


FISHERY AND AQUACULTURE COUNTRY PROFILES	Food and Agriculture Organization of the United Nations	FID/CP/KHM
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NATIONAL FISHERY SECTOR OVERVIEW

CAMBODIA

1. GENERAL GEOGRAPHIC AND ECONOMIC DATA

Area	181 035 km ²
Permanent fresh water area ³ :	4 520 km ²
EEZ area:	55 600 km ²
Length of continental coastline	435 km
Population (2007):	14 324 000
GDP at purchaser's value (2008):	USD 10.3 billion
GDP per head (2008):	USD 739
Agricultural GDP (2008):	USD 3.35 billion
Fisheries GDP (2008):	USD 720 million

2. FISHERIES DATA (2007)

	Production	Imports	Exports	Total Supply	Per Caput Supply
	Tonnes live weight				kg/year
Fish for direct human consumption	514 200	8 037	49 361	472 876	33.0
Fish for animal feed and other purposes					

Estimated Employment (2009):	
(i) Primary sector (including aquaculture):	> 420 000
(ii) Secondary sector:	> 2 000 000
Gross value of fisheries output (2007):	USD 608.7 million
Trade (2008):	
Value of fisheries imports:	USD 2.4 million
Value of fisheries exports:	USD 35.8 million

3. FISHERY SECTOR STRUCTURE

3.1 Overall fishery sector

Cambodia's fisheries produced an estimated 515 000 tonnes in 2009. The country's freshwater fisheries are among the most productive in the world due to the presence of large floodplains around the Great Lake and along the Tonle Sap and the Mekong Rivers. These inland fisheries are thought to have produced around 390 000 tonnes in 2009. By comparison, the total marine fishery production was small (75 000 tonnes) as is the aquaculture sector (50 000 tonnes). Much of the production generated is consumed domestically, although exports totaled 30 000 tonnes in product weight in 2009. The fisheries sector employs around 420 000 people directly and more than 2 million people are thought to derive some type of livelihood benefit from involvement in the sector.

3.2 Marine Sub sector

Marine fisheries in Cambodia have been slow to develop relative to inland fisheries. Fisheries Administration (FiA) statistics suggest a near doubling of marine fish landings from 33 100 tonnes in 1993 to 75 000 tonnes in 2009.

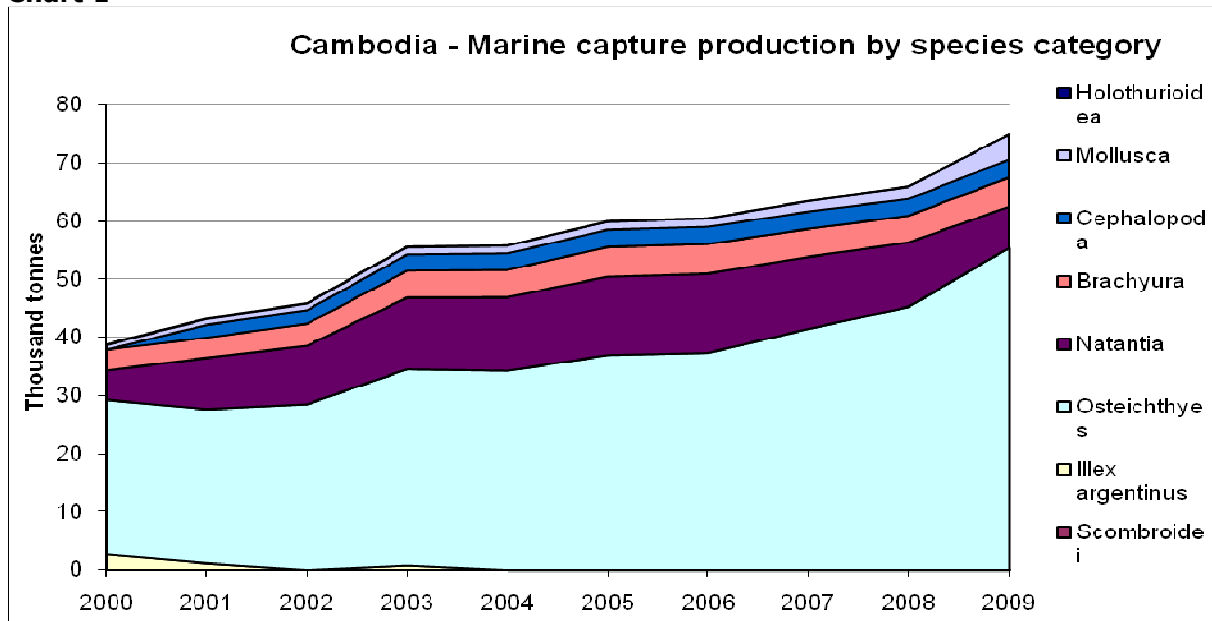
Fishing activities can be classified into coastal and commercial fisheries. The coastal fishery is characterized by family-scale fishing which extends from the coast to waters of a depth of 20 m. Boats used in this area are either without engines or have engines of less than 50 hp. The commercial fishery is characterized by larger-scale fishing boats, using engines of more than 50 hp, and fish from the 20 m depth line to the limit of the EEZ. Boats fishing in Cambodia's waters can be broadly classified as purse seiners, shrimp trawlers and gillnetters.

