



CRFM Secretariat



**Status of Coastal Zone and Fisheries /
Aquatic Resources Management
and the Incorporation of Demographic
and Socio-Economic
Considerations / Indicators**

Trinidad and Tobago Case Study

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STATUS OF COASTAL ZONE AND FISHERIES RESOURCES
MANAGEMENT AND THE INCORPORATION OF
DEMOGRAPHIC AND SOCIO-ECONOMIC
CONSIDERATIONS/INDICATORS:

TRINIDAD AND TOBAGO

Prepared for the CARICOM Regional Fisheries Mechanism (CRFM):

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1. GENERAL COUNTRY INFORMATION

1.1 Population

Trinidad and Tobago is an archipelagic state comprising the two southernmost islands of the Lesser Antilles and located on the north-east coast of Venezuela between 10 ° 02' - 10 ° 50' N latitude and 60° 55' - 61° 56' W longitude. Trinidad is separated from Venezuela at its nearest points on the northwestern and southwestern peninsulas by an approximately 13 km strait of the Gulf of Paria which is an enclosed basin bounded on the east by Trinidad and on the west by Venezuela. A distance of 32 km separates the two islands of Trinidad and Tobago. Total land area is 5,128 sq km of which Trinidad covers 4,828 sq km. Total coastline for Trinidad and Tobago is 362 km. Maritime boundaries in keeping with UNCLOS II (1982) are a 200 nm exclusive economic zone (EEZ), 200 nm continental shelf or to the outer edge of the continental margin, 24 nm contiguous zone and a 12 nm territorial sea. Maritime boundaries with Grenada and Barbados are still being negotiated.

The estimated population in mid-1999 was 1,275,705 (Central Statistical Office (CSO), 2000). The sex ratio is roughly equal with the overall population ratio of males to females being 1:1.1. It is estimated that 70% of the population is between 15 and 65 years old and comprises 403,202 males and 370,498 females while 8.1% of the population is 65 years and over and comprises 39,762 males and 48,765 females. The overall median age for males and females is 30.4.

The population growth rate is -0.7% with the birth and death rate estimated at 12.8 births and 9 deaths per thousand persons. The net migration rate is -10.8 migrants per thousand persons. Total fertility rate is estimated at 1.8 children born per woman with the overall infant mortality rate estimated at 24.6 deaths per thousand live births.

The main ethnic groups are the East Indians, a local term referring to immigrants from India (40.3%) and persons of African descent, blacks (39.5%). Other groups are mixed (18.4%), white (0.6%), Chinese and other (1.2%).

Adult literacy, defined as the ability to read and write at age 15 and over, is estimated at 93.8%, with a youth literacy rate of 97.5% (CSO, 2004). Literacy rates for males and females were 99.1% and 98% respectively.

The labour force, by occupation, is service oriented with 64.1% of the population employed in services, 14% in manufacturing, mining and quarrying, 12.4% in construction and utilities and 9.5% in agriculture (1997 estimate). Average monthly income in 1999 for men and women working in the agricultural, forestry and fisheries sectors was approximately TT\$1,137 and TT\$577 respectively. The unemployment rate is 10.9% (2003 estimate). It was estimated that 21% of the population lived below the poverty line in 1992.

In the 2000 Human Development Index (HDI) based on life expectancy, school enrollment, literacy and income, Trinidad and Tobago was ranked as the 50th most developed country among 173 countries. This ranking placed the country in the group of countries with a high level of development that includes Singapore, Norway and Barbados (Ministry of Finance, 2002).

The Gulf of Paria coastal zone, on the west coast of Trinidad, is the site of all the major human settlements and it is estimated that 90% of the population lives in this area. The population is concentrated in and around Port of Spain and San Fernando in the northwest and southwest respectively. The cluster of ethnic groups by geographic location is notable with people of East Indian descent predominantly in rural and more agriculture-oriented areas. In Tobago, the population is concentrated in the southwest of the island.

Using data obtained in a 1992 CSO Survey of Living Conditions, the Ministry of Social and Community Development in 1999 described the poverty situation on the basis of local government administrations. According to the report, the poorest households were found in the rural areas where 20% of the rural population was determined to be poor as compared to 15.6%

of the urban populace (Ministry of Agriculture, Land and Marine Resources, 1999). The country was not divided into rural and urban areas, however, based on electoral/geographical boundaries, the major concentrations of rural poverty appears to be in seven of the nine regional government areas namely Rio Claro / Mayaro, Sangre Grande, Princes Town, Siparia, Penal / Debe, Tunapuna / Piarco, Couva / Tabaquite / Talparo. Large households, those with unemployed elderly persons and households headed by females were among those affected by poverty. Poverty was only significant for the dominant ethnic groups. It should be noted that the two regional government areas, Diego Martin and San Juan / Lavantille, which were not characterized by rural poverty, are located in close proximity to Port of Spain.

1.2 Economy

1.2.1 General Economy

The economy is heavily dependent on the production and export of petroleum and gas. The average contribution of the petroleum sector to Gross National Product (GDP) was 25% over the period 1991 - 1998 and 27% for the period 2000 - 2002. Within recent times, there has been a shift in emphasis away from crude oil production in order to take advantage of abundant natural gas reserves which are used in the domestic production of methanol and ammonia for export. The energy sector has also been boosting development in some sub-sectors, namely distribution, transportation and construction and heavy industries such as iron and steel have developed (Ministry of Finance 2002).

Per capita GDP is US\$7,345 and GDP (real growth rate) is 4.5% (2002 estimate). GDP composition by sector is: agriculture, 1.6%; industry, 43.2% and services, 55.2%. Total exports for 2002 were valued at approximately US\$3.0 billion and of this the main export commodities were petroleum and petroleum products such as fuels and lubricants at a value of US\$1.8 billion; chemicals and related products such as ammonium fertilizers valued at US\$500 million, manufactured goods (excluding oil refining and petrochemical industries) valued at US\$362 million and food and live animals valued at US\$115 million (Annual Economic Survey, Central Bank). Total imports and exports for 2002 were estimated at US\$3.7 billion and US\$3.9 billion respectively and a trade balance of US\$191 million (Review of the Economy, CSO).

Approximately 42% of exports are destined to the USA and 19% to CARICOM states. Tourism, primarily for Tobago, accounts for 2.5 % of GDP.

Agriculture is described as a sector with the potential to generate sustainable increases in output, income and employment. The main cash crops are sugar, coffee, cocoa and citrus. The contribution of agriculture to GDP over the period 1985 - 2002 ranged from 5% in 1985 to 1.6% in 1999 with a steady decline in the last 3 years to 1.2% in 2002. The contribution of fisheries to agricultural GDP averages 10% and the fisheries sector contributes 0.2% to national GDP.

1.2.2 Fisheries Sector

Marine Fisheries

The marine fisheries of Trinidad and Tobago are characterized by a high diversity of species harvested by many gear types and fishing fleets, including commercial and recreational components. Due to its location on the Brazil-Guianas Continental shelf the marine resources off Trinidad are diverse, including soft substrate and hard substrate demersal species in addition to small coastal pelagics and large migratory pelagic species. Off Tobago, the prevailing oceanic conditions are favourable to small coastal pelagics and highly migratory pelagic species, and to a lesser extent, reef species. A number of the fish stocks are migratory and common with northern South American countries as well as the Caribbean islands chain.

The fishing industry has traditionally been an artisanal one, based on resources occurring in the coastal and territorial waters. However, there was a trend, in the 1980's in Trinidad and in the early to mid-1990s in Tobago, toward the development of larger, more industrial vessels targeting traditional fisheries in areas inaccessible to the artisanal fleet.

It is estimated that there are about 1570 fishing vessels in the national fleet of Trinidad and Tobago of which 1491 are artisanal vessels operating in inshore coastal waters, 35 are semi-industrial multi-gear vessels operating in inshore and offshore areas and 25 are industrial vessels operating off the west and south coasts of Trinidad (Kuruvilla *et al*, 2002).

Artisanal vessels, or pirogues, are 7 - 10 metres in length, made of wood or fibreglass, and powered by outboard or inboard engines (Henry and Martin 1992). The artisanal multigear fleet comprise vessels which fish daily in coastal areas, targeting pelagic or demersal species and are equipped with gillnets, lines or fish pots. Gillnet and pelagic lines are used to target the mackerels (*Scomberomorus brasiliensis*, *S. cavalla*) and sharks (*Sphyrna tudes*, *Rhizoprionodon lalandii*, *Carcharhinus porosus*, *C. limbatus*) and non-target species include a diversity of small coastal pelagics (*Selene vomer*, *S. spixii*, *Oligoplites saurus*, *Caranx hippos*, *C. crysos*) and demersal species (groundfish) which include croaker (*Micropogonias furnieri*), weakfish (*Cynoscion* spp, *Macrodon* sp.), snook (*Diapterus* spp), snappers (*Lutjanus* spp), grunts (*Haemulon* spp, *Genyatremus luteus*, *Orthopristis* spp), and catfish (*Arius* spp, *Bagre* spp). Demersal lines are used to target snappers (*Lutjanus* spp) and sharks while fishpots target snappers and groupers (mainly *Epinehelus* spp).

In Tobago, pirogues are of similar design to those in Trinidad, but range between 6.7 to 12.1 m in length with engines of 15 to 100 Hp (Potts *et al*, 2002). The fleet which specifically targets the four-winged flyingfish (*Hirundichtys affinis*) and associated pelagic species such as dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*) comprised between 100 and 126 pirogues in the late 1990's.

The semi-industrial multigear vessels operate within the territorial waters and the exclusive economic zone (EEZ). The vessels are 10 – 14 metres in length and are equipped with fish pots to target snappers (*Lutjanus purpureus*, *Rhomboplites aurorubens*) and groupers; live bait equipment for king mackerel and dolphinfish; surface longlines to target swordfish (*Xiphias gladius*), tunas (*Thunnus albacares*, *T. obesus*) with marlins (*Makaira nigricans*, *Tetrapturus albidus*), wahoo, dolphinfish and sharks caught as bycatch; and gillnets and lines for flyingfish and associated pelagics. In Tobago the semi-industrial multi-gear (iceboat) fleet operates mainly off the western and northwestern coasts of Tobago. Iceboats range between 6 to 12 m in length, with inboard diesel engines of between 75 to 335 Hp. They target mainly the four-winged flyingfish and associated pelagic species with monofilament gillnets and pelagic lines (Samlalsingh and Pandohee, 1992; Potts *et al*, 2002, Martin *et al*, 2004).

There are also 114 vessels in a demersal trawl fleet targeting shrimp (*Farfantepenaeus subtilis*, *F. notialis*, *F. brasiliensis*, *Litopenaeus schmitti*, *Xiphopenaeus kroyeri*). Groundfish of commercial importance commonly caught in trawl gear are species of croaker, weakfish (locally known as salmon), snook, snappers, grunts and catfish as caught in the gillnet and line fisheries. The fleet comprises artisanal, semi-industrial and industrial trawlers. Trawlers operate on the west (Gulf of Paria) and south (Columbus Channel) coasts of Trinidad and for 3 months in a designated area on the north coast of Trinidad. Trawl fleets of Trinidad and Tobago and Venezuela target the same stocks of shrimp and groundfish in the Gulf of Paria and Columbus Channel (Ferreira *et al*, 2004).

Artisanal fishing vessels land at about 65 sites around Trinidad and 32 sites in Tobago. Semi-industrial and industrial vessels generally operate out of a few major sites on the west coast of Trinidad. Most vessels are individually owned although a few individuals may own several vessels. There are no company-owned fleets in Trinidad and Tobago and processing plants and export companies usually purchase from individually owned vessels through a system of wholesale buyers.

The marine fishing sector employs an estimated 5,978 persons of which 3,908 are fishers, 1,225 are involved in the processing industry, 1,245 are involved in fish marketing and distribution and 80 are involved in vessel and gear construction and maintenance (Kuruvilla *et al*, 2002). The participation of women in the industry is not well documented however women are more likely to be involved in processing and marketing activities.

Total annual landings for the fisheries of Trinidad and Tobago for the period 1999 / 2000 are estimated at 14,000 metric tonnes with an ex-vessel value of US\$21 million. Estimates of sales at the retail level and the lack of data on the landings of the semi-industrial fleet suggest that total landings may be underestimated by as much as 25% (Kuruvilla *et al*, 2002).

There is a transshipment port in Trinidad owned by Taiwanese interests that services two Taiwanese longline fleets operating in the south Atlantic. These vessels transship tuna through Trinidad to international markets.

