



CAMBODIA COASTAL SITUATIONAL ANALYSIS

Ali Raza Rizvi and Uwe Singer



Building Resilience to Climate Change Impacts, Coastal Southeast Asia No.6





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This publication has been made possible in part by funding from the European Union

Published by: IUCN, Gland, Switzerland

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Citation: Rizvi, A.R. and Singer, U. (2011). *Cambodia Coastal Situation Analysis*, Gland, Switzerland: IUCN. 58 pp.

ISBN: 978-2-8317-1519-3

Cover photo: © IUCN Cambodia/Kimsreng Kong

Layout by: Pafon Nextstep Co., Ltd.

Produced by: IUCN Asia Regional Office

Available from: Building Coastal Resilience Project

<http://www.iucn.org/building-coastal-resilience>



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**Building Resilience to
Climate Change Impacts-
Coastal Southeast Asia**

January 2011

Ali Raza Rizvi and Uwe Singer

1. Introduction

IUCN is implementing a European Union funded Project, “Building Coastal Resilience in Coastal Southeast Asia”, in Cambodia, Thailand, and Vietnam. This initiative aims at field testing adaptation options and strengthening the capacity of institutions and communities to integrate best practice results in the overall national policies and action planning for adaptation and ecosystems’ management.

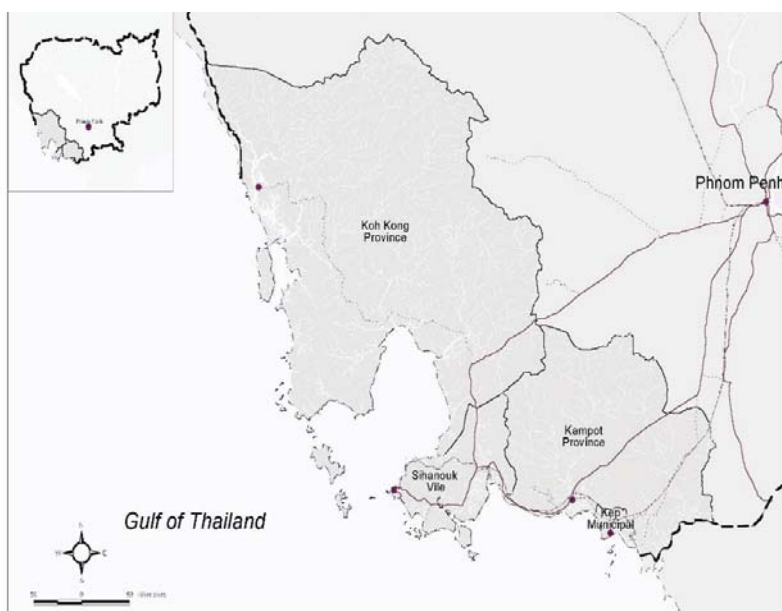
The purpose of the current report is to provide baseline information to the project staff and partners, to facilitate subsequent working steps, such as stakeholder consultations, climate risk and vulnerability assessments, and the prioritisation of adaptation options.

The report has been compiled based on accessible secondary data. In depth stakeholders’ consultations and firsthand data collection were not undertaken as part of the report preparation. It is thus a living document which will be updated throughout the project implementation phase.

2. Development, Climate Change and Coastal Areas in Cambodia

2.1 General Information on Coastal Areas

Cambodia has a coastline of 435 kilometres covering an area estimated at between 17,791km² and 18,477km². It consists of two provinces and two municipalities namely Koh Kong Province bordering Thailand in the west; Sihanoukville Municipality which contains the key port; Kampot province, bordering Vietnam to the East; and Kep Municipality. The offshore marine area contains 64 islands. The claimed Economic Exclusive Zone (EEZ) of Cambodia covers an area of approximately 42,000 km².



Map 1: Cambodia's Coastal Zone

Source: MoE 2005

The coastal region features a number of closely interrelated ecosystems, beach, forest and strand vegetation, mangroves, including a *Melaleuca* dominated swamp forest, estuarine ecosystems, seagrass, coral reef and the marine ecosystems of the gently sloping, relatively shallow seabed. The following table gives an overview of key socioeconomic and ecosystem characteristics of the coastline including the islands.