In recent years, the marine fishery has seen a significant increase in the number of fishing boats (both national and foreign) resulting in an increase in pressure on coastal resources. Annual catches by licensed Thai vessels in Cambodian waters are thought to range from 26 500 – 37 500 tonnes per annum but there is probably also a substantial amount of illegal fishing by non-licensed foreign vessels. The growing fishing effort in coastal areas is placing the natural resources under increasing pressure. There is substantial habitat degradation brought about through destructive fishing practices (dynamiting, cyanide fishing, illegal trawling in shallow nursery areas), mangrove forest destruction (for firewood, shrimp aquaculture), siltation and the pollution from urbanization/industrialization and increasing tourism. There are also reports of increasing conflict situations among different categories of fishermen.

3.2.1 Catch profile

The coastal waters of Cambodia support a diverse range of fish and invertebrate species. The main commercial species include mackerels, scads, anchovies and snappers, penaeid and metapenaeid shrimps, blue swimming crabs, cuttlefish, squid, green mussels, oysters and blood cockles. In the 2002 marine fisheries statistics, nine different groups of aquatic animals are given as shown in the chart below.

Chart 1



Although more than 30 species of finfish are exploited, only five species are abundant in the landings: These are: *Megalaspis cordyla* (torpedo scad), *Scomberomorus commerson* (narrow-barred spanish mackerel), *Rastrelliger brachysoma* (short mackerel), *Rastrelliger kanagurta* (Indian mackerel) and *Atule mate* (yellowtail scad).

3.2.2 Landing sites

Landing locations are not disaggregated from provincial fishing locations in the official records. FiA statistics for 2007 show that Sihanoukville, (22 000 tonnes) and Koh Kong, (35 600 tonnes) have the highest landings. Harbour facilities are limited and in most cases poorly developed. A significant amount of the marine catch is transferred to foreign vessels at sea and is not landed in Cambodia.

3.2.3. Fishing production means

The table below illustrates the small-scale nature of the marine fishing fleet with the bulk of boats being either non-motorized or motorized with less than 10 HP and also highlights the pressures on the inshore fishery where these smaller craft operate.

Table 3. Number of marine fishing vessels in Cambodia 2009

Type of vessel	Number of vessels	% of fleet
Non-Motorized Boats		
< 5 tonnes	57 910	53.55
>5 tonnes	3 808	3.52
Motorized Boats		
<10 hp	37 338	34.53
10-30 hp	7 696	7.12
31-50 hp	792	0.73
>50 hp	601	0.56
TOTAL	108 145	100.00

The following fishing gears are the most commonly used in Cambodia's marine waters: mackerel purse seines, anchovy purse seines, crab gillnets, mantis shrimp gillnets, shrimp gillnets, fish gillnets, crab traps, squid traps, hook & lines, push nets, stow nets & beach seine. Live coral reef fish and shellfish collection is carried out manually by divers. Many boats change fishing gear on a seasonal basis, according to the abundance of particular species and market demand.

3.2.4 Main resources

Cambodia has a relatively short coastline of 435 km and an EEZ of 55 600 km² including 69 offshore islands. The marine fishing grounds are relatively shallow with an average depth of 50m and are located on the eastern bank of the Gulf of Thailand. There are four provinces/municipalities bordering the sea; Koh Kong, Sihanoukville, Kampot & Krong Kep. Mangrove areas cover 56 188 ha, and these are found primarily in Koh Kong Province.

There is little information regarding the status of Cambodia's marine stocks. However, the available literature indicates that the exploitation of Cambodian marine fishery resources is probably close to or has already exceeded the maximum sustainable yield.