International trade in fish and fishery products is based mainly on the export of shrimp, snappers, swordfish, tuna, flyingfish and other pelagics. Fishery products are exported mainly chilled or frozen and limited to primary processing and packaging. Approximately 4,000 metric tonnes of fish valued at US\$10 million (TT\$62 million) was exported in 2000 of which over 40% in terms of revenue went to CARICOM markets, 30% to the United States and 22% to Canada (CSO, 2000). Trinidad and Tobago has not been eligible to export to the European Union since 1999 and is at present taking measures to meet the required quality control criteria.

Aquaculture

Aquaculture in Trinidad and Tobago has traditionally operated at the subsistence level and commercial food fish production has been marked by numerous unsuccessful ventures. Aquaculture has not been developed to its full potential and the development of a national policy on aquaculture has been identified as an important initiative to be pursued by the government. In 1999, 57 aquaculture operations were identified of which 43 were subsistence or small-scale farmers of cascadura (*Hoplosternum littorale*). Tilapia production was not practiced on a wide scale even though some farmers have attempted polyculture with the species (Kuruvillea et al, 2002).

The ornamental fish industry has a longer history than food fish production and there are an estimated 20 producers who rear several exotic and indigenous species and 8 exporters. A significant quantity of the ornamental trade is local however there is a great demand for indigenous freshwater fish and exotics on the export market, mainly the CARICOM countries and the USA. Exports of ornamentals are the only economically important component of the aquaculture sector. Ornamental fish exports for 1999/2000 had an estimated value of US\$610,000. 72% of the ornamental fish exported for this period were local species with exotic species contributing to the remainder of exports. Employment generated by the ornamental fish trade is estimated at 64 persons (Kuruvillea *et al*, 2002).

1.2.3 Fisheries subsidies

A 2002 study of the impacts of subsidies on the fisheries sector showed that government support to the fisheries sector was largely through the provision of government services at no cost to the fisheries sector which was probably feasible because of the relatively small size of the sector in relation to the earnings from the energy sector (Kuruvilla *et al*, 2002). The study showed that government support is still focused on encouraging an increase in primary production (total landings) rather than on improvements of post-harvest handling, processing, quality assurance and marketing or on the development of alternative under-utilised or less preferred species. This is reflected in the support given by the state to employment at the level of the primary producers, the majority of whom are viewed as subsistence / artisanal operators in the aquaculture and capture fisheries sub-sectors. This is consistent with the government's view of the fisheries sector as a supporter of the more disadvantaged rural economy.

1.3 Political, Legal and Administrative Structure

The two islands became one state in 1888 and gained independence from Britain in 1962, also becoming a member of the Commonwealth, a voluntary association of primarily former British colonies, at this time. In 1976 the twin-island State became a Republic and the Constitution of the Republic of Trinidad and Tobago Act provides for the President as Head of State. Executive power lies with the Prime Minister and the Cabinet. The Legislature is a bicameral Parliamentary system consisting of an elected House of Representatives and an appointed Senate. Tobago has a unicameral system with considerable autonomy under the Tobago House of Assembly which is responsible for most of the island's domestic affairs.

Laws and ordinances of the country are made by Parliament and administered by a Supreme Court of Justice comprising the High Court of Justice, the Court of Appeal and Magistrates Courts. At present, the highest court of appeal is the Privy Council in London however the Caribbean Community (CARICOM) is working towards the establishment of the Caribbean Court of Justice (CCJ), the Caribbean's first indigenous court, to replace the Judicial Committee

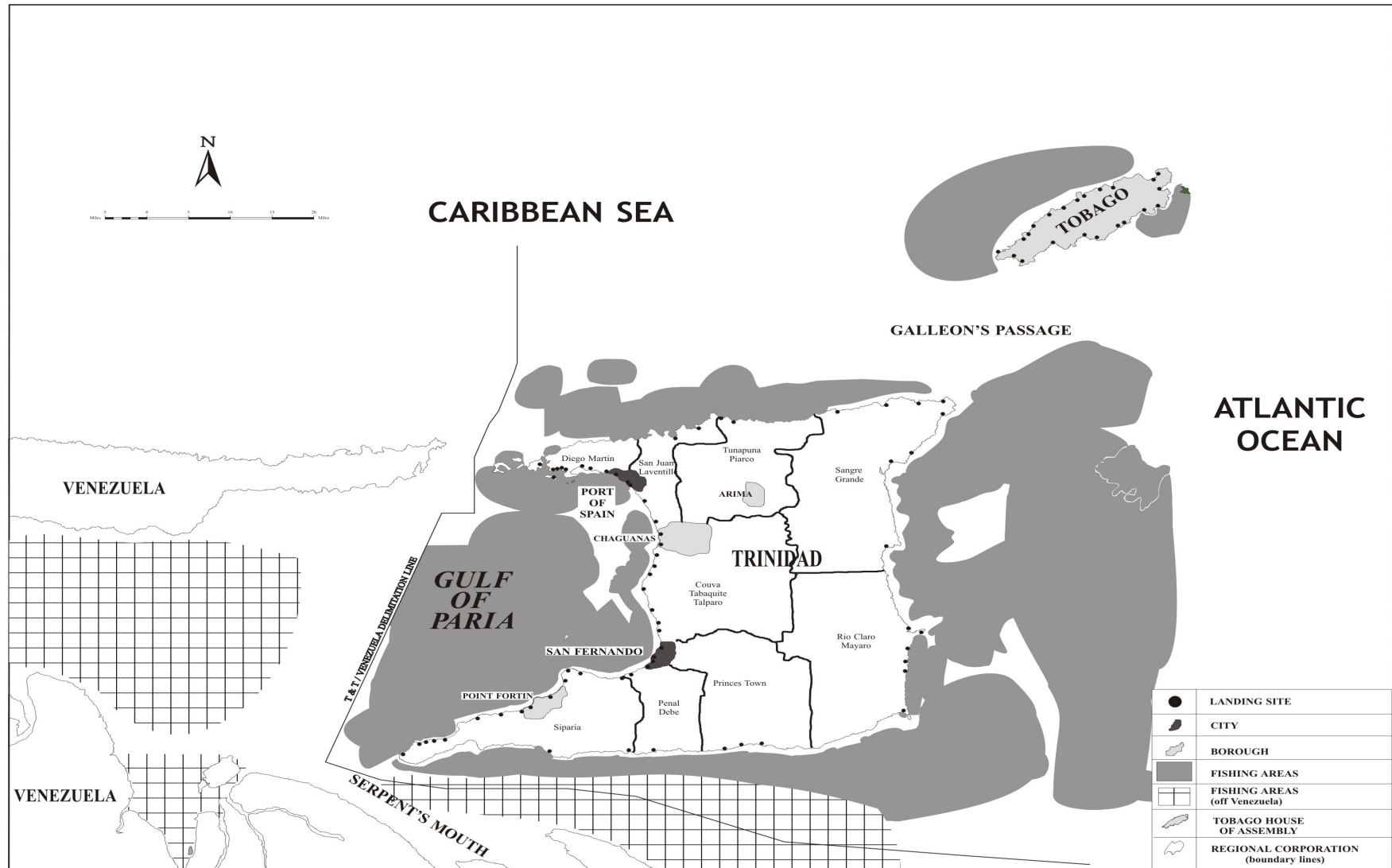
of the Privy Council. The Agreement establishing the CCJ entered into force in 2002 and the court will function both as an international court and an appeal court.

There are no Administrative courts in Trinidad and Tobago but there are provisions for an Ombudsman under the Constitution. The local government system consists of 14 corporations made up of two cities, three boroughs and nine regional corporations.

Figure 1 shows the location of Trinidad of Tobago in relation to Venezuela, local administrative areas and boundaries, main fishing areas and fish landing sites.

Figure 1. Map of Trinidad and Tobago showing administrative boundaries, fishing areas and landing sites.

(Source data: Fisheries Division, Land Administration Division, Ministry of Agriculture, Land and Marine Resources)



1.3.1 National Planning: Economic and Regional Planning

National Planning in Trinidad and Tobago was initially that of planning for socio-economic development. There have been a series of Five Year Development Plans that focused on economic growth, GDP, employment, incomes, balance of payments and other measures designed to increase output and improve welfare on a sectoral basis. The Third Five Year Development Plan (1969 - 1973) introduced the concept of 'Regional Planning' into the national planning and development process. It was thought that physical and economic planning should be integrated on a regional basis where the government's social and economic plans would be assessed based on their spatial implications. Regional planning was expected to facilitate the co-ordination of capital budgeting for projects and the integration of private development into the process, therefore resulting in a reduction of regional imbalance and disparities (Town and Country Planning Division, 1974). The Development Plan identified regions within the west coastal areas, namely Port of Spain, San Fernando and the central area, as suitable for regional planning.

1.3.2 Legislation of Development Planning and Control

The Town and Country Planning Division of the Ministry of Finance and Planning is responsible by law for development planning, development control and coastal zone management in Trinidad and Tobago.

The Town and Country Planning Act, Chapter 35:01 (formerly the Town and Country Planning Ordinance, No. 29 of 1960) empowers the Minister to '...frame and execute a comprehensive policy with respect to the use and development of all land in Trinidad and Tobago in accordance with a development plan....' The Act makes provisions for the orderly and progressive development of land in both urban and rural areas, to preserve and improve related amenities; for the granting of permission to develop land and for other powers of control over the use of land.

The Act concentrates on the control of land development and does not specifically address marine areas. However, it acknowledges the need for the control of activities that will impact on

the marine environment and mention is made of the “allocation of land for the protection of marine life” and “prohibiting, regulating and controlling the deposit or disposal of waste materials and refuse, the disposal of sewage and the pollution of rivers, lakes, ponds, gullies and the seashore.”

The Town and Country Planning Division interprets the Act as making the Division responsible for any development activity which may take place within the whole of Trinidad and Tobago, including the territorial seas, although the Act does not address actual sea use as opposed to land use. This is the only aspect of coastal zone management not addressed by the Act.

1.3.3 The National Physical Development Plan

The National Physical Development Plan formulated by the Town and Country Planning Division was approved by Parliament in 1984. The Plan provides the framework for the preparation of regional and local land use plans, and for the integration of spatial planning with socio-economic sectoral policy making (Town and Country Planning Division, 1989).

The Plan examines the problems of inter-regional allocation of resources and of the national settlement patterns. It also attempts to assess the needs and demands of individual regions and to correlate them with national priorities and capabilities.

The Plan identifies environmental problems such as pollution associated with the disposal of solid, liquid and gaseous wastes; defacement of landscapes by quarrying and unplanned settlement patterns; land use conflicts; lack of adequate legislation of environmental management; and lack of proper environmental standards. The Plan suggests that an environmental policy is needed which must be complimented by a strategy for environmental planning and conservation.

1.3.4 Coastal Zone Management in Trinidad and Tobago

The coastal areas of Trinidad and Tobago are a critical natural resource as they yield to the increasing demands for industrial, housing and tourism development. Trinidad's Gulf of Paria coastal zone on the west coast is most affected by these developmental pressures since this is the most populated area of Trinidad and Tobago and where most economic activity takes place. The Town and Country Planning Division, although charged with the responsibility for coastal zone management, does not include the disciplines which deal with the marine environment. In addition, adequate institutional arrangements do not exist for dealing with the complexities of coastal area management. The need was therefore seen for the establishment of a multi-disciplinary agency to deal with coastal zone management in Trinidad and Tobago.

In 1984 the Institute of Marine Affairs (IMA) was identified as a suitable multi-disciplinary agency and the Town and County Planning Division and the IMA collaborated on the integration of their efforts with regards to national development. A Coastal Area Planning and Management Division was included in the research programme of the IMA and was mandated to conduct a multi-disciplinary coastal area planning and management study to develop a Coastal Area Plan for Trinidad and Tobago using the west coastal area of Trinidad as the pilot area. The major objectives were to identify and gather information related to the planning and management of coastal resources and to undertake research leading to the development of a model coastal area planning and management scheme which will provide effective criteria, policies and management strategies (McShine-Mutunhu H., 1985).

