| FISHERY AND AQUACULTURE COUNTRY PROFILE | Food and Agriculture Organization of the United Nations | FID/CP/TLS |
|---|---|---|
| PROFIL DE LA PÊCHE ET DE L'AQUACULTURE PAR PAYS | Organisation des Nations Unies pour l'alimentation et l'agriculture | December 2009 |
| RESUMEN INFORMATIVO SOBRE LA PESCA Y LA ACUICULTURA POR PAÍSES | Organización de las Naciones Unidas para la Agricultura y la Alimentación | |

**NATIONAL FISHERY SECTOR OVERVIEW**

**TIMOR LESTE**

## 1. GENERAL GEOGRAPHIC AND ECONOMIC DATA

| | |
|---|---|
| Area: | 14 919 km² |
| Water area: | N.A. |
| Shelf area/EEZ: | 25 648 km$^2$ / 72 000 km$^2$ |
| Length of continental coastline: | 730 km |
| Population (2008): | 923 198 |
| GDP at purchaser's value (2007): | USD 453 million[(1)] |
| GDP per head (2007): | USD 392.5[(1)] |
| Agricultural GDP (% of total) | USD 32.2%[(2)] |
| Fisheries GDP (2004): | USD 5.7 Million [(3)] |

## 2. FISHERIES DATA

| | **Production** | **Imports** | **Exports** | **Total Supply** | **Per Caput Supply** |
|---|---|---|---|---|---|
| | tonnes live weight | | | | kg/year |
| Fish for direct human consumption | 5 024[(4)] | 0 387.1 | 0[(4)] | 4 884[(4)] | 4.36[(4a)] |
| Fish for animal feed and other purposes | N.A. | N.A. | N.A. | N.A. | N.A. |

| | |
|---|---|
| **Estimated Employment:** | |
| (i) Primary sector (including aquaculture): | 7600 |
| (ii) Secondary sector: | N.A. |
| **Gross value of fisheries output (2004)** | USD 5 759 602[3] |
| **Trade:** | |
| Value of fisheries imports (2005): | USD 2 654[3] |
| Value of fisheries exports: | N.A. |

## 3. FISHERY SECTOR STRUCTURE

### 3.1 Overall fishery sector

Reliable data and information on the fishery resources of Timor-Leste are scant. Records from Indonesian times are highly aggregated and do not provide useful information about the country's fishery and its status prior to independence. The information collated in this profile is primarily based on current data recorded by the State Secretariat for Fisheries[1] (SSF) and augmented by information obtained from various project reports and from fisheries officers in Timor Leste. In 2003, annual losses from IUU fishing were estimated at some USD 20 million. Mitigation of this would be achieved by introducing income from access licenses of approximately USD 15 million and projected income from fish exports a further USD 5 million[2]. Potential annual catches have been projected to 116 000 tonnes, although actual annual estimated catches (not including loses from IUU fishing) are below 10 000 tonnes.

Small-scale coastal fisheries dominate the fisheries sector and are restricted to a relatively narrow area along the coastline. Freshwater fisheries activities, i.e. inland capture fisheries, are largely limited to the monsoon season and predominantly carried out for subsistence. Back-yard fish farming activities are being promoted by the government to supplement rural food production with additional animal protein. Such small-scale aquaculture activities are concentrated on milkfish, tilapia and carp, and are found in the coastal districts of Biqueli and Liquica.

Before independence, off-shore and coastal fisheries were dominated by Indonesian fishers using motorized vessels. Many of these vessels were destroyed during the struggle for independence and subsequently Indonesian fishing in Timorese waters has been disallowed. Not having a domestic commercial fishing fleet, Timor-Leste entered a number of bilateral agreements that gave foreign fishing fleets limited access to the country's deep-sea fishing areas under the condition that the catch was landed and shipped through ports in Timor-Leste. Some of these access agreements were cancelled due to non-compliance issues, others expired and were being re-negotiated as of October 2009.

These agreements aim at regulating and ensuring benefits to Timor-Leste from its major fishing grounds located South and Southwest of the mainland. The shallow Sahul-banks in the South are considered the most productive fishing grounds. These grounds are often fished illegally by foreign commercial fishing fleets.

The topography of the country makes transport of fresh fish difficult. Lack of processing and landing infrastructure compound the problem of fish marketing and trade. The domestic market for fish thus remains rather underdeveloped and for many upland communities in the country's interior, fish is not a substantial part of their food consumption. The average domestic fish consumption is thus relatively low, with 1.96 kg per capita per year (weight of product actually consumed), with higher consumption levels in the capital Dili and coastal areas.

### 3.2 Marine sub-sector

Marine fisheries are characterized by artisanal, small-scale fishing operations. The number of fishers is steadily increasing, with the number of artisanal fishers reaching nearly 5 300 in 2009 using nearly 3 000 fishing vessels, up from 4 940 fishers and 2 230 fishing vessels in 2004. Of these fishing boats 615 are motorized, but only eight have an inboard engine. The boats used allow for fishing only within inshore areas close to the beach.

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[1] The State Secretariat for Fisheries, under the Ministry of Agriculture, is the main government institution responsible for fisheries management. It is headed by the Secretary of State for Fisheries and managed by the National Director. See Section 10 for institutional arrangements.

[2] Acacio Guterres (2003)."Planning for fisheries development in East Timor" in Agriculture: New Directions for a New Nation — East Timor (Timor-Leste). Edited by Helder da Costa, Colin Piggin, Cesar J da Cruz and James J Fox. ACIAR Proceedings No. 113. (printed version published in 2003)

The small-scale nature of fishing operations means that fishing is no more than a supplementary activity for coastal communities, where inhabitants derive their livelihood from a variety of activities. It is estimated that fishing is the main source of livelihood only for about 20 percent of coastal fishers.

Industrial fishing occurs mainly along the South coast. As mentioned, Timor-Leste does not have a domestic off-shore fishing fleet and has in the past issued fishing licences to foreign fishing vessels within the framework of bilateral fishing agreements. These agreements have not been renewed, as the government seeks to ensure greater benefits for its own fishers. Negotiations with overseas fishing companies are underway. Discussions include agreements on establishing fish handling and processing facilities in the country itself and measures to prevent offshore transshipment of fish caught by foreign fishing vessels fishing under license agreements.

### *3.2.1 Catch profile*

Disaggregated species-wise catch data are not available. Observations of roadside marketing and landing sites indicate a high diversity of fish caught from nearshore fisheries. Fish from offshore commercial fishing is less evident in markets.

FishBase (2006) lists 144 marine fish species in 38 families for Timor-Leste waters, with one species, the bigeye tuna (*Thunnus obesus*) listed as threatened, 18 of the species as being pelagic and 10 of the species as being deep water. Many of the species listed for Timor-Leste are found throughout the tropics and are important commercial species, such as tunas, mackerels and snappers.

Among the more common reef fish landed in Timor Leste the following families dominate: Serranidae (groupers), Scaridae (parrotfish), and Lutjanidae (snappers).

