mechanisms for capture of lessons & best practices.			
Domestic Benefits	No existing SIRM Project or initiative within Antigua and Barbuda although the principle is accepted and adopted through the OECS St. George's Declaration. Specific training is needed to adopt the approaches associated with SRIM within each relevant sector and as a cross-sectoral approach. Localised demonstrations are necessary in order to capture the best practices and strategies at the national level	Adoption of an overall national initiative that targets adoption of an SIRM approach and mainstreams SIRM concept and the need to maintain and conserve ecosystem functions into overall national and sectoral management policies. Improved Capacity to address environmental issues. Improved human welfare and quality of life as well as overall national economic welfare. Clear demonstrations of specific island resource management issues related to water resource management and sanitation, land-use management and livelihoods, etc	Effective project coordination and integrated inter-ministerial management. Established standards and mechanisms for assessing Project success and delivery. Possible adoption of a long-term body for SRIM oversight. Inter-sectoral training and capacity building to improve effectiveness of responsible sectoral agencies. A set of targeted demonstrations addressing areas of primary concern (hotspots) that threaten the long-term sustainability of island resources and ecosystem functions Capacity building and training to assist in assuming these new responsibilities.
Global	No effective overall demonstrations of SIRM. Very few applicable case studies of specific SRIM issues at a localised	Protection of an important area of biodiversity. Conservation of	A transferable example of effective SIRM for replication within other

Benefits	delivery level that 'prove' the efficacy of the SIRM approach	endemic and threatened species and habitat types. A replicable example of working SRIM and mechanisms that demonstrate the maintenance and protection of ecosystem functions with emphasis on cooperative management that captures the need for economic growth and livelihood protection	SIDS at the regional and global level.
Costs	\$900,000: Equivalent costs for Environment Division (including activities related to Demos) \$112,500: Equivalent costs for Forestry Division (including activities related to Demos) \$1,000,000: Barbuda Council – training ad capacity building, baseline activities related to demo (Tourism and infrastructure around Island), etc \$150,000: Lands Division –Training and capacity building baseline and other baseline activities related to Demos. \$375,000: Public Works Department – Baseline activities dealing with training and capacity building and substantial foundation activities related to Demos., etc \$110,000: Ministry of Agriculture –Foundation activities linked to Demos lessons and best practices (Alternative agriculture, etc). \$350,000: Caribbean Conservation Association - assistance to Protected Areas and Protected Species that are foundation to Demo activities **OUTCOME TOTAL: \$2,997,500**	**Baseline: \$2,997,500** **Incremental: \$4,425,170** **OUTCOME TOTAL: \$7,422,670**	**GEF: \$2,250,570** **CO-FUNDING: \$2,174,600** ***CASH*** Intl/Reg Orgs: \$165,000 Gov't: \$620,000 (Project Coordinator and support to Demonstrations) **\$785,000** ***IN-KIND*** Intl/Reg Orgs: \$56,500 Gov't: \$947,300 Communities: \$69,200 Private Sector: \$316,600 **1,389,600** **OUTCOME TOTAL: \$4,425,170**

PART II: Logical Framework Analysis

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				
GOAL	TO ENSURE THE SUSTAINABILITY AND MAINTENANCE OF ISLAND ECOSYSTEM INTEGRITY AND FUNCTION THROUGH INTEGRATED PLANNING AND MANAGEMENT OF ISLAND RESOURCES				
OBJECTIVE OF THE PROJECT **TO EVOLVE AND IMPLEMENT A SUSTAINABLE ISLAND RESOURCE MANAGEMENT APPROACH WITHIN ANTIGUA AND BARBUDA TO STABILIZE AND MAINTAIN ECOSYSTEM FUNCTIONS, THEREBY PROVIDING A BASIS FOR CONTINUED SUSTAINABLE ECONOMIC DEVELOPMENT**	**KEY PERFORMANCE INDICATOR**	**BASELINE**	**TARGET**	**SOURCE OF VERIFICATION**	**RISKS AND ASSUMPTIONS**
	By Year 3 of the project, a SIRM Plan adopted by Antigua and Barbuda	No SIRM mechanism and little by way of coordinated cross-sectoral administration and management of island resources	▪ Proactive SIRM Mechanism in place and fully operational at policy, institutional and ground level by end of project	▪ Government records and Cabinet minutes. ▪ Reports from the National Coordination Mechanism.	▪ Private sector understands requirement for, and benefits of, SIRM ▪ Identified funding mechanisms are feasible and there is a government commitment to allocate manpower and capacity.
	By Year 3 associated legislative and policy reforms are in place	Physical Planning Act and Draft Environmental Protection and Management Bill		▪ Government records ▪ Legislative records ▪ New approved legislation in line with SIRM.	▪ Political willingness to adopt an SIRM approach and to undertake necessary reforms.
	By Year 4 government budgetary allocations for SIRM are in place	None	▪ Adequate funding for sustainability of SIRM approaches is ensured	▪ Budgetary allocations in relevant line ministries and government agencies	▪ Government agencies willing to assign adequate funding to continued implementation of SIRM approaches and practices

	Effective program to monitor project progress using impact indicators established by the project.	No effective or coordinated monitoring of resources and ecosystem functions or response system	▪ Improved and updated monitoring and information processing programmes, focused on SIRM, in place by end Y2 ▪ Effective communication and feedback between monitoring process and decision-makers demonstrating reactive management approaches by end Y2	▪ Data and reports available from responsible agencies showing regular monitoring of resources and processing of information. ▪ Government records, Cabinet minutes, demonstrate policy and decision-making based on monitoring information	▪ Communities, NGOs and /or private sector can be voluntarily drafted or contracted for some of field-work ▪ Agencies willing to share and make available existing information
	Acceptance of trade-offs between maintenance of ecosystem functions and integrity and existing land use trends, reflected in increased application of EIAS and SEAs	Business-as-usual scenario	▪ Long term economic benefits of a SIRM strategy and approach validates necessary trade-offs and sectoral stakeholders groups accept them by end Y2	▪ Minutes of NCM meetings ▪ Records of EIAs and SEAs ▪ MTE and FEV	▪ Private sector, line ministries, and communities understand requirement for, and benefits of, SIRM
	Incentives for inappropriate practices have been identified and removed	Incentives, or lack of positive incentives, promote unsustainable practices	▪ Regulations on livestock management adopted and enforced ▪ Imports of agrochemicals reduced ▪ Increased application of integrated pest management approaches ▪ 80% of hotels in North West region have adequate waste management systems in place by end Y3	▪ Reports and registers of relevant government agencies ▪ MTE and TE	▪ Line ministries with sectoral responsibilities willing to remove negative incentives and to put in place positive incentives

	Areas where the 4 demonstration projects are carried out, totalling 11,274 ha, are under SIRM	No application of integrated management approaches	• Demonstration projects provide validation of new models and guidelines for SIRM, and compilation of lessons learned and best practices contribute to up-scaling and mainstreaming SIRM	▪ Internal project reports ▪ MTE and TE	

OUTCOME 1 **EASY AND RELIABLE ACCESS TO INFORMATION FOR ENVIRONMENTAL MANAGEMENT BY ALL STAKEHOLDERS**	**KEY PERFORMANCE INDICATOR**	**BASELINE**	**TARGET**	**SOURCE OF VERIFICATION**	**RISKS AND ASSUMPTIONS**
	By Year 3, the EIMAS is operational	No mechanism in place to allow agencies to organise existing data on SIRM and share information with other agencies. Agencies do not currently have requisite equipment Ad hoc information handling and presentation with no feedback from policy level.	• EIMAS database and information processing mechanism in place, and operating as a tool to integrate existing datasets and structure new data input by end Y1 • Agencies required to provide inputs and prepare outputs to EIMAS are fully equipped and trained by end Y1. • Briefing mechanism for policy-makers and senior managers in place by end Y1 • Integrated EIMAS system, linked into monitoring programmes, with regularly updated data and GIS datasets, actively used and accessed by policy-makers by MTE and fully operational by Y3	• Necessary equipment installed within defined government agencies, with proof of purchase • Evidence of training materials and records of attendance of training course. • Evidence of information entered into EIMAS and available in a form that is useable by other agencies and interested stakeholders. • Records of requests for information from stakeholders / policy makers / senior managers. • Confirmed by MTE and TE through reporting procedures between EIMAS and relevant users.	▪ Existing datasets are made available to the Project and sufficient capacity to compile and integrate datasets. ▪ No sensitivity / copyright issues restricting access to existing datasets for inclusion into EIMAS

	KEY PERFORMANCE INDICATOR	BASELINE	TARGET	SOURCE OF VERIFICATION	RISKS AND ASSUMPTIONS
	By Year 2, island resources surveyed and mapped and data and baseline maps input into EIMAS	Limited and out-of-date baseline data and maps.	• Surveys implemented by end Y1 (using feedback from 4 Demos) • Set of maps to guide land-use planning, development, designation of PAs, etc. available by month 18. Maps prepared to include: • Distribution and status of biological and physical resources (i.e. terrestrial & marine habitat maps from ground-truthed remote sensing data, invasive and introduced species, soil types, topography, hydrology, watershed function, surface and ground water resources, coastal erosion and shoreline stability); and, • Land and marine resource use patterns, infrastructure (i.e. roads etc.) and socio-economic data using stakeholder consultation and participatory GIS and resource mapping techniques (e.g. to locate dive sites and fishing grounds). • Monitoring indicators identified for long term monitoring programme (for Output 1.5) by Y1	• Survey data and maps available to EA (Min of Environment) for Project Review. • GIS maps and info analysis available for SIRM as confirmed through Project and Evaluations and reporting • Project provides evidence to Evaluators plus positive feedback to evaluation process by policy-makers • Confirmed by MTE and TE through reporting procedures.	• Existing datasets provide an adequate baseline. • Sufficient capacity available to initiate surveys and mapping • Policy makers are prepared to ask for guidance and willing to use information analyses even if not favourable. • Training provided and resources assigned (including human) continue to be available for EIMAS to operate.

	KEY PERFORMANCE INDICATOR	BASELINE	TARGET	SOURCE OF VERIFICATION	RISKS AND ASSUMPTIONS
	By Year 3, an island ecosystem model developed, tested and in use by appropriate stakeholders	No existing island ecosystem functional integrity model	• Model being used by Project and stakeholders to develop the SIRM Plan by month 18 • Set of thematic maps to guide land-use planning, development, designation of PAs, etc. available by month 12. • Analysis of thematic maps and model of island ecosystem available by end of month 18.	• Minutes of NCM meetings on SIRM Plan • Maps available to EA (Min of Environment) for Project Review • Model in place that captures all of the pertinent information (as listed in the Outcome) by MTE	• Sufficient capacity available to analyse data, create thematic maps and generate island ecosystem model.
	Disaster management and contingency planning system built into EIMAS by Year 3 and used by all relevant agencies by year 4.	Current approaches to resource management do not effectively capture the potential effects of environmental variability or extreme events	• EIMAS tools enable stakeholders to plan for environmental variability and extreme events • Bases established for system to monitor Environmental Variability and forecast Extreme Events (accessible through EIMAS linked into long term monitoring programme Output 1.5) by month 18.	• Disaster management and contingency plans (DM-CP) reflect value of SIRM • Records of provision of information for DM-CP through EIMAS • Confirmed through Independent Evaluator (MTE & TE).	• Acceptance of the need to include extreme event prediction and management as well as on-going environmental variability into SIRM process.
	Sustainable mechanism to update the environmental information through monitoring and reporting established by end of project	No effective monitoring programmes for resources and ecosystem functions. Lack of any cross-sectoral organisation in monitoring	• Training and capacity building for monitoring, analysis and information presentation completed within Y2 • Full national monitoring programmes, with standardised monitoring methods, and agreed sampling strategy, established and delivering data to EIMAS by Y3	• Documented evidence of monitoring programme. • Survey data and reports and entered into EIMAS • Updated Status of Environment Report by end Y3. • Confirmed by Independent Evaluators.	• Agencies prepared to coordinate monitoring approaches and work together to develop integrated long term monitoring programme and share data. • Training provided and resources assigned (including human) continue to be available for effective monitoring • Policy level commitment

	KEY PERFORMANCE INDICATOR	BASELINE	TARGET	SOURCE OF VERIFICATION	RISKS AND ASSUMPTIONS
			• Updated report on status of national resources and ecosystem function (State of the Islands Environment Report) and updated SIRM components by end of Y3.		and associated sustainable funding made available.
	By the end of the project, key sectors within the island's business and social communities show increased awareness relative to the need and desirability of SIRM	No effective awareness campaigns for SIRM	• Develop awareness raising materials during Y1 • Targeted awareness campaigns implemented ongoing throughout duration of Project. • Awareness campaign monitored and refined to ensure all stakeholder groups are effectively addressed – clearly demonstrated by time of MTE	• Evidence of widespread media campaign to raise awareness of need and desirability of SIRM (leaflets, Government website, newspaper articles, media reports) • Positive feedback from community representatives (private and public sector, educational, etc) through stakeholder meetings and evaluations. • Media reports indicate increasing awareness of the need for SIRM	• Media willing to assist in publicising the need and benefits of SIRM • No cause for 'negative press' generated through the duration of Project.