Subsequent to the establishment of the IMA, it was apparent that a multi-disciplinary agency, while being able to address the institutional problems as well as the lack of knowledge and expertise, could not solve the existing jurisdictional problems. An example of the complexity of the jurisdictional problem is that of beach area. Existing land use management policy (Government of Trinidad and Tobago, 1993) dictates that the local government such as the County Council has responsibilities up to the high water mark while land administration, rather than land management, is undertaken from the high water mark seawards to the extent of the EEZ by the Commissioner of State Lands under the Ministry of Planning and Development. Further, if beach facilities are constructed they are the responsibility of the Tourist Board under

the Ministry of Enterprise Development, Foreign Affairs and Tourism; the construction and maintenance of coastal protection structures fall under the jurisdiction of the Ministry of Works and Transport; construction of fish landing facilities is the responsibility of the Fisheries Division of the Ministry of Agriculture Land and Marine Resources, and if the beach is fringed by mangroves or a site for turtle nesting the area is the responsibility of the Forestry Division in the Ministry of Public Utilities and the Environment. Additional jurisdictions involved may be the Ministry of Energy with regards to exploited petroleum and gas reserves.

In 1995, the Government announced its intention to foster and encourage ecologically sustainable development based on commitments made at the United Nations Conference on Environment and Development (UNCED), the Earth Summit, held in Rio de Janeiro. Arising out of this, the Environmental Management Act No. 3 of 1995 was enacted and the Environmental Management Authority (EMA) was established in the same year. The Act provides “for management of the environment within Trinidad and Tobago through the establishment and operation of the EMA, an Environmental Trust Fund and an Environmental Commission to define the powers and duties thereof, and for related matters.” The Act defines environment as “all land, area beneath the land surface, atmosphere, climate, surface water, groundwater, sea, marine and coastal areas, sea bed, wetlands and natural resources within the jurisdiction of Trinidad and Tobago.” The Act promotes an integrated approach to sustainable development and provides for environmental impact assessments, protection of natural resources, control of pollution and hazardous substances, appointment of inspectors and other enforcement personnel, and the payment of user and licence fees towards an Environmental Trust Fund.

The National Physical Development Plan of the Town and Country Planning Division remains the overall plan for the coastal zone of Trinidad and Tobago. Currently, the IMA continues to carry out aspects of the multi-disciplinary coastal area development study within this context. In fulfilling its statutory mandate to coordinate and oversee environmental management functions, the EMA entered into Memoranda of Understanding (MOUs) with other agencies which traditionally dealt with one aspect or another of environmental management. These MOUs are intended to facilitate a collaborative and coordinated approach to dealing with the country’s environmental problems.

Over time, a number of *ad hoc* and Cabinet-appointed committees, chaired by the Ministry responsible for planning and development, have been established to deliberate on general land administration issues. These committees are often provided with little financial and technical support to conduct appropriate studies. Currently, development standards and policies are in a preliminary stage and have been prepared by the West Coast Master Plan Committee (Mohammed, 2003).

2. INSTITUTIONAL AND LEGAL ARRANGEMENTS FOR THE MANAGEMENT, DEVELOPMENT AND CONSERVATION OF FISHERIES, AQUATIC AND OTHER COASTAL RESOURCES

2.1 Administrative arrangements for the management, development and regulation of fisheries and aquaculture

The Government's management objectives regarding the fisheries sector and main policy directions are outlined in the draft marine fisheries policy document (Fisheries Division and FAO, 1994) and the goals outlined in the draft strategic plan (Fisheries Division, 2002). The management objectives and main policy directions for the fisheries sector incorporate the principles of co-management and integrated management involving local fishing communities, non-fishing coastal communities, coastal zone users and international communities.

The Government's objectives for management are to:

- Implement efficient and cost-effective management;
- Ensure through proper conservation and management that fisheries resources are not endangered by overfishing;
- Ensure that the exploitation of the fisheries resources and the conduct of related activities are consistent with ecological sustainability;
- Maximise economic efficiency of commercial fisheries;
- Ensure accountability to the fishing industry and the community at large for fisheries management;
- Achieve appropriate cost-sharing arrangements between all the beneficiaries of sound fisheries management.

Institutional arrangements

A number of public and private sector agencies and committees at the national level, regional and international organisations, and foreign governments provide support for the fisheries sector and the Fisheries Division interacts with these agencies in implementing its programmes and meeting its responsibilities. The agencies which play a lead role in the administration of the fisheries sector, including resource and coastal zone management, are listed below. Details of the government agencies, Inter-Ministerial and Inter-Sectoral Committees are provided in Section 2.1- 2.3.

Government Agencies

- **MINISTRY OF AGRICULTURE, LAND AND MARINE RESOURCES (MALMR)**
Fisheries Division, Caribbean Fisheries Training and Development Institute (CFTDI), Sugarcane Feed Center (SFC), National Agricultural Marketing Development Company (NAMDEVCO), Agricultural Development Bank (ADB), Stakeholder Organisations
- **MINISTRY OF WORKS AND TRANSPORT**
Port Authority, Maritime Services Division (MSD)
- **MINISTRY OF PUBLIC UTILITIES AND THE ENVIRONMENT**
Institute of Marine Affairs (IMA), Environmental Management Authority (EMA), Environmental Commission, Forestry Division
- **MINISTRY OF HEALTH**
Chemistry, Food and Drugs Division, Public Health Division
- **MINISTRY OF TRADE AND INDUSTRY**
- **MINISTRY OF FINANCE**
Customs and Excise Division
- **MINISTRY OF NATIONAL SECURITY**
Trinidad and Tobago Coast Guard

- MINISTRY OF ENTERPRISE DEVELOPMENT, FOREIGN AFFAIRS AND TOURISM
Trade and Industry Development Company
- OFFICE OF THE PRIME MINISTER
- TOBAGO HOUSE OF ASSEMBLY (THA)
Marine Affairs Section

Inter-Ministerial/Inter-Sectoral/Stakeholder Committees

- National Monitoring Committee on Foreign Fishing and Related Matters (MCFE)
- Monitoring and Advisory Committee (MAC)

Regional Organisations

- Caribbean Community (CARICOM)
- Caribbean Regional Fisheries Mechanism (CRFM)
- University of the West Indies (UWI)

International Organisations

- United Nations (UN) Organisations, Global Environment Facility (GEF)
- Foreign Donor Governments – European Union (EU), Japan

2.1.1 Laws and regulations specific to the fisheries sector

The principal legislation governing domestic fishing in Trinidad and Tobago is the Fisheries Act of 1916 and the subsequent amendments to the Act, the Fisheries (Amendment) Act 1966, and the Fisheries (Amendment) Act 1975. The Act applies to all rivers and tidal waters in Trinidad and Tobago and to the 12-mile territorial sea, and empowers the Minister responsible for fisheries to make regulations to prescribe mesh size of nets; to restrict the size of fish, shrimp, crabs and turtles caught, and prohibit their sale or prevent the catching of these species either absolutely or by season or area. Fisheries regulations are made under Section 4 of the Act.

The Fisheries (Amendment) Regulations, 1998 defined the increase in mesh size for multifilament gillnets and the restriction on the importation and operation of monofilament gillnets. Based on the lack of support from the fishing industry, a moratorium has been placed on the implementation of these gillnet regulations pending further research. The Fisheries (Amendment) Regulations, 2002 specifies the restriction on the mesh size of monofilament and multifilament gillnets.

The Fisheries [Control of Demersal (Bottom) Trawling Activities] Regulations 1996 and the Fisheries [Control of Demersal (Bottom) Trawling Activities] (Amendment) Regulations 1998 specify restrictions on the areas of operation of the different trawler fleets according to a depth zoning regime and prescribe a minimum stretched mesh size for the cod end of the trawl nets. Also with regard to trawling, a 1988 decision of the Cabinet restricts entry of new vessels, both artisanal and industrial, to the fishery.

The Fisheries (Conservation of Marine Turtles) Regulations, 1994 requires the semi-industrial and industrial trawl fleets to use Turtle Excluder Devices (TEDs) on their nets.

The Fishing Industry (Assistance) Act, 1955, makes provisions for the granting of financial assistance to the fishing industry by such means as fuel rebates, tax waivers and subsidies on fishing equipment.

The Marine Areas (Preservation and Enhancement) Act of 1970 provides for the designation of restricted areas, and the Marine Areas (Preservation and Enhancement) Regulations 1973, require the permission of the Minister to enter and remove fauna from the restricted area. The Act is currently applied only to the management of coral reefs. A National Parks and Other Protected Areas Bill has been drafted which will have an effect on the Marine Areas (Preservation and Enhancement) Act when enacted.

The Archipelagic Waters and Exclusive Economic Zone Act of 1986 provides for the declaration of archipelagic waters and the establishment of a 200-mile exclusive economic zone (EEZ). The Act charges the Minister with responsibility for the conservation and management of living

resources. Within this context, it provides for the determination of the allowable catch in respect of each fishery in the EEZ, and the determination of the proportion to be harvested by citizens of Trinidad and Tobago. Access of foreign fishing vessels to the archipelagic waters, territorial sea or EEZ is allowed only through licences issued by the Minister who also provides the authority for surveillance and enforcement of regulations pertaining to foreign fishing.

The Fish and Fishery Products Regulations, 1998 under Section 25 of the Food and Drugs Act Chapter 30:01 authorizes the Minister with responsibility for health to grant licences for the import and export of fish which have been handled and packed under conditions conforming to health and safety standards prescribed under the Act. The Regulations specify the requirements for handling fish including establishments handling or processing fish, the requirements for vessels used for fishing or transporting fish and, for vehicles and equipment used for unloading, handling, holding and transporting fresh fish for processing. As a consequence of non-implementation of the regulations, fish and fishery products originating in Trinidad and Tobago were banned from export to the EU in 1999.

A Fisheries Management Bill prepared in 1995, to be known on finalisation as the Marine Fisheries Management Act, will repeal the Fisheries Act of 1916 and the relevant sections of the Archipelagic Waters and Exclusive Economic Zone Act of 1986. The Marine Fisheries Management Act will provide for the preparation of fishery management plans and will, in accordance with these plans, control and limit access to fish resources through the establishment of a licensing system for both local and foreign fishing vessels.

2.1.2 Ministry Of Agriculture Land and Marine Resources

The Fisheries Division of the Ministry of Agriculture Land and Marine Resources is charged with the responsibility of managing the sustainable development of the fisheries sector of Trinidad and Tobago while conserving the environment and incorporating the principles of responsible fisheries. The Division is specifically responsible for assessment, management and conservation of the marine fisheries resources of Trinidad and Tobago and the provision of extension and specialised information services on the marine fisheries. The Division administers

the fisheries regulations, in accordance with the existing Fisheries Act Chapter 67:51; Control of Importation of Live Fish Act Chapter 67:52; Archipelagic Waters and Exclusive Economic Zone Act, No. 24 of 1986; Fishing Industry (Assistance) Act 1955 Chapter 85:03. The Division is also responsible for implementing state obligations under regional and international conventions concerning fisheries or related matters and collaborates with the relevant state organisations, para-statal agencies and non-governmental organizations.

The Division is comprised of four (4) functional units: Administration, Extension, Aquaculture and Research. There is also a fisheries training institute, the Caribbean Fisheries Training and Development Institute (CFTDI).

Under the THA Act 40 of 1996, the Tobago House of Assembly (THA) coordinates the management of the fishing industry in Tobago, although legislative authority for the fisheries sector lies with the Minister of Agriculture, Land and Marine Resources. The THA Act provides the THA with authority to manage coastal waters up to 3 miles from the coastline. The Marine Affairs Section under the THA is responsible for marine affairs, largely fisheries, in Tobago.

The Administrative Unit oversees the work of the units of the Fisheries Division.

The Extension Unit is responsible for information dissemination and technology transfer to the fishing industry. The unit provides extension services through the administration of fiscal incentives, licensing and registration of fishing vessels and fishermen, provision of physical and maintenance of infrastructure at major beach landing sites, assistance in the formation of fishing associations and cooperatives and in the area of conflict and problem resolution in the fishing industry. The Division also provides extension support through training of fishermen, persons involved in marketing and aquaculturists on fishing methods and gears, fish handling and processing through the fisheries training institute, the Caribbean Fisheries Training and Development Institute (CFTDI).

The Aquaculture Unit is responsible for implementing the aquaculture programme of the Division. The government's current focus on aquaculture is training, establishment of

community-based aquaculture projects, and extension and administration of the ornamental fish trade (Fisheries Division, 2001).

The Research Unit, generally referred to as the Marine Fisheries Analysis Unit (MFAU), is responsible for implementation of ongoing fisheries monitoring programmes which involve catch and effort, economic and biological data collection on the major commercial fish species for use in stock assessments and the development of fisheries management plans. The Unit is also responsible for maintenance of the Fisheries Management Information System (FISMIS) which is a system of in-house marine computerized databases and an extensive library reference collection which provides specialised information services on marine fisheries of Trinidad and Tobago and the Wider Caribbean area.