This reflects the productivity and biodiversity of tropical coastal eco-systems characterized by coral reefs, rocky shores and a narrow shelf area. The narrowness of the shelf area and the substrate do not provide for a productive fishery of demersal species. Local fishery officers report that along the North coast small pelagics and some small reef fish dominate, a consequence of the fact that the majority of fishing operations is carried out in very shallow waters near the beach. The composition of the catch in this area is corroborated by a "Reef-check team" that conducted various reef and resources surveys between 2006 and 2008. They report that larger commercial reef fish (groupers, Serranidae, and snappers, Lutjanidae; larger than 40 cm) were rarely observed, and it appeared that smaller species, such as butterflyfish (Chaetodontidae), were being targeted by fishers (ReefBase 2008) operating in this area.

A socio-economic survey of fisheries in three coastal districts provides an overview of common fishing gear and their respective target species:

**Table 1 - Types of fish caught per fishing gear by district**

| | FISH CATCH | | |
|---|---|---|---|
| Fishing Gear | BOBONARO | DILI | VIQUEQUE |
| Gill net | banyar/kombong (red snap per), *caroba,* kamerra (red emperor), coco (giant tre-vally), daun (long tom), ikan manu (flying fish), sardines *tengiri* - | alu-alu (barracuda), *atun*, banyar fatuk (fusilier), banyar mutin (white snapper), bifnangka (goatfish), *bubara*, coco (giant trevally), *compor batu buraka, comporlaya*, daun (long | tongkol (spanish mackerel), sardines, garopa toke (estuarine rockcod), Indian mackerel, coco (giant trevally), banyar/kombong (red |

| | | |
|---|---|---|
| | tom), *ekor kuning*, *fatula*, garopa (coral trout), gurita (octopus), kamerra (red emperor), ikan manu (flying fish), *kakap, kerbil,* kafir (surgeonfish), tongkol (spanish mackerel), kalepa (butterfish), *karala,* kerapu (sea bass), *kitam*, *kompolaer*, *labul*, *lalusi*, sardines, lanjara (black marlin), niru (blue tusk fish), *trigger* | snapper) |
| Fish trap | atun, banyar/kombong (red snapper), boek fatuk (lobster), lanjara (blackmarlin), *kerbil*, garopa (coral trout), kerapu (sea bass), coco (giant trevally), *Kail* | |
| Crab pot | banyar mutin (white snapper), banyar/kombong (red snapper) | |
| Hook and line | banyar/kombong (red snapper), tuna, boek fatuk (lobster), *bubara*, *buraka*, ikan manu (flying-fish), kamerra (red emperor), coco(giant trevally), *kerbi*l | maromak china (queenfish), shark, garopa toke (estuarine rock-cod), coco (giant trevally), tongkol (Spanish mackerel), red fish, kassareta (skip-jack tuna), white fish |
| Spear gun | banyar fatuk (fusilier), ,garopa (coral trout), *buraka,* banyar/kombong (red snapper), boek fatuk (lobster), coco (giant trevally), gurita (octopus), ikan manu (flyingfish), *kail*, kerapu (sea bass), sardines, *kitam*, niru (blue tusk fish), *salar, kerbil* , suntu(squid) | |

Source: Didi B. Baticados: Socio-Economic Issues in Fishing Communities and Socio-economic Indicators to Monitor and Evaluate Sustainable Fisheries Development in East Timor

Though actual catches and effort are unknown it is anticipated that over-exploitation may become an issue in the near future. Available information from a few research projects that were conducted in the recent past indicate that overfishing might already impact fish populations along the north coast. (Deutsch, C., n.d. Coral Reefs in East Timor: An Investigation of the Impacts of Fishing on Reef Abundance. EM 531 Project Report.)

### *3.2.2 Landing sites*

Being small-scale and artisanal, fishers tend to land their catch close to their respective homes and villages. During pre-independence times, the Indonesian Government organized 151 fishing centers that served as the main landing sites for local fishers and resource users. Fish is sold and marketed from these centers and the government aims to use these centers as the basis for establishing a more reliable knowledge base about landed and traded fish. These landing sites are also intended to serve as local foci for fisheries management, where fishers get organized in groups and can participate in local fisheries management decisions. In some

instances, fishers organized through a fishing center developed a set of fishing rules and regulations for local fisheries.

Currently, no data on the volume of fish landed at each site is available. The following table provides an overview of marine capture fish production per district.

**Table 2 - Estimates of Total Marine Fisheries production (kg) [5]**

| District | 2007 | 2008 |
|---|---|---|
| Ainaro | 9 000 | 14 400 |
| Ambeno | 207 900 | 247 500 |
| Baucau | 76 500 | 93 600 |
| Bobonaro | 331 200 | 357 300 |
| Covalima | 154 800 | 203 400 |
| Dili | 1 035 000 | 1 170 900 |
| Liquica | 498 600 | 497 700 |
| Lautem | 111 600 | 130 500 |
| Manufahi | 153 900 | 202 500 |
| Manatuto | 229 500 | 176 400 |
| Viqueque | 103 500 | 112 500 |
| **Total** | **2 911 500** | **3 206 700** |

Source: SSF fisheries database

### *3.2.3. Fishing production m*eans

As the marine fishery sector is dominated by small-scale, artisanal fishing, the majority of fishing boats are small outrigger canoes, which are operated by 1 – 5 fishers, depending on the boat size. There are currently (2009) 2 948 fishing boats, out of which 615 are motorized. Accordingly, fishing gear is mostly hand operated and selected according to both fishing area and targeted species. Fishing activities generally take place during early morning and/or late afternoon hours. The preferred fishing gear depends on the fishing ground, with a preference for handlines and spears when fishing in reef areas. Of increasing importance are gill nets, which have been distributed to fishers by the Government as well as NGOs. In coral reef areas, fishers use small enclosing nets, into which they drive the fish by using a group of divers that scare the fish into the net.

Some NGOs have introduced long-lines, which, like other fishing gear, are operated in near-shore areas. The lines are about 100 meter long and have 40 hooks, which are baited with small fish that the fishers buy from other boats. However, in general fishers who have received these long-lines prefer to continue to use gill nets as the long-lines are unfamiliar and produce smaller catches.

## 4. MAIN RESOURCES

Being part of the Indo-Pacific 'coral triangle' Timor-Leste's marine resources are characterized by the high biodiversity associated with coral reefs. Fringing reefs form an almost continuous strip along the coast of East Timor, with the topography along the north coast ranging from gentle slopes to sheer walls. A recent marine habitat mapping project along the Northwest coast shows no indication of obvious anthropogenic damage, bleaching or disease to the corals. However, their data do indicate an obvious lack of large predatory fish and macro invertebrates such as giant clams and crayfish. Focusing on the area of the Nino Konis Santana Marine Park they also report a low coral and high fish diversity. (The Timor-Leste coastal/marine Habitat Mapping for Tourism & Fisheries Development Project).

Thus, overall diversity is high, both in terms of inshore, coastal fish populations (e.g. snappers and groupers) and offshore pelagic and mid-water species (e.g., mackerel and tuna). A fish identification guide developed in 2006[6] through a market survey and observations at landing sites, lists more than 130 species. These are important both for subsistence and for the generation of income at the village level. As mentioned above, FishBase lists 144 species for the country.

Fishery resources off the Southern coast are considered of greater commercial value than those found off the North coast. In the south species belonging to the families of Balistidae, Serranidae, Haemulidae, Scaridae, Lethrinidae, Lutjanidae are in greatest abundance.