OUTCOME 2 **A SUSTAINABLE ISLAND RESOURCE MANAGEMENT PLAN DEVELOPED AND IN PLACE**	**KEY PERFORMANCE INDICATOR**	**BASELINE**	**TARGET**	**SOURCE OF VERIFICATION**	**RISKS AND ASSUMPTIONS**
	By Year 3, SIRM Zoning Plan and associated regulations and guidelines, developed and adopted, with full participation of stakeholders	No comprehensive zoning maps or plan that address SIRM needs or integrated approach to resource management	• Key government agencies make SIRM approach effective by adoption of requisite regulations and guidelines, supported by budgetary allocations for implementation and enforcement • Zoning Plan, along with guidelines and regulations, adopted and accepted by a broad range of stakeholders within 30 months of Project inception.	• Minutes of PCC / NCM to confirm adoption. • Budgetary allocations of relevant government agencies • Project has access to documented evidence of implementing/enforcing agency confirming compliance • Reports of stakeholder consultations and records of attendance. • Confirmed by Independent Evaluator by MTE.	• Stakeholders are able to accept trade-offs and understand long-term benefits of Zoning Plan • NCM willing to adopt the Zoning Plan in the face of any objections from individual agencies or the private sector
	By Year 2 SIRM Cost-Benefit Analysis indicating economic and resource sustainability advantages of SIRM, developed and presented to stakeholders	No current Cost Benefit Analysis for resource management.	• CBA, including total economic valuation of environmental and socio-economic resources and consequences of their degradation / loss (e.g., lost recreation values, water quality/public health, reduced agricultural productivity, and reduced fish populations), presented to policy-makers and leader in both private and public sector within first month 18 • Capacity building for cost-benefit analysis by month 18.	• CBA report available to Project and for review by PCC, NCM, and IA. • Feedback from agencies / policy makers on increased capacity to use CBA as a decision making tool for ecosystem based management. • Feedback from Policy-makers to Evaluators.	• CBA will find clear economic benefits to an SIRM approach thus off-setting and validating possible trade-offs
	By end of Year 2, sustainable alternative livelihood options identified and shared with stakeholders	Alternative sustainable livelihood options not well known or rarely considered viable and the need for self-sufficiency not recognized as essential.	• Sustainable alternative livelihood options identified within 9 months of inception. • Advisory Brief with strategies and alternative livelihood options promoted and used as an input into, and for inclusion in, the 5 year plan for SIRM and National Economic Development Plan. Within 24	• Brief prepared within 2 years of inception and made available for review by PCC, NCM, IA • Confirmed through evaluation process.	• Viable and sufficient alternatives to existing livelihoods and resource use practices identified • Government recognizes need to include these in development planning and promote self sufficiency. • Resource users, private

			months of inception.		sector and communities accept proposed alternatives or modifications to resource use practices
	Demonstration project areas are zoned as per categories and criteria of national Zoning Plan	No Zoning Plan available	• Demonstration project areas, which include not only defined sensitive and hot spot areas but also of high development potential, are zoned with the agreement of all relevant stakeholders	• Zoning maps • Minutes of stakeholder meeting • Minutes of PCC meetings	• All relevant stakeholders will agree to proposed zoning plans
	By Year 3, a strategic Plan for SIRM, developed with full stakeholder participation, adopted by Government	No current integrated resource management plan	• Draft SIRM Strategic Plan completed by month 21 • Revision of SIRM plan by end of Y2 • Plan accepted by a wide range of stakeholders and adopted by Government within first 30 months of Project • Plan available and being used by government agencies, developers, and other stakeholders for guidance and compliance after month 30	• Media reports of to raise awareness of stakeholder consultation process and report on progress. • Report of stakeholders' workshops, records of attendance. • Draft Plan available by MTE. • Confirmed by Independent Evaluator.	• Stakeholders, in particular resource users and private sector, accept trade-offs and long-term objectives • Government recognises need and prepared to adopt a realistic Plan

OUTCOME 3 **POLICY AND INSTITUTIONAL REFORMS PROVIDE A FRAMEWORK FOR IMPLEMENTATION OF THE SIRM PLAN**	**KEY PERFORMANCE INDICATOR**	**BASELINE**	**TARGET**	**SOURCE OF VERIFICATION**	**RISKS AND ASSUMPTIONS**
	By Year 1 relevant policies, legislation and regulatory reforms have been reviewed, gaps identified and recommendations developed	Existing reviews outdated and not focused on an integrated and cross-sectoral SIRM approach	• Full set of reviews and recommendations relating to realignment of policy and legislation in support of an SIRM approach completed and accepted by relevant government agencies by end Y2 • Policy frameworks are harmonized and strengthened to support SIRM Plan	• Reviews available to Project • Discussed in PCC and NCM as per minutes. • Availability of reviews confirmed through Evaluation process	• Government prepared to accept that review process is intended to realign overall policy and legislation toward an SIRM approach. • Effective cooperation from relevant agencies and departments
	By Year 1 relevant institutions have significantly and effectively raised their levels of training and capacity to comply with SIRM requirements	Training in SIRM approaches not in place	• Relevant institutions, especially in the public sector, support training programs to enhance capacity of staff to address SIRM requirements • Definition of cross-sectoral training and capacity building programme for agencies, NGOS and CBO and specific resource communities by end Y1	• Reviews and training needs and capacity assessments available to Project • Discussed in PCC and NCM as per minutes. • Number of certified staff • Budgetary allocations of government agencies • Confirmed by Independent Evaluator	• Government prepared to accept that review process is intended to realign overall institutional strategy and financing toward an SIRM approach. • Effective cooperation from relevant agencies and departments • No 'u'-turns associated with elections and possible new government
	Land tenure arrangements encourage short-term leases, usually for small plots	Land tenure reforms lead to longer leases for farms – to a median average of 10 years - and increased size thus providing incentives for better land use practices and investments by end Y3	▪ Internal project monitoring • MTE and FEV	• Existing tenure arrangements and land availability make land tenure reform possible	Land tenure arrangements fully account for and protect the value of land and associated ecosystem functions and services

	KEY PERFORMANCE INDICATOR	BASELINE	TARGET	SOURCE OF VERIFICATION	RISKS AND ASSUMPTIONS
	Realistic financial mechanisms and fiscal incentives to support policy and institutional reforms identified by Year 2	No current sustainability or financing mechanisms to support an SIRM approach	• Financial mechanisms and instruments to sustainably support SIRM identified within 21 months. • Sustainable financing strategy to support SIRM presented to stakeholders and at NCM level within 21 months	• Minutes of PCC meetings Official records from Government. • Records of meetings between Project and government • Confirmed by Independent Evaluator	Sufficient financial incentives and actual revenues can be generated and allocated to support SIRM

OUTCOME 4 **Requirements for implementation of the SIRM Plan in place, as well as mechanisms for capture of lessons and best practices** **N.B. SEE APPENDIX ONE FOR INDIVIDUAL LOGFRAME ANALYSES FOR EACH DEMONSTRATION**	**KEY PERFORMANCE INDICATOR**	**BASELINE**	**TARGET**	**SOURCE OF VERIFICATION**	**RISKS AND ASSUMPTIONS**
	By Year 1 PMU fully operational and NCM established as a long-term advisory and policy group with defined project and post-project roles	No existing SIRM project. IWCAM Project needs to be closely coordinated and involved	• Project Manager, Project Coordinator and Administrative Assistant positions advertised, recruitment process carried out as per UNDP requirements and appropriately qualified staff appointed. • Project Objectives met in timely fashion. • Project M&E undertaken to plan and completed	• Project reports. APR/PIRs. Project Evaluation Process (MTE and TE). • M&E plan meets targets according to PB and TE	NCM willing and able to assume role as inter-ministerial/sectoral committee for the project.
	By Year 2, training programmes bring about a demonstrable increase in utilization of sustainable natural resource use practices	Limited training and capacity building at present, and not focused on SIRM	• Training and capacity building given to relevant sectors to realign them toward an integrated and cross-sectoral approach to SIRM. • Project develops a T&CB Plan, to address cross-sectoral SIRM needs identified in Output 3.3 within first year • Training and capacity building program targets relevant sectors during Y2 and Y3	• Project reports • Project reports provide evidence for Training and Capacity Building programmes. • Evaluations and user surveys confirm effectiveness • Confirmation by MTE and TE	Relevant agencies and stakeholders are prepared to allocate appropriate staff for training and capacity building
	By year 4 at least four Site Specific Demonstrations projects implemented.	No demonstrations of the SIRM approach at selected hotspot sites around Antigua and Barbuda	• Project Coordinators for each Demo appointed. • Selected Pilot Demonstrations (see Appendix 1) implemented by Year 2 months	• Project reporting on demonstrations. • MTE and TE. • Specific technical and process reports on demonstration • achievements	• Demonstration Implementation process reveals appropriate lessons and practices that are replicable.
	By end of the project lessons and practices, including from the demonstrations, compiled and incorporated into national models, guidelines and governance reforms. (Output 4. 5)	Absence of effective lessons and best practices for sustainable island resource management	• Demos provide clearly defined lessons and practices collated as a set of model guidelines by year 3 for replication at other sites • Phased plan to replicate the lessons learnt within SIRM at other sites	• Mid-term and end-of-activities reports from demos with clear lessons and practices available to GEF and UN for transfer to other pertinent SIDS. • Evaluators review	• Demos work to plan and are completed and produce lessons that are applicable at the national level • Governments willing to adopt

	KEY PERFORMANCE INDICATOR	BASELINE	TARGET	SOURCE OF VERIFICATION	RISKS AND ASSUMPTIONS
			prepared by the end of the Project.	lessons and practices	models and guidelines.
	Monitoring system designed and operational with baseline information for project indicators, including intermediate benchmarks and means of measurement	No Project therefore no Project M&E	• Plan for providing baseline (initial project condition determined by indicators); to be completed during the first year of implementation • All impact and performance indicators are measured prior to the final evaluation. • Final evaluation, PB, Project team evaluate results	• Monitoring reports. • PIR/APR Reports. • MTE and TE Reports • PB to confirm	

Table 2: Indicative Outputs, Activities and Quarterly Workplan
(Work-plans are presented as quarterly columns).

OUTCOME 1: EASY AND RELIABLE ACCESS TO INFORMATION FOR ENVIRONMENTAL MANAGEMENT BY ALL STAKEHOLDERS

OUTPUT	ACTIVITY		YEAR 1				YEAR 2				YEAR 3				YEAR 4			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.1. Environmental Information Management and Advisory System (EIMAS) and mechanism for data for use in planning and decision-making established.	1.1.1	Stakeholder consultation workshops to sensitise relevant stakeholders	X															
	1.1.2	Assess resource needs (existing GIS software, computer hardware and software etc.) and training needs (to identify suitable personnel for training within the main agencies)	X															
	1.1.3	Prepare inventory and meta-data catalogue of existing relevant datasets (hard and soft copy), and develop standard formats for mapping and data basing to ensure interoperability	X	X														
	1.1.4	Prepare standard databases to allow input, storage and retrieval of existing and new datasets (for key ecosystem characteristics water, biodiversity, habitat management, commercial resources, fish stock etc)		X														
	1.1.5	Create baseline EIMAS from the existing data sources		X	X	X												
	1.1.6	Establish central EIMAS facility within an appropriate agency / Government IT agency that is accessible to interested parties, and necessary hardware and software resources to at least 5 agencies on Antigua and 1-2 agencies on Barbuda (e.g. Min of Agri., Env. Div., DCA, National Office of Disaster Services, Nat. Parks Aut.)		X	X	X												
	1.1.7	Develop EIMAS training materials and implement training for at least 2 x staff in each of the main agencies			X	X												
	1.1.8	Adoption of a mechanism for regular briefing of policy-makers and senior managers on key trends and deviations in ecosystem functions and resource sustainability				X												
1.2. Island ecosystem resources, function and usage patterns assessed and mapped	1.2.1	Review existing information and identify gaps (compiled in 1.1.4) on: land resources and biodiversity; marine resources and biodiversity; marine and land resource use patterns and environmental issues.		X														
	1.2.2	Develop survey / assessment methods (using feedback from Demos - Outcome 4)			X	X												
	1.2.3	Implement baseline assessments (using feedback, lessons and practices from Demos - Outcome 4)			X	X												
	1.2.4	Analyse, interpret and document results (including proposed strategies for monitoring selected indicators)				X												
1.3. Modelling of island ecosystem	1.3.1	Reviews lessons and best practices from Demo Activities relating to mapping			X	X	X											

resources and identification of key resources required for sustaining island ecosystem integrity and functionality	1.3.2	Prepare maps to identify exposure and erodability index to understand potential soil loss (based on detachability of soil particles and steepness of slope)			X	X													
	1.3.3	Prepare maps of water resource distribution			X	X													
	1.3.4	Prepare maps showing the extent and status of functional habitats in need of restoration / maintenance			X	X													
	1.3.5	Prepare maps showing environmentally sensitive habitats in need of protection (i.e. areas of high biodiversity, breeding, feeding, foraging grounds, etc.);			X	X													
	1.3.6	Prepare maps showing extent of cover by invasive species (i.e. Citronella sp.);			X	X													
	1.3.7	Prepare maps showing patterns of resource use and, areas of conflict that may require specific mitigatory measures			X	X													
	1.3.8	Analyse thematic maps (1.3.1 to 1.3.6 above) and preparation of an island ecosystem model					X												
1.4. Environmental variability and extreme events forecasting	1.4.1	Compile existing data on environmental variability from regional datasets and other sources			X	X													
	1.4.2	Analyse existing baseline data from regional datasets and other sources				X													
	1.4.3	Identify likely effects of environmental variability and extreme events (for inclusion and consideration in a Strategic Contingency Planning activity (Activity 2.4), and provide recommendations for long-term indicator monitoring.				X	X												
1.5. Long term monitoring programme for island ecosystem status and function established	1.5.1	Identify information and monitoring requirements for long term monitoring approach of island resources (using indicator recommendations from Outputs and Activities above)			X	X													
	1.5.2	Establish indicators and means of verification			X	X													
	1.5.3	Design monitoring approach and evaluation				X	X												
	1.5.4	Establish data analysis & reporting mechanism (linked to EIMAS and 1.1.7)				X	X												
	1.5.5	Implement training and capacity building for monitoring, analysis and information presentation					X	X	X										
1.6. Targeted Awareness and Sensitisation	1.6.1	Develop SIRM issues awareness raising strategy for various targets and sectors		X	X	X													
	1.6.2	Implement SIRM issues awareness raising strategy (through specific workshops, media interviews, high-level policy briefings, etc) - to include on-going assessment of effects of awareness campaigns and fine-tuning			X	X				X				X				X	