The Fisheries Division is involved in negotiations for fishing access agreements with other countries. Trinidad and Tobago has had bilateral fishing agreements with Venezuela and Barbados. The current Trinidad and Tobago/ Venezuela Fishing Agreement provides for a common fishing zone south of Trinidad and north of Venezuela for a range of vessel types from both countries (Figure 1). The Agreement with Barbados, in force for only one year (1990) provided for access by the Barbados fishing fleet to the resources of flyingfish and associated species off Tobago. There is no history of granting fishing licences for foreign fishing in national waters apart from those granted under the aforementioned bilateral arrangements.

Under the Ministry of Agriculture, Land and Marine Resources (MALMR), there are several statutory agencies responsible for provision of specialized services to the fisheries sector as part of their overall mandate. The main agencies are the Sugar Cane Feed Centre (SFC), National Agricultural Marketing Development Company (NAMDEVCO) and the Agricultural Development Bank (ADB). The SFC is responsible for the provision of aquaculture seed stock, training in seed stock production, advice on aquaculture enterprise development and extension services in aquaculture. The main focus of the SFC is research on integrated farming. NAMDEVCO is responsible for identifying local and export markets for local agricultural commodities and fish and establishing linkages between buyers, sellers and producers. NAMDEVCO is also responsible for daily collection of agricultural data/information including

prices of fish and managing wholesale fish markets. The ADB provides financing to the Agriculture Sector, including fisheries. Loans are provided for any aspect of fisheries with the exception of the purchase of trawlers and new pirogues (artisanal vessels) for which loans are not provided.

2.1.3 Stakeholder organizations

Fisherman's Organisations

Fisherman's Organisations are of two types, Fishing Associations or Fishing Co-operatives, and are generally comprised of fishermen who operate out of a particular beach, landing site or fishing area. The organizations were traditionally formed as a means of fishermen having a collective voice and lobbying power for matters which directly impact on their fishing activities and livelihood. Individual members of each of these two groups, however, are often involved in different fisheries. Of the two, the Co-operatives are more organized, with formal registration at the Ministry of Labour, and are managed by a Board of Directors. Fishing Associations are informal groups with no legally binding commitments. In 1988, an umbrella organization of fisheries related groups called the National Organisation of Fishermen and Allied Cooperatives Society Ltd. was formed to coordinate the representation of the fisheries sector. The effectiveness of this organization has been severely limited by the general lack of organization at all levels in the industry, and poor representation in the fishing communities.

There are currently 34 fishing organizations (9 co-operatives and 25 Associations) in Trinidad and Tobago. Of these, 24 are in Trinidad and 10 in Tobago, however, these organizations are not well managed (Picou-Gill, 2003). In Trinidad, the Cedros Fishing Cooperative is currently the most successful organization and it services the needs of families in the southwestern Peninsula whose main source of income is fishing. The organization maintains a fishing complex, operates a gas station, post-office and lottery outlet. In Tobago, developments in the fishing sector during the 1980s spurred the Tobago House of Assembly to encourage the formation of fishers' organizations. Investment is mainly from the private sector due to the lack of financial support from the government. In 1999 the All Tobago Fisherfolk Association (ATFA) was formed as a legal entity. Based on the achievements of ATFA, an umbrella organization, the National Organization of Fishers of Trinidad and Tobago (NOFOTT) was formed.

Cabinet-appointed committees

There are two Cabinet-appointed committees funded entirely by the state and comprised of representatives of the fishing industry and other stakeholders. Both committees are chaired and administered by the Fisheries Division.

The Monitoring and Advisory Committee (MAC) comprises mainly representatives from the artisanal fisheries sector and includes representatives of government agencies and research institutions. The MAC is the only existing formal structure for fishing industry consultation. The Committee was established in 1997 to resolve conflict between the artisanal (non-trawling) fishing communities of the north coast and the industrial trawl fishery. The MAC was mandated to ensure implementation of an *'Agreement to promote the sustainable management and optimal utilisation of the inshore/coastal fisheries on the north and south coasts and in the Gulf of Paria'* (Fisheries Division, 1997). Under the agreement regulations were drafted for closure of the fishing grounds in the disputed area to the trawl fishery. Although the membership and mandate of the Committee has since broadened, it does not provide the appropriate framework for constructive consultation on the trawl fishery.

The second Cabinet Appointed Committee is the National Monitoring Committee on Foreign Fishing and Related Matters (MCFE) which was established in 1998. The Terms of Reference of the Committee include (*inter alia*) monitoring of the operations of foreign fishing vessels in Trinidad and Tobago waters including compliance with conditions of access, monitoring the characteristics of foreign fishing vessels that use Trinidad and Tobago for transshipment or landing to ensure compliance with international law and agreements, and informing the Minister on industry activities that may adversely affect the conservation and management of living resources. The membership of the MCFE includes representatives from government agencies, a research institution, an environment NGO and a fishing industry association.

2.1.4 Other government agencies

The main agencies under the Ministry of Works and Transport are the Port Authority and the Maritime Services Division. The Port Authority of Trinidad and Tobago is responsible for all

coastal property within the geographic zone designated the Port of Port of Spain, Trinidad and Scarborough Port, Tobago. It provides advice on port development, considers applications for use or development of port facilities within the designated area, on recommendation by the relevant Ministries. The Maritime Services Division (MSD) is responsible for registration of vessels under the Shipping Act for vessels over 24m in length and under the Motor Launch Register for vessels under 24m in length. Currently only a few fishing vessels are registered with the MSD. It also produces tide tables and provides information and navigational warnings for small craft. Under this Ministry, there are nine (9) state-owned Regional Co-operations with wide ranging responsibilities including management and maintenance of retail markets which may exist in the municipality within jurisdiction of the Co-operation. Many of these markets include retail outlets for fish and associated species.

Under the Ministry of Health, the Chemistry Food and Drugs Division is the designated “competent authority” to implement the provisions of the Fish and Fishery Products Regulations, 1998. It is also responsible for monitoring fish and fish products for safety and sanitation standards and certification for export. The Public Health Division is responsible for ensuring that people involved in food handling are certified to handle fish safely and that disposal of wastes does not pose a health hazard.

The Ministry of Trade and Industry administers laws governing trade, local and international, including trade agreements and export processing zones among other responsibilities. It also provides general and special Minister’s License for import or export of fish (including crustaceans and mollusks) and fishing vessels.

Under the Ministry of Finance, the Customs and Excise Division administrates Customs laws with regard to duty payments for imports of fish and fish products and equipment, duty waivers, fish exports or re-export and transshipments.

Under the Ministry of National Security, the Trinidad & Tobago Coast Guard is responsible for maritime surveillance, monitoring and enforcement of fisheries regulations as well as rules under

fisheries agreements. It is a major participant in marine delimitation negotiations and carries out inspections of fishing vessels under the Turtle Excluder Devices Regulations.

In the Ministry of Public Utilities and the Environment, the Forestry Division has authority under the Wildlife Act for the conservation of wildlife and implementation of relevant regulations. The Division also has authority under this Act for protected areas which includes wetlands. The Division is also responsible for administration of this country's accession to the Convention on Trade in Endangered Species of Flora and Fauna (CITES) as well as the Specially Protected Areas and Wildlife Protocols of the Cartagena Convention. Species addressed under CITES includes marine species that are harvested locally.

Regional and International Organisations and Foreign Donor Governments

The Caribbean Community (CARICOM) is an institution of regional integration established as the Caribbean Community and Common Market by the Treaty of Chaguaramas signed on 4 July 1973. By Treaty revision, effective February 2002, the successor entity is now the Caribbean Community, including the CARICOM Single market and Economy (CSME). The principal organs of CARICOM are the Conference of Heads of Government, responsible for determining policy directions for CARICOM, and the Community Council of Ministers, responsible for strategic planning and co-ordination of regional activities. Four Ministers Councils assist these principal organs in performance of their functions. Among these Councils is the Council for Trade and Economic Development (COTED) which promotes trade and economic development of the Community and oversees operations of the CSME. Matters relating to agriculture and fisheries are discussed at annual COTED meetings and decisions made with regard to fisheries management and sustainable development at the regional level. The CARICOM Secretariat is responsible for providing leadership to the development of the Community and ensures close interaction with Member States at the technical and political levels.

The Caribbean Regional Fisheries Mechanism (CRFM) was formally established in 2003 and is the successor to the CARICOM Fisheries Resource Assessment and Management Program (CFRAMP) which promoted sustainable use and conservation of the fisheries resources of CARICOM Member States from 1991 to 2003. CFRAMP was funded mainly by the Canadian

International Development Agency (CIDA), with contributions by member states of CARICOM. Before 1991 the regional fisheries desk was hosted at the CARICOM Secretariat. The CRFM's mission is to promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the economic and social benefits of the current and future populations of the region. Membership is open to all CARICOM countries and special provisions are made for other countries in the region to become associate members. Trinidad and Tobago is a member of the CRFM. The CRFM comprises the Ministerial Body, the Caribbean Fisheries Forum, the main technical and scientific decision making unit, and the Caribbean Fisheries Technical Unit which functions as the Secretariat. The CRFM also functions as a project management agency on behalf of the region, implementing a number of projects such as the ACP/EU project for Strengthening Fisheries and Biodiversity Management in ACP Countries and the Integrated Caribbean Regional Agricultural and Fisheries Development Programme (ICRAFD). Policy and activities are approved by COTED which functions as the Ministerial Body.

The University of the West Indies (UWI) is responsible for tertiary level education and research which includes fisheries and aquaculture research and coastal studies in addition to the Centre for Research Management Studies (CERMES) specializing in natural resource management studies.

The Food and Agriculture Organisation (FAO) of the United Nations provides financial and technical support for a number of fisheries projects related to management and sustainable development of fisheries resources. The United Nations Environment Programme (UNEP) provides support for activities which benefit fisheries indirectly. The Global Environment Facility (GEF) is an independent financial organization that provides grants to developing countries for projects that benefit the global environment and promote sustainable livelihoods in local communities.

The United Nations Development Programme (UNDP) and the GEF often provide the financial support necessary for the implementation of FAO projects with the latter providing the technical support. Trinidad and Tobago is currently participating in:

- (a) FAO/UNDP Project EP/GLO/201/GEF "Reduction of Environmental Impact from Tropical Shrimp Trawling, through Implementation of By-catch Reduction Technologies &

Change of Management” (2002 - 2007) which is a global project aimed at reducing finfish discards from catches of the trawl fleet. The main project activities are the testing of by-catch reduction devices and awareness building with regard to the issues of by-catch and discards with a view to the introduction of modified gear and adoption of alternative management strategies.

(b) FAO/Japan Project GCP/RLA/140/JPN “Scientific Basis for Ecosystem-based Management in the Lesser Antilles, Including Interactions with Marine Mammals and Other Top Predators” (2002 - 2007) involving modeling of the pelagic ecosystem in the eastern Caribbean. Among the objectives of this project is the development of ecosystem-based management plans for the pelagic waters of the EEZs of participating countries specifically for key species resources that are shared in the region.

A number of sub-regional working groups are maintained by FAO under the Western Central Atlantic Fisheries Commission (WECAFC, among which are the FAO/WECAFC *ad hoc* Working Group on Shrimp and Groundfish Resources of the Guianas-Brazil Continental Shelf and the Working Group on Small Pelagics and Flying Fish. Trinidad and Tobago is a member of both Working Groups.

The European Union (EU) has provided grant funding at both the national and regional levels under African Caribbean and Pacific States/ European Union (ACP/EU) arrangements. Grants have been provided for infrastructure development at the national level. In addition, grants have been approved for facilitating preparedness for implementing sanitary and phyto-sanitary standards for fish and fish products for export to EU markets. At the regional level, grants have been provided for the implementation of the ACP/EU project “Strengthening Fisheries and Biodiversity Management in ACP Countries” and the ICRAFD Project.

Since 1994 the Japan International Cooperation Agency (JICA) has implemented the “Project for the Promotion of Sustainable Marine Fisheries Resource Utilisation”, which includes components in marine engineering, fish handling, sea food technology, fishing technology and training of local counterparts and fishermen of Trinidad and Tobago and the region. The Project

includes the provision of equipment, vessels and overseas attachments in support of project activities.