## 5. MANAGEMENT APPLIED TO MAIN FISHERIES

Fishery resources in Timor-Leste were considered underexploited for several years following resource estimates undertaken shortly after independence. In 2004 the SSF estimated that only 53% of the country's marine fishery potential was being utilized. Accordingly, policies are focused on assisting fishers to improve their catch, e.g. through the distribution of fishing gear and engines.

A draft "Policy and Strategy for the Fisheries Development in Timor-Leste" provides the general framework for the development and management of the sector. While not yet (October 2009) officially adopted, this document reflects the major policy goals and management approaches for the fisheries sector.

1. Optimal Use and management of Living Resources
2. Habitat conservation
3. Fishing industry development
4. Aquaculture Development, and
5. Development of Fisheries Institutions

To achieve these, the document suggests

- to limit the number of vessels operating in Timor-Leste's waters and so controlling the amount of fishing by both national and foreign fishing vessels;
- to ban the use of destructive fishing methods including bottom trawling and fishing with explosives and poisons;
- to halt the destruction of scarce fish nursery habitats such as mangroves, corals reefs and sea grass beds;
- to avoid targeting spawning aggregations of vulnerable, high-value reef species;
- to limit the impacts of various forms of pollution and sediment run-off caused by the felling of trees, and by agriculture and coastal infrastructure projects, and,
- to promote sustainable foreign investment in fisheries and aquaculture.

The implementation of these policy directions is governed by a set of laws and ministerial edicts as follows:

**Table 3**

| Law/Ministerial Edict No. | Title |
|---|---|
| DECREE NO. 5/2004 | GENERAL REGULATION ON FISHING |
| DECREE-LAW No. 6/2004 OF 21 APRIL 2004 | GENERAL BASES OF THE LEGAL REGIME FOR THE MANAGEMENT AND REGULATION OF FISHERIES AND AQUACULTURE |
| LAW NO. 12/2004 | FISHING-RELATED OFFENCES |
| MINISTERIAL ORDER No. 06/42/GM/II/2005 | SANCTIONS FOR FISHERIES INFRINGEMENTS |

| | |
|---|---|
| MINISTERIAL ORDER No.04/115/GM/IV/2005 | LIST OF PROTECTED AQUATIC SPECIES |
| MINISTERIAL ORDER No.03/05/GM/I/2005 | PERCENTAGES OF BYCATCH |
| MINISTERIAL ORDER No.02/04/GM/I/2005 | MAIN FISHERIES |
| MINISTERIAL EM CONJUNTO: MINISTERIAL ORDER No.01/03/GM/I/2005 | DEFINITION OF FISHING ZONES |
| MINISTERIAL ORDER No.05/116/GM/IV/2005 | MINIMUM SIZE AND WEIGHT OF CAPTURE SPECIES |
| MINISTERIAL ORDER No.06/42/GM/II/2005 | FINES FOR FISHING INFRACTIONS |
| DECREE-LAW No. 21/2008 OF 25 June | IMPLEMENTATION OF THE SATELITE SYSTEM FOR MONITORING FISHING VESSELS |

Decree laws No. 5 and 6 of 2004 establish the State as the owner of the country's fishery resources and provide the general rules and regulations that determine how these resources can be utilized. The laws highlight the importance of establishing rules that ensure the sustainability of the resources and acknowledge that the participation of critical stakeholder groups such as resource users, local NGOs and community representatives, academic institutions and other social, professional and economic partners associated with the sector is a prerequisite for ensuring resource management regimes that are sustainable.

The laws differentiate between commercial and non-commercial, subsistence fishing activities and require licensing of all commercial fishing, be they artisanal, semi-industrial, or industrial. In practice, the SSF strives to license all fishing boats to have a reliable data-base on the number of boats operating in national waters. A ministerial ordinance provides details about the fines to be paid for fishing without a licence.

The Ministerial Order No.02/04/GM/I/2005 defines six major fisheries and stipulates the establishment of Total Allowable Catch limits for each of these, based on best scientific information:

a) Tuna fishery
b) Demersal fishery
c) Large pelagic fishery
d) Small-pelagic fishery
e) Shrimp fishery
f) Lobster fishery.

For each of the identified categories of commercial fishing, the DIPLOMA MINISTERIAL EM CONJUNTO: MINISTERIAL ORDER No.01/03/GM/I/2005 establishes a fishing zone, that is reserved for this particular type of fishing, as summarized in the table below.

**Table 4. Timor-Leste Fishery Management Zones**

| Category | Distance from shore | Type of fishing |
|---|---|---|
| Zone A | < 200 m | Artisanal |
| Zone B | 200m - 3 nautical miles | Domestic Semi-industrial |
| Zone C | 3 - 12 nautical miles | National industrial (South Coast) |
| Zone D | >16 nautical miles | Foreign Semi-industrial (South Coast) |
| Zone E | >18 nautical miles | Foreign Industrial (South Coast) |

To protect important species from overfishing, limits on the minimum size of caught fish are

set by the MINISTERIAL ORDER No.05/116/GM/IV/2005. These regulations are supported by gear restrictions, such as a minimum mesh size. For gill nets it is set at 1.5 inch, which is the only management measure that is currently strictly enforced by the SSF.

As the conservation and protection of marine resources is one of the country's guiding principles for its fisheries policies, the SSF is considering the establishment of Marine Protected Areas and has been working with local communities to identify suitable sites. As part of the Nino Konis Santana National Park, Jaco Island and the surrounding fishing grounds have been declared a Marine Park, which is informally known as the Jaco Island Marine Park. Additionally, Marine Protected Areas are planned in Atauro Island and in Batugade, near the border to West Timor.

## 6. FISHERMEN COMMUNITIES

### 6.1 Inland sub-sector

Inland capture fisheries practically exist only as subsistence activities. Rural communities engage in fishing activities seasonally, i.e. during and just after the monsoon. SSF promotes freshwater fish farming, which will be described below.

### 6.2 Recreational sub-sector

There is no recreational fishing in Timor-Leste. However, a recent coastal habitat-mapping project that was implemented with the University of Darwin assessed sport-fishing opportunities around Jaco Island and concluded that this area provides unique opportunities to recreational fishers because of its diversity of both reef and pelagic fish species.

### 6.3 Aquaculture sub-sector

Aquaculture activities are focused on freshwater fish farming. The government promotes small-scale, "backyard" farming of carp and tilapia to increase fish consumption in inland areas. A third species that is promoted by the government is milkfish. The number of people or households engaged in such small-scale fish farming is about 2 000 and the average size of a fishpond is below 200 sqm. Also, the Government promotes rice-fish culture to increase local supply of animal protein. Overall, the promotional efforts by the government have led to a steep increase in aquaculture production.

**Table 5**

| | Aquaculture area (ha) | | | No of people | Production (kg) | | |
|---|---|---|---|---|---|---|---|
| | Freshwater | Brackish water | Marine | | Freshwater | Brackish water | Marine |
| 2007 | 28.5 | 6 | 22 | 1 677 | 27 300 | 3 700 | 37 000 |
| 2008 | 41 | 6 | 30 | 2 622 | 45 600 | 4 500 | 100 000 |

Marine aquaculture consists of seaweed farming only. The centre for this activity is the island of Atauro. Seaweed is exported to various Asian countries, with Vietnam having received the largest share.