OUTCOME 2: A SUSTAINABLE ISLAND RESOURCE MANAGEMENT PLAN DEVELOPED AND IN PLACE

OUTPUT	ACTIVITY		YEAR 1				YEAR 2				YEAR 3				YEAR 4			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2.1. Sustainable Island Resource Management Zoning Plan (SIRMZP) Prepared	2.1.1	Design participatory planning process		X	X													
	2.1.2	Agree on planning objectives			X													
	2.1.3	Train community leaders in planning process to aid facilitation				X	X											
	2.1.4	Stakeholder consultations (Workshops 4 x Antigua 4 x Barbuda)				X	X	X										
	2.1.5	Prepare draft zoning plan for Antigua and Barbuda along with zoning activity guidelines and regulations. Finalise through participatory consultative process					X	X										
	2.1.6	Submit zoning plans, guidelines and regulations to Government for review and adoption						X										
2.2. Comparative Cost-Benefit Analysis of SIRM Zoning and Management Plan	2.2.1	Assess the costs and benefits of SIRM Zoning and Management Plan						X										
	2.2.2	Prepare report and recommendations focusing on the needs of a National Economic Development Plan						X										
	2.2.3	Prepare presentation at policy level, and other awareness raising actions						X	X									
2.3. Advisory Brief for Commercial Resource and Livelihood Sustainability	2.3.1	Review of current livelihood options and resource use practices / trends		X														
	2.3.2	Identify strategies for self-sufficiency (agricultural products, fisheries, sand for construction, etc)		X	X													
	2.3.3	Identify sustainable alternatives (land use practices, technologies, economic assessments, options)		X	X													
	2.3.4	Prepare brief with recommended strategies for self-sufficiency and sustainable alternatives				X	X	X	X									
2.4. Strategy and Contingency Plan to address Environmental Variability	2.4.1	Develop strategy and contingency plan for environmental variability using information from Outcome 1					X											
	2.4.2	Consultation workshop (NCM) for submission to Cabinet						X										
	2.4.3	Prepare presentation for elected representatives as well as other awareness raising materials						X										
2.5. SIRM Plan submitted to government and adopted	2.5.1	Preparation of plan for the implementation of SIRM					X	X	X									
	2.5.2	Stakeholder workshops to review the Plan for SIRM on Antigua and Barbuda							X									
	2.5.3	Revision of SIRM plan based on stakeholder input							X	X								
	2.5.4	Submission of plan for SIRM to government								X								

OUTCOME 3: POLICY AND INSTITUTIONAL REFORMS PROVIDE A FRAMEWORK FOR IMPLEMENTATION OF THE SIRM PLAN

OUTPUT	ACTIVITY		YEAR 1				YEAR 2				YEAR 3				YEAR 4			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
3.1. Review of the policy, legislation, and regulations related to SIRM across the different sectors	3.1.1	Review existing government policies related to SIRM				X												
	3.1.2	Review existing and pending legislation related to SIRM across different sectors				X												
	3.1.3	Identify gaps and limitations in legislation related to SIRM					X											
3.2. Review of institutional structures & mandates for SIRM implementation	3.2.1	Review of institutional structure, responsibilities, mandates and revenues of the various institutions and stakeholder groups.		X														
	3.2.2	Identify gaps or areas of overlap in mandates and division of responsibilities		X														
	3.2.3	Assess training and capacity needs (across sectors / multi-agency) for implementing SIRM (in coordination with Output 1.5)		X	X													
3.3. Reforms recommended for the streamlining of policy, legislation and institutional arrangements	3.3.1	Preparation of a formal government Advisory Paper on mainstreaming SIRM into policy, legislation and institutional mechanisms/bodies					X	X										
	3.3.2	Review of Advisory documents by appropriate stakeholders						X										
	3.3.3	Submission of formal Paper to government for adoption and implementation						X	X	X								
3.4. Identification of suitable financial instruments and fiscal incentives, and other sustainability mechanisms to support SIRM	3.4.1	Identify and assess existing financial economic instruments, taxes and levies					X											
	3.4.2	Identify and assess potential financial economic instruments and options (exploring case studies/strategies from other islands and regions)					X	X										
	3.4.3	Assess feasibility of options through participatory stakeholder reviews						X	X									
	3.4.4	Design a sustainable financing strategy to support SIRM						X	X									
	3.4.5	Present draft SFS-SIRM to stakeholders and then to Gov.							X									
	3.4.6	Adoption & Implementation sustainable financing strategy							X	X	X	X	X	X	X	X	X	X

OUTCOME 4: REQUIREMENTS FOR IMPLEMENTATION OF THE SIRM PLAN IN PLACE, AS WELL AS MECHANISMS FOR CAPTURE OF LESSONS AND BEST PRACTICES

OUTPUT	ACTIVITY	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

4.1. Project Coordination Unit and NCM for SIRM	4.1.1	Establish Project Coordination Unit : Recruit Project Coordinator through competitive bidding process as per UNDP requirements, finalise other staffing needs and acquire needed equipment	X	X																
	4.1.2	Define NCM's new role within project as equivalent of inter-sectoral/ministerial committee	X	X				X				X				X				
4.2 Inter-sectoral Training and Capacity Building Programme for SIRM	4.2.1	Develop cross-sectoral targeted training programme and appropriate materials (based on assessments from Output 3.2) for implementing SIRM (in coordination with Output 1.5)			X	X														
	4.2.2	Implement training programme			X	X			X				X							
	4.2.3	Address capacity needs and improvements							X				X							
4.3. Implementation of demonstrations of integrated ecosystem management at sites identified as Hotspots or Sensitive Areas	4.3.1	see individual activities in demonstrations																		
	4.3.2	see individual activities in demonstrations																		
	4.3.3	see individual activities in demonstrations																		
	4.3.4	see individual activities in demonstrations																		
4.4. Project Monitoring and Evaluation	4.4.1	Review and adopt Project Performance Indicators	X																	
	4.4.2	Regular monitoring and reporting requirements (quarterly reporting, PIR/APR, etc)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.4.3	Mid-Term Review								X										
	4.4.4	Terminal Evaluation																	X	
4.5.Capture of Lessons and Best Practices	4.5.1	Identify areas for replication of best practices, lessons and appropriate technologies arising from demonstration activities							X	X	X	X			X	X				
	4.5.2	Implement replication of best practices, lessons and appropriate technologies in selected areas								X		X				X				

SECTION III: TOTAL BUDGET AND WORKPLAN

TOTAL PROJECT WORKPLAN AND BUDGET							
Award ID: tbd							
Project Title: Demonstrating the Development and Implementation of a Sustainable Island Resource Management Mechanism in a Small Island Developing State, PIMS 1899							
GEF Outcome/Atlas Activity**	**Responsible Party**	**Source of Funds**	**Year 1 (USD)**	**Year 2 (USD)**	**Year 3 (USD)**	**Year 4 (USD)**	**Total (All Years)**
1. Easy and Reliable Access to Information for Environmental Management by All Stakeholders.	Ministry of Works, Transport & Environ.	GEF	60,003	108,005	132,007	100,005	**400,020**
A Sustainable Island Resource Management Plan developed and In Place	Ministry of Works, Transport & Environ.	GEF	30,588	55,058	67,294	50,980	**203,920**
3. Policy and Institutional Reforms provide a Framework for Implementation of the SIRM Plan.	Ministry of Works, Transport & Environ.	GEF	21,213	42,426	49,497	28,284	**141,420**
4. Requirements for Implementation of the SIRM Plan In Place, as well as Mechanisms for capture of Lessons and Best Practices.	Ministry of Works, Transport & Environ.	GEF	225,057	675,171	900,228	450,114	**2,250,570**
		UNDP				20,000	**20,000**
TOTAL BY SOURCE OF DONOR		**GEF**	**336,861**	**880,661**	**1,149,025**	**629,383**	**2,995,930**
(includes UNDP's $20,000)		**INTL/REG org**	79,545	159,090	185,605	106,060	**530,300**
		UNDP	0	5,000	7,000	8,000	**20,000**
		GOV	417,883	1,028,512	1,124,935	642,820	**3,214,100**
		COMM	9,658	34,242	26,340	17,560	**87,800**
		PRIVATE	60,110	180,330	240,440	120,220	**601,100**
		BILATERAL	50,000	75,000	75,000	50,000	**250,000**
SUB-TOTAL Co-financing							**4,703,300**
GRAND TOTAL							**7,699,230**

SECTION IV: ADDITIONAL INFORMATION

PART I: Other agreements

Endorsement Letter is attached as a separate document. Some Co-Financing letters received before submission have been added as a separate document, however the rest will be attached before CEO Endorsement.

PART II: Terms of References for key project staff and main sub-contracts

To be added after the GEF has approved the project, and before requesting CEO endorsement.

PART III: Stakeholder Involvement Plan

The primary stakeholders in this Project at the national level will be the various government agencies responsible for biodiversity and natural resources within the island watersheds and along the coastlines. Similarly, because as a SIDS both Antigua and Barbuda function as island ecosystem units Sustainable Island Resource Management directly affects all persons within the island communities, and therefore all resident persons must be considered to be stakeholders to this Project and its Objective. At the global level it will be the various MEAs to which Antigua and Barbuda are signatory, and all individuals and organisations associated with the sustainable management and conservation of global biodiversity. The stakeholder participation plan per Project output is outlined below along with details of the key stakeholders, their roles and interest in this Project, and any potential sources of conflict and associated mitigation measures.

Outcome 1:

1.1. Easy and Reliable Access to Information for Environmental Management by all Stakeholders

The main focus of this Output will be to bring together information from a variety of agencies and bodies dealing with biodiversity and natural resources. Primary amongst these would be the Environment Division of the Ministry of Works, Transportation and Environment which has a lead role in coordinating all environmental information as well as a mandate to identify and coordinate the implementation of national commitments to MEAs. However, the purpose of the data that will be stored within the EIMAS is to advise and guide policy-makers and technical managers dealing with all aspect of ecosystem functions and services, and biodiversity. Key amongst these would be the Lands Division, the Development Control Authority, the Forestry Division, and the Water Division (APUA). One source of conflict or constraint may be the general lack of willingness among government agencies to share information within their personal mandate. The budget and work-plan provides for a series of workshops to discuss the use of data, copyright issues, including a high-level workshop to discuss how the data would be targeted and used at the policy level.

1.2 Island ecosystem resources, function and usage patterns assessed and mapped

The surveying and mapping process will require the collaboration and coordination of a number of Government agencies dealing with agriculture, watershed management, forestry, environment, development, etc. as well as the community and the private sector. The end-product will be of value to all of these sectors and will provide overall guidance on both current land-use and function and, by extrapolation, on long-term policies and planning. The overall stakeholder benefits would therefore cross public and private sector and reach into watershed and coastal communities. Stakeholders will be brought together to develop survey and assessment methods most appropriate to their needs and the requirements of SIRM. The same stakeholders would also meet at a later date to review and evaluate baseline assessments and agree on monitoring indicators.

1.3 Modelling of island ecosystem resources and identification of key resources required for sustaining island ecosystem integrity and functionality

This modelling process will again require multiple stakeholder input although the modelling process itself will be undertaken by specialists and through on the job training. The outputs of the model(s) will be shared and discussed in a 2-day multi-stakeholder forum to debate their accuracy. Based on the outputs from the model(s) it should be possible to prioritise key resource management and conservation measures and to then identify responsibilities and strategies for their management by relevant stakeholders.

1.4 Environmental variability and extreme events forecasting

In order for models and management plans to be effective they would need to take into account the effects of both environmental variability (seasonal effects, cyclic changes) and extreme events (storms, hurricanes, droughts). Inputs will be essential from agencies that specialise in meteorology and hydrology, as well as oceanography. Some of these stakeholders may be external to the country and working at a regional level. Environmental variability and extreme event issues and concerns would be captured through a dedicated 2-day stakeholder workshop as a separate but sequential part of the modelling process (as per 1.3 above).

1.5 Long term monitoring programme for island ecosystem status and function established

For any SIRM approach to be effective, the key indicators for ecosystem, biodiversity and related socio-economic welfare will need to be identified and a regular and comprehensive suite of monitoring undertaken. Information from this monitoring will reveal trends, changes and highlight cause for concern. Responsibility for the monitoring will depend on the parameters to be monitored, and would necessarily be allocated to the appropriate agencies. NGOs and CBOs will have an opportunity to work closely with the responsible agencies and, along with the community as a whole (including the private sector), will be essential in providing an adequate work-force and area coverage for these tasks. One critical aspect of stakeholder participation related to monitoring and data collection is the need for access to data and associated reporting. The data collected will be stored centrally within the EIMAS and made available to the different stakeholders as required thereby promoting data sharing and maximising the potential utility of the data. The real end-user of this process will be national policy-makers who will need to be kept informed of trends and changes in order to steer policy and make appropriate decisions related to resource use and management. Stakeholders will be brought together to design a monitoring and evaluation approach through a design workshop specifically for that purpose.

1.6 Targeted Awareness and Sensitisation

This Output aims to target all sectors by delivering up-to-date information on the status of the environment and associated biodiversity, and on the critical importance of maintaining ecosystem functions (in contrast to the risks involved in losing those same functions). The primary stakeholders involved in the delivery of this awareness are expected to be the Environment Division in cooperation with the NGO community, and hopefully with some financial support form the private sector. Civil society will benefit from this awareness campaign in gaining a deeper understanding of the need to protect and manage ecosystem functions. Policy makers in all areas of government (including economic affairs and development) and the private sector (commercial directors and managers) will be apprised of the issues and the risks. Awareness raising will also target communities in order to foster support and assistance. The media will be important stakeholders in delivering the message of the need for managing island resources and ecosystem functions to the population as a whole. Education establishments will also benefit from specific packages crafted specifically for certain age groups and levels of education. Substantial resources have been allocated through the Project to support awareness workshops, policy-level sensitisation meetings and media interviews in order to capture full stakeholder participation.

Outcome 2: A Sustainable Island Resource Management Plan Developed and in Place

2.1 Sustainable Island Resource Management Zoning Plan (SIRMZP) Prepared

The Government's Planning Division and the Development Control Authority will guide stakeholders in this process, working closely with the Environment Division. Any meaningful zoning plan will need to clearly identify those areas which need to be protected and managed

for the long-term maintenance of ecosystem functions and conservation of valuable resources. In contrast, it will be essential to identify areas of specific land-use such as agriculture, tourism development, residential housing, etc. Possible areas of conflict may arise between those whose interests and responsibilities lie more with development and construction, and those who have the mandate to manage and protect the environment. Cooperation and understanding will be essential and this issue cuts to the core of what SIRM is really targeting i.e. protection of ecosystem functions and island resources in balance with economic development and freedom of livelihoods. An open and transparent process for developing this Zoning Plan is essential and discussions thereof will be open to all stakeholders (i.e. all island residents and those with business interests). To this effect, the Project provides for a substantial number of participatory stakeholder meetings and workshops (both in Antigua and Barbuda) as well as community training workshops to explain the zoning and planning process.