2.1.5 SCIENTIFIC WORKING GROUPS

The marine resources in Trinidad and Tobago waters are considered to be shared since stocks of some commercially important fish species are found in waters of neighbouring countries and, as a result, recruitment and population dynamics of local fisheries are also affected by harvesting activities in neighbouring fisheries.

Demersal species, primarily shrimp and groundfish, are considered to be shared with other countries on the Guianas-Brazil Continental Shelf. The shrimp and fish resources in the Gulf of Paria and Columbus Channel are considered to be shared stocks exploited by the fleets of both Trinidad and Tobago and Venezuela. It is therefore essential that Trinidad and Tobago and Venezuela collaborate on the development of a joint management regime for the fisheries resources. The current Trinidad and Tobago/Venezuela Fishing Agreement outlines a 'Protocol on Fisheries Research' which is a collaborative approach to the management of shared resources. To date, this Protocol has not been fully activated. Under the framework of the FAO/WECAFC *ad hoc* Working Group on the Shrimp and Groundfish Resources of the Guianas-Brazil Continental Shelf, CFRAMP and the FAO conducted a series of sub-regional workshops involving Brazil, French Guiana, Suriname, Guyana, Venezuela and Trinidad and Tobago to assess shared stocks of shrimp and groundfish.

Large pelagic species are trans-boundary, occurring or migrating in the EEZ of all or most of the CARICOM coastal states and north-east South American states and extending to international waters. The distribution of large pelagic species harvested by local fleets goes beyond the WECAFC area and may be trans-Atlantic. The International Commission for the Conservation of Atlantic Tunas (ICCAT) has a mandate to manage all the large coastal pelagic and oceanic large pelagic species. Within the Caribbean, the CRFM established a Working Group on Large Pelagic Fish Resources (the CRFM LPWG) in 2000. Since then, the CRFM LPWG has held two large

pelagic fish stock assessment meetings during which data analyses were conducted on coastal and pelagic species.

Trinidad and Tobago participated in several of the working groups for the assessment of fisheries resources established under CFRAMP. These included the small coastal pelagics and flyingfish; large coastal pelagics, reef and slope and the shrimp and groundfish groups. In some instances, due to the shared nature of the resources and with some of the neighbouring states being non-CARICOM states, CFRAMP collaborated with the FAO/WECAFC *ad hoc* Working Groups in conducting the assessments. More recently, the Caribbean Regional Fisheries Mechanism (CRFM) has stated that the management of shared stocks is one of its highest priorities and has formed similar working groups to ensure continuity in the assessment work initiated under CFRAMP and the FAO/WECAFC. The CRFM coordinated its first scientific workshop in June 2004.

2.2 Administrative arrangements for the conservation and rehabilitation of the coastal environment and aquatic resources.

2.2.1 Coastal Zone Management

The key agencies involved in environmental and coastal zone management including efforts in rehabilitation of the coastal environment were introduced in Section 1.3.4. These are the Institute of Marine Affairs (IMA) and the Environmental Management Authority (EMA) under the Ministry of Public Utilities and the Environment.

The Institute of Marine Affairs (IMA) is a statutory entity established by Act of Parliament 1976. The IMA also receives funds from non-government sources including fees collected for technical advisory services. Responsibilities include advising the government on various aspects of marine affairs as well as assistance with legal aspects and implementation of research programmes. Major programme areas are environmental research, fisheries and aquaculture, legal research and

technical advisory and information services. The IMA focuses on research into fish diseases and breeding and grow-out techniques in intensive systems for both marine and freshwater species.

The Environmental Management Authority (EMA) is a statutory board established in 1995 under the EMA Act which also provides for the establishment of the Environmental Commission. The EMA has legislative authority for the control of noise and water pollution, waste management, handling of hazardous substances and related issues. The EMA administers environmental education and related public awareness programmes; issues Certificates of Environmental Clearance to new development projects that may impact the environment and in some cases an Environmental Impact Assessment (EIA) may be a requirement of the developer. The EMA also responds to emergency incidents and spills in conjunction with other government agencies providing technical and investigative support to response teams. It takes the lead role on behalf of the Government of Trinidad and Tobago in implementing global and regional environmental agreements including the Convention on Biodiversity, Convention on Climate Change and the Basel Convention (EMA, 1997).

The Environmental Commission is a tribunal responsible for judicial review of decisions of the EMA. These include decisions with regard to designation of environmentally sensitive areas or species and to deny issuance of a certificate of environmental clearance.

2.2.2. Conservation and Rehabilitation of Aquatic Resources

Efforts oriented towards conservation and rehabilitation of aquatic resources are quite limited. The implementation of some fisheries legislation can be considered to be conservation oriented despite the primary impetus being access to foreign markets. The same reasoning applies to the implementation of some data collection programmes where efforts by the Fisheries Division to monitor catches for stock assessment purposes were unsuccessful until the threat of international trade sanctions compelled fishers to submit data on fishing operations.

Demersal trawl fishery

The implementation of the 1994 Fisheries (Conservation of Marine Turtles) Regulations requiring the use of Turtle Excluder Devices by the trawl fleet can be considered to be conservation oriented. These regulations were drafted under section 4 of the Fisheries Act, Chapter 67:51, in response to the legislative requirements of the USA where access to the US market for shrimp became dependent upon annual re-certification by the US Department of State and is based on a condition of complete compliance with the use of TEDs by all semi-industrial and industrial shrimp trawl vessels. The Fisheries Division has a continuous monitoring regime which assists the national programme for the protection and conservation of marine turtles. This programme was implemented in collaboration with the Trinidad and Tobago Coast Guard, with a Memorandum of Understanding being signed between the Fisheries Division and the Coast Guard for cooperative monitoring of trawlers at-sea to ensure TED compliance. Selected officers of the Coast Guard were empowered under the Fisheries Act 1916 to enforce the regulations governing the use of TEDs. New regulations were also drafted to address the type and specifications and proper installation of TEDs (Fisheries Division, 2001).

The high incidental catch and discard of non-target fin fish species from trawl fisheries impacts negatively on the environment and on the sustainability of the resources. In Trinidad and Tobago the incidental fish catch may be as high as 90% for the artisanal trawl fishery and most of these fish are juveniles of other important coastal fisheries. This aspect of trawl fisheries is also the most important source of conflict between the trawl fishery and other coastal fisheries in national waters.

Trinidad and Tobago is one of the participating countries in the global project EP/GLO/201/GEF “Reduction of Environmental Impact from Tropical Shrimp Trawling through the Introduction of By-Catch Reduction Technologies and Change of Management. This 5-year project, inaugurated in 2003, is funded by the Global Environmental Facility (GEF) and coordinated by the FAO. The project intends to introduce By-catch Reduction Devices (BRDs) and appropriate trawl gear modifications as more responsible fishing gear and techniques and will look at the development of the necessary legal and management frameworks to ensure the use of such devices.

In the Latin America and Caribbean region, Trinidad and Tobago is expected to collaborate with Columbia, Cuba, Costa Rica, Mexico and Venezuela. The overall work-plan of project EP/GLO/201/GEF involves consultation with the commercial shrimp-trawler fleets and other stakeholders, and the collection of specific base-line data on the operations, catches, by-catch and discard rates from the present commercial shrimp-trawl fisheries, as well as related socio-economic data (Kuruvilla et al, 2000). These Project activities support initiatives of the Government to introduce sustainable fishing methodologies to the existing trawl fisheries.

Small Coastal and Large Pelagic Species

Trinidad and Tobago became a Contracting Party to International Commission for the Conservation of Atlantic Tunas (ICCAT) in 1999 and in so doing demonstrated its commitment to global fisheries initiatives in fisheries conservation and management including compliance with the precautionary principle and responsible fishing practices. ICCAT is an international fisheries management organization responsible for the assessment, management and allocation of quotas among nations and fishing entities harvesting tunas, billfish and associated species in the Atlantic.

A trip reporting system was implemented for the offshore longline fleet in 2001 in order for Trinidad and Tobago to submit catch and effort data to ICCAT for incorporation into species stock assessments. The government, through the Fisheries Division, issues Certificates of Eligibility (COE) for Atlantic swordfish caught by locally flagged vessels and exported to the United States in accordance with the United States Law: Title 50, Code of Federal Regulations Part 630. Each shipment of swordfish bound for the United States is inspected to ensure compliance with specified size and catch limits. Adherence to ICCAT's swordfish rebuilding programme is achieved through a combination of government's non-issuance of export licenses upon meeting catch quantities agreed upon by the owners and the government in relation to Trinidad and Tobago's catch limit stipulated by ICCAT, and voluntary action by the industry to cease targeting the species. These measures have been successfully implemented (Martin *et al* 2004).

The country's obligations to observe ICCAT port state responsibilities are being addressed through a Memorandum of Understanding (MOU) between the Ministry of Agriculture, Land and Marine Resources and the private company that owns and manages the facilities located at the transshipment port. The MOU was drafted to facilitate monitoring of landings, transshipment activities and vessel activity at the port.

Marine Protected Areas

The Marine Areas (Preservation and Enhancement) Act of 1970, and the Marine Areas (Preservation and Enhancement) Regulations of 1973 are conservation oriented however, the Act is currently applied only to the management of coral reefs. The Buccoo Reef area in Tobago is the only area that has been designated a restricted area under the Marine Areas (Preservation and Enhancement) Act of 1970. The Buccoo Reef has traditionally been a major tourist attraction in Tobago and is impacted by a number of socio-economic and environmental factors. In 1990, under an IMA/THA Coral Reef Project to conduct ecological surveys of the reefs around Tobago, a management plan was proposed for the Buccoo Reef Marine Park. The Project had several components which studied the environmental conditions of the reef, and included public education and awareness as well as socio-economic aspects (IMA 1994a, 1994b).

In 1999 a research project on Buccoo Reef Marine Park in Tobago was initiated which was a collaborative effort between the University of East Anglia, UWI and the THA (Brown et al, 1998; 1999). The research project was perceived by the THA and local stakeholders to be an important contribution to implementing sustainable coastal resource use as outlined in the management plan for the Buccoo Reef Marine Park prepared by the IMA. The situation with the Buccoo Reef Marine Park was a case of a marine protected area where uses and users had been in conflict for a number of years due to conflicting management, ineffective enforcement, suspicion and non-communication between stakeholders, including resource managers.

The aim of the project was to develop and promote sustainable resource use strategies through an analysis of the conflicts and trade-offs between different uses and users of marine protected areas using participatory techniques. Multi-criteria analysis (MCA) was used as the framework for

assessing the resource use strategies and for quantifying the impacts of coastal zone management options on the urban and rural communities in the coastal zone. Research included the collection of economic, social and ecological data to perform an environmental economic valuation of the Buccoo Reef Marine Park. Social and economic data collection was based on a survey to estimate consumer surplus from recreational use of the marine park, a census of informal business vendors, and a series of semi-structured interviews. Ecological data including fish counts by species, mangrove leaf fall, water quality and plankton tows were used to estimate productivity. The Tobago tourism sector was modelled to determine the economic costs and benefits of various tourism development options.

Results of the surveys showed a high degree of consensus among stakeholders which provided the potential action for co-management. Future work will seek to address how the participatory processes can be institutionalised. The Town and Country planning Division has expressed an interest in this methodology which can also be applied to urban planning. The EMA, IMA and Caribbean Natural Resources Institute (CANARI) have also expressed interest in collaboration in the continuation of activities.

Monitoring, Surveillance and Enforcement

The Fisheries Division established a monitoring system for fish imports and exports in the late 1990s primarily to be able to provide actual and reliable export data. The system requires the return of export licences of the previous shipment certified by customs from all exporters that detailed coded items of all shipped fish and fishery products prior to approval being granted for additional licences. This system is used to verify data from Central Statistical Office (CSO).

In June 2004, Cabinet approval was obtained for a proposal, prepared by the Fisheries Division, for the establishment of a monitoring, surveillance and enforcement unit, which will address enforcement of fisheries legislation.

2.3 Administrative arrangements for regional planning and development in coastal regions

Planning and development of the coastal area are not adequately approached on a comprehensive basis institutionally, functionally or geographically. Statutory land use planning is conducted by the Town and Country Planning Division of the Ministry of Planning and Development. Land use development plans have been prepared utilizing population projections, labour force and employment land requirements for economic growth.

The mandatory Certificate of Environmental Clearance (CEC) issued by the EMA for most development activities can be considered an attempt at regional planning. The submission of an environmental impact assessment (EIA) by the developer for review and approval by the Town and Country Division is another arrangement to facilitate regional planning and development.