**Table 6 - District wise Freshwater Aquaculture Production 2008**

| District | Area (Ha) | Total production (Kg) | Total Value USD | No of fish farmers |
|---|---|---|---|---|
| Ermera | 7 | 10 000 | 25 000.00 | 350 |
| Baucau | 3 | 2000 | 5 000.00 | 210 |
| Ainaro | 4 | 5000 | 12 500.00 | 75 |
| Lospalos | 6 | 7000 | 17 500.00 | 40 |
| Viqueque | 3 | 2000 | 5 000.00 | 80 |
| Manatuto | 2 | 1500 | 3 750.00 | 45 |
| Bobonaro | 4 | 2500 | 6 250.00 | 150 |

| | | | | |
|---|---|---|---|---|
| Same | 4 | 3000 | 7 500.00 | 70 |
| Oecussi | 1.5 | 1500 | 3 750.00 | 60 |
| Aileu | 4 | 8000 | 20 000.00 | 80 |
| Liquisa | 0.5 | 800 | 2 000.00 | 50 |
| Suai | 1.5 | 1500 | 3 750.00 | 35 |
| Dili | 0.5 | 800 | 2 000.00 | 35 |
| **Total** | **41** | **45 600** | **114 000.00** | **1 280** |

To further develop marine aquaculture, the government is looking for potential investors, who can set-up floating cages in inshore waters for the production of grouper and other marine fish. However, responsible fisheries officials are also aware that such kind of marine aquaculture is limited by the availability of fish-based feed and want to avoid that locally caught fish is used as feed for more intensive marine aquaculture.

## 7. POST-HARVEST USE

The marine fisheries sector being characterized by small-scale artisanal fisheries, the places where fishers live, fish and land their catch, are close together. The general lack of infrastructure at the landing sites compels fishers to sell their catch fresh. Local traders buy the fresh fish directly from the boat and then try to sell it through small stalls along the roadside to travelers or other traders who will take the fish to the next larger town for sale.

Thus, about 75% of fish landed is sold fresh, the rest is dried, often on makeshift racks, before being transported to markets further inland. The main market for fish is the capital Dili, where restaurants and private consumers create a steady demand for fresh fish. Dili's supermarkets, however, mainly sell imported, frozen fish. They usually find the quality of the local fresh fish unsuitable.

Export of marine fish catch has nearly ceased, after the fishing agreements with foreign fishing fleets have expired or were cancelled. The recorded peak of fish exports in 2006 and 2007 of around 500 tons and 300 tons respectively, as shown in the table below, can be attributed to these fishing agreements, under which the catch was exported to Thailand. Malaysia is a market for sea-cucumber (Holothuria), while Singapore received a small amount of lobster. A pharmaceutical company exported few "marine organisms" to Spain for scientific purposes.

Vietnam has emerged as a major market for farmed seaweeds and received about 15 tons (dry weight) in 2009.

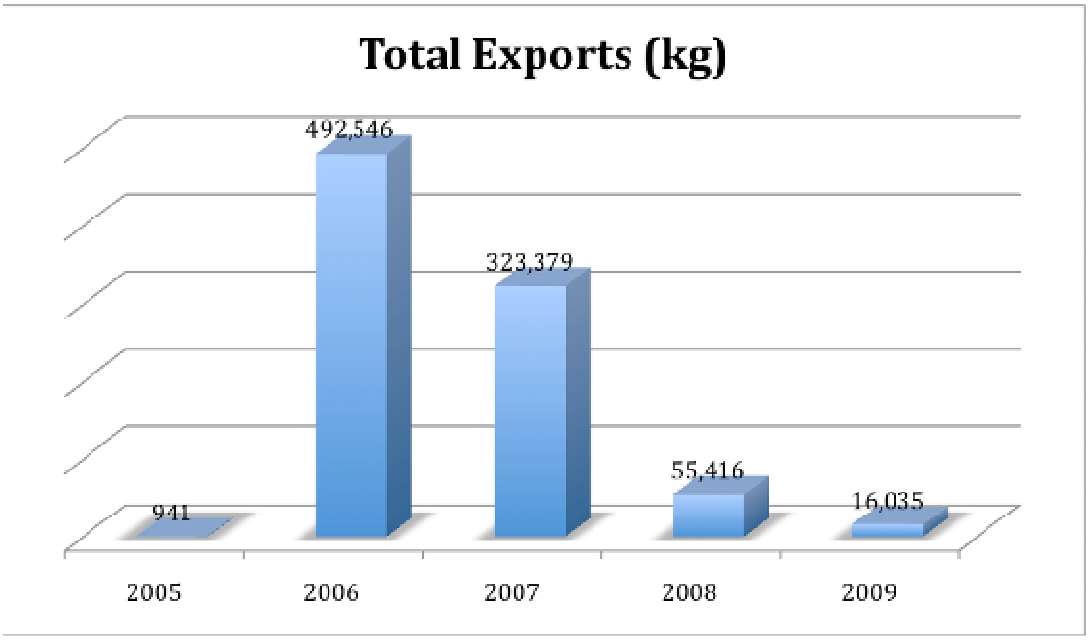



**Chart 1**

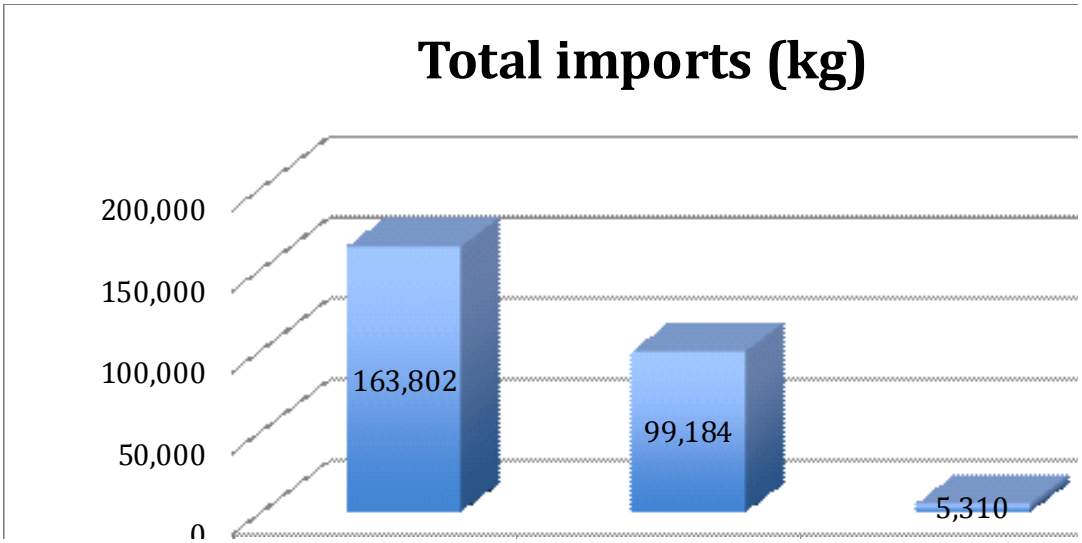



**Chart 2**

## 8. FISHERY SECTOR PERFORMANCE

Fisheries play a significant role as an additional source of income and animal protein in coastal and some inland communities. However, the number of people depending solely on fisheries for their livelihoods is rather small. Both small-scale coastal fishers and inland fishers supplement the income derived from agricultural activities by fishing, or, in inland communities, by backyard fish farming. Notwithstanding the government efforts to regulate the sector through licensing and technical support to fishers and fish farmers, the sector remains largely unregulated.