2.2 Comparative Cost-Benefit Analysis of SIRM Zoning and Management Plan

This activity is primarily targeted at senior policy-makers, and subsequently key decision-makers in the private sector, particularly those who deal with economic development and investment. It is recognised that, in order to emphasise the importance of SIRM and ecosystem functions, these concepts need to be presented in a manner that clearly identifies their real value, and the national financial and socio-economic losses that would be associated with failure to achieve effective long-term management of resources and ecosystem functions. The key stakeholders here would therefore be the elected representatives of the people at the Ministerial level (the Cabinet). This activity is an essential in precipitating the adoption of a Five Year Plan by the Government (see 2.5 below). The Project will present its findings and solicit open discussion and feedback at the policy level through a high-level workshop/consultation process.

2.3 Advisory Brief for Commercial Resource and Livelihood Sustainability

The key beneficiary stakeholders for this Output would be those currently employed in sectors or occupations that may represent a potential threat to sustainable resource management and ecosystem conservation. The aim is to provide better options and alternatives that have a long-term economic sustainability rather than a short-term return dependent on a finite or deteriorating resource. The agricultural sector and the construction industry would be two obvious beneficiaries. The Project would aim to develop more secure and sustainable agricultural livelihoods and would also attempt to identify solutions to the pressing issue of finite sources of construction materials (e.g. sand), the removal of which is now seriously jeopardising coastal ecosystem functions. Rather than this being an area of conflict it actually represents an area where both the resource users and the resource managers would be in agreement (i.e. the need to find alternatives). The result and recommendations arising from the review and Brief will be shared with stakeholders through an open workshop to explain options and to capture feedback and identify interest.

2.4 Strategy and Contingency Plan to address Environmental Variability

As above (1.4) those agencies specialising in meteorology and hydrology, as well as oceanography would be the active stakeholders in terms of developing the Strategy and Contingency Plan, while the responsive stakeholders would be those responsible for the management of water resources, liquid wastes, agriculture (land management), and public works. These stakeholders would need to address the requirements of the Strategy and Plan in relation to water storage and conservation, sewage treatment and siting of septic tanks, flood prevention (training of water run-off and stream-ways), road construction, etc. A consultation workshop at the inter-ministerial policy level will serve to ensure full policy-level stakeholder discussions prior to open stakeholder consultation (see 2.5 below) and eventual submission to Cabinet.

2.5 Strategic Plan for SIRM submitted to government and adopted

All island residents would be direct stakeholders to this Strategic Plan. The SIRM Plan will capture the development goals and needs in terms of economic development, social improvements and resource management. The final draft zoning plan and Plan will be submitted to the Government for approval. However, the key responsive stakeholders that would need to take action based on this plan would be senior government policy-makers and Directors of government divisions who would be expected to react to the plan and to the instructions of the policy-makers. Stakeholder workshops are scheduled to allow for proper dissemination of the draft Plan, and to gather pertinent feedback prior to formal submission.

Outcome 3: Policy and Institutional Reforms Provide a Framework for Implementation of the SIRM Plan

3.1 Review of the policy, legislation, and regulations related to SIRM across the different sectors

The primary stakeholders to this Output will be the government's legislative officers and the Attorney General's office. Senior government personnel responsible for briefing and direct government departments (e.g. Permanent Secretaries) would also need to work closely with the legislature to capture appropriate and pragmatic amendments related to SIRM and the protection of ecosystem functions within the terms and commitments of the various MEAs signed by the government.

3.2 Review of requirements for SIRM Implementation

Heads of Institutions (Government Divisions and Departments and Statutory Bodies) would have the primary interest in this review process as it may well have direct implications for their mandates and budgeting. Government Finance Officers would also be key stakeholders in view of the possible revenue implications. Human resource constraints are common in SIDS due to the limited population size. Capacity to undertake key activities within a SIRM framework, such as mapping and monitoring, must be strengthened and catalyzed. This includes not only at the level of government, but also of key civil society organizations that have played and will continue to contribute to sustainable use of resources, and to management of vital sites and systems. The capacity assessment called for in the project will therefore benefit a wide range of stakeholders, in both the private and public sectors.

3.3 Reforms recommended for the streamlining of policy, legislation and institutional arrangements

All stakeholders under 3.1 and 3.2 would be participants in the decision-making process on the appropriate reforms necessary to mainstream SIRM into government policy, legislation and institutional mandates as would the Cabinet. Ultimately all nationals would be affected by these reforms and would be end stakeholders. Possible conflicts may arise between institutions/divisions where responsibilities are amended with consequent alterations to budgets and revenue allocations. Such proposed reforms would need to be sensitive to such concerns while not losing sight of the objective. Proposed reforms will be shared with appropriate stakeholders through a 2-day open stakeholder workshop as well as a high-level policy consultative meeting.

3.4 Identification of suitable financial instruments and other sustainability mechanisms to support SIRM

The Ministry of Finance and Economic Development would be most directly concerned with this Output. However, this may also have direct implications on the private sector as beneficiaries of ecosystem functions and resources, as they may well be expected to pay

towards the maintenance of these functions and resources. Each government department and division may also be expected to become more active in revenue collection processes as appropriate. End-user stakeholders may well include tourists and visitors who may be required to assist in the financing of resource management and ecosystem function protection. Stakeholders will be invited to discuss the potential options (stakeholder meeting) and then a further 1-day stakeholder discussion will present and discuss the draft Sustainable Financial Mechanism, followed by a policy-level consultative meeting.

Outcome 4: Requirements for implementation of the SIRM Plan in place, as well as mechanisms for capture of lessons and best practices

3.1 Project Coordination Unit and NCM for SIRM

The NCM will be important for the Project by providing a forum for cross-sectoral deliberations and guidance that will be necessary for the evolution, definition and implementation of a SIRM Mechanism. The NCM should assist in promoting an enabling environment for the continued evolution and implementation of SIRM approaches and principles.

3.2 Inter-sectoral Training and Capacity Building Programme for SIRM

All government agencies responsible for monitoring, surveillance and management of aspects related to SIRM will be stakeholders to this training and capacity building Output. This does not, however, exclude NGOs and the private sector who will also participate as appropriate and as they feel necessary. Over 18 days of stakeholder training workshops and consultations have been allocated to this Output, with significantly more time and resources being allocated to preparing training material s and identifying capacity building needs for the stakeholders.

3.3 Project Monitoring and Evaluation

This is critical to the overall success of the Project. GEF and UNDP must be seen as a key stakeholder for this Output as much of the reporting and evaluation process is their requirement. However, the PCU and associated government personnel within the Environment Division and on the PCC must also be seen as primary stakeholders as they are responsible for overseeing delivery from this Project at the national level. Stakeholders will be directly involved in this process through the Annual Project Review and PIR process as well as through consultations with the Independent Evaluators at the Mid-Term and Terminal stages of the Project.

3.4 Implementation of demonstrations of integrated ecosystem management at sites identified as Hotspots or Sensitive Areas

The four demonstrations associated with this project have slightly different stakeholders (although the ultimate stakeholders would be the residents of Antigua and Barbuda as the intent would be to replicate demonstration practices and lessons throughout the islands). For **Demonstration One** (Sustainable land use practices for the conservation of soil and water resources and rehabilitation of the Body Ponds watershed on Antigua) the key stakeholders would be the resource users (farmers) and resource beneficiaries (the population that rely on this area for drinking water). For **Demonstration Two** (Development of an integrated 'ridges to reefs' co-management approach for the conservation of resources in the South West region of Antigua), the stakeholders extend throughout the watershed and into the coastal area and therefore include farmers, tourism establishments, tourists, fishermen, etc. **Demonstration Three** (Integrated Planning and Management for the sustainable use of Codrington Lagoon, Barbuda) is a more coastal initiative and targets tourism and tourists as well as fishermen as the primary stakeholders. However, the demonstration area includes a Ramsar Site and a newly-designated National Park and the direct stakeholders here clearly extend beyond the

national level to the global level. **Demonstration Four** (Promoting best practices in water conservation and waste water disposal and grey water re-use in the North West tourism zone Antigua) captures the interest of the Antigua Public Utilities Association as a key responsible stakeholder although the tourism sector is a recipient stakeholder in that water quality within this tourism zone is critically important to the well-being of tourists and therefore the industry.

Various stakeholder consultations and workshops are allocated to specific Demonstrations to discuss progress, and to review and consult on technical matters and issues relevant to the community and private sector. A further set of stakeholder meetings and workshops (8 in total – 2 per Demonstration) has been scheduled as part of the overall Project activities specifically to review and capture lessons and best practices for transfer and replication elsewhere within the country). To this effect, stakeholders also exist in other SIDS and UNDP/GEF, as they will benefit from endeavour to transfer lessons and best practices beyond the system boundary of this particular project and out to other small islands around the world.

PART IV: Other Annexes

Annex 1: Proposed and existing Marine and Terrestrial Protected Areas around Antigua and Barbuda

Annex 2: Agricultural Statistics Relating to Soil and Livestock Features for Antigua and Barbuda

Annex 3: Summary descriptions of the principal environmental laws

Annex 4: Details of the institutional framework and coordination mechanism for environmental management in Antigua and Barbuda

Annex 5: Threats analysis and barrier identification associated with a sustainable island resource management approach

Annex 6: Technical and Financial Details related to the Adoption of an Environmental Information and Management Advisory System

Annex 7: Maps Annex: Please find as a separate document.

ANNEX 1: PROPOSED AND EXISTING MARINE AND TERRESTRIAL PROTECTED AREAS AROUND ANTIGUA AND BARBUDA

1. A: The status of Marine Protected Areas (MPA) around Antigua and Barbuda

MPA	Type of PA	Activities	User involvement	Management plan	Management body	Financing Mechanisms
Diamond Reef	No Take Zone	None allowed	None	No	No	None
Palaster Reef	No Take Zone	None allowed	None	No	No	None
Codrington Lagoon	National Park	Fish landing site, eco-tours	Consultations planned	In development	No	Existing tours to bird sanctuary
Cades Bay	Multi-use management area	Fishing, scuba diving, snorkelling, kayaking tours	Consultations during draft plan development	Draft	No	None
Nelson's Dockyard	Historical National Park	Historical museums, tours, yachting, fishing ports	Park board	Yes	National Parks Authority	Yacht mooring fees, gift shops, rental fees, user entrance fees

1.B: Proposed Marine Protected Areas around Antigua and Barbuda

Area	Reasons for Selection	Aprrox. Size
Hanson Bay and Flashes	Large system; damaged extensively from storms and human interference with a strong potential for recovery	225 ha
Pinching Bay	A healthy system with fisheries potential, little degradation	2 ha
Yorks Salt Pond	Important nursery for marine fauna Used to be a storm shelter for vessels	1 ha
Area from Johnson's Point to Old Road Bluff (now Cades Bay Marine Reserve)	Large mangal system linked to coral reefs and sea grass beds with strong potential for fisheries support; important nursery for marine fauna; needed to maintain integrity of fisheries and to protect biodiversity	8 sq miles
Willoughby Bay/Christian Cove	Linked to sea grass beds and offshore reefs; supports important fisheries activity including cockle harvesting; relatively large system with some degradation	5sq mile
Area between Green Island and Indian Town	Ideal assemblage of mangroves, seagrass beds and offshore coral reefs; important nursery area in fairly healthy condition	7 sq miles
Point Northeast area from Boon Point to Indian Town	Complex, system with healthy assemblages of mangroves, coral reefs and sea grass beds; includes rare and endangered species; important nursery for marine fauna; turtle nesting areas	70 sq miles
Codrington Lagoon (Now Codrington Lagoon National Park)	Large integrated and complex ecosystem; very important nursery for marine fauna and important to Barbuda's lobster fishery; sanctuary for frigate birds.	19.5 sq miles

1.C: Proposed Terrestrial Protected Areas around Antigua and Barbuda

Proposed sites	Reason for Selection	Type of Protection Proposed
Wallings Forest	Historical, biodiversity and ecotourism	Forest Reserve / Recreational park
Christian Valley Forest	Watershed/biodiversity	Forest Reserve
Dark Wood Swamp	Wildlife (water fowl)	Wildlife Sanctuary
Codrington Lagoon (Barbuda)	Wildlife (large frigate bird nesting site)	Wildlife Sanctuary
Boggy Peak and surrounding hills and valleys	Watershed/biodiversity wildlife, reserve, recreation	Forest Reserve
Off shore islands (North Sound)	Ecotourism/watershed	Marine Park / wildlife Sanctuary
Fig Tree Drive Forest	Fish/wildlife	Forest Reserve
McKinnon's Swamp		Wildlife Sanctuary
Body Pond	Watershed	Forest Reserve

ANNEX 2: AGRICULTURAL STATISTICS RELATING TO SOIL AND LIVESTOCK FEATURES FOR ANTIGUA AND BARBUDA

Antigua soils classified as having moderate to severe erosion potential[33]

Soil No	Soil Name	Erosion Hazard[1]	Erosion Factor[2]	Acreage	% of Total
23	Boon sandy loam	M/S	S/E	466	1.4
24	Elliots clay	M/S	S/E	370	1.1
20	Wetherills clay loam	M/S	S/E	844	2.6
25	Belmont clay	M	S	246	0.8
21	Fitches clay	M	--	8,560	26.3
62	Ottos clay (stony phase)	M	--	2,190	6.7
74	Shirley loam	M/S	E/S	1,632	5.0
76	Indian Creek loam	M/S	E/S	898	2.8
73	Isaac clay loam	S	E/S	208	0.6
75	Picadilly clay loam	M/S	E/S	994	3.1
77	Liberta clay loam	M/S	E/S	1,850	5.7
70	St. Clair clay	M/S	E/S	1,960	6.0
80	Ffryes clay loam	M/S	E/S	2,966	9.1
90	Monteros clay loam	M/S	E/S	8,716	26.8
81	Spring Hill loam	VS	E	628	1.9

Notes: (1) M = Moderate; M/S = moderate to severe; S = severe; VS = very severe; (2) E = erosion; S = shallowness; S/E = shallowness + erosion; E/S = Erosion + shallowness

Classification of Barbuda soils according to erosion hazard[34]

Soil No	Soil Name	Erosion Hazard		Acreage
		Wind	Water	
26	Codrington clay	L	L	6,640
27	Blackmere clay loam	VH	M	12,280
28	Barbuda clay loam	M	H	9,536
29	Highland ridge clay	M	M	--
Bs	Beach sand	VH	Nil	3,720
SAL	Salinas	M	Nil	3,178

Livestock density data by Parish (as of March 2002)[35]

Parish	Area	Cattle		Sheep		Goats	
		Total	Density	Total	Density	Total	Density
	(Acres)	Head	Head/acre	Head	Head/acre	Head	Head/acre
Barbuda	39,680	26	0.001	160	0.004	257	0.006
St George	6,032	1,506	0.250	793	0.131	2,212	0.367
St John	16,547	5,505	0.333	7,347	0.444	9,228	0.558
St Mary	15,704	3,861	0.246	3,650	0.232	6,005	0.382
St Paul	11,187	1,991	0.178	6,753	0.604	10,008	0.895
St Peter	7,998	1,494	0.187	1,391	0.174	3,681	0.460
St Philip	10,050	1,763	0.175	2,092	0.208	8,842	0.880
Total/Mean	107,198	16,146	0.151	22,186	0.207	40,233	0.375

[33] Hill (1966)
[34] Vernon, Lang and Hill, (1966)
[35] Environment Division of the Ministry of Works, Transportation, and Environment

ANNEX 3**:** SUMMARY DESCRIPTIONS OF PRINCIPAL ENVIRONMENTAL LAWS

Constitution of Antigua/Barbuda

The constitution of Antigua/Barbuda does not contain any provision relating to land or the use of land, natural resources or the environment.