Macro-economic policy often determines sectoral priority in situations of multi-sectoral use of natural resources. Coastal waters are important for maintaining fisheries production and this is particularly important for artisanal gillnet and line and the trawl fisheries of Trinidad and Tobago which sustain communities along the Gulf of Paria. The economic and social profile of the fisheries sector and national perceptions dictate the extent to which fisheries can influence development decisions that impact the environment and ultimately the resources upon which these communities depend. Some progress was made in 1995 through a Government of Trinidad and Tobago/UNDP/FAO Project INT/91/001 “Integrated Coastal Fisheries Management of the Gulf of Paria”, as a consequence of which the sector has been included in the process of review of coastal development proposals.

To date, information collected from administrative systems within the Fisheries Division such as the registration of fishermen and fishing vessels and fishing vessel censuses have not been used for planning purposes.

2.4 Co-management of fisheries and coastal aquatic resource

Guided by Chapter 17 of Agenda 21 adopted at the 1992 UNCED, the FAO and UNDP implemented the FAO/UNDP Project INT/91/007 “Integrated Coastal Fisheries Management of the Gulf of Paria” aimed at contributing in the long-term to the improved well-being of coastal communities through better management of marine and land-based resources and through the protection of coastal ecosystems. The Gulf of Paria, Trinidad and Tobago was used as a pilot site in the region, with the other pilot sites of the Project being in the Philippines and in Gambia (Fisheries Division 1995).

The Gulf of Paria is a semi-enclosed estuarine sea completely delimited between Trinidad and Tobago and Venezuela and downstream of the Orinoco River. A significant coastal and marine fishery exists in the Gulf of Paria and there is a considerable amount of interaction between fishing and non-fishing uses of the coastal and marine areas. Within the fishing industry, there are 6 main methods involving artisanal trawl, gillnet and lines semi-industrial multigear vessels and semi-industrial and industrial trawlers in operation. Non-fishing uses include the petrochemical industries, manufacturing, agriculture, tourism, housing, service industries, and combined with these multiple uses is the resulting waste disposal, and pollution. The non-fishery uses of the coastal zone were increasing at a faster rate than fishery development, and preliminary stock assessments completed for commercial species indicated full exploitation, with probable growth and economic over-fishing. The “Open Access “situation (with the exception of regulations for the trawl fishery), multiple use of the coastal zone and bilateral implications of stocks shared with Venezuela, present special problems for management. The situation is further compounded by the fact that the fishing communities were among the most impoverished, vulnerable and disadvantaged coastal communities (Fisheries Division 1995a, 1995b).

Project INT/91/007 recognised the multi-sectoral and multi-disciplinary characteristics of integrated coastal fisheries management and was of an investigative and experimental nature, focusing on three main elements (i) information gathering and research; (ii) awareness-building; and (iii) integrated planning, coordination and consultation. The project was conducted over the period 1993-1995 and focused on the coastal communities, encouraging active participation of the stakeholders in recognition of their important role in the management of fisheries and the

coastal zone. Output from the project included the development of a computerized bibliographic database (GULP) and a pilot GIS for the Gulf of Paria coastal zone, the hosting of a National Workshop on Information Networking on Fisheries and the Coastal Zone, a pesticide survey to determine types of usage patterns in the coastal area and gathering of local environmental/resource knowledge through community surveys. A video highlighting uses of the Gulf of Paria coastal zone and the fisheries management issues involved was prepared, along with other awareness-building materials such as a fisheries alphabet and a brochure on the effect of plastics on the environment. The country's first Clean Coast Day was hosted where volunteers from schools and the general public focused on removing litter from beaches in the Chaguaramas area in the northwestern peninsula of Trinidad. A workshop on integrated planning was hosted, involving the Ministry of Planning and Development and other key agencies, at which the roles of the various sectors in integrated management of the Gulf of Paria coastal area were discussed.

2.5 Integration of fisheries and coastal aquaculture into coastal area management, planning and conservation

There are directed efforts to integrate fisheries and coastal aquaculture into coastal area management, planning and conservation. The Town and Country Planning Division has developed several Land Use Plans for Trinidad and Tobago which identify how areas are to be utilized. There are, however, significant gaps in the information on the natural processes of the environment and resource utilization necessary to guide coastal zone planning. Local knowledge, for both public and private sector agencies, of the coastal zone of the Gulf of Paria generally tends to be sectoral and resource oriented. In addition, availability of and access to expertise are unbalanced between the traditional sectors like the fishing industry and the more highly technological sectors like the petroleum industry (Town and Country Division 1989). The common result is the restriction of development to the high income and employment generating energy and manufacturing sectors. The artisanal fisheries provide stability to rural coastal communities where it is estimated that some 3000 fishermen are directly employed in the trawl, gillnet and line fisheries. Therefore the socio-economic importance of the artisanal fisheries must also be a major consideration in decision-making.

3. CONSIDERATION OF SOCIO-ECONOMIC AND DEMOGRAPHIC CONCERNS

3.1 Socio-economic and demographic information on coastal fishing communities

Population Censuses

Demographic data is available from the Central Statistical Office (CSO) through periodic general population censuses. The CSO also conducts a series of continuous surveys of the population during the periods between general population censuses. Demographic information is collected by administrative boundaries and under broad categories and is not collected specifically for fishing communities. Relevant data therefore has to be disaggregated or compiled from the available statistics as necessary and may be limited in details specific to the fishing community. Socio-economic information is also collected by the CSO through special surveys which target particular sectors of the economy such as the agriculture sector. Information on the fisheries sector is commonly included in statistics for the agriculture sector and therefore special request must be made to the CSO to obtain information on the fisheries sector.

Fisheries Censuses

In 1991 a national vessel census was conducted by the Fisheries Division under an FAO/UNDP funded project “Establishment of Data Collection Systems and Assessment of Marine Fisheries Resources”. Details on vessel and engine specifications, gear utilized and species targeted in order of priority and seasonality were recorded (Fisheries Division unpublished data). A vessel census was conducted in Trinidad in 1998 (Chan A Shing 1999) and more recently in 2003 (Fisheries Division unpublished data) where this information was updated. The data are currently used with catch statistics to generate estimates of total landings by species. Data collected with regards to the number of fishing vessels, is used to derive estimates of total fishing effort which

is used to raise estimates of landings to totals for the country. Numbers of fishermen are used to describe the size of fishery by gear type and by landing site but little more information has been extracted from the previous censuses.

Licensing and Registration System

The voluntary system of fisherman and vessel registration, implemented by the Fisheries Division has the potential to provide valuable socioeconomic information on the industry. The system is linked to the government's fiscal incentives programme and the only criteria for the award of subsidies are that applicants must be fishers, fishing vessel owners or fishing proprietors who are citizens of Trinidad and Tobago and registered with the Fisheries Division. With the exception of the trawl fishery, this system is not used for management purposes. Almost all fishing vessels are registered by the Fisheries Division and assigned a registration number at no cost to the owner/fisherman.

At its inception this system was not linked to fisheries management and the fishing communities and hence the optimum level of information was not extracted. The vessel registration form records details on the vessel. This includes physical characteristics, such as length, width, depth, colour, engine horsepower and manufacturer, as well as details on the year of construction, costs of vessel and engines and dates of purchase. The fisherman registration form records details on personal information (name, date of birth, address, and general physical characteristics), details of his background (family size, level of education, fisheries related training), and fishing operations (fishing methods employed, number of boats, engines and vehicles owned). The data are being computerized using a fisheries-database software (CARIFIS), supported by the CRFM. The processing of fisherman and vessel registration in Tobago is currently conducted by the Fisheries Division (Trinidad). The Department of Marine Affairs and Fisheries (Tobago) is responsible for collecting the necessary information.

Ad hoc Surveys and Special Projects

The Fisheries Division has conducted a number of ad hoc surveys and implemented projects in developing profiles or fishery descriptions for commercially important marine species for use in fisheries stock assessments. Most of these reports focus on the technical aspects of the fishery

(biological, economic and bio-economic assessments) however they include different levels of details with regards to the social and economic aspects of the particular fishery and the associated fishing communities. Data is available for the fishers and fishing communities associated with the shrimp and groundfish, large pelagics, flyingfish and small coastal pelagics fisheries. Many of these studies including country reports were prepared under the CFRAMP, FAO/WECAFC and CRFM Working Groups and for submission to ICCAT.

Regional Initiatives

In the late 1990's, the Fisheries Division participated in the Community Education Sub-Project of the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP). Under this sub-project awareness building materials targeting fishermen on issues related to fisheries management were produced and technical advice on the methodologies for the collection of socio-economic data was provided.

The International Development Research Centre (IDRC) of Canada funded Community Based Coastal Resource Management (CBCRM) research projects, which is being coordinated by the CRFM Secretariat. The fund provided financial and technical support for Caribbean scholars to undertake interdisciplinary research seeking solutions to problems of coastal resource management. From 1999-2001 the Project provided small grants for projects in various Caribbean countries and Trinidad & Tobago received funds for one project. The project is being executed by the Institute of Marine Affairs (IMA). It focuses on a fishing community on the east coast of Trinidad.

3.2 Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans.

Local Knowledge, Community and Household Surveys

Under the FAO/UNDP Project INT/91/007 Integrated Coastal Fisheries Management (Section 2.4) profiles were prepared for two fishing communities on the Gulf of Paria coastal zone in the towns of Orange Valley, located in the Couva/Tabaquite/Talparo Regional Cooperation, and Otaheite, further south in the Penal/Debe Regional Cooperation. The main source of socio-economic and demographic data was the Central Statistical Office (CSO) where data was extracted from records of the 1990 Population & Housing Census for the enumerated districts which comprised each study area. Secondary socio-economic and demographic data were collected from the fishing communities through interviews that were conducted by the Fisheries Division. Analyses focused on comparisons between the fishing and non-fishing communities within each area and with the national average where possible.

Rural profiles were completed for the two fishing communities (Mohammed, 1995) with the fishing community defined as including all persons who reside in fisherman-headed households, that is, where the fisherman is the main breadwinner. The total population of Orange Valley was 43,640 of which the fishing community comprised 1.5% of this population, or 636 persons. The total population of Otaheite was 26,407 of which the fishing community comprised 1.7%, or 438 persons. The mean household size was higher for the fishing community, averaging 5 persons, than for the non-fishing community which averaged 4 persons. The fertility rate was higher in the fishing community, with women bearing children at an earlier age and having more children throughout their life. With regards to education, fewer persons within the fishing community achieved secondary education and none received tertiary education as compared to the non-fishing community. In addition, fewer persons within the fishing community received training (Trade/Craft and Industry, Service and Trade, Commerce and Business) as compared to the non-fishing community. With regard to land tenancy, fewer persons within the fishing community

owned land (20% in Orange Valley, 13% in Otaheite) as compared to the non-fishing community (45% in Orange Valley, 38% in Otaheite). In general, a lower standard of living is experienced in the fishing communities of Orange Valley and Otaheite as compared to the non-fishing communities in these areas.

Community profiles were also completed under the project (Ramjohn, 1995) for the two communities and it was noted that the fisheries in these two communities were strongly dominated by shrimp trawl activities. At Otaheite, fishing activities were essentially artisanal with a greater diversity in the occupational structure of the population not involved in fishing due to greater integration into the surrounding economy related to the petroleum and gas production sector. At Orange Valley, fishing activities ranged from artisanal to industrial and most of the population not involved in fishing were associated with the operations of the state-owned Caroni (1975) Limited involved in sugar production. There was a direct correlation between the level of fishing and the levels of income generated from fishing where Otaheite appeared to be a very depressed community with declining activity and Orange Valley showed significant signs of growth and development. Stakeholders perceptions of factors considered to constitute major threats to fishing activity were also studied in the fishing communities. Non-trawler owners stated that the greatest threat to fishing activity in the Gulf of Paria was trawling. All fishers emphasized pollution, national as well as regional sources, as the greatest threat to the productivity of the Gulf of Paria, while trawler owners identified this as the primary threat.