3.2.5 Management applied to main fisheries

The Cambodia fishery law identifies a range of input controls to be used as main management tools:

- Fishing permits for commercial fishing,
- Licences for offshore boats,
- Licences for foreign vessels fishing in Cambodian waters,
- Prohibition of illegal fishing gears, such as electro-fishing, explosives & poisons,
- Restrictions on some gear types and sizes,
- Prohibition to trawling in waters less than 20 m deep,
- Protection of mangrove areas and designated fish sanctuaries,
- Closed spawning season for mackerel from 15 January to 31st March,
- Prohibition of harvesting corals and endangered species listed in the CITES appendices.

At present, there seems to be no TACs or quotas set for marine fisheries. The coastal fishery is freely accessible for boats smaller than 33 hp. Trawling and light fishing are illegal in coastal waters and pair trawling is illegal offshore. The enforcement of these limitations is generally poor.

Cambodia has four established marine protected areas totaling about 2 500 km², including Ream National Park that has significant coral reef resources. The other MPAs are: Botum Sakor National Park (171 250 ha); Dong Peng Multiple Use Area (27 700 ha) and Peam Krasop Wildlife Sanctuary (25 897 ha).

In recent years there have been efforts to apply community based fisheries management to ensure stakeholder and resource user participation in the management of fisheries resources. In 2006 a total of 40 community fisheries schemes involving 4 235 households had been established.

3.2.6 Fisheries communities

The 2008 census indicated that the population of the coastal provinces and municipalities was 960 480 people, a 13.7% increase from the 1998 figure of 844 861 people, (although the province of Koh Kong has shown a decline in population over that time). This represents 6.6 percent of the population of Cambodia. Population densities vary considerably in the coastal provinces and are as low as 12 people /km² on Koh Kong to 178 /km² in Sihanoukville. The fisheries communities in Kompot province are considered to be among the poorest in the country where typical incomes from marine fisheries range from USD 25-30 per family per month. Households in Sihanoukville and Koh Kong Provinces are slightly better off due to the more productive fishing grounds.

3.3 Inland sub-sector

Cambodia's inland fisheries productivity stems from the annual inundation by the Mekong River of the large floodplains found in central Cambodia around the Great Lake (Tonle Sap) and the Tonle Sap and Mekong River floodplains, where important ecological habitats such as flooded forests are found.

The Great Lake is characterized by its unusual hydrology. During the monsoon season, the Great Lake expands by 4-6 times, to cover around 6% of Cambodia's total land area. This expansion is caused mainly by the flow reversal of the Tonle Sap River. During the rainy season, these shallow flooded areas created provide extremely high fisheries productivity and diversity. At the beginning of the dry season the Tonle Sap River level decreases and water begins to drain from the Great Lake.

Certain stretches of the Cambodian Mekong mainstream contain a large number of deep pools. The most important stretch is between Kratie and Stung Treng, where 58 deep pools have been identified, and where a large number of fish species congregate during the dry season. Some of the pools are also the habitat of the river dolphin, *Orcaella brevirostris*.

Statistics suggest that fish production from inland sources has risen in recent years from 67 900 tonnes in 1993 to 390 000 tonnes in 2009. However this is mainly due to the 1999 revision in the way that fisheries statistics were calculated to take into account small-scale production. The inland fisheries of Cambodia produce between 289 000 - 431 000 tonnes of fish each year. The Great Lake alone accounts for 235 000 tonnes. FiA annual production statistics for 2007 allow for the inland catch to be divided into three different types of fisheries, as shown below.

Table 4. Estimates of inland fisheries production in 2007

Type of fisheries	Estimated Production (tonnes) (2007)
Large scale/middle scale	159 900
Small-scale	135 000
Rice fields	100 100
Total	395 000

3.3.1 Catch profile

Studies have shown that more than 500 fish species are found in Cambodia freshwaters. Cambodians categorise their freshwater fish species as 'Black' or 'White'. 'Black fish' are those species able to survive in wetlands areas, year round and have limited lateral migrations. They are mostly carnivorous or detritus feeders with quite a number of them being air breathers. They include: *Channidae* (Snakeheads), *Clariidae*, *Bagridae* & *Anabantidae*. 'White fish' are mainly riverine species that show strong lateral and longitudinal migrations. This group includes many cyprinids, various *Pangasius* sp., *Siluridae* and *Cirrhinus*.