With a national income from fishing of just under 6 million USD in 2004, the sector contributes 1.4 % of the country's GDP.

While the estimates of the current exploitation level of coastal resources at 53 % might overlook the already existing indications of overexploitation and thus be over optimistic, there is no doubt, that the country is loosing a substantial amount of potential income from not

being able to reap the potential benefits from major fishing grounds such as the Sahul Banks off the South Coast. This is because the country does not have its own commercial fishing fleet and at the same time does not have the means to regulate fishing activities by foreign fishing boats in these areas. Some years ago the government of Timor Leste received a small patrol vessel from Portugal that is controlling the immediate coastline of the northern side of the island. Recently the government has acquired two boats that will be run by the national navy, who will be in charge of controlling the illegal fishing, especially in the southern sea, where the IUU is higher. It is the first time that the government has its own boats for this purpose.

Domestic demand for fish remains low, with an average per capita consumption of about 2 kg per year (weight of fish actually consumed). With an estimated annual supply of about 4.4 kg/capita (live weight equivalent), the low demand reflects both traditional and cultural preferences for other foods as well as the technical problems in fish marketing that are caused by the lack of infrastructure and transportation facilities [(5)]. However, the increase of small-scale freshwater aquaculture demonstrates that people are ready to expand the share of fish in their daily food consumption, if fish products are affordable.

As mentioned above, fish caught in coastal waters is primarily traded fresh in local markets and Dili, with virtually no export of fish products from marine capture fisheries since the fishing agreements with foreign fishing companies have expired. When local fishermen estimate that they will not be able to sell all their catches fresh to middlemen or in the local markets, they take the products to Dili or process them, especially when it comes to sardines or other small pelagic species. In this case the catch is dried or preserved in a spicy sauce made with piri piri (chilies) and bilimbi (Averrhoa bilimbi). These products are used for the own consumption of the domestic units and in most cases are sold in the same houses of fishermen. Much of the local markets sell dried fish, however, given the low production of dried fish from local fisheries, Indonesian products monopolize this market. Supermarkets and restaurants in Dili import some fish products, which are not provided by the domestic fishery. These are mainly frozen shrimp and some large pelagic fish, with Indonesia being the main supplier.

The lack of fish processing and marketing infrastructure and the nature of fishing activities prevent the sector from making a significant contribution to employment. The number of people who have no other sources of income than from fishing related activities remains small, as both the majority of fishers and fish traders have other sources of income. Even in coastal villages fishing remains a supplementary income and food generating activity, with other agricultural products being more important to the local economy than fish or other aquatic products.

## 9. FISHERY SECTOR DEVELOPMENT

### 9.1 Constraints and opportunities

The fishery sector is believed to have a great potential for growth, income generation and food supply. However, given the current status and character of the sector, substantial investments in infrastructure and processing facilities are required to increase the sector's productivity and performance. The government plans to develop and improve the facilities at the existing landing centers, of which there are about 150. These "landing centers" are currently just spots along the coast, where fishers land their fish and sell it to local traders.

As mentioned, coastal fish resources are highly diverse and composed of reef fish as well as pelagic fish species. However, the high productivity generally associated with coral reef areas is often misinterpreted as constituting a high, under utilized potential for local, coastal fisheries. But, the absence of large reef fish and the pre-dominance of small-pelagics in the catch indicate that the coastal fishery potential might not be as high as expected.

Coastal marine aquaculture is seen as a promising sector for rural development, a view that is currently supported by the success of seaweed cultivation in some areas. However, any expansion of these activities needs to carefully consider the potential impacts on the productivity of adjoining reef areas. Similarly, the development of floating marine cages, while

considered an interesting option for community-based livelihood development, may be limited and not only by the locally available fish that would be needed as feed. Developing coastal marine aquaculture also requires substantial investments in production facilities and in marketing and processing infrastructure. The distance to foreign markets other than Indonesia and Australia will make it difficult for East-Timorese fishery products to compete.

In the fishery sector the best potential for providing substantial economic benefit to the country is the commercial fishery off the South and East coast of the country. However, to realize this potential the government would have to develop a limited domestic commercial offshore fishery in these fishing grounds and, also, prevent IUU fishing of the same resources.

### 9.2 Government and private sector policies and development strategies

Current government policies are focused on five major areas:

1. Providing technical support to coastal communities to improve local fish catches and products. The government has programs through which it distributes fishing equipment to local fishers and has identified some sites that will be developed into small fish landing centers, with landing and processing facilities, cold storage and equipment repair services.
2. Improving the country's knowledge about available resources, their potential and current uses. Following an FAO project that experimented with data collection approaches through log-books, the government is currently trying to generate basic information on the amount and type of fish landed in Dili. Instead of trying to get the catch information from individual fishers, the fisheries officers now collect data from fish traders. These activities are currently limited to Dili, but might be expanded to other coastal areas, if the data collected are considered useful.
3. Addressing the IUU fisheries in the Sahul-banks fishing grounds and other areas. This is considered a priority area of the present administration, which is severely hampered by lack of resources. While waiting for the completion and delivery of vessel capable of patrolling those fishing grounds, the government currently depends on Australia for assistance in dealing with illegal fishing activities on its off-shore fishing grounds. Efforts are under way to enter new fishing agreements with foreign fishing companies and/or other governments. It is hoped that it will help to regulate fishing activities by foreign fishing vessels off East Timor.
4. Promotion of aquaculture both in inland and in coastal areas is considered as an important strategy for increasing local food security and income of rural populations. The establishment of small fishponds for backyard fish farming in rural areas is seen as a successful approach to improve local livelihoods and the government wants to expand these experiences. Floating-cage based aquaculture in coastal areas is not promoted directly, but the government seeks to attract private investment for developing this activity.
5. In line with its overarching vision of sustainable development, the government is promoting efforts to protect and conserve critical coastal habitats such as sea grass beds, mangroves and coral reefs. Conservation of coral reefs is of high priority to the government and thus its cooperation with the Coral Triangle Initiative (CTI).

For a better understanding of its coastal resources, the government did carry out a joint research project with Australia's Darwin University, through which an assessment of coastal resources around Jaco Island and the Northwest coast was undertaken. The country does not have domestic research capacities and depends on such cooperation with foreign research institutions. As mentioned before, current efforts of the government are focusing on generating baseline information on fisheries and coastal resources, as the only reasonably reliable information available is the number of fishers.

The lack of domestic research capacity is just one indicator of the capacity building needs in the fisheries sector. The country's higher educational institutions are just being rebuilt and don't offer fisheries specific courses. Higher educational degrees (Master or PhD) in fisheries related subjects are obtained from Universities in Indonesia and Australia, and, to a smaller extent, other countries such as Thailand. SSF staff rely on training and skills development

activities provided by foreign cooperation projects. The recently concluded habitat-mapping project with the University of Darwin provided some training in coral reef assessment (Reef Check), and the Coral Triangle Initiative offers training and workshops in the establishment and management of protected areas.