Table 1: Characteristics of Cambodia's coastal area

Characteristics	Number
No. Coastal Provinces	2
No. Coastal Municipalities	2
No. Coastal Districts:	16
No of Coastal Villages	93
Area of Coastal Provinces	17,791 km ²
Area of Coastal Districts	15,748 km ²
Area of Claimed EEZ	42,000 km ²
Population of Coastal Provinces (1998)	836,973
Population of Coastal Districts (1998)	515,253
National Per Capita GDP (1998)	R 654,000
Area of land Mines in Coastal Provinces	5,120 ha
Marine Fisheries Production (1998)	31,843 tons
Aquaculture Production (1998)	1,600 tons
Products Exports (1998)	15,082 tons
Length of Coastline	435 km
Area of Mangroves (1997)	63,039 ha
Area of Priority Coastal Wetlands (1997)	54,500 ha
Number of Coastal, Marine Protected Areas	6
Area of Coastal, Marine Protected Areas	388,700 ha

Source ADB: 5712-REG Coastal and Marine Environment Management in the South China Sea, II and MoE, 2003 /UNEP; In: MoE (2005)

Koh Kong Province covers an area of 1,160 km², borders Pursat Province in the north, Kampong Speu Province in the east, Sihanoukville Municipality in the south, and the Gulf of Thailand and Thailand in the west. For administrative land management, the Province is divided into 8 districts, 32 communes and 127 villages and has a population of 132,106, making up 1.2% of the total population in the country.

Kampot Province is located in the south-western part of Cambodia with a total coastline of 73 kilometres. The coastline stretches from the border of Hatieng district, Vietnam to Koh Ses, Prey Nup district, Sihanouk Ville. Kampot Province comprises eight districts with 92 communes and 477 villages, with a population of around 4% of the country's total.

Kep Municipality is located in the southeast part of the country, approximately 175 km from the capital Phnom Penh. The northern part of Kep, which borders Kampot province, features the Vir mountain ranges as well as flat areas for crop production. The total land area of Kep municipality is 375.02 km², and it is administratively divided into 2 khans with 5 Sangkats and 16 villages.

Sihanoukville Municipality is located just over 200 kilometres from Phnom Penh and borders Sre Ambel district, Koh Kong Province, in the north, Kampot district, Kampot Province, in the east, and the Gulf of Thailand in the south and west. Sihanoukville Municipality has a total land area of 868 km² and consists of 3 districts, 23 communes and 82 villages. Sihanoukville is the largest coastal town in Cambodia with the biggest seaport in the country (<http://czmcam.org/dataregionsDet.aspx?c=1&zone=7®id=6>). It is fast developing into a busy commercial port. It has a total operational land area of around 125 ha and was built in 1959 at the old French-built wharf. Over a period of time, the port has been expanded steadily, mainly through financial assistance by the Japanese. The construction of a modern container terminal was completed in 2007. There are 12 berths equipped with modern cargo handling facilities. The port can accommodate ships of 10,000 - 15,000 tons deadweight. The port has an environmental policy which makes it mandatory to comply with the Environmental Protection Law and Natural Resource Management of 1996 and other regulations.

2.2 Demography

The estimated population of Cambodia in 201 was 14.7 million with 90% Khmer, 5% Vietnamese, and 5% others including Chinese. The annual average growth rate is 1.6% (<https://www.cia.gov/library/publications/the-world-factbook/geos/cb.html>; UN 2010). The result of the population census in 1998 showed that the population of the four coastline provinces constitute 7.38% of the total with a growth rate of 2.8% per annum (see table 2).

Kampot, with 4.62% of the total population, has the largest proportion of population followed by Sihanoukville with 1.36%, and Koh Kong and Kep with 1.16% and 0.25% respectively.

Table 2: Population statistics per coastal province 1998 population census

Province/Municipality	Area (Km ²)	Population (Total)	Density (Per/Km)	Population (%)
Coastal Region	17,237	1,035,000	75	
Sihanoukville	R 654,000			
	868	204,000	235	1.36
Kampot	31,843 tons			
	5,209	611,000	117	4.62
Koh Kong	11,160	182,000	16	1.16
Kep	374	38,000	98	0.25

Source: MoE 2004

In 2008 the four provinces hosted only 960,480 residents, which accounts for 6.8% of the total population. This is due to the fact that Kampot, Kep and Koh Kong have turned into provinces/municipalities of out-migration.

Table 3: Population statistics per coastal province 2008 population census

Province/Municipality	Sihanoukville	Kampot	Koh Kong	Kep
Population total	221,396	585,850	117,481	35,753
Population density per Km ²	255	112	10,5	96

Source: National Institute of Statistics 2008

Despite that decline of total population, a number of studies have shown that most residents of Cambodia's four coastal provinces and municipalities are recent migrants to the coastal zone. Statistics from the 2008 National population census indicate that up to 41% of the coastal population had their previous residence outside the district or province of remuneration. Some 3% of the population of Kampot Province moved there from another province or municipality in Cambodia, while 45% of the residents of Koh Kong are from another province.