The constitution provides, however, in section 9 (1) that no person is to be deprived of his property compulsorily except for a public purpose and except in accordance with a law that provides for the payment of adequate compensation within a reasonable time.

Land Acquisition Act, Cap 333

Passed in1958 it addresses the issue of eminent domain. Pursuant to section 3 of the act, the government may acquire land for a public purpose. An authorised officer appointed by the cabinet for the purpose of the act, has powers of entry on the land for the purpose of taking such action, including digging the soil to ascertain whether the land is suitable for the purpose for which it is intended to be acquired.

A board of assessment deals with the issue of compensation, the Governor General appoints the board, with a judge as chairman, along with another appointee plus a nominee of the owner.

It is felt that the provisions under this act are all very detailed and can be an effective legal tool in any effort to achieve sustainable management of our ecosystems. However, there are complaints that in practice the state does not pay the open market value for land and there are lengthy delays before the compensation payable is assessed and payment made.

Aggravating these problems is the lack of provision for the payment of commercial rates of interest on the amount of the compensation payable from the date of acquisition until the date of payment. This result in considerable financial hardship for landowners, and there is a need to provide a legal remedy for these situations.

Additionally, the act is silent with respect to what constitutes a 'public purpose" for which private land may be compulsorily acquired; questions always arise as to the use to which land compulsorily acquired can be put if the public purpose for which it was acquired is abandoned, this ultimately impacts approaches to protected area management.

The Beach Control Act, cap 45

This act was passed in 1958, amended in 1989 and vests all rights in and over the foreshore of Antigua/Barbuda and the floor of the sea in the crown. It also prohibits the encroachment on or use of the foreshore or floor of the sea for any public purpose or in connection with any trade or commercial enterprises except as provided by the act.

The term" floor of the sea" means the soil and subsoil of the sea between the low water mark and the outer limits of the Territorial Sea.

The minister with responsibility for Crown Lands may grant licenses for the use of the foreshore or floor of the sea for the aforementioned purposes as he deems fit. Applications for a license shall be made in the prescribed manner and shall be published in the gazette for public scrutiny. Nothing in the Act shall be deemed to affect any land used for Agriculture or any prior rights and uses of the beach including by fishermen. This act has significant teeth in the interest of environmental protection .The powers under this act have been subsumed under the new Physical Planning Act 2003, but there is no evidence of it been repealed

The Beach Protection Act cap 46

This act was passed in 1957 and makes it unlawful for any person to remove sand, stone, shingles or gravel from any beach or foreshore in Antigua/Barbuda except in accordance with a written permit from the Director of Public Works. The act as written has no application to Barbuda. It gives good legal cover for sand removal from a prime resource- our beaches, but the fines and penalties need to be re-examined to reflect the current socio-economic realities.

The Bush Fire Act, Cap 62

This Act was passed in 1901, last amended in 89, authorises the cabinet of Antigua/Barbuda to prohibit the setting of fires on land within any part of Antigua/ Barbuda or within such times as may be specified in an order and creates an offence if any person fails to comply with the terms of the order. Any person who wishes to set a fire to any land must apply in writing to the Commissioner of Police.

Experience has shown that this law is not vigorously implemented, especially in our upper Watershed areas where there is a tendency of some farmers to slash and burn in preparation for planting or encourage new growth for fodder.

Marine Areas (preservation/enhancement) Act, cap 259

Passed in 1972, and last amended in 1989, it gives the minister responsible for Fisheries, the power under the act to designate any area a restricted area that is necessary for the protection of the flora and fauna in the area. The minister can assign the management of the area to any body deemed competent.

The minister is also empowered to acquire lands in the vicinity of a protected area by agreement or compulsorily under the land acquisition act. There is school of thought that this act should be repealed because much of its provisions are adequately covered even now under the Fisheries Act and the Marine Areas (Act 1972).

Two Marine Reserves have been designated under this Act (Diamond Reef -off the North-West coast of Antigua and Palaster Reef -off the South coast of Barbuda), no management plans have been completed for these areas and neither area is managed.

Public Utilities Act, cap 359

Passed in 1973 it gives the Antigua Public Utilities Authority the exclusive right to supply, and distribute water in Antigua/Barbuda. It establishes general control over watercourses, but does not address watersheds or their management in any way or form.

The National Parks Act, Cap 290

This act was passed in 1984 and makes provision for the preservation, protection, management and development of the natural, physical, ecological, historical and cultural heritage of Antigua /Barbuda.

The act establishes a Parks Commissioner whose function is to prepare and keep under review plans for the management and development of parks. A park plan must identify the park in question, and also statements of objectives and policies in matters relating to the development and use of all land in the park.

A park is established under the act on the request of the National Parks Authority by a declaration by the minister published in the gazette. The declaration can relate to any area of land or water or both.

Section 22 precludes any government agencies from granting any permission, to do any thing with land whether crown land or other wise, within the park unless prior written approval is obtained from the

National Parks Authority. The section essentially provides that where an approval is not obtained, the action of these agencies shall be null and void.

The Forestry Act, cap 178

Passed in 1941, it provides for the Director of Agriculture to be the Chief Forestry Officer and for the appointment of Forestry Officers to carry out the provisions of the act.

It prohibits the clearing of any timber, or the burning or clearing of any wood within a Forest Reserve without a permit in writing from the Chief Forestry Officer.
The minister is empowered to declare any estate to be subject to the act, and the owner of a forest reserve is entitled to be compensated in respect of any work, which he carries out in accordance with a scheme of reforestation.

This present Act is way out dated and there is certainly a need to enact the Draft Forestry and Wildlife Act which has been making the rounds for the last ten years. This new act proposes a comprehensive approach to the management of forest and wildlife and purports to cover the whole sector.

Specifically the Forestry and Wildlife Act would accomplish the following:

- It would help to tackle the management of watershed areas, which is not properly covered now by any existing legislation or draft legislation.
- Safeguard threatened and endangered species, giving additional cover to terrestrial species.
- The draft act also requires the Chief Forestry and Wildlife Officer to prepare a national plan every two years. The plan will contain a statement of forest and wildlife policy, and an estimate of the contribution of the forest and wildlife to the national economy.

The enactment of this draft act will repeal the old Forestry Act, Forestry Regulations and the Wild Birds Protection Act cap115. Additionally,

- The draft Act supplements the provisions of the existing Bush Fire Act, 1901. It makes the Chief Forest and Wildlife Officer responsible for the prevention and control of fires in forest reserves, and protected forest.
- It requires persons setting fires in these areas to obtain a permit from the Chief Forest and Wildlife Officer.
- It empowers all Forest and Wildlife Officers to arrest offenders and deliver them to the nearest Police Station; it also provides for the payment by offenders of a sum of money for a named offence, which discharges the person from any further legal proceedings

Fisheries Act, cap 173

It was passed in 1983 for the development and management of fisheries and matters incidental thereto. The act is the principal fisheries legislation in Antigua/Barbuda. It was enacted in the context of the initiative to introduce harmonized OECS fisheries legislation throughout the OECS and is modelled on the harmonised OECS Fisheries Legislation of 1983. It provides for the appointment of a Chief Fisheries Officer and other Fisheries Officers and assistants to be responsible for the administration of the Act.

The last twenty years, however, have seen many developments in the area of Fisheries Management Law. These, among other reasons justified the 2003 overhaul/review of the Fisheries Act- 1983, and its implementing regulations. This was done following wide stake holder's consultations, inclusive of government officials and took into account global trends in fisheries management, and binding commitments under International Laws and Agreements to which Antigua and Barbuda is party.

Again, although the current Act provides for a fisheries management and development plan to be prepared and kept under review by the Chief Fisheries Officer, the new Act will take on board the concept of

sustainable ecosystem-based approaches to fisheries management and the precautionary principle in any management plan. Although there are some strong provisions under the current Act there are some areas, which need attention.

- Aquaculture: No protection is afforded to those willing to attempt Aquaculture. Framework provisions however, have been incorporated into the Draft Fisheries Act to address that sub sector.

- Turtles: The proposal includes a new approach to the management of turtles, so measures have been incorporated to protect nesting areas, erection of structures on beaches that are nesting areas.

- Sea moss: The question has been raised whether the Fisheries Act 1983 provides a legal framework for regulating the taking of sea moss or other aquatic flora. This is an area that will be address in the new legislation.

The Draft Fisheries Act represents a modern legal framework for Marine Ecosystems Management and should be afforded quick passage through the parliament by the first half of 2006.

ANNEX 4: DETAILS OF THE INSTITUTIONAL FRAMEWORK AND COORDINATION MECHANISM FOR ENVIRONMENTAL MANAGEMENT IN ANTIGUA & BARBUDA

There are a large number of different institutions involved in environmental management that include government ministries, statutory bodies, NGO's and community based organisations (CBOs). At the government level the control and development of land and the management of coastal resources is divided among a number of different agencies. The key institutions and their involvement and responsibilities with respect to island resource management are described below:

Ministry of Agriculture Lands, Marine Resources & Agro Industries
This Ministry has the broadest and oldest involvement with land and marine based natural resources. It is staffed with well-qualified professionals, but often lacks the support staff, basic equipment and supplies to do an effective job, and suffers also from weak legislation. The Fisheries and Forestry Division are the two principal government agencies charged with gathering most of the primary data on the biological resources of Antigua and Barbuda.

- The Fisheries Division has responsibility for development of the fisheries sub-sector, monitoring fish stocks and marine resources, as well as a regulatory role in policing fishing practices. The Division is given powers under the Marine Areas Act (1972) to restrict fishing in certain areas and to preserve habitats, flora and fauna, natural beauty or shipwrecks in marine areas. These powers however, have not been exercised to any large extent due to inadequate resources. The Fisheries Division has been involved in a number of activities to address issues related to land degradation including:
  - Monitoring and inventory of all mangrove forests to ensure continued growth and health;
  - Efforts to declare areas as mangrove reserves;
  - Monitoring of beach changes;
  - Working with the DCA on EIA's for coastal area development.

  The overall long-term work program that will tackle issues related to land degradation aims to:
  - Protect and manage mangrove forests on Antigua and Barbuda;
  - Raising awareness of beach erosion.

- The Forestry Division has responsibility for managing the country's forest and woodland areas and for reforestation. The Division has been restricted by the lack of adequate legislation to support its activities and is seriously under staffed and under budgeted. The primary instrument for management of the upper watersheds is the Forestry Ordinance (cap 99 1941), which provides for the establishment of forest reserves, the granting of permits for harvesting forest resources, and clearing. Apart from the prohibition of forest clearing on steep slopes, the regulations of the Forest Law are almost completely ignored and exploitation for fuel, wood and charcoal on both government and private lands is virtually uncontrolled. However, the Forestry Division does not have the manpower to enforce these ordinances, even assuming that there was a supportive policy. In recent years, the Division has taken on activities more related to biodiversity conservation and to eco-tourism development, reflecting a more environmentally conscious thrust from the newly trained staff. Forest officers now regularly lead groups of cruise-ship passengers on forest hikes.

- The Soil and Water Conservation Unit has responsibility for the soil conservation programme activity. It also assists farmers with development of irrigation systems, primarily in the area of mini-dam cleaning, repair and construction, and in improving drainage. The well-qualified, professional staff only have a small budget, so soil conservation programmes are very limited.

- The Lands Division is responsible for the management and control of all Government lands, including land reclamation, land use and the sub-division of land. Since a little less than half of the land is government owned this Division has a key role in determining the conversion of land to non-agricultural uses. The Division is responsible directly to the Permanent Secretary.

- The Agricultural Extension Division has the major responsibility for farmer training and assistance and is also involved with allocation of state lands to farmers for agricultural purposes. Plots of up to 2 ha can be leased out under the authority of the Chief Extension Officer. The Extension Division is also responsible for control of stray cattle and provides land tillage services. This Division along with the Soils Unit was successful in transferring soil conservation technologies to farmers.

- The Plant Protection Unit has responsibility for plant protection recommendations and provides pest scouting in the field for crops such as cotton. The Plant Protection Unit also has responsibilities for Plant Quarantine functions at the Ports of Entry.

- The Pesticides Control Board has responsibility for approving the importation, use and disposal of all pesticides used in domestic, animal and plant protection. The Board is composed of professionals in the Ministries of Agriculture and Health, including the Director of Agriculture and the Chief Medical Officer and representatives of the agrochemicals importers. The Board has not been very effective and farmers have until recently imported whatever chemicals they thought effective. The Pesticides and Toxic Substances Act has been sometime in the preparation stages. This Act would strengthen the powers of the Pesticides Control Board to limit importation, control pesticide operators, and generally regulate the way pesticides and toxic substances are traded and used.

- The Veterinary and Livestock Division is headed by the Chief Veterinary Officer whose staff are concerned with both animal health and animal production issues. Animal quarantine matters are also the responsibility of the Chief Veterinary Officer. Animal production concerns include assistance with pasture improvement activities.