These capacity building and research activities within projects sponsored and supported through foreign and international development partners demonstrate the reliance of SSF on such cooperation. However, international support for the fisheries sector management and development is scarce. With two regional cooperation projects, of which one has been concluded and the second one commenced in 2009, FAO is one of the international partner providing inputs to the fisheries sector.

The "Partnerships in Environmental Management for the Seas of East Asia" and the "Coral Reef Triangle Initiative" (CTI) are the other two currently ongoing cooperation programs with SSF. With their focus on environmental conservation and habitat protection, however, these programs do not seem to have a specific fisheries management component.

## 10. FISHERY SECTOR INSTITUTIONS

The State Secretariat for Fisheries, under the Ministry of Agriculture and Fisheries , is the main government institution responsible for fisheries management. It is headed by the Secretary of State for Fisheries and managed by the National Director under the supervision of the General Directorate.
The National Directorate of Fisheries consists of four Departments, i.e., the Department for Fisheries Management, the Department of Fishing Industry, the Aquaculture Department and the Department of Fisheries Inspection, which are responsible for Management and Administration of fisheries on the national level. The National Directorate of Fisheries is decentralized to the District level, with District fisheries officers being responsible for management of fisheries at the local level. They are responsible for the management of the local fishing centers, of which there are 151.

**Table 7**

| District | Number of fishing centers |
|---|---|
| Ainaro | 2 |
| Ambeno | 13 |
| Baucao | 10 |
| Bobonaro | 11 |
| Covalina | 10 |
| Dili | |
| Mainland | 13 |
| Atauro Island | 18 |
| Lautem | 12 |
| Liquica | 31 |
| Manufahi | 5 |
| Manatuto | 18 |
| Viqueque | 8 |
| Total | 151 |

These fishing centers were established during Indonesian time as a means to decentralize fisheries management. In these centres the fishers agree on the price of fish, arrange for the traders to buy their catch and, in some places, have developed their own local fisheries rules and regulations. Only some of these centers have been reorganized after independence. The National Directorate of Fisheries has constructed nine auction centers to better control and collect data about fishing activities in the main fishing centers. These auction halls are planned to be centers to promote the development of the small scale fishing sector. They will function as local fishery management focal points, in which resources users and local stakeholders are responsible for fisheries management, with the district fisheries officers being responsible for having the general oversight.

The Secretariat of State of Natural Resources under the Ministry of Economic Development together with the Secretariat of State Fisheries are responsible for the marine environmental protection. Some pilots for the creation of Marine Protected Areas have been developed in Batugade (Bobonaro District NW of Timor Leste) and Atauro island, however, there is not a specific regulation on its use.

**Table 8** - **Timor Leste Fisheries in Figures for 2004 & Projected to 2010**

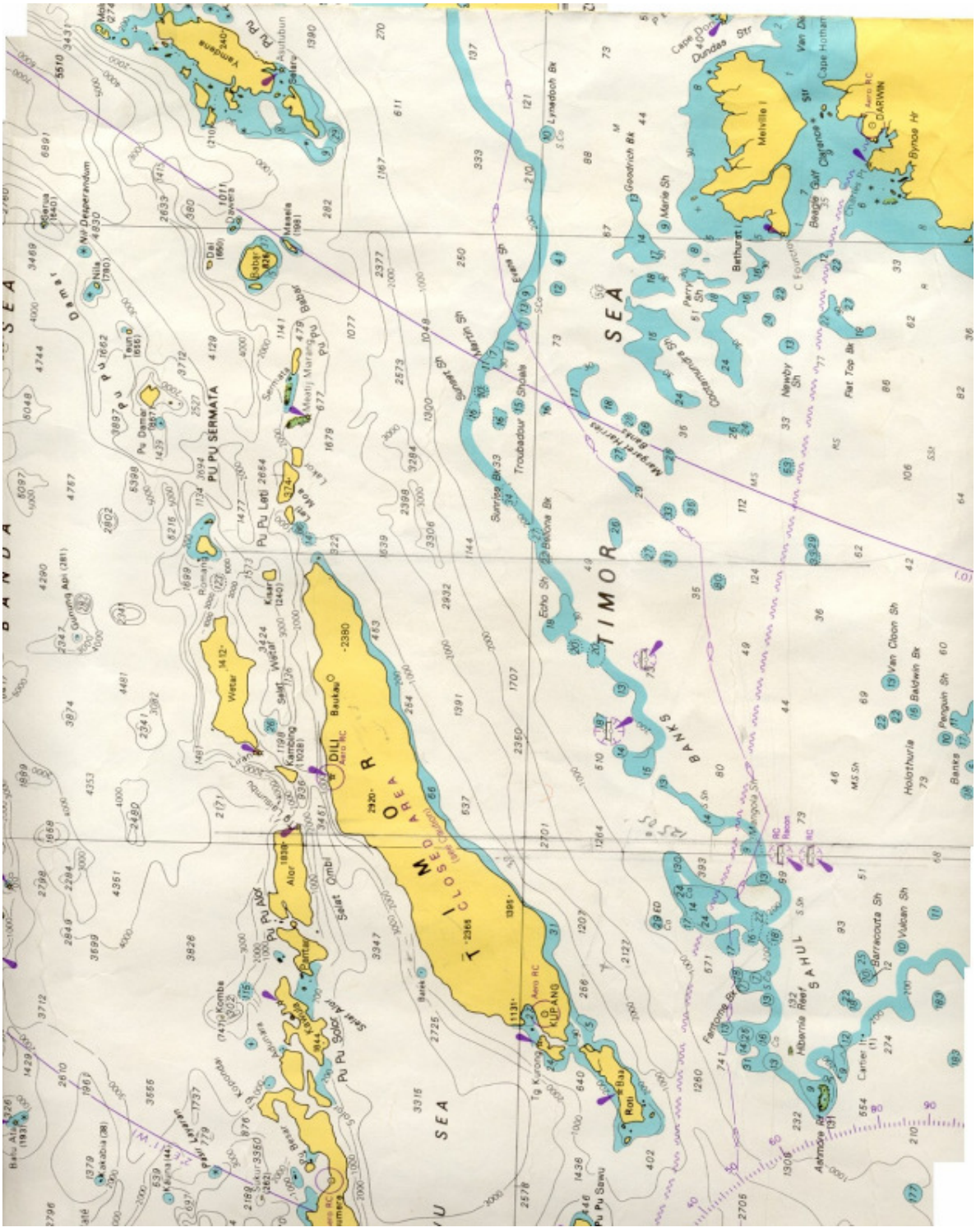
| Item | Description | | Unit | Note | Source |
|---|---|---|---|---|---|
| | **General statistics** | | | | |
| 1 | Population | 923 198 | People | 2004 | NDS 2004 |
| 2 | No of households (hh) | 194 962 | Hh | | NDS 2004 |
| 3 | Average household (hh) size | 4.7 | people/hh | | NDS 2004 |
| 4 | % of the population in labour force | 60.2 | % | | |
| 5 | % of the population in subsistence agriculture, etc | 45.7 | % | | |
| 6 | % of the population in paid labour | 13.4 | % | | |
| 7 | % of the population unemployed | 7.2 | % | | |
| 8 | % of the population in rural areas | 73.9 | % | | |
| 9 | % of the population in urban centres | 26.1 | % | | |
| 10 | Median age | 18.3 | Yrs | | |
| 11 | National income (GDP) incl. oil & gas | 407 | USD million | Basis 2003 + 5% | NA 2005 |
| 12 | National income (GDP) from agriculture | 102 | USD million | Basis 2003 + 5% | NA 2005 |
| 13 | National income (GDP) from fishing – N A | 1.0 | USD million | Basis 2003 | NA 2005 |
| 14 | National income from fishing – NDFA est | 5.7 | USD million | Basis 2004 | NDFA est |
| 15 | Fishing as a % of national income – NDFA | 1.4 | % of GDP | Basis 2004 | NDFA est |
| 16 | Average household income (per hh GDP) | 2 090 | USD/hh/yr | | |
| 17 | Average per capita income (per capit GDP) | 441 | USD/person/yr | | |
| 18 | Average agricultural household income | 691 | USD/hh/yr | | |
| 19 | Average per capita income for agriculture | 146 | USD/person/yr | | |
| 20 | Average population growth rate | 3.2 | %/yr | | |
| 21 | Projected % increase in population by 2010 | 20.80 | % compound rate | | |
| 22 | Projected population in 2010 | 1 115 252 | People | | |
| | **Fisheries statistics - 2004 base year** | | | | |
| 23 | Land area | 14 919 | km2 | | |
| 24 | Area of the EEZ | 72 000 | km2 | conservative | |
| 25 | Coastline length | 730 | kilometres | | |
| 26 | Average marine catch/unit area all sources) | 70 | kg/km2/yr | est incl. Sahul Bank | |
| 27 | Average potential marine catch/unit area | 140 | kg/km2/yr | est incl. Sahul Bank | |
| 28 | Average marine catch/km of coastline | 5 492 | kg/km/yr | est excl. Sahul Bank | |
| 29 | Average potential marine catch/km length of coastline | 10 384 | kg/km/yr | est excl. offshore potential 2,500 mt/yr | |
| 30 | Average shortfall in potential marine catch/km coastline | 4 892 | kg/km/yr | NDFA estimate | |
| 31 | Av. level of exploitation of coastal resources | 53 | % | | |
| 32 | No of fishing households (hh) | 5 000 | Hh | | NDFA 2004 |
| 33 | No of fishermen hh - part time | 4 742 | Hh | 96.0% | FAO 2004 |
| 34 | No of fishermen hh - full time | 198 | Hh | 4.0% | |
| 35 | No of fishermen hh - total | 4 940 | Hh | 2004 | NDFA 2004 |
| 36 | Number of fishing centres | 151 | | 2004 | NDFA 2004 |