The main commercial freshwater fish species are: *Channa striata*; *Channa micropeltes*; *Barbonymus altus*; *Barbonymus gonionotus*; *Cyclocheilichthys apogon*; *Cyclocheilichthys enoplos*; *Cirrhinus lobatus*; *Cirrhinus siamensis*; *Pangasius hypophthalmus*; *Pangasius djambal*, *Pangasius larnaudii*; *Clarias batrachus*; *Cirrhinus microlepis*; *Leptobarbus hoevenii*; *Thynnichthys thynnoides*; *Trichogaster microlepis*; *Trichogaster pectoralis*; *Anabas testudineus*; *Boesemania microlepis*; and *Oxyeleotris marmorata*.

Some remarkable fish species can be found in Cambodia's freshwaters, including the Mekong Giant Catfish, *Pangasionodon gigas*, which can reach a length of 3m and a weight of more than 300kg, the Giant Mekong Carp (*Catlocarpio siamensis*) and the Seven-line barb (*Probarbus jullieni*). The populations of all these species have shown sharp declines in recent years. The Giant Mekong Catfish is considered critically endangered with only around 10 individuals being caught each year. The collection of wild caught Giant Snakehead, *Channa micropeltes* fingerlings for culture is now banned on the Great Lake in an effort to conserve the species and reduce the amounts of trash fish used as feed.

3.3.2 Landing sites

There are no details of specific landing sites but the FiA statistics show that the most productive fishery provinces in 2007 were Kandal (35 000 tonnes), Kompong Chhnang (17 000 tonnes), Siem Reap (12 000 tonnes) Pursat (14 000 tonnes), Kompong Thom (10 500 tonnes) and Battambang (10 000 tonnes).

3.3.3 Fishing production means

More than 150 types of fishing gear are known from Cambodia. The largest gears are barrage traps, fish bag nets, shrimp bag nets, and arrow shaped bamboo fence traps. These gears are non-selective and target fish that migrate and tend to catch fish live and so produce a high quality market product. The 'Dai' system of bag nets operates on the Tonle Sap River during the multi-species migrations that take place during periods in December, January and February each year. The catch from the bag nets is predominantly comprised of two small cyprinid species; *Cirrhinus siamensis* and *Cirrhinus lobatus*, which are used for making fish paste. The total catch from the Dai fishery is usually around 15 000 tonnes a year although in 2005/6 it doubled to around 30 000 tonnes.

Middle-scale fishing is carried out in the open waters of the inland fisheries domain. Cambodia has given a legal definition to 24 different types of middle-scale fishing gear and these include seine nets, river pelagic trawls, deep bag nets (dragged), V shaped boat mounted nets, big cone shaped nets and raft mounted lift nets. Fish caught by middle scale methods are generally not as high quality as fish caught from the fishing lots, as fish are killed and injured during capture.

Many smaller gears are specialized for fishing particular habitats for a small number of target species. Gears classified as small scale include gill nets, cast nets, oblong traps, drum traps, slit traps, scooping baskets, folded cone traps, vertical vase traps and hooked long lines.

3.3.4 Main resources

Long distance migrations of fish and large variations in fish stocks depending on the season make assessing freshwater fish stocks a challenge in Cambodia, and few extensive studies have been carried out. However, as much of the inland freshwater catch is comprised of fish that are a product of a single growing season, i.e. less than one year old, this allows for considerable fishing pressure to be exerted on the stocks each year, which then show a remarkable ability to recover the following year. Catches of some of the slower growing or larger fish species have shown drastic reductions in recent years.

3.3.5 Management applied to main fisheries

Since the late nineteenth century, the larger scale fisheries in Cambodia have been managed under a series of 'lots'. These are exclusive areas that are awarded through a competitive public bidding system for a period of two consecutive years. In 1997, there were 175 fishing lots ranging in size from 2 000 - 50 000 ha. The largest lots were found on the Great Lake. The burden book for each lot describes the open season, payment schedule, permissible fishing gear, boundaries, main geographic features, and designated public fishing areas. The operator of each lot controls the right to harvest fish according to the burden book for the lot. The number of lots was reduced from 141 to 82 in 1998, following the Government's decision to hand over the fishing rights to fishing communities. Since 1995, the number of bag net licences has remained constant at around 80.

Closed seasons for inland waters have been specified and no commercial scale fishing is permitted from 1 June - 30 September (31 October in some southern areas). Small-scale fishing for subsistence is tolerated outside of these closed seasons and in some closed areas. However, it is illegal for small-scale fishermen to fish in fishing lots during the open season (October-May). In the Mekong main stream, the area around the Khone Falls, on the border between Cambodia and the Lao PDR, contains numerous deep pools, some of which have been designated as fish conservation zones by the local villagers.