A Household Survey (Camps-Campins, 1995) was conducted which focused on the fishing households especially its female-head. Over 50% of the households interviewed had the fisherman as the only wage-earner. Of the other group, less than half had the fisherman's wife as the only wage-earner besides the fisherman and the remaining group had individuals who did not contribute financially to the household. The main type of employment was associated with fishing activities which included fishing at sea, marketing of catch, and manual labour. Employment in fishing was full-time. A small proportion of the households had members employed with Caroni (1975) Limited or the resident carbonated beverages factory in Otaheite. This employment was seasonal or part-time and supplemented by work in the fishing sphere. With regards to the impacts of changes in the fishing industry, over 75% of the households

acknowledged negative changes in the community's fishing industry during the period 1984 - 1994. This was characterised by decrease in catches, fish size, an increase in operational costs, increase in the number of people entering the fishing industry, inability to get employment outside of the fishing industry. These changes had negatively impacted on the fisherman economically. In over 50% of the households, the perception was that there was little future for the fishing industry and that they would discourage young members to continue in fishing. The other group still recognised a future in fishing but only with co-operation within the community.

Ad hoc Surveys and Special Projects

A frame survey of the gillnet fishery was conducted in 2000 to determine the status of monofilament and multifilament gillnet usage and to investigate the use of alternative gears (Nagassar, 2000). This was in response to the industry's refusal to accept new regulations promulgated by the stakeholder committee, the Monitoring and Advisory Committee (MAC), which proposed to ban the sale and use of monofilament gillnets. The information was collected from fishermen and sought to quantify the number of fishermen and vessels involved in the fishery. Similar types of data were collected as for a census of fishing vessels as well as the fisherman and vessel registration system to determine the socio-economic background of the fisherman. Economic data on the costs of the operation of gillnets were also collected.

Results showed that there were 1404 fishermen involved in the gillnet fishery with 1368 operating in Trinidad and 36 in Tobago. In addition there were 280 net menders and 90 vendors involved in the fishery. Gillnet usage, in terms of numbers of fishermen, is highest on the south coast. In Trinidad, 73% of the fishermen interviewed fished fulltime while in Tobago 79% were fulltime. The average age of the fisherman was 38 and approximately half of those interviewed had at least a primary school education. The average fisherman employed in the gillnet fishery would have difficulty in accessing alternative employment due to the lack of additional skills. Fishermen on the South coast of Trinidad are especially affected since they represent the largest numbers with the most limited options for alternative employment.

Environmental Impact Assessments

Socio-economic and demographic data have been used in preparing coastal profiles mainly as a component of an Environmental Impact Assessment (EIA) for a particular region in which development work is proposed. This is a requirement for any development work in Trinidad and Tobago and needs approval from the Ministry of Planning and Development and the EMA. This data is usually obtained from a range of agencies. Data on the fisheries sector is extracted from fishing vessel census reports, cost and earnings surveys, resource assessments, local knowledge surveys of fishing communities and *ad hoc* studies conducted by the Fisheries Division. Other sources of some of this information on the fisheries sector may be from primary data collection through interviews conducted by consultants however these reports are not available to the public since the information is considered the property of the consultant and treated as confidential.

3.3 Special projects in fisheries and coastal area management and conservation aimed at improving the socio-economic well being of coastal fishers and their families.

Community-based Turtle Management in Trinidad

In the absence of adequate legislation and enforcement aimed at protecting turtles, a community based co-management approach to protect nesting turtles was introduced by the Wildlife Section of the Forestry Division (then under the Ministry of Agriculture, Land and Marine Resources) in 1989. The main objective of the project was to promote conservation and eco-tourism, using principles of sustainable economic use, through the education of rural communities residing in areas where there was a high incidence of wildlife (James and Fournillier, 1992). Every year female leatherback turtles nest on the beaches on the north-east and east coasts of Trinidad. The turtle population is threatened by poaching of adults and eggs, destruction of nesting habitats and sand mining. Under the Wildlife Act, three beaches, Matura and Fishing Pond in 1990 and Grand Riviere in 1997, were declared prohibited areas requiring permits for entry and allowing only a

limited number of visitors access to turtle nesting beaches each night. “Turtle” tourism was developed to stimulate community participation by encouraging income-generating activities through lodging and the sale of food and drinks and souvenirs in addition to conducting turtle watching tours.

Volunteering members of the community were trained as nature tour-guides and later formed themselves into an organisation (Nature Seekers Incorporated) which concentrated on protecting turtles and their nesting habitat, and managed tours for tourists and locals. With assistance from government agencies, the villagers were able to upgrade beach facilities.

These co-management efforts were largely successful in reducing the killing of nesting turtles on the three protected beaches and making neighbouring villages aware of the benefits to be derived from the conservation of turtles. Furthermore the educational impact of turtle watching tours increased the awareness of the need to protect leatherback turtles among large segments of the population in Trinidad and Tobago. Media support contributed to the success of the eco-tourism project and public response was so high that there was an exceedingly high demand for permits resulting in substantial income being generated yearly.

The Nature Seekers Incorporated has since grown into an active Non-Governmental Organisation for conservation. They are also involved in public awareness programmes and fund-raising activities for projects in the area. They continue to assist the Wildlife Section with beach patrols and data collection on nesting activity. In June 1998, Nature Seekers supported by the Wildlife Section and WIDECAST with co-funding from UNDP/GEF and the government of Canada, began a tagging programme on Matura beach.

Community-based Aquaculture

Over the period 1999-2000, the Fisheries Division initiated two community-based aquaculture projects for demonstration and training purposes (Fisheries Division, 2001). The primary objective of the projects was to encourage income-generating activity by creating opportunities for self-employment in rural communities. The principal targets of this project were unemployed youth, fishermen displaced from traditional fishing areas, aging agricultural workers and women. In particular, fishermen in the southwest peninsula of Trinidad, who were displaced as a result of the withdrawal of access to the shrimp resources in the Orinoco Delta under the 1997 TT/Venezuela Fishing Agreement, were targeted. The long-term objective was to facilitate the establishment of commercially viable and sustainable food-fish projects in depressed rural communities. The selection of communities was based on a number of criteria which included community interest, the existence of a cohesive community structure or organisation, willingness of the community to undergo a period of training, availability of suitable lands, and the availability of an adequate water supply of good quality.

The project consisted of two main elements, firstly it focused on community sensitization, training in aspects of fish culture and establishment of community-management units, secondly there was the actual aquaculture project of rearing Tilapia (*Oreochromis nilotica*) in earthen ponds. One 0.5 acre pond was constructed in Barrackpore and a 0.3 acre pond in Pt. Coco, Cedros, both located in the southwestern peninsula of Trinidad. The project was promoted as one vested in the community where cooperation and the sense of ownership were essential for success. The government, however, bore the cost of pond construction and all production costs for the first stocking and harvesting of the ponds and all monetary and other benefits derived from the project went to the community. Land used for the project in Pt Coco belonged to the Point Coco Agricultural Cooperative Society Limited and the aquaculture project was one component of a more expansive agriculture project envisioned for the area comprising 44 acres of agricultural lands belonging to the Cooperative. The Cooperative comprised 227 members and the committee in Barrackpore comprised 17 members.

The initiation of the Community-managed aquaculture projects was well supported by the communities of Barrackpore and Point Coco. After the first harvest, the communities were given

the responsibility for management of the project however there is no information on the current status of these projects.

Other Projects

The Poverty Eradication Programme under the Office of the Prime Minister, provides services with specific regard to fishing programmes to all communities in an “Adopt a Community Programme” which involves Government, the community and corporate donor (Ministry of Agriculture, Land and Marine Resources, 1999). Under this programme there is a steering committee of farmers, fishers and others, who determine and prioritise the needs of the community.

The Small Business Development Company Limited (SBDC), under the Ministry of Labour and Micro Enterprises, promotes the establishment of small and medium business enterprises. It will guarantee up to 85% of the loan for small business which includes vessels, equipment for fishing, processing marketing and aquaculture.

The UNDP provides an avenue for accessing funding under the Global Environment Facility. In addition there is the UNDP small grant facility which targets community projects aimed at stakeholder empowerment. A number of UNDP/FAO projects have been implemented by various stakeholders in fishing communities, in liaison with the Fisheries Division, in the areas of fisheries resource assessment and management and integrated coastal fisheries management. In recent times, the small grants project supported two projects: (i) fishers on the north coast of Trinidad received funds to replace panels of net lost by cutting and removing to facilitate timely release of endangered sea turtles; (ii) Assessment of the flying fish fishery by members of the All Tobago Fisherfolk Association (ATFA) based in Tobago.

3.4 USE OF SOCIO-ECONOMIC AND DEMOGRAPHIC INDICATORS IN MONITORING THE IMPACT OF MANAGEMENT REGULATIONS AND MEASURES OF THE SOCIO-ECONOMIC WELL-BEING OF THE COASTAL POPULATION.

Although over-exploitation of marine resources must be avoided to foster sustainable sources of food and employment, the socio-economic importance of the artisanal fisheries to the coastal population must be a major consideration in decision-making (Ferreira and Soomai, 2000). Traditionally, resource assessments for target marine species have been conducted to determine the status of the resources. Socio-economic and demographic indicators have been used, albeit in a limited capacity, in monitoring the impact of management regulations primarily for the trawl and gillnet fisheries. The artisanal fisheries provide stability to rural coastal communities where it is estimated that, in Trinidad, some 195 fishermen are directly employed in the trawl fishery and 464 fishermen in the gillnet and line fisheries (1998 figures).

In general, there have not been any focused studies on how the exploitation of natural resources and management recommendations or regulations affects the socio-economic well-being of both fishing and non-fishing segments of coastal communities. A few studies have gathered local knowledge information and perceptions of fishermen on fisheries and management from the trawl communities as part of this country's participation in the WECAFC Shrimp and Groundfish *ad hoc* Working Group and in international projects such as the FAO/UNDP Project INT/91/001 and EP/GLO/201/GEF Project. Information related to the trawl fishery is mainly available since it is the most regulated fishery.

Bio-economic Assessments of resources

Cost and earnings studies were conducted for the shrimp and groundfish fishery and were used in bio-economic assessment conducted under the WECAFC Shrimp and Groundfish *ad hoc* Working Group (Seijo *et al* 2000; Soomai and Seijo 2000). The surveys were based on interviews conducted with vessel owners/fishermen. Economic parameters such as average vessel revenues, operating costs and net profits to the owner were estimated for 1997 for each of the three trawl fleets (Ferreira 1998a). Economic parameters for the fleets operating

monofilament and multifilament gillnet, banking, a-la-vive and palangue lines were obtained from a similar study conducted in 2000 (Soomai and Seijo, 2000).

Bio-economic analyses for the shared Trinidad and Tobago – Venezuela shrimp fishery for 1995 to 1998 indicate that the shrimp resources were over-exploited and a reduction to 80% of current levels of effort will increase profits to the fishery by 12% (Seijo et al. 2000; Ferreira and Soomai 2001). Bio-economic analysis of the artisanal groundfish fishery showed a major decline in yield, net revenues and biomass of *M furnieri* and *C. jamaicensis* under current conditions of ‘open access’. The recommended management option is to limit effort of all fleets to maintain the resource and the profits to the fishery at sustainable levels (Soomai and Seijo 2000).

Perceptions of fishermen in general

A ‘local knowledge survey’ of 100 fishermen operating out of sites on the west coast of Trinidad, was carried out by the Fisheries Division in 1994 under the FAO/UNDP Project INT/91/007 (Ramjohn, 1995). The survey was developed in order to document the views, perceptions and attitudes of the fishing industry on resource management issues in the coastal area. The interviews were carried out using a questionnaire developed for the survey on a sample of 5% of the estimated population of fishermen, stratified by fishing method based on a 1991 census.

Results of the 1994 local knowledge survey indicated that all fishermen noted a decline in individual catches. The majority perceived that trawling activities posed the greatest threat to the marine resources of the Gulf of Paria due to the physical damage to the seafloor and destruction of juvenile fish. Trawl respondents, however, indicated that industrial pollution was the major cause for declining catches. Of the trawl respondents, 39% felt that trawling was responsible for the decline, with artisanal trawlers holding industrial trawlers responsible and industrial trawlers claiming that the inshore activities of artisanal trawlers were responsible.

The fishermen interviewed were generally of the view that the Government should introduce controls in the form of zonation, restricted areas and times of operation, and open/ closed seasons

for this particular fishing method in the Gulf of Paria. It was also noted that fishermen employing other methods considered trawling to be separate from other types of fishing and this perception affected their response to questions on the possible effects of over-fishing in the Gulf of Paria. It was not perceived that there could be over-fishing by other fishing methods.

Perceptions of fishers involved in the shrimp fishery

In November 1999, in the preparatory phase of Project EP/GLO/201/GEF, a survey of key individuals in the trawl fishery was conducted to examine the perceptions on issues related to shrimp exploitation and the impacts of this fishery on the resources and environment (Kuruvillea 2000). Key fishermen operating at the major trawl landing sites on the west coast were selected to be interviewed.