Table 4: Place of birth of residents per coastal province

Place of Birth	Kampot	Koh Kong	Kep	Sihanoukville
Born in place of Remuneration	84	58	77	55
Born elsewhere in District of Remuneration	6	3	2	3
Born in another District of Province of Remuneration	6	4	1	3
Born in another Province	4	35	20	38
Born in another Asian country	0	1	0	1
Born in another country	0	0	0	0
Total	100	100	100	100

Source: National Institute for Statistics Cambodia 2008

Sideth and Vanntha (1999)¹ point out that “many residents of coastal Cambodia are economic migrants and internally displaced people from inland areas of the country and therefore do not have traditional ties to the landscape or experience in the management of mangroves”.

This point is further elucidated in interviews conducted by the ADB of residents of coastline provinces which show that most of them moved to their current place of residence for economic or security reasons. Coastal Cambodia, therefore, has a relatively large population whose patterns of resource uses might contribute to the economic pressure on coastal ecosystems.

Koh Kong with population density of only 10.5 people per km² is a sparsely populated province. PMMR (2000) indicates that there are about 6 ethnic groups residing here: Khmer, Chinese, Vietnamese, Thai, Cham and Lao. There are two different social segments of inhabitants residing in Koh Kong: in-migrants and so-called autochthonous² people. In-migrants have come to Koh Kong from the central and eastern Cambodian provinces.

The population census of 2008 shows that 35% of the province’s population moved to the province during the past decade; while 36.2% of the recently settled indicated the “search of employment” as the reason for migration. This is, amongst others, an indicator for livelihood opportunities, primarily resource based, the province is offering to in-migrants from other parts of the country. Thus, the majority of the inhabitants of Koh Kong province depend on fishing, farming and other resource dependent activities, such as charcoal production.

Table 5: Reasons for migration in per cent

Reason for Migration	Kampot	Koh Kong	Kep	Sihanoukville
Transfer of work place	10	9	10	10
Search of employment	13	38	12	38
Education	2	2	3	3
Marriage	24	5	19	5
Family moved	34	37	39	38
Lost land or house	2	0	1	1
Natural calamity	0	0	0	0
Insecurity	3	1	2	1
Repatriation	7	3	10	0
Orphaned	0	0	0	0
Visiting	4	4	2	4
Other	1	1	1	0
Total	100	100	100	100

Source: National Institute for Statistics Cambodia 2008

¹ MRC, <http://www.mekonginfo.org/assets/midocs/0001627-environment-mangrove-forest.pdf>

² Inhabitants claiming “traditional” resource access, use and property rights. Usually the social construct of autochthony is based on a foundation myth of a location through first settlers.

A vast in-migration of people to Koh Kong has occurred since the collapse of the Khmer Rouge regime with an estimated average annual growth rate of 16%. A survey of 90 households undertaken in three villages in Koh Kapik by Bann (1997) showed that 94% of the population are in-migrants, attracted to the area by the economic potential of fishing and charcoal production at a time when the Province's population, and hence resource exploitation, was still low. Overall, only 6% of households originate from Koh Kong Province. The remaining population originates from 13 of the 18 provinces in Cambodia. The majority (36%) migrated from the neighbouring coastal provinces of Kampot and Sihanoukville, followed by Kandal province and Phnom Penh (together 22%). The greatest influx into the area occurred during the period 1985-90. The study also shows that nearly 90% of households are dependent on fishing for their livelihood. However, fish productivity has reportedly declined dramatically in recent years due to the increased number of fishers, the loss of mangrove areas due to the construction of shrimp farms, and the resulting water pollution from these farms. As a consequence, households in the study villages claim to have turned to charcoal production or logging activities as an income alternative. Thus, there is a direct link between increase of shrimp farming, declines in fish yields, and changes in the alternative income activities of local people resulting in new and additional stresses on the resource base, especially the mangroves.

Sihanoukville's population density with 255 people per km² is high compared to the neighbouring coastal provinces/ Kep municipality and to the national average of 75 persons per km². The people of Sihanoukville live in 3 districts composed of 22 communes and 94 villages (CDB 2004). The main ethnic group is Khmer, followed by Vietnamese, Chinese, Cham and Thai.