Conflicts over fishing rights are common. In fishing lot areas, households depending on fishing for livelihood and subsistence have often lost out to politically and economically more powerful users. The government promotes co-management in order to encourage people to become more directly involved with management of their fisheries.

As with the marine sector, the lack of data relating to catch-per-unit effort makes it difficult to develop an appropriate management strategy for the freshwater fisheries.

3.3.6 Fishermen communities

The growing population and associated development pressures are major threats to the Great Lake's ecosystem. Despite the lake's inherent richness of natural resources, most indicators of poverty in the Tonle Sap area are more negative than in other rural areas of Cambodia. Even in the protected areas, local people are allowed to take fish. Many of the people who live around the lake are extremely poor and depend on it for their livelihoods. As the number of large fish caught has declined, the people who live around the Lake are finding it increasingly difficult to sustain fisheries based livelihoods. This is creating a vicious cycle of increasing poverty, and increasing damage to the lake's resources.

On the Great Lake a number of 'floating villages' can be found. In these villages inhabitants derive their livelihoods exclusively from fishing or services supporting fishing. Amongst these villages are Chong Khnies, and Kampong Phluk on the northern shore and Kaoh Chiveang, Dei Roneat and Kampong Luong on the southern shore.

In other floodplain and lowland areas of the country, virtually all communities are involved in fishing at certain times of the year, often alternating between farming and catching fish from the fields and ditches.

3.4 Recreational sub-sector

The Tonle Sap Lake with its flooded forests, spectacular flocks of water birds and unique floating villages, together with its proximity to Angkor Wat, provides opportunities for tourism and is a significant source of foreign currency for the Cambodian economy. Sport fishing may have potential to develop in certain parts of the Great Lake.

3.5 Aquaculture sub-sector

Aquaculture in Cambodia includes mainly cage culture, pond culture and fish culture in rice field. Cage culture has been common practice in Cambodia for hundreds of years, and originated from the need to manage non-marketable sized fish from the fishing lots. These were stocked in pens for fattening and until prices were high. However, the aquaculture sector remains of minor significance to the overall fishery production of Cambodia, accounting for less than 9.7% of total fish production in 2009. Until recently, poor infrastructure limited the distribution of fish feed, fingerlings and the products of the industry.

The vast majority of aquaculture is done in freshwater, ponds and cages. After 1990 cage-culture expanded rapidly whilst pen culture virtually disappeared during the last few years. Snakehead used to be the most important species cultured in cages before the practice was banned in 1995. This was done in order to stop the practice of catching small fish to feed snakehead. This was thought to endanger the concerned populations of fish. Recently, there has been request for reconsidering the ban. In cage culture the most popular species are *Pangasianodon hypophthalmus*, *Clarias batrachus* and *Oreochromis niloticus*. Peri-urban intensive pond culture has also developed close to major urban centres. Small-scale aquaculture of carps and tilapia is also developing, particularly in fish deficit provinces such as Takeo & Kompong Speu. In recent years there has been a lot of interest in the culture of *Macrobrachium rosenbergii* and numerous hatcheries have become established to produce post larvae. Crocodile farming has grown rapidly from 4 816 heads in 1993 to 185 000 heads in 2009.

Table 5. Number and area of earthen ponds, floating cages and pens in 1997 & 2009

Culture Systems	1997		2009	
	Number of units	Area	Number of units	Area
Earthen ponds	3 455	239 (ha)	55 035	962 (ha)
Floating cages	3 970	135 200 (M ²)	5 165	78 800 (M ²)
Pens	164	103 500 (M ²)	na	na

Presently coastal aquaculture accounts for less than one percent of all fishery production from Cambodia's marine areas and about two percent of aquaculture production. Marine shrimp (tiger prawn) farming became established in the early 1980s in Koh Kong province and spread rapidly to Sihanoukville and Kampot municipalities. However, shrimp production has dropped from over 700 tonnes in 1995 to 200 tonnes in 1998 and has since been affected by disease and pollution dropped further and reached a level of less than 100 tonnes. Seabass, grouper and snapper are grown in cages in Kampot and Koh Kong provinces but have also declined since 1993. The major constraint is the dependence on wild seed supply. Seaweed culture (*Eucheuma cottonii*) was introduced in 2001 and by 2005 the production reached the level of 18 000 tonnes. However, the seaweed production dropped drastically to 6 800 tonnes in 2006 and no production of farmed seaweed has been reported after that.