| | | | | | |
|---|---|---|---|---|---|
| 37 | Number of fishermen groups | 1 095 | | 2004 | NDFA 2004 |
| 38 | Vessels without engine (2004) | 2 230 | | 2004 | NDFA 2004 |
| 39 | Average catch/vessel without engine/year | 1 200 | kg/vessel/yr | NDFA estimate | |
| 40 | Total catch - all vessels without engine | 2 676 | tonnes/yr | | |
| 41 | Vessels with engine (2004) | 472 | | 2004 | NDFA 2004 |
| 42 | Average catch per vessel per year | 2 400 | kg/vessel/yr | NDFA estimate | |
| 43 | Total catch - all vessels with engine | 1 133 | tonnes/yr | | |
| 44 | Total subsistence catch (not incl. above) | 200 | tonnes/yr | NDFA estimate | |
| 45 | Total domestic marine catch (2004) | 4 009 | tonnes/yr | NDFA estimate | |
| 46 | Aquaculture | 15 | tonnes/yr | NDFA estimate | |
| 47 | Total marine & aquacult product (domestic) | 4 024 | tonnes/yr | | |
| 48 | Other catch (Sahul Bank & other IUU fish) | 1 000 | tonnes/yr | NDFA estimate | |
| 49 | Total marine & aquacult prod. (all sources) | 5 024 | tonnes/yr | | |
| 50 | Average fish supply (domestic only) | 4.36 | kg/capita/yr | excl IUU fishing | |
| 51 | Average fish consumption (domestic only) | 1.96 | kg/capita/yr | 45% conv. factor | |
| 52 | Average landed price of fish (ex-vessel) | 1.25 | USD/kg | estimation | |
| 53 | Average domestic price of fish (retail) | 1.50 | USD/kg | estimation | |
| 54 | Av. HH expend on fish (domestic supply) | 29.42 | USD/hh/yr | excl. subsist catch | |
| 55 | Total value of domestic fish output (retail) | 5 735 700 | USD | excl. subsist catch | |
| 56 | Total value of domst fish output (ex-vessel) | 4 779 750 | USD | excl. subsist catch | |
| 57 | Total cost of domst fish output (ex-vessel) | 1 500 000 | USD | estimation - 2004 | |
| 58 | % cost of domestic fish output (ex-vessel) | 31 | % cost | | |
| 59 | Av. fishers hh gross income (ex-vessel) | 968 | USD/fisher hh/yr | | |
| 60 | Average fishermen hh net income | 664 | USD/fisher hh/yr | | |
| 61 | Imports - volume | 387.1 | Tonnes | 2004 | NDS 2005 |
| 62 | Imports - value | 23 902 | USD | 2004 | NDS 2005 |
| 63 | Imports - volume | 174.9 | Tonnes | 2005 | NDS 2006 |
| 64 | Imports - value | 2 654 | USD | 2005 | NDS 2006 |
| 65 | Exports | 0 | USD | 2004 | NDS 2005 |
| 66 | Total volume of fish supplies (l.w.e.) | 4 884 | Tonnes | 2.22 x convrs factor | |
| 67 | Total value of fish supplies (retail) | 5 759 602 | USD | 2004 | |
| 68 | Av value of fish supplies (dom+impt-exprt) | 1.18 | USD/kg | 2004 | |
| | **Fisheries statistic projections - 2010** | | | assume 5%/yr gr.rt. | |
| 69 | Total population in 2010 | 1 115 252 | People | | |
| 70 | Projected increase in population by 2010 | 192 054 | People | | |
| 71 | Projected average GDP growth rate | 5 | %/yr compound | excl oil & gas rev. | |
| 72 | Total GDP by 2010 | 546 | USD million | 2004+5%/yr comp. | |
| 73 | National income (GDP) from agriculture | 137 | USD million | 2004+5%/yr comp. | |
| 74 | National income (GDP) from fishing (incl Sahul Bank) | 11.47 | USD million | 5%/yr comp. + 1 500mt*USD2.5/kg | |

| | | | | | |
|---|---|---|---|---|---|
| 75 | Fishing as a % of GDP - NDFA est. | 2.1 | % of GDP | includes Sahul Bank | |
| 76 | Total number of fishermen households (excl. foreign fleet) | 6 251 | Hh | Assume 1%/yr rise in productivity/hh | |
| 77 | Total marine & aquacult prod.(domestic) | 5 392 | tonnes/yr | excl offshore fleet | |
| 78 | Average domestic price of fish (ex-vessel) | 1.41 | USD/kg | Estimation | |
| 79 | Average domestic price of fish (retail) | 1.69 | USD/kg | Estimation | |
| 80 | Total value of domestic fish output (retail) | 9 108 869 | USD | | |
| 81 | Total value of domst fish output (ex-vessel) | 7 590 724 | USD | | |
| 82 | Total cost of domst fish output (ex-vessel) | 2 010 143 | USD | Estimation | |
| 83 | Net value added of fish output (ex-vessel) | 5 580 581 | USD | | |
| 84 | Average fishermen hh gross income | 1 214 | USD/fisherman/yr | | |
| 85 | Average fishermen hh net income | 893 | USD/fisherman/yr | | |
| 86 | Average fish supply (domestic only) | 4.84 | kg/capita/yr | excl offshore fleet | |
| 87 | Average fish consumption (domestic only) | 2.18 | kg/capita/yr | 45% convers factor | |
| 88 | Av. exploitation rate of coastal resources | 65 | % | | |