According to the 2008 Cambodian population census, 38% of the population are in-migrants from other provinces. It can be assumed that the economic reasons for in-migration are primarily based on urban employment rather than on resource dependent livelihood opportunities as in Koh Kong.

Kampot's estimated population in 2008 was 585,850 people. Although population density has decreased between the 1998 and the 2008 census, it remains with 112 persons per km² relatively high, compared to Koh Kong. The people of Kampot live in 8 districts composed of 92 communes and 482 villages (CDB 2004).

The population census of 2008 shows that only 4% of the population are in migrants from other provinces, which might reflect a lower degree of livelihood opportunities due to the higher population density. However, almost 57% of all in-migrants stated economic or security related reasons (according answer categories were "transfer of workplace": 10%, "search of employment": 13% and "family moved": 34%) while social migration reasons, that could also be interrelated with other pressures of out-migration, such as "marriage" ranked at 25%.

Kep Municipality had an estimated population of 35,753 persons in 2008. The people of Kep live in 2 districts composed of 5 communes and 16 villages (CDB 2004). The population density has slightly decreased from 98 to 96 persons per km² between 1998 and 2008. Mainly due to economic and social reasons some 20% of the residents are in-migrants.

2.3 Gender & Coastal Livelihoods

About a fifth of all households in Cambodia are headed by women (SIDA 2008). In coastal areas, men are primarily responsible for fishing in the open ocean, while women undertake fishing activities closer to home as well as processing, marketing, tending fish culture ponds and cages, and maintaining fishing equipment (Ahmed et al. 1998, Gum 1998). In family fishing businesses, women sometimes may have more influence or rights in decision making than their husbands. Even in poorer families, women help their husbands by picking crabs from the net, processing fish products, repairing nets, and painting boats. During the dry season, the most productive season for coastal people, fisher women often work more than 10 hours a day, excluding household work. For women-headed households the work is even harder, as they must also look after children, conduct small businesses, maintain the home, collect firewood, and cook (USAID 2001).

2.4 Coastal ecosystems, land cover and resource use

General Information

Land use types are well spread out in all areas of Sihanoukville. A good cover of broad leafed forest is found in areas in the central part, areas close to the provincial boundaries and in most part of Ream National Park. In sections between Khan Stueng Hav, Khan Mittakpheap and Ream National Park, there is a mixture of land uses that are predominantly made up of bamboo and secondary forests, grassland, and shrubland. Along the coast, east of Ream National Park, a stretch of mangrove forest is found.

Land use covers for Kep ranges from rocky outcrops found in the west of the city, to mostly bamboo and secondary forests found in protected areas and along the border south of Krong Kep. To the east, land use comprises of degraded mangrove forest, shrubland, grass and rocky outcrops.

A broad range of land use types has been recorded in Kampot province ranging from Settlement areas to rock outcrops. A good cover of broad leafed forest is found within the Bokor Mountain National Park in the eastern part of the province. In the flatter parts of the province, notably, Chhuk, Angkor Chey, Dang Tong, Kampong Trach districts and even small areas of Kampong Bay and Chum Kiri districts, where paddy fields predominate. In these areas there are many canals and rivers which would have been used to supply water to rice paddy during rice planting seasons. The other main type of land use found in Kampot province is the deciduous forest, which is scattered in areas formed between Bokor National Park and parts of Chum Kiri and Chhuk districts.

Land use category in Koh Kong province is predominantly broad leafed forest (Evergreen type) scattered throughout the area included coastal mountains, islands and the highlands. The next land use type found to be common is mangrove forest which is scattered in low-lying areas next to Botum Sakor town as well as inside protected areas of Botum Sakor National Park and Dong Peng Multiple Use Area (<http://czmcam.org/mapsDet.aspx?c=1&zone=7®id=4&mapid=10>). The following tables give an overview on land use per type in the coastal provinces in 2006.