Fish seeds are currently produced in 13 government hatcheries and numerous small-scale private hatcheries. Total seeds production from Government hatcheries in 2009 was 69.8 million fingerlings, mainly comprising the *Barbonymus gonionotus*, *Pangasianodon hypophthalmus*, Chinese carps, Indian major carps and Nile tilapia. Construction has begun on the Marine Aquaculture Development Centre in Muoy district, Preah Sihanouk province. When it is completed in 2012, the complex will have a fish hatchery, maturation building and a research facility to breed shrimp, sea bass and grouper for coastal fish farmers. The

Government promotes research into the culture of indigenous fish species, *Pangasionodon hypophthalmus*, *Pangasius bocourti*, *Cirrhinus microlepis*, *Leptobarbus hoevenii*, *Catlacarpio siamensis*.

Culture of tilapia, common carp and mrigal (*Cirrhinus mrigala*) in ricefields has been introduced.

4. POST-HARVEST USE

4.1 Fish utilisation

Cambodia has a centuries old tradition of processing freshwater fish. Products include: fish paste, fermented fish, dry salted fish, smoked fish, fish sauce, and dried fish for animal feed. These products are both for the domestic and international markets. For the domestic market, the most important fish for processing are two *Cirrhinus* species, which are caught in huge amounts during the annual migration from the Great Lake. Marine processed fish commodities include: shrimp, lobster, crab, squid, octopus, cuttlefish, much of which is dried.

4.2 Fish markets

The bulk of Cambodia's inland fish production is sold through small village and town markets. The use of ice is limited in these markets with much of the produce sold live, or in a fermented or dried form. Fish exports totaled 30 000 tonnes in product weight in 2009, most of which went to the Asian markets. Some exporters specialize in live fish export of high value fish such as the Marbled Sand Goby (*Oxyleotris marmorata*). Frozen fish is exported through the seaport of Sihanoukville and fresh and live fish is exported via the international airport of Phnom Penh. A significant amount of fish is exported unofficially through the border with Viet Nam.

Cambodia is not yet able to legally export crocodile skins as farms are unable to meet industry standards. However, crocodile meat can be exported. The export of snakes, coral fish, and terrapins, has declined following Cambodia's commitment to reduce the illegal trade in wildlife from June 2002.

5. FISHERY SECTOR PERFORMANCE

5.1 Economic role of fisheries in the national economy

Fisheries play an important role to the Cambodian economy. In 2008, the fisheries sector contributed about 7% to the national GDP and 21.5 % of the country's output of goods and services in the agriculture, fisheries and forestry sectors. Fish exports represented about 1 % of total merchandise trade in 2008.

5.2 Demand

The Cambodian people have a strong preference for freshwater fish and the domestic demand for fish is expected to increase with population growth. The 2008 population of Cambodia was 14.56 million growing at a rate of 1.65% per annum. The growing population will demand more fish and this will lead to pressure on the fisheries resources. Fish consumption on per capita basis is relatively high with 33.0 kg in 2007 according to FAO estimate and some studies showing consumption figures as high as 60 kg/person/yr plus with over 5kg of other aquatic animals/person/yr. With increasing prosperity, consumer preference is shifting from traditional processed products to live and fresh fish. However, many consumers still require preserved fish, particularly fermented fish, known locally as 'Prahoc', for daily consumption, because of the absence of refrigeration in many rural areas. Domestic demand of marine fisheries products is limited and most marine fisheries products are exported.

5.3 Supply

The pressures on freshwater and coastal fisheries are resulting in fish of lower economic value predominating in catches. Many of the larger and more valuable species have declined significantly both in numbers and size and are now in short supply in local markets.

5.4. Trade

Fish exports increased steadily from the 1993 level of 32 332 tonnes before peaking in 2003 at 56 400 tonnes. Since that time exports have declined to 24 100 tonnes in 2007, to increase again to 25 000 tonnes in 2008 and to 30 000 tonnes in 2009. The main export markets are Thailand and Viet Nam, and to a smaller extent Singapore, Malaysia, China, Hong Kong SAR, China, Taiwan Province of China, Japan, USA and Australia. China is the main importer of crocodiles and is an increasing market.

The export of fish has been controlled by the Department of Fisheries through the state monopoly company, KAMFIMEX (Kampuchea Fishery Import & Export) for more than two decades. Fish traders can export only under licence by the state company. Provincial licensees are empowered to collect a 4% fee on the value of all fish exported through the province without taking title or providing service. However, because there are unofficial 'export gates' at remote locations, smuggling of fish and fish products is also active. Smuggling is estimated to account for about 30% of total exports.