Ministry of Works, Transportation and the Environment

This Ministry has responsibility for the, Antigua Public Utilities Authority (including Water, Electricity and Telephones), Development Control Authority (DCA), Energy and the Environment, and Public Works amongst others (Infrastructure Maintenance, Sea Ports, Harbours, Port Authority):

- The Environment Division was initially set up within the Ministry of Tourism and Environment and was mandated to (i) identify and coordinate the implementation of national commitments to Multilateral Environmental Agreements, (ii) develop and implement a national environmental awareness program, (iii) establish projects related to the rehabilitation and protection of the environment, coordinate the development of environmental legislation; and (iv) coordinate the process of conducting EIAs for development projects (such as those involving dredging, shoreline or marine construction, removal of mangroves, and large-scale land clearing although such EIAs are not a legal requirement). The Division serves as the Secretariat for Antigua and Barbuda's National Coordinating Mechanism for Environmental Conventions. To address the issue of land degradation, the Division in collaboration with the Forestry Division has embarked upon a national urban reforestation program to raise awareness of deforestation. The program involves the building and maintenance of a nursery, which is designed to house over 5,000 plants. In 1999, the Division initiated a project to increase the capacity of relevant agencies to develop and manage their own databases on natural resources. This project is ongoing and will seek to include information related to land degradation.

- The Development Control Authority, has responsibility for regulating the use and development of land for urban, economic and infrastructure development. The DCA was set up after the first attempt to establish a National Land Use Plan was rejected by the Cabinet in 1974. Although the DCA had relatively effective legislation the agency itself was not very effective in addressing land use issues, due to the lack of political will to implement the legislation The DCA has recently been assisted in the development of the Physical Development Plan, which gives clear directives on how further development of natural resources should be accomplished and could have significant implications for integrated ecosystem management.

- The Water Division of APUA has legal control over all water resources in the country and is mandated to provide supplies of water to meet the municipal needs of the country. However, agricultural needs are not dealt with under the Act and are therefore not officially part of its remit. At times of drought, wells and reservoirs have been utilized for municipal supplies to the detriment of agricultural needs. The Division has made some concessions to agricultural water needs but there has been no active development of water supplies specifically for agriculture by the Authority. The Division is responsible for water quality testing and routinely tests water for residual chlorine levels and sediment. The Planning and Development section of the Division is responsible for hydrological studies, planning and digging of wells and building of dams. A water development plan that encompasses both municipal and agricultural needs does not currently exist although its requirement is recognised. Furthermore, the Water Division has no mandate or resources to manage the watersheds which supply the water.

- Public Works is a Department of this Ministry and is responsible for roads and drainage structures throughout the country. As such, the Department can have considerable influence on sedimentation management as part of road construction and maintenance and the management of flood waters. The Director of Public Works is also responsible for the Beach Protection Act, which is supposed to prevent the unauthorized removal of material from beaches or foreshores and for granting permits where permission is approved. However, it has no control over how the removal is carried out and is not able to regulate the quantities removed. Legal difficulties regarding definitions of beach and other problems remain to be resolved. Despite many statements by government authorities, that sand mining needs to be controlled, little seems likely to change until alternative sources of sand for construction are available.

Ministry of Finance and Economic Development

This Ministry has responsibility for several divisions, including inland revenue and social security. Of particular relevance to the present project is:

- Economic Policy and Planning Unit, whose functions are: i) to formulate and implement the programmes for sustainable development with a novel approach to managing and directing the process of national socio-economic development; ii) to enunciate sound economic policy, exercise strategic planning and provide reliable statistical indicators to inform the decision-making and advise the Minister; iii) to undertake economic policy review and formulation to ensure economic stability; iv) to draft new economic policies as directed by the Cabinet, with ensuing inter-sectoral partnerships and appropriate linkages in the process; v) to translate existing policies into projects and programmes; vi) to manage the project development cycle from the perspective of financial resources, allocation, use and accountability; vii) to ensure successful project preparation and implementation through the collaborative efforts of the public and private sectors and the wider civil society; and viii) to develop and implement a sound national statistical database to facilitate the economic policy and planning initiatives.

Ministry of Tourism and Civil Aviation

This Ministry has responsibility for Meteorology, V.C. Bird International Airport, Civil Aviation, St. John's Development Corporation, Tourism Corporation, Deep Bay Development, Beach Protection, Vendors, National Parks Authority, Antigua & Barbuda Hospitality, Training Institute, Heritage Sites, and Botanical Gardens:

- The National Parks Authority (NPA) is a financially self-sufficient statutory body with a Board of Directors established through the National Parks Act. This act provides procedures for the designation of any area of land or water as a national park. The NPA is mandated to 'preserve, protect, manage and develop the natural physical and ecological resources and the historical and cultural heritage of Antigua and Barbuda'. The NPA has responsibility for managing the country's single national terrestrial park (Nelson's Dockyard). This is focused on providing a world-class tourism destination based on the historical and natural resources within the park area. Generally, the country's natural landscape is largely unprotected.

Ministry of Health, Sports and Youth Affairs
This Ministry has responsibility for the Central Board of Health and the National Solid Waste Management Authority amongst others:

- The Central Board of Health CBH) is responsible, among other things, for enforcement of the environmental sanitation regulations, preventing the spread of infectious diseases, operating a mosquito control programme and for the handling of liquid and solid waste. The practical aspects of solid waste management have recently been transferred to the National Solid Waste Management Authority (NSWMA), which theoretically, leaves the CBH free to provide the regulatory role more effectively. The CBH has undertaken a programme of monitoring water quality at six of the main tourist beaches around the island for faecal contamination. Details of analyses are not published but do provide the possibility to the authorities to detect problems of water pollution at an early stage. Besides the monitoring of bathing waters, there is no routine testing of marine or wetlands waters for pollution monitoring. Domestic water is not regularly monitored for chemical toxins or contaminants.

- The National Solid Waste Management Authority (NSWMA) was set up as part of a sub-regional programme to improve management of solid waste in the OECS and to provide facilities for the disposal on-shore of the growing amount of cruise ship generated waste as required under the MARPOL agreement. The Authority now handles the disposal of solid waste for the island. It is making considerable efforts to introduce at least the rudimentary aspects of sanitary landfill as normal practice. This has not eliminated unofficial dumping and there are still no provisions for handling toxic chemicals or biologically hazardous wastes.

Non Governmental and Community Based Organizations
Non-Governmental Organizations (NGOs) have played an important role in the last ten years or so in drawing public attention to a number of important environmental issues, such as sand mining, solid waste management and the destruction of wetlands.

- The Environmental Awareness Group (EAG) has consistently raised issues of sustainable natural resource management and has become involved in efforts to improve community management of coastal natural resources, providing training to stakeholders in practices that conserve reefs, off-shore island ecosystems and mangrove wetlands. EAG has also been active in improving education of teachers and students with respect to environmental matters including coastal issues.

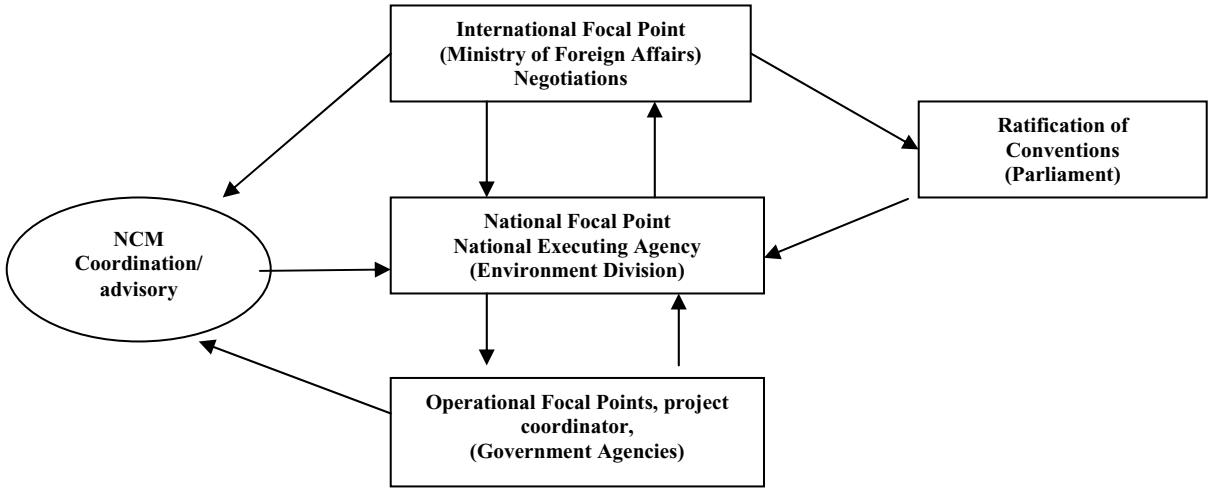
- The Gilbert Agricultural and Rural Development Centre (GARDC) has conducted courses in agriculture and rural crafts that emphasize the need for sustainable practices and effects of polluting chemicals. GARDC has provided training in agro-forestry practices to farmers and agricultural

extension officers (on the use of trees in livestock systems, hillside crop farming, and fire prone areas, using multipurpose trees for live fencing, fire/windbreaks and fodder production). GARDC established a number of farm projects that were more environmentally friendly (i.e. composting, use of green manure crops, cover crops, mulching, bio-pesticides, alley cropping). GARDC worked collaboratively with the Environment Division in a national tree planting project and with the Forestry Unit in a watershed protection project, to establish buffer strips around a major water reservoir (Potworks Dam).

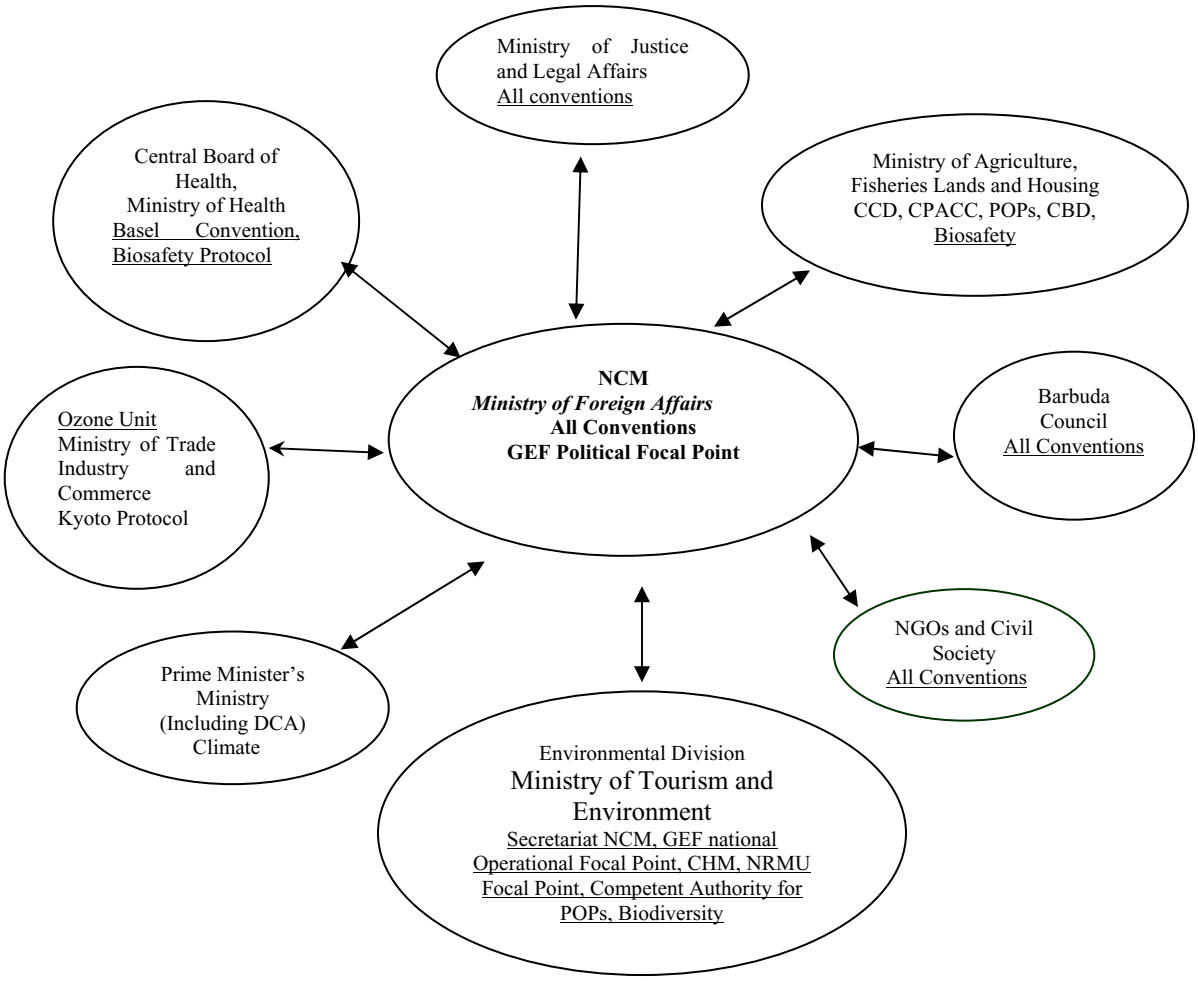
National Coordinating Mechanism for Environmental Conventions

The National Coordinating Mechanism (NCM) has developed into a forum for the coordinated follow-up, at the national level, to all Environmental Conventions ratified by the Government of Antigua and Barbuda. The role of the NCM is to strengthen communication links between the relevant ministries and departments of Antigua and Barbuda directly involved with the implementation of the Conventions. It consists of a network of government agencies/ divisions (see list above), national focal points, competent authorities, and NGO's, working to together to facilitate a coordinated and timely response to Antigua and Barbuda's treaty obligations as well as providing a forum for discussions on work-programs for government agencies.

Antigua &Barbuda Focal Point System



INSTITUTIONAL ARRANGEMENTS FOR IMPLEMENTATION OF MEAs IN ANTIGUA AND BARBUDA



COMPOSITION OF NATIONAL COORDINATION MECHANISM

The NCM's organizational chart illustrates the communication links, information exchange and the availability of resources between agencies. All resources within specific agencies are available for the implementation of activities related to the NEMS.

Coordination of the implementation of the NEMS can best be done using existing mechanism of the NCM to direct policy and facilitate high-level support for activities. Day-to-day coordination of the implementation of the NEMS can be the responsibility of the Environmental Division and may fit in with its Cabinet mandate.