All fishermen interviewed were generally of the view that pollution of the inshore area, due to industrial and agricultural run-off, has resulted in a significant decrease in fish populations. Many fishermen were also of the view that trawling for shrimp in inshore areas, which is prohibited under national legislation, is responsible for a further decrease in resources due to the removal, of large amounts of juvenile fish as by-catch, and physical damage to fishing grounds. It is the common view of all trawl fishermen that there is an urgent need for government to enforce the regulations governing area/zone restrictions particularly with regards to artisanal vessels.

The view was also commonly held that shrimp and fish resources can be managed by the implementation of a closed season for trawling as well as limiting fishing effort by monitoring entry of new trawlers into the fishery. Artisanal fishermen also believe that educating younger fishermen in resource management and increasing awareness on the impacts of fishing and land-based activities on the marine environment will contribute to management of the marine resources. A National Workshop on Shrimp and Groundfish Fisheries held in 2000 reiterated these views and emphasized the importance of collaboration between the industry and the Fisheries Department on improvement of data and information collection systems to inform management approaches, and the need for regular consultation with the fishing industry. The

industry recommended a review of current fisheries consultative arrangements and increased stakeholder participation in management decision making (FAO, 2001).

There is still inadequate data and information available on the socio-economic importance of trawl bycatch to the fishing industry and the communities supported by that industry. Additional information will be gathered under the project to inform management decisions and ensure the economic viability of the fishery.

4. CONCLUSIONS AND RECOMMENDATIONS

The coastal areas of Trinidad and Tobago are a critical natural resource as they yield to the increasing demands for industrial, housing and tourism development. The Gulf of Paria coastal zone on the west coast of Trinidad is most affected by these developmental pressures. Many studies have focused on this coastal area because of its importance as a fishing ground and as a site for industrial activity, agriculture and shipping. The important role of fisheries in terms of social cohesion and employment for persons in coastal communities has also been recognised.

The Town and Country Planning Division of the Ministry of Planning and Development is the responsible agency for coastal zone management, however, it does not include those disciplines which deal with the marine environment and adequate institutional arrangements do not exist for dealing with the complexities of coastal area development. The IMA and later the EMA were established as multi-disciplinary agencies to deal with coastal zone management in Trinidad and Tobago. In spite of this, institutional arrangements for resource management and coastal zone planning are still fragmented.

Currently, the state of coastal land administration and management in Trinidad and Tobago is such that government policies still favour the development of the lucrative energy and related sectors and little has been done to upgrade its management and administrative capabilities in the preservation of the environment. There is also no systematic development planning or studies for the sustainable management of coastal or marine lands and the only existing standards and policies are still in a preliminary stage. This situation clearly indicates the urgent need for a national plan or policy for the environment. The National Physical Development Plan recognizes that an environmental policy is needed which must be complimented by a strategy for environmental planning and conservation.

The sectoral approach to the management of coastal activities seldom takes into consideration the inter-relatedness of the activities and this approach has not been effective in managing the

coastal and marine environment. The establishment of certain inter-ministerial and inter-sectoral committees for adopting and implementing the policies relating to management of the marine and related environment does not ensure consistency and continuity. It is therefore essential that all sectoral components of coastal zone planning are placed under one umbrella and an adequately funded, dedicated administrative unit to develop this area should be established. There may also be the need to enact appropriate legislation to govern the coastal zone.

There is the urgent need to pursue the requirements for Integrated Coastal Zone Management by building on past research projects such as the FAO/UNDP Project INT/09/007 which used the Gulf of Paria as the study area. It is essential that government allocate or source the technical and financial resources needed to facilitate such studies to develop standards for development and management objectives. The major legislation for management of biological resources and ecosystems in Trinidad and Tobago consists of regulations permitting exploitation rather than sustainable management, and both primary and supporting legislation are antiquated and ineffective with low penalties. Management of resources and the assessment of the well being of coastal communities require interdisciplinary research such as in the natural and social sciences.

With regard to a global perspective as it relates to trade, it has been noted that an integrated approach to development, including infrastructural developments, to assist industry in maximizing opportunities afforded by a liberalized trading environment is urgently needed. This will demonstrate seriousness in addressing environmental concerns, and ensure that the development process considers the coastal environment and minimizes impacts on coastal and other resources in the interest of sustainability (Fisheries Division 1995a; Kuruvilla and Chan A Shing 2002).

The socio-economic and demographic analyses on fishing communities collected under the FAO/UNDP Project INT/91/007 Integrated Coastal Fisheries Management remain the only focused and accessible studies conducted with regard to the significant role of fisheries in poverty alleviation. Even though the studies were specific to two communities where trawling is the primary fishing activity, the results of the demographic and socio-economic analyses can generally describe other coastal fishing communities particularly in the artisanal sector.

Indications are that the standard of living is considerably lower for the fishing component of the community than for the non-fishing component; number of persons per household is higher than the national average; low levels of education are prevalent and consequently the ability to seek alternative forms of employment are limited. This situation, understandably, explains the government's continued welfare approach to management of the fisheries, but this is not consistent with fisheries management approaches in the context of sustainable use of natural resources.

The community profiles prepared under the FAO/UNDP Project INT/91/007 as well as other data collected by private agencies have been mainly incorporated into the preparation of environmental impact assessments for coastal development. The inclusion of the fisheries sector in development plans under review by the EMA is an initial step in the development of an integrated approach to coastal development. Sufficient data on fishing communities are not available for inclusion in decisions for land use plans and there is a definite need for adequate and sustainable social and economic data collection programmes to be implemented.

It has been recognized that fisheries plays a significant role in rural poverty alleviation in coastal communities and therefore the socio-economic importance, particularly of artisanal fisheries, must be a major consideration in decision-making. Traditionally, fisheries data collection and research focused on biological data however, fisheries assessments incorporating social, economic and biological data in dynamic models are more indicative of changes in the performance of the fishery and quantifying the impact on the well-being of fishing communities. In spite of regional initiatives under CFRAMP in the collection and use of social and economic data, the Fisheries Division currently lacks the technical expertise and human resources to effectively implement and conduct detailed socio-economic data collection and analyses of fishing communities.

The greatest challenge with regard to strengthening the use of socio-economic and demographic indicators in coastal zone management, planning and conservation is the change in attitudes both by government and resource users. The general lack of trust and suspicion that fishers hold for government can only be removed by building greater awareness and understanding for each

party's activities. This can be accomplished through the establishment of an operational Extension Unit within the Fisheries Division. This requires enhancing the institutional capacity in terms of administrative structures as well as the human resource capabilities to deliver adequate extension services to the fishing communities. At present, the Extension Unit of the Fisheries Division provides mainly administrative type services linked to the licensing and registration of fishermen and vessels and the provision of beach landing infrastructure. Effective extension services will ensure that there is a two-way transfer of information between the government and the fishing industry. The government needs to focus on the on-going education of fishers to keep them abreast of government's activities with regards to fisheries research and administration through the preparation of resource management and conservation-related information and advisories as an aid to communication and the building of awareness within the fishing industry. The government also needs to continue documenting local knowledge of the fishers. This system will improve relations between the fishing industry and the government and foster a new environment of trust.

To complement the establishment of an Extension Unit, government support must be given to the strengthening of user organizations. It is necessary to examine the critical factors which contribute to the success of these organizations and the histories of failed initiatives. Ferreira (1998b) and Boodoosingh (1995) suggest an approach that focuses on commonalities, so that the formation of fishing organizations can be encouraged based on homogeneity in fishing activities, since shared issues are more likely to be vigorously pursued, for example, establish an "Association" of artisanal trawler owners. Consideration should also be given to the co-management approach to managing fisheries.

The national issues regarding fisheries and aquatic resources and coastal zone management requiring immediate action are:

1. Finalization of the Draft Fisheries Management Bill and implementation of the new Marine Fisheries Management Act.

This will allow for development of a cooperative/integrated approach to fisheries management.

2. Approval and implementation of the proposed restructuring of the fisheries administration.

This will provide the institutional and administrative structure to efficiently manage the fisheries sector and provide for fisheries extension services.

3. Strengthen the institutional capabilities of the Ministry of Agriculture, Land and Marine Resources and specifically the Fisheries Division to enable socio-economic data collection from fishing communities and relevant analyses.

4. Formulation of a national plan or policy for the environment.

This will provide for environmental planning and conservation as well as the institutional restructuring to enable the positioning of all sectoral components of coastal zone planning under one administrative unit to coordinate activities and prevent the jurisdictional problems. It will also provide for the enactment of appropriate legislation to govern the coastal zone.

5. Establish formal linkages between the Fisheries Division and other government agencies with primary responsibility for collection of social, economic and demographic information.

These institutions include the Central Statistical Office and, Ministry of Community and Social Development.

6. Formulation of special projects focused on consolidation of socio-economic data and information for both fishing and non-fishing communities in the coastal zone.

These projects should include the development of databases comprising relevant information which often exists as 'grey-literature', identifying institutional sources of data, information and technical expertise. This will provide government agencies and non-governmental organizations with a comprehensive basis to plan and implement programmes of coastal zone development and management.

7. Government commitment to incorporate socio-economic issues in coastal zone planning and the allocation of financial and technical resources to conduct interdisciplinary research to provide the technical basis for the management of natural resources and the assessment of the well being of coastal communities. Where necessary, external financial aid and technical expertise should be sourced from regional organizations such as the CRFM and international organizations such as the FAO and GEF.

8. In terms of socio-economic information, further investigations into the role of women and children in the fisheries sector are necessary especially with regard to their contribution to the labour force and the conditions of employment.

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Additional sources of information:

Tourism and Industrial Development Company (TIDCO)

World Bank's World Development Indicators database for April 2004.

TERMS OF REFERENCE

1. General country information (3pages)

1.1 Population:

size; age; and ethnic composition, average income; percentage of population living in poverty; population growth rate; child mortality rate; % of urban and rural population; % of population living in coastal towns and villages; unemployment.

1.2 Economy:

GDP: value and type of imports and exports; contribution of fisheries and aquaculture to GDP; fishery sector; number of fishing boats and gears by type; number of fishers (ft, pt): production.

1.3 Political, legal and administrative structure:

General and with special reference to regional planning and development and conservation.

2. Institutional and legal arrangements for the management, development and conservation on fisheries, aquatic and other coastal resources (8 pages)

2.1 Administrative arrangements for the management, development and regulation of fisheries and aquaculture.

2.2 Administrative arrangements for the conservation and rehabilitation of the coastal environment and aquatic resources.

2.3 Administrative arrangements for regional planning and development in coastal regions.

2.4 Efforts undertaken in past and present, in the field of co-management of fisheries and coastal aquatic resource: constraints encountered, results achieved, future outlook and next steps to be taken.

2.5 Efforts undertaken in past and present, in the field of integration of fisheries and coastal aquaculture into coastal area management, planning and conservation: constraints encountered, results achieved, future outlook and next steps to be taken.

3. Consideration of socio-economic and demographic concerns (10 pages)

- 3.1 Availability of socio-economic and demographic information on coastal fishing communities; list study reports, agencies which conduct/ed studies including fisheries censuses.
- 3.2 Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans: provide examples of cases where socio-economic and demographic data has actually been used in the preparation of coastal area profiles and management plans. Specify which data has been used where it has been obtained from, i.e. extracted from population censuses, demographic and health surveys or other national surveys or from primary data collection. If no socio-economic and demographic indicators have been used so far, are there any plans to use them in future. Specify plans.
- 3.3 Preparation and implementation of special projects and activities in the context of fisheries and coastal area management and conservation programmes, which aim at improving the socio-economic well being of coastal fishers and their families. Please give five specific examples of such project and activities, elaborate on constraints encountered, achievements and future outlook.
- 3.4 Use of socio-economic and demographic indication in monitoring the impact of management regulations and measures on the socio-economic well-being of coastal fishers, their families and other segments of the coastal population. Please give specific examples and elaborate on constraints encountered, achievements and future outlook.

4. Conclusion and recommendation (4 pages)

Summarize it and to what extent socio-economic and demographic concerns have been addressed in fisheries and aquatic resources management, planning and conservation. Make specific recommendations as to how the use of such socio-economic and demographic indicators in coastal and fisheries management can be strengthened, as to which organization should be involved and identify local and foreign (including regional) assistance needs.