5.5 Food security

Freshwater fish is of great importance for food security and nutrition of the Cambodian people. Average per capita fresh fish consumption nationally is estimated at 33.0 kg per annum with 14 kg of processed fish. Fish paste is of vital importance for many poor Cambodians during periods of low fresh fish availability. Traditionally, people from all over the country have come to the Tonle Sap river in December to February to take advantage of the cheap and abundant fish from the Dai fishery.

By contrast other animal protein sources account for about 5 kg per person per year. In some areas with large-scale fisheries, fish consumption can be as high as 123 kg fish per person, per year. Even in relatively less important fishing areas, the seasonal availability of fish and other aquatic animals is an essential part of the diet, contributing up to 56 kg per person per year. The catch of the small-scale and rice field fishers is of high socio-economic importance as most output from those activities is directly consumed by the fishing family, with the surplus, or high quality fish, sold for cash.

5.6 Employment

FiA statistics for 2009 suggest that over 420 000 people were employed in the fisheries sector, accounting for almost 5% of the Cambodian workforce. However, more than 85% of the population in Cambodia live in rural areas and survive on agriculture and fisheries. During the wet season virtually all rural households engage in fishing for subsistence purposes, it can be argued that around six million people or 50% of the population are 'employed' on a part-time basis in fisheries.

The labor force involved in the marine fishery sector, including fishing, gathering, processing, and marketing is estimated to be only 20 000 people (20% of the coastal inhabitants). Income generated from marine fishing activities has decreased in recent years due to market constraints, poor quality raw materials, resource depletion, and insecurity.

5.7 Rural development

In many rural areas poor roads and a lack of electricity make the storage and transportation of fisheries products difficult. Open fishing areas are coming under increasing pressure and important natural floodplain habitats are still being converted for agriculture purposes.

6. FISHERY SECTOR DEVELOPMENT

6.1 Constraints and opportunities

Cambodia's marine fisheries face two serious threats to their continued productivity, i.e. an

excessive fishing effort, including significant unregulated foreign fishing activity, and habitat degradation. The number of subsistence fishers and fishery workers has increased, partially as a result of the improved management in the forestry sector, forcing ex-forestry workers to the coastal zone where many become involved in fishing. Export demand is also encouraging additional fishing effort, especially for the high value species.

The fishery law bans trawling in the area between the shoreline and the 20 metre isobath. As many of the trawlers are small and unsuitable for use in offshore areas, much of the trawling is done illegally in these areas. This is the major source of conflict between groups of marine fishers in Cambodia. Despite the fact that inshore trawling is clearly illegal, the FiA is reluctant to enforce the ban. Those who suffer from the illegal trawling are frustrated at the lack of Government action to halt the illegal activity. The number of foreign vessels operating in Cambodian waters is also a source of contention. Jurisdiction over waters claimed by Cambodia is complex and the number of foreign vessels is difficult to estimate and is not helped by the fact that the licensing function is shared between several Government agencies.

Habitat destruction along the Mekong River and Great Lake is a major threat to the freshwater fisheries resources in Cambodia. The building of dams on the upper Mekong River and its tributaries affect fish migration and water levels and is likely to have negative effects on Cambodia's freshwater fisheries. Logging has also had a serious impact on fisheries, causing reduced floodplain productivity and the accelerated siltation of water bodies.

The destruction of flooded forest has reduced spawning and nursery areas for many Great lake fish species. Flooded forest areas have been greatly reduced from 795 400 ha in 1985. It is estimated that only 19 517 hectares of inundated forest now remain. Much of the forested areas has been converted into agricultural land and has increased the siltation rate in the Great Lake.

Achieving food safety in processed fisheries products is of concern due to the reported use of the insecticides in the small-scale processing of fish paste and dried fish.

6.2 Government and private sector policies and development strategies

Cambodia's Master Plan for Fisheries 2001 to 2011 calls for the development of sustainable fisheries, and for the supply of fish and fishery products to keep pace with growing demand. The reduction of poverty among fishing communities is another important priority, given the large proportion of the population engaged in fisheries related activities. Although the Master Plan focuses mainly on freshwater fisheries, it also includes a strategy for establishing five-year plans for the administration and management of the marine capture fisheries.

In 2001, the Tonle Sap Biosphere Reserve was established by Royal Decree and divides the lake area into three core areas for protection and sustainable management. These areas are: Prek Toal Battambang Province, Boeng Tonle Chhmar and Stoeng Sen in Kompong Thom Province. Boeng Tonle Chhmar has been selected as a Ramsar site, which designates wetlands of international importance. The core areas cover 42 300 ha and function in a manner similar to national park areas.