ANNEX 5: THREATS ANALYSIS AND BARRIER IDENTIFICATION ASSOCIATED WITH A SUSTAINABLE ISLAND RESOURCE MANAGEMENT APPROACH

Antigua and Barbuda aim to adopt a policy of sustainable island resource management. Such a policy recognises the need to conserve the countries biodiversity and associated natural resources and to maintain the welfare and efficacy of the island ecosystem functions within a landscape that also protects individual livelihoods, provides a fair quality of life and expands opportunities for economic development.

The following table identifies the threats and barriers to such an approach, and provides proposed solutions that Antigua and Barbuda should adopt in order to achieve its objective.

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
Limited water availability	• Failure to recognise need to protect critical watershed habitats to help maintain water resources.	• Limited baseline data on ground water distribution, watershed hydrology or relationship to environmental flow and functional habitats on which to base decisions and assist in management of water resources. • Limited understanding of the environmental variability and the interaction between key habitats to ensure watershed function is maintained / restored. • Agencies do not have the capacity or resources to survey and monitor water resources and watersheds, or analyse the data for use in developing policies and informing management decisions.	• Assess capacity of key agencies involved in management of water resources and the watershed to undertake surveys and provide training as required. • Undertake baseline surveys and mapping related to hydrology and environmental flow (storage areas, predicted annual capture, sensitive downstream biological habitats and functions, etc) • Develop an effective monitoring programme (meteorological, precipitation and evaporation, stream flows) and analyse data for use in constructing predictive models to aid the development of policy and management approaches.
	• Focus on immediate technological solutions to secure water supplies to meet domestic and commercial water demands.	• Government struggling financially to recover after hurricane damage. High operation and maintenance costs for desalinated water. • Limited availability of appropriate financial instruments to cover the	• Review water rates and identify financial instruments and other mechanisms to support water resource management as part of SIRM, to incorporate support from companies that operate private desalination

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
		initial capital and transaction costs to develop and support long term strategies to improve management of water resources and watershed (including monitoring). • No long term plan for water resource conservation, no watershed reserves and /or plan to ensure equitable allocation / distribution.	plants. • Cost-benefit analysis of long term dependency on desalination versus protection of watershed. • Development and implementation of an integrated water resource management strategy and action plan that deals with all elements of meteorology, hydrology, capture and storage capacity, technological improvements, conservation (including recycling), abstraction versus harvesting, etc. equitable distribution.
	• Uncoordinated management approaches between agency responsible for water management (APUA) and the main water users (e.g. agriculture), and environment to ensure watersheds are adequately protected.	• Inadequate human resources to develop a more integrated approach to ecosystem management.	• Review institutional arrangements, identify gaps and make recommendations on possible reforms to clarify mandates and areas of responsibility and ensure equitable distribution and supply of water resources to each sector.
	• General lack of awareness of need to protect functionality of watershed in order to help maintain water resources.	• Agencies do not have the capacity or resources to raise general awareness about these issues.	• Raise awareness about island ecosystem structure and function and the need for an integrated approach for conservation of biodiversity and protection of function, relates to water resource management
Pollution and contamination by solid and liquid waste	• Rate of urban expansion and commercial / tourism developments poorly controlled, resulting in an increasing volume of waste without treatment or disposal facilities.	• Inability to plan and predict waste management and disposal requirements due to a lack of information on current and future trends. • Weak and/or absent policies and legislation to ensure adequate	• Study of island carrying capacity to include consideration of solid and liquid waste disposal requirements with respect to number of residents and number of tourists etc. and set sustainable limits. • Develop national environmental

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
		provision for disposal, treatment and management of wastes is an integral part of any planned development proposal. • Poor communication with Development Control Authority and environmental agencies (Min. of Agri. etc.) • General lack of awareness of the critical need to not damage / pollute environment. • Self-regulation not widely practiced within the tourism and recreational industry.	quality standards (e.g. level of faecal coliforms permissible for bathing waters etc.) for inclusion in guidelines in SIRM zoning plan. • Raise awareness about the need to reduce pollution and develop incentives to encourage investors / developers to establish public private partnerships, adopt environmental management systems and self-regulate.
	• Existing legislation to prevent pollution are inadequate and poorly enforced.	• Weak and/or absent policies and legislation to control pollution. • Fragmented responsibility between agencies involved in waste management and the environment with poorly defined mandates. • Insufficient resources and capacity necessary to monitor water quality, and check functioning of domestic and commercial waste disposal systems (e.g. septic tanks, private sewage plants), and waste disposal and treatments.	• Review and develop more realistic regulations, policies and legislation to reduce pollutant impact on ecosystem functions. • Review inter-sectoral responsibilities of agencies involved in water, waste management and the environment and recommend reforms for the streamlining arrangements. • Institutional strengthening and capacity building for CBH and NSWMA to assess islands solid and liquid waste disposal and treatment requirements (alongside activities to be carried out IWCAM).
	• Insufficient funds to implement and manage necessary waste disposal, treatment and management.	• Current system of fines and penalties require involvement of courts, and are poorly enforced. • Fines do not act as an effective deterrent to fly tipping or poor waste disposal.	• Review financial instruments and mechanisms and ensure fines are set at a suitable level to act as a deterrent • Ensure management agencies have the power to issue on the spot fines. • Ensure monies levied through fines contribute towards protection of

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
			environment.
	• Uncontrolled overuse of agro-chemicals (pesticides, fertilisers etc).	• Weak and/or absent policies and legislation to control importation and application of agro-chemical.	• Review, revise and enact necessary legislation (Pesticide and Toxic substances Act) • Institutional strengthening of Pesticide Control Board. • Further explore alternative agricultural practices (mixed cropping, crop rotation, genetically pest resilient strains etc.) to encourage reduction in use of agro-chemicals.
	• Loss of natural filtration systems (e.g. watershed, mangroves) resulting in land based sources of pollution impacting on the marine environment.	• Lack of intersectoral collaboration or cooperation in planning and management of island ecosystems.	• Strengthen existing mechanisms to improve coordination between agencies (NCM) and develop systems to improve the sharing of information / data (EIMS). • Clearly demarcate natural filtration systems in need of protection (as part of SIRMZP), in consultation with stakeholders.
Land degradation, loss of terrestrial biodiversity, productivity and function.	• Inter-dependencies within the ecosystem between species and their habitats (i.e. critical habitats, refugia, spawning, feeding, breeding, roosting etc) and habitats and their ecosystem function is poorly understood.	• Information needed to assist in decision making and planning is limited (e.g. distribution of critical / sensitive / functional habitats), and the datasets that do exist are scattered between different agencies and are often in an inaccessible format. • Agencies involved in land use and management have limited ability to collect, manage, analyse and interpret data about the island ecosystem and hence are unable to effectively plan and manage resources. • Poor coordination and collaboration between planning department, agricultural, environmental and water	• Assess capacity and training needs amongst key agencies involved in land use and management, and provide cross-sectoral training in information data collection, management etc. • Strengthen existing mechanisms (NCM) to improve coordination between key agencies. • Establish a mechanism to coordinate and manage different types of data about the islands terrestrial resources and patterns of resource use to inform decision making and improve management; • Collate and structure existing

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
		management sectors to overcome problems of deforestation and soil erosion. • Limited availability of appropriate financial instruments to cover the initial capital and transaction costs associated with developing a more integrated management approach.	terrestrial baseline datasets (e.g. soil types) and identify gaps; • Develop standard survey methods and implement baseline surveys; • Analyse data and improve understanding of the island ecosystem through developing a model to inform management.
	• Critical / sensitive / functional terrestrial habitats not adequately protected.	• Planning legislation and policy does not account for the urgent need to protect and manage critical habitats for conservation of species as well as functional habitats for overall maintenance of ecosystem integrity. • Limited availability of appropriate financial instruments to cover the initial capital and transaction costs associated with protecting critical / sensitive/ functional habitats.	• Revise policies associated with land use and protection of critical / sensitive / functional habitats as well as the protection of fertile agricultural land and grazing pastures. • Clearly demarcate sensitive areas in need of protection (as part of SIRMZP), in consultation with stakeholders, to balance interests of biodiversity conservation with construction and development against maintenance of productive landscape. • Identify financial instruments and other sustainability mechanisms to support protected areas (e.g. entrance fees etc.) and as part of SIRM.
	• Traditional agro-pastoral practices (especially burning and loose grazing) are unsustainable.	o Agro-pastoralists often do not have security of land tenure on crown lands to make it financially worthwhile investing in better land use practices.	• Revise policies and procedures associated with land tenure arrangements to provide the security needed to encourage investment.
	• Limited general understanding of the need to protect critical terrestrial habitats (e.g. forests, watersheds), to prevent land degradation and maintain island ecosystem.	• Limited communication between primary resource users and relevant agencies. • Disproportionate value of land for tourism / housing developments relative to agriculture / grazing.	• Encourage stakeholder participation in decision making process and planning through strengthening National Coordination Mechanism. • Raise awareness about island ecosystem structure and function and

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
			the need for an integrated approach for conservation of biodiversity and protection of function, as it relates land degradation.
Degradation of coastal and marine resources, loss of biodiversity, productivity and shoreline protection	• Inter-dependencies within the ecosystem between marine and coastal species and their habitats (i.e. critical habitats, refugia, spawning, feeding, breeding, roosting etc), and habitats and their ecosystem function poorly understood.	• Information needed to assist in decision making, planning and management of marine resources is limited (e.g. distribution of mangroves, beaches, reefs etc), and the datasets that do exist are scattered between different agencies and are often in an inaccessible format. • Agencies involved in marine resource use and management (Fisheries Division) have limited ability to collect, manage, analyse and interpret data about the island ecosystem and hence are unable to effectively plan and manage resources. • Poor coordination and collaboration between agencies responsible for the key agencies to overcome problems of sedimentation and coastal erosion.	• Training, capacity and resource needs assessment of Fisheries Division. • Institutional strengthening and training for Fisheries Division. • Establish a mechanism to coordinate and manage different types of data about the coastal and marine resources and patterns of resource use to inform decision making and improve management (as above); • Collate and structure existing baseline datasets on marine and coastal resources and identify gaps; • Develop standard survey methods, implement baseline surveys and establish monitoring programme ; • Improve understanding of the island ecosystem function through developing a model of the island ecosystem (linked with terrestrial components as above) and use findings to provide inputs to 5 year SIRM strategy.
	• Critical / sensitive / functional coastal and marine habitats (e.g. coral reefs, seagrass beds, mangroves, beaches spawning & nursery grounds) not adequately protected.	• Disproportionate value of coastal lands relative to habitat value. • Weak or inadequate policies and regulations controlling coastal development / construction activities . • Fisheries division has inadequate resources to exercise powers and	• Revise policies associated with coastal development and protection of critical / sensitive / functional habitats as well as the protection of beaches. • Demarcate critical / sensitive and functional marine habitats in need of protection (as part of SIRMZP), use markers and mooring buoys to separate resource users, and balance

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
		functions. • Limited availability of appropriate financial instruments to cover the initial capital and transaction costs associated with implementing MPAs as part of SIRM.	interests of biodiversity conservation with recreation and development against maintenance of productive landscape. • Cost-Benefit Analysis of Ecosystem Functions and Biodiversity (taking into account renewable-resource concept). • Identify financial instruments and other sustainability mechanisms to support marine protected areas (e.g. entrance fees, mooring buoys etc.) and ensure funds levied are retained for use in conservation.
	• Failure to control exploitation of nearshore fish resources.	• Limited capacity of management authority to monitor and actively manage fisheries and enforce regulations. • Limited baseline data on fishing and no long-term national fisheries policy that addresses sustainable use of these resource.	• Revise policies and fisheries regulations associated with maximum sustainable yields, gear types etc, and establish fisheries no-take zones (as part of SIRMZP), to help protect stocks and ensure sustainable use.
	• Excessive removal of beach sand and no control over mining methods or quantities removed.	• Weak or inadequate policies and legislation to control sand mining (e.g. Beach Protection Act)	• Revise policies associated with sand mining, beach sand and inland deposits include requirements for EIA etc. • Inputs to an Economic Development Plan that include strategies to stop the need for sand mining through providing alternatives (e.g. stone crushing)
	• Sedimentation and siltation due to dredging.	• (see above)	• (see above)
	• Contamination of coastal and nearshore waters from land based sources.	• (see above)	• (see above)

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
Increased economic vulnerability	• Short term economic growth has taken precedent and acted as the key driver regardless of potential impacts on the environment and island ecosystem function. • Failure to recognise the need for a long term vision that encourages the diversification of the economic base and provides alternative livelihoods options, and self sufficiency in natural resources in relation to ecosystem maintenance (including resource sustainability) human welfare and economic independence.	• The need for economic development, and limited understanding of possible alternatives. • Policy level and decision-makers unaware of the need to balance livelihood protection and economic development with ecosystem maintenance and biodiversity conservation. • Positive attitudes to continued tourism development as considered to be the main economic driver. • Negative attitudes towards agro-pastoralists / fishermen, due to historical associations with slavery colonial era, not considered to be a desirable or profitable livelihood. • Negative attitudes towards environmental conservation in that it is often poorly understood and seen as a constraint to economic development / livelihoods. • Possible resistance to reforms within a sector by those responsible for the management and administration of that sector. • Limited availability of appropriate financial instruments to cover the initial capital and transaction costs associated with integration of ecosystem management and to minimize actual or perceived economic risks that relate, particularly, to innovative approaches and technologies.	• Cost-Benefit Analysis of Ecosystem Functions and Biodiversity. • Review existing resource use patterns and livelihoods and identify 'more sustainable' alternative livelihood options that promote self sufficiency and diversification of economic base, within areas with potential for economic development in the context of sustainable island resource management. • Prepare an advisory brief with recommended strategies for self-sufficiency and sustainable alternatives. • Develop 5 year strategy for effective implementation of SIRM that incorporate diversification of the economic base and support for alternative livelihood options. • Identify financial instruments and other sustainability mechanisms to support SIRM (e.g. fees, tourist taxes etc) and design a sustainable financing strategy to support SIRM.
	• Failure to recognise the need to	• Ineffective communication between	• Cost-Benefit Analysis of Ecosystem