Source: Ministry of Agriculture and Fisheries, State Secretariat of Fisheries : A Policy and Strategy for the Fisheries Development in Timor-Leste, 2007

**Annex 1** - Maps[3]

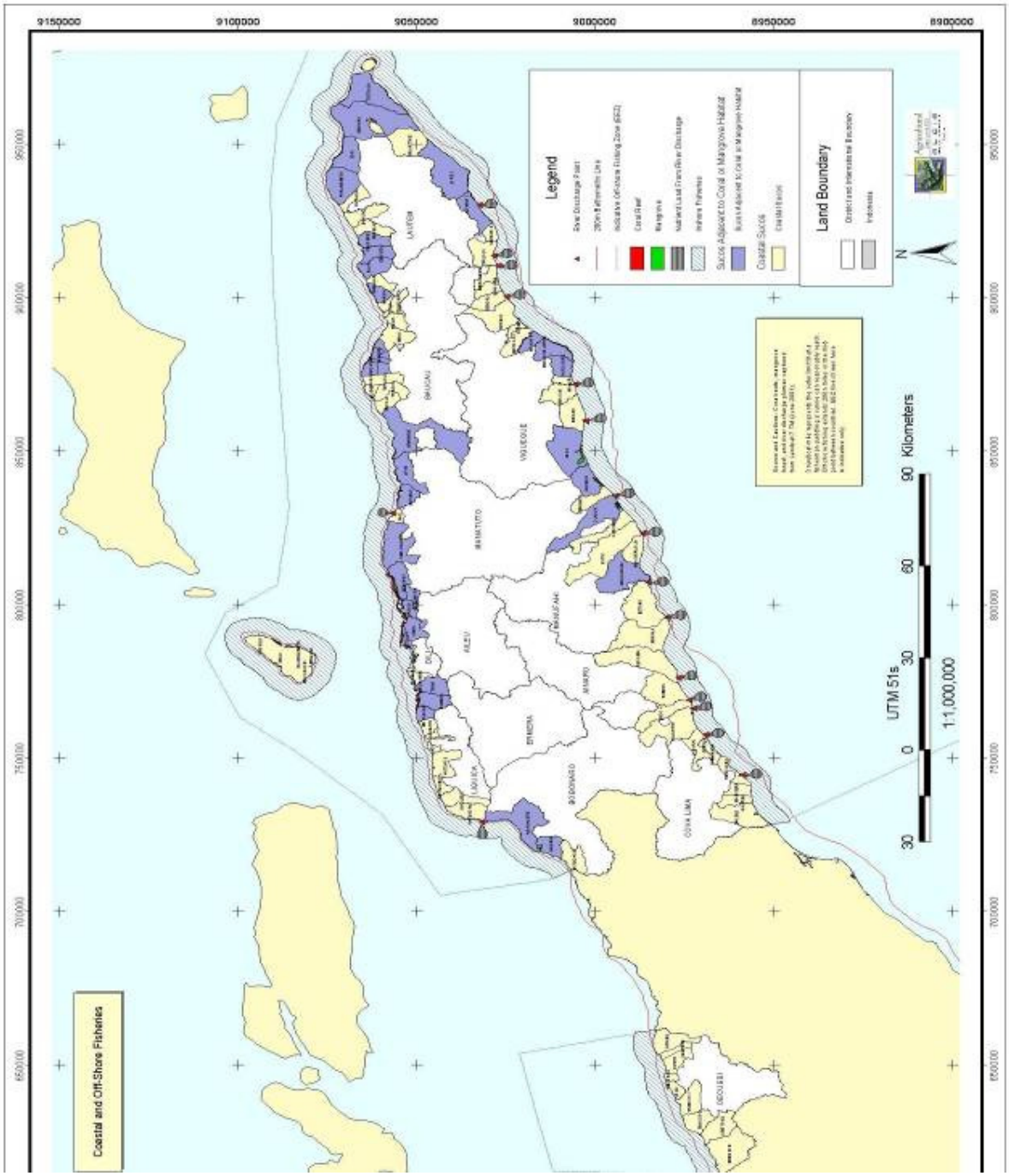



Marine chart of Timor Sea showing the narrow coastal shelf and deep water trenches (below 3,000 metres) offshore the main island, plus the shallow water Sahul Banks to the south. The mid-point line for fisheries between Timor Leste and Australia is shown by a dotted line with the fish symbol.

[3] All Maps from: Ministry of Agriculture and Fisheries, State Secretariat of Fisheries : A Policy and Strategy for the Fisheries Development in Timor-Leste, 2007

**Aerial photographic view of the Nino Conis Santana National Park land and marine boundary, which is 3 nautical miles from the coastline.**

Notes:
i) Jaco Island on the eastern tip of the island, which is an up-welling area rich in fish resources, and ii) the town of Com on the north coast, the planned centre for the commercial foreign fishing operating to the south of the main island, mainly in the Sahul Bank area.




Map of Timor Leste showing the thirteen districts, the coastal Sucos adjacent to coral reef and/or mangrove habitat, the 200 metre depth contour, the 3 nautical mile line representing the coastal fishing area, and the indicative EEZ boundary line between Indonesia and Timor Leste.

**ENDNOTES**

1) http://data.un.org/CountryProfile.aspx?crName=Timor-Leste
2) Fisheries sector employment: SSF estimates 2008
3) State Secretary of Fisheries, Policy and Strategy for the Fisheries Development in Timor Leste. SSF 2006
4) Marine capture fisheries (Including Sahul Bank and estimated IUU fishing) and total aquaculture (source: Policy and Strategy for Fisheries Development in Timor Leste, MAF/SSF, 2006)

4a) Domestic only, excluding IUU (source: Policy and Strategy for Fisheries Development in Timor Leste, MAF/SSF 2006)

5) Figures for per capita supply are estimated as "live weight, while for the consumption figures SSF applies a conversion rate of 45%. this reflects both the loss through spoilage and the need to preserve and sell fish as dried fish, as facilities for marketing of fresh fish are lacking.
6) FAO GCP/RAS/199/SWE
7) All Maps from: Ministry of Agriculture and Fisheries, State Secretariat of Fisheries : A Policy and Strategy for the Fisheries Development in Timor-Leste, 2007

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**Deutsch, C.[ n.d.].** Coral Reefs in East Timor: An Investigation of the Impacts of Fishing on Reef Abundance. EM 531 Project Report.

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