The fisheries sector has undergone major reforms towards a more poverty-focused approach, expressed in fisheries policy statements and the Fisheries Development Action Plan, 2005-2008. Up to 2005, 56.46% of fishing lots have been released to communities. More than 440 community fisheries management mechanisms are in place throughout the country. The Government promotes a range of rural development including community fish refuges, small-scale aquaculture and raises awareness of the importance of fisheries through functions organized for National Fish Day on July 1st each year.

6.3 Research

The Inland Fisheries Research and Development Institute (IFReDI), established in 2002, is responsible for producing research findings to assist in the management of Cambodia's fisheries. Priority research areas include fish habitats, fish migration, fish consumption and marketing, export of fisheries products, fishing gears, the valuation of fisheries and resource management systems. Staff and students at the Royal University of Agriculture (RUA) at Chamcar Daung, Phnom Penh, also carry out research on capture fisheries and aquaculture related topics.

6.4 Education

RUA has a fisheries faculty and produces BSc. graduates for the fisheries sector. It also offers a course leading to Master Degree on integrated farming system. In 2005, a new campus was established in Battambang Province with the study campus in the provincial town and an experimental station situated in Sangkae district.

Two schools of agriculture, namely Prek Leap National School of Agriculture (PLNSA) and Kampong Cham National School of Agriculture (KCNSA), conduct elementary and intermediate levels of fisheries education. The duration of elementary and intermediate levels is 1 and 3 years, respectively. Both of these institutions run fisheries certificate courses. PLNSA is located in Khan Russey Keo close to Phnom Penh and manages a 24 ha farm including a fish farm. The School also offers short courses on fisheries related topics.

6.5 Foreign aid

Since the mid 1990s there have been many international and regional organizations supporting the development of Cambodia's fisheries sector including: Mekong River Commission (MRC), FAO, Asian Institute of Technology, The Asian Development Bank (ADB) The World Fish Center, World Bank, the Southeast Asian Fisheries Development Center (SEAFDEC) and World Wildlife Federation (WWF). In terms of donor support to fisheries projects, DANIDA, SIDA, DFID and JICA have been particularly generous.

7. FISHERY SECTOR INSTITUTIONS

FIA is under the Ministry of Agriculture, Forestry and Fisheries and its HQ is in Phnom Penh. FiA has the following responsibilities

- To prepare fishery resource inventories, assess potential and follow-up the development of fishery resources and aquaculture;
- Enact laws, regulations and orders for fishery protection and improvement and the management of fishery resource exploitation and monitor their implementation;
- Prepare plans for management of fishery zones, fishery conservation and set up fishery resource development policies and measures to ensure environmental protection;
- Conduct scientific research on fishery and aquaculture and document the findings;
- Inspect and manage all activities of fishery resource exploitation and aquaculture;
- Support and encourage any person who initiates research on fishery resource protection and/or promotes aquaculture;

At the provincial level Fisheries Administration Cantonment, (FiAC) under the FiA, are responsible for promoting, overseeing and regulating the development of fisheries in each province.

8. GENERAL LEGAL FRAMEWORK

The first fisheries regulations were promulgated during the French colonial period, starting with a royal regulation in 1872 that allowed fishing barrages to be placed across water channels. Subsequent regulations included the classification of fishing lots for public auction and definitions of sizes for fishing gear. In 1956, Cambodia established a code for managing freshwater fisheries and a similar code for managing marine fisheries was formulated in 1958. In 1981, the Government began preparing the formulation of a new fisheries law that was signed in March 1987.

To strengthen management, the new Fisheries Law of 2006 was developed. The new law encourages the creation and proper maintenance of conservation zones and strongly promotes

the development of aquaculture. It also aims to ensure long-term conservation and sustainable management of fishery resources taking into account social, economic and environmental factors. The law ensures local community rights to use fishery resources for traditional, religious and livelihood purposes through the establishment of community fisheries.

In 2000, a sub-decree was issued, reducing the area of fishing lots by 56 percent, and making 538 522 ha available for family-scale fisheries. The Royal Decree on establishment of community fisheries was signed on 29 May 2005, and a Sub-Decree on Community Fisheries Management was promulgated on 10 June 2005. To reduce illegal fishing, the law allows serious penalties to be applied to those who break the law including government officers. To investigate, prevent and counteract illegal activities and compile documents for submission to courts, the officers of the fisheries administration are considered as judicial fisheries police.

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