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
	conserve landscape values for tourism and local quality of life.	public and private sector on separate needs and concerns is a key barrier to coordination and understanding.	Functions and Biodiversity (taking into account landscape value and renewable-resource concept).
	• Development and construction activities permitted on the islands with very few restrictions at the expense of the environment and other livelihoods. EIAs / SIAs are rarely requested / implemented / enforced.	• EIA regulations have only recently become legal requirement and agencies lack the capacity to implement / review EIA and ensure mitigatory measures are enforced.	• Development of guidelines to accompany zoning plan that provides clearly outlines activities and EIA requirements etc. in different zones. • Improve awareness within the public and private domain of procedures involved in EIA and SIA and possible involvement of public in process. • Provide training programmes in EIA and SIA procedures.
	• Loss of fertile agricultural lands / grazing lands / to tourism / housing development.	o Planning legislation and policy does not account for the need to reserve land suitable for agriculture and pasture. o Need for proper valuation as part of the zoning and planning process is a management issues.	• Revise policies associated with land use and protection of fertile agricultural land and grazing pastures. • Clearly demarcate fertile agricultural and grazing lands (as part of SIRMZP) to balance interests of biodiversity conservation with construction and development against maintenance of productive landscape.
	• Limited local market for agricultural produce, due to competition with imported produce.	o Policies do not support local producers (e.g. land tenure arrangements, water for irrigation, taxation on imported goods) in recognition of the need to encourage self-sufficiency, or to encourage competitiveness. o Farming not considered to be a profitable sector, twinned with historical association of farming with colonial era and slavery, hence not considered to be a desirable livelihood.	• Revise water management strategies (see above) to ensure farmers receive reliable source of water for irrigation. • Review financial mechanisms to ensure that incentives are in place to support local producer and generate demand for local produce. • Inputs to an Economic Development Plan that include strategies for joint ventures and public-private partnerships, incentives for alternative agricultural practices, identifies and encourages technology that increases

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
			range and productivity (e.g. hydroponics) and exploits high earning niche markets (e.g. organic farming, high-level ecotourism). • Increase awareness of the importance of supporting local agriculture in terms of promoting island self-sufficiency.
	• Regulations and policies frequently developed without equitable participation from all stakeholders	• Coordination and understanding limited by poor communication between agencies responsible for economic development and the environment and between public and private sector on separate needs and concerns limits.	• Development of improved land management and development policies and legislation which balances all interests equitably using a zoning approach based on realistic land value as per Cost-Benefit Analysis. • Implement mechanisms to involve stakeholders in the decision making process (such as EIA, SIA etc.) • Review of EIA and other development and construction related legislation and policies using a participatory approach
	• National ratification of various regional Conventions and Treaties require legally-binding improvements to biodiversity conservation and general protection of the environment.	• Lack of awareness of Convention requirements beyond immediately responsible sectors is a key barrier to intersectoral coordination and understanding.	• Improve inter-sectoral management of resources and communication between different sectors, affected by the Conventions, including public and private sectors, through strengthening existing National Coordination Mechanism.
Global climate change (i.e. Global warming, sea level rise and the potential intrusion of salt water into the freshwater lens, increased frequency and severity of hurricanes and tropical storms, ddroughts and desiccation).	Anthropogenic climate forcing and sea level rise.	Inadequate differentiation between environmental and anthropogenic impact on the environment within framework of national and regional management initiatives	• Establish a long term monitoring for island ecosystem status and function including monitoring of environmental variability and extreme events forecasting.

Threats to Sustainable Island Resource Management	Root Causes	Key Barriers	Solutions
		Partial understanding of the potential impact of climatic disturbances and global climate change on Antigua & Barbuda. Incomplete information about environmental variability. Data gaps exist in understanding hydrography, oceanography, meteorology, primary production, food webs, and geophysical characteristics.	Raise awareness and publicize link between climate change related threats to marine environment and anthropogenic threats

ANNEX 6: TECHNICAL AND FINANCIAL DETAILS RELATED TO THE ADOPTION OF AN ENVIRONMENTAL INFORMATION AND MANAGEMENT ADVISORY SYSTEM

The Threats and Root Causes analysis of the Project Document identified the fragmented and uncoordinated information gathering, analysis and reporting process as being a key concern relation to developing and implementing an effective SIRM strategy. Information capture, processing and management is critical to the overall decision-making and policy definition process, as well as for developing effective compliance, surveillance and enforcement measures. Current monitoring and data capture across various thematic areas is in itself inadequate even for the more specific and limited needs of individual sectors. This becomes even more disjointed and fragmented when attempting to address the needs of cross-sectoral, multi-dimensional SIRM and island ecosystem modelling.

In order to secure the benefits of sustainable island resources and the maintenance and integrity of ecosystem services there is an urgent need to understand the current status and functionality of the island ecosystem as a single entity. Fundamental to this is the requirement to develop an EIMAS which will improve collection, integration and accessibility of data and be reactive to the specific needs of managers and decision-makers who depend on intact and healthy ecosystem functions and services to maintain the islands economic and social well-being.

The following text provides a more detailed description and understanding of the costs involved in setting up and maintaining an effective EIMAS and its various peripheral requirements and deliverables.

Output 1.1: Environmental Information Management and Advisory System (EIMAS) and mechanism for data for use in planning and decision-making established

An initial review and compilation of existing information will start the process of developing the EIMAS. All relevant institutions (approximately 10 government departments and various NGOs and private sector stakeholders) will provide this initial set of data. Date will include:

- Biological
- Physical/geophysical
- Meteorological
- Socioeconomic
- Land-use (demographics and administrative boundaries)

This constitutes a large baseline of information collection and maintenance even without EIMAS. The EIMAS facility involves a substantial amount of in-kind co-funding effort on the part of the government agencies to process and deliver this information. It will also need to be updated as an on-going exercise during the Project

Physically, setting up the EIMAS facility will require considerable costs. There is a substantial baseline of commitment within the Government and other regulatory/management agencies but this is focused on specific sectoral needs and if very fragmented within the context of SIRM and ecosystem management. GEF will cover the hardware and software costs and some of the expert/specialist costs, and costs associated with harmonising disparate datasets, establishing standard formats and databases to ensure interoperability between government departments and the utility of the system in the long term. Co-financing for Government will be required to provide office facilities including furnishings, staff (Admin and scientific), utilities (electricity, water, vehicle, fuel, etc). Operating and maintaining an effective GIS system is an expensive undertaking. GIS software licences for a single computer can run to $2,000 per annum and to be effective there would need to be several computers able to operate this software for storage and access. Standard training programmes for advanced GIS system operation can be in the order of $10,000.

Reporting costs also need to be covered as the information needs to be circulated and targeted at relevant government departments and especially policy level decision-makers. This also represents a substantial baseline and co-funding cost.

Output 1.1 Budgeting Allocation: GEF - $52,270 Co-Funds - $477,000

Output 1.2: Island ecosystem resources, function and usage patterns assessed and mapped

This Output will address the gaps and needs not identified in 1 as well as the requirement to upgrade and integrate data for SIRM. Specific baseline surveys will be required that are currently not included (or are inadequate) as part of the baseline. These will include:

- Terrestrial and marine habitat surveys
- Terrestrial and marine resource uses
- Invasive and introduced species
- Soil types
- Topography
- Hydrology
- Watershed functions
- Surface and groundwater resources
- Coastal erosion and shoreline stability
- Diving and tourist sites

All of these will require RS and GIS related resource mapping techniques. Again, a substantial baseline of information may exist but not in the required format and many gaps will need to be filled. The co-funding will capture much of the missing information. GEF will pay for much of the incremental cost of using remote sensing and applying advance GIS techniques, including having expert trainers not only for the EIMAS centre but to train and build capacity at each of the government agency and NGO nodes for using the GIS. GEF will also cover costs of survey equipment (diving equipment, cameras, etc)

Output 1.2 Budgeting Allocation: GEF - $84,790, Co-Funds - $70,000

Output 1.3: Modelling of island ecosystem resources and identification of key resources required for sustaining island ecosystem integrity and functionality

The purpose of the island ecosystem modelling is to produce a decision support system that integrates the remote sensing of island ecosystems resources, with the monitoring and assessment of results to produce useful end products to aid management decision makers.

It is well recognized that management authorities need scientifically valid geospatial information in order to make decisions on how to conserve and sustainably exploit resources. Recent advances in remote sensing and GIS mean that most types of the environmental data (i.e. ecological, geological, hydrographical, meteorological and oceanographic) can be stored in GIS and presented as maps for management purposes. However the information needs for ecosystem level approaches to management differ from those of traditional population level or organism-level management approaches.

While relatively simple maps showing the spatial distribution and abundance of specific variables at a fixed point in time are of value for managers, further ecosystem level information can be gained through integrating multidisciplinary datasets using advanced geographical and geo-statistical modelling techniques. Advances in is modelling techniques allow the user to quantify uncertainty and develop tools that assist managers to interactively and objectively undertake "what if" scenarios to test alternative use policies, and apply this knowledge to optimize zoning and resource exploitation decisions[36].

The **objective** of the island ecosystem modelling is to integrate remote sensing with *in situ* monitoring data to map the interactions between island ecosystem resources, uses and environmental conditions to

[36] Possingham, H.P., I.R. Ball, and S. Andelman. 2000. Mathematical methods for identifying representative reserve networks. In: Quantitative methods for conservation biology, eds. S. Ferson and M. Burgman. New York: Springer-Verlag.

assist in the sustainable management of the island ecosystem. Baseline datasets collected in Outputs 1.1 and 1.2 will be used as inputs and integrated using geographical modelling techniques to generate thematic outputs (for example):

- Environmental sensitivity maps of the island ecosystem[37], and
- Risk maps indicating current functional (in the ecosystem sense) status of key habitats and major sources of anthropogenic-stress.

More advanced techniques will be used to model (for example):

- Water resource availability and usage maps using of rainfall, ground water, aquifer distribution, topography etc. and hydrological modelling techniques;
- Soil stability, exposure and erodibility using topography, soil quality and environmental and climatic variability data and watershed modelling techniques;
- Protected Areas systems for the preservation of key resources (e.g. corals and seagrass) using spatial optimisation techniques;
- Priority areas for restoration/re-vegetation/maintenance (e.g. stream-ways and forest cover) using techniques to model vegetation cover under different intervention scenarios;
- Risk maps for natural hazards and disasters, include hurricanes and tropical storms; and,
- Spatial cover and population modelling of the spread of invasive species, based upon current distribution and intervention methods.

Advanced data integration techniques, geographical and geostatistical modelling requires specialist expertise and tends to be an expensive exercise even at an island level. GEF will cover the incremental cost of procurement of modelling software and the cost of technical expertise and human resources for developing the various outputs. The co-financing will assist toward the spatial design of an on-going monitoring programme and to compile and consolidate all the modelling outputs into zoning plans and recommendations. There will be a substantial cost associated with integrating information and cross-sectoral designs.

Output 1.3 Budgeting Allocation: GEF: $80,960, Co-Funds: $110,000

Output 1.4: Environmental variability and extreme events forecasting

This particular component has a sizeable baseline and co-funding line as it will need effective forecasting and prediction and this requires satellite imagery plus sophisticated real-time data recording. Some baseline work is being done through the Office of Disaster Preparedness but more data is needed that relates to environmental variability and to ecosystem function behaviour and threat during extreme event. GEF will cover the cost of analysis and linking the baseline and co-funding efforts into forecasting for disaster mitigation and climate changes issues

Output 1.4 Budgeting Allocation: GEF: $40,800, Co-Funds: $130,000

Output 1.5: Long term monitoring programme for island ecosystem status and function established

Long-term detailed monitoring programmes will need to be established. Some monitoring programmes exist within the baseline already but need to be upgraded based on the types of information identified above. Co-funding will cover a lot of the cost of this over the 4 year period including boats and vehicles. GEF will cover capital equipment costs and training as well as expert design of the long-term monitoring programmes including the conversion of the raw data into deliverable packages and recommendations that can be used as the decision-making level. These long-term monitoring programmes will need to address:

- Biological Resources

[37] Environmental sensitivity mapping is a method of integrating and summarising the environmental and / or cultural assets at a given location. The assets may be weighted depending on their importance or significance. The environmental sensitivity map can then be based on the total score, rather than the total number of assets

- Groundwater and coastal water quality
- Water resource distribution (aquifers, lenses, storage capacities)
- Land degradation trends (Soil erosion, overgrazing, sedimentation
- Physical variables (meteorology, sweater temperatures, tides, sea level)
- Socio-economic parameters

The responsibility for undertaking the monitoring programmes will be shared across various government agencies and EIMAS office will serve a coordination function. Co-funding costs will address inputs from various agencies including manpower, transport, processing, etc over 4 years. GEF will address setting up the sustainability of the process (identifying financial/revenue mechanisms), some capital equipment costs, training and inclusion of communities into monitoring process, production and delivery of reports.

Output 1.5 Budgeting Allocation: GEF: $42,800, Co-Funding: $70,000

Output 1.6: Targeted Awareness and Sensitisation

Awareness and sensitisation is crucial to the entire information management process. This is not only awareness at the street level, in schools and in communities but will also target technical managers and policy-makers in the private sector and the public sector. Such a 'sensitisation' process is essential for the development and adoption of an SIRM strategy and for the long-term sustainability of its support structure (including the overall information capture and processing component). Co-funding is fairly minimal and a lot of it addresses the engagement costs for the various sectors in being made aware. GEF will provide the bulk of the funding for this as much of the cost will be in stakeholder meetings and identifying target groups as well as sub-contracting awareness specialist groups (e.g. NGOs) to undertake what amounts to a widespread awareness and sensitisation campaign over 4 years.

Output 1.6 Budgeting Allocation: GEF: $98,400, Co-Funds: $12,000

SIGNATURE PAGE

[Note: leave blank until preparing for submission for CEO endorsement]

Country: _____

UNDAF Outcome(s)/Indicator(s):

_____

(Link to UNDAF outcome., If no UNDAF, leave blank)

Expected Outcome(s)/Indicator (s):

_____

(CP outcomes linked t the SRF/MYFF goal and service line)

_____

Expected Output(s)/Indicator(s):

_____

(CP outcomes linked t the SRF/MYFF goal and service line)

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Implementing partner: _____
(designated institution/Executing agency)

Other Partners: _____

_____

Programme Period:_____ Programme Component:_____ Project Title:_____ Project ID: _____ Project Duration: _____ Management Arrangement: _____	Total budget: _____ Allocated resources: _____ • Government _____ • Regular _____ • Other: o Donor _____ o Donor _____ o Donor _____ • In kind contributions _____

Agreed by (Government): _____
Agreed by (Implementing partner/Executing agency):_____
Agreed by (UNDP):_____