Table 6: Land use in Sihanoukville, Kep, Koh Kong and Kampot

Land use types	Area (ha)			
	Sihanoukville	Kep	Koh Kong	Kampot
Urban settlement	263		442	159
Village settlement	2,334	244	1,206	4,816
Airfield	0.4	0	12	
Wet season rice	13,737	2,291	10,126	48,578
Rice with villages	107	3,588		109,836
Flooded Rice	0	0	1,747	
Cropland	1,921	776	1,948	5,754
Irrigated Cropland	0	133	54	817
Orchard	877	68	388	790
Rubber plantation	324			53
Swidden agriculture	1,049	1,436	14,612	2,036
Moist evergreen broad leafed forest	67,657	0	869,06	145,017
Coniferous forest	0	0	4,363	
Deciduous forest	0	0	13,258	52,190
Dry deciduous forest	0	0	4,479	7,282
Mixed forest (evergreen and deciduous)	0	0	18,994	1,575
Riparian forest	48	0	1,379	986
Secondary forest	13,478	2,455	66,581	11,682
Mangrove forest	2,853	2	30,047	185
Rear mangrove forest	5,258	1,113	19,867	5,619
Grassland	9,169	120	51,510	7,336
Abandoned field covered by grass	14,495	429	28,770	13,544
Flooded grass	37		4	18
Shrubland	5,544	841	39,095	31,279
Abandoned field covered by shrub	2,496	818	10,827	14,821
Shrubland and scattered trees	97	0	3,298	201
Lake	80	3	188	170
Reservoir	18	0	3	223
River	94	0	585	425
Sea	1,109	81	18,554	722
Marsh	1,471	0	162	478
Shrimp/ Fish farming	1,193	770	899	3,188
Barren Land	228	0	365	218
Sand Bank	381	0	54	26
Rock outcrop	525	6	465	47

Source: MLMUPC 2006

Coral Reefs

Coral reefs occur throughout the coastal zone of Cambodia with the most extensive beds in the waters off Kampot Province and Kep Municipality growing as pure or mixed stands, and Caulerpa beds along the entire coast to the border with Vietnam. Recent studies estimate the area of coral reefs at 2,806ha (MoE 2007). In Sihanoukville, coral reefs are located around most of the islands and are a popular diving destination with Koh Rong Saleom, Koh Rong and Koh Kron being the islands most promoted for tourism. The following map shows the present location of coral reefs in Cambodia.



Map 2: Locations of Coral Reef in Cambodia

Source: MoE 2007

Table 7: Estimated coral reef areas in the coastal waters by provinces/municipalities

Data Source	Coral Area in ha				
	Kampot	Koh Kong	Sihanoukville	Kep	Total
MoE 2007	953	602	1198	53	2,806

Source: MoE 2007

The health of the coral reefs is generally poor, with low species' diversity, dominated by massive forms. The average live coral cover for the whole coastline accounts for 23% to 58% (Cambodia Reef Conservation Project 2011). Thus the coastline is dominated by dead coral reefs and reefs heavily under threat as shown in the following table.

Table 8: General reef statistics of Cambodia

Reef Area (ha), Country Estimate	2,806
No of Hard Coral Species	111
Low integrated threat index, % of reef area	0
Medium integrated threat index, % of reef area	0
High integrated threat index, % of reef area	90
Very high integrated threat index, % of reef area	10
Threat indicator marine pollution	high
Threat indicator coastal development	high
Threat indicator sedimentation	high
Threat indicator overfishing	high
Threat indicator destructive fishing	high
Total number of actively managed MPAs	2
Total number of MPAs with coral reefs	1
% of MPAs with good management ratings	10
Length of Coastline	435 km
Area of Mangroves (1997)	63,039 ha
Area of Priority Coastal Wetlands (1997)	54,500 ha
Number of Coastal, Marine Protected Areas	6
Area of Coastal, Marine Protected Areas	388,700 ha

Source: Cambodia Reef Conservation Project 2011

Still, this small number of live coral accommodates 111 hard coral, 17 soft coral species as well as 9 species of seafans and seawhips as shown in table 9. Further they are home to at least 70 non coral species in 33 genera and 11 families (UNEP 2007; in: <http://www.worldfishcenter.org/Pubs/CambodiaProceedings/pdf/CambodiaProceedings-02.pdf>)

Table 9: Coral species in Cambodia

Group	Estimated number of species	References
Hard Coral	70	Nelson (1999)
Soft Coral	17	Nelson (1999)
Marine Fish	520	Ing (2003)
Echinoderms	21	Ing (2003)
Crustaceans	50	Ing (2003)
Mollusks	250	Ing (2003)
Marine Turtles	5	Ing (2003)
Marine Mammals	12	Ing (2003)
Seaweeds	16	Ing (2003)
Seagrass	9	CZM/MoE (2002)

Source: Cambodia Reef Conservation Project 2011

Current information about Cambodia's reef ecosystems is sparse and poorly documented and there is an urgent need for accurate data on the status of these critical habitats (Chou et al., 2003, Wilkinson, 2008). The first surveys on Cambodia's reefs were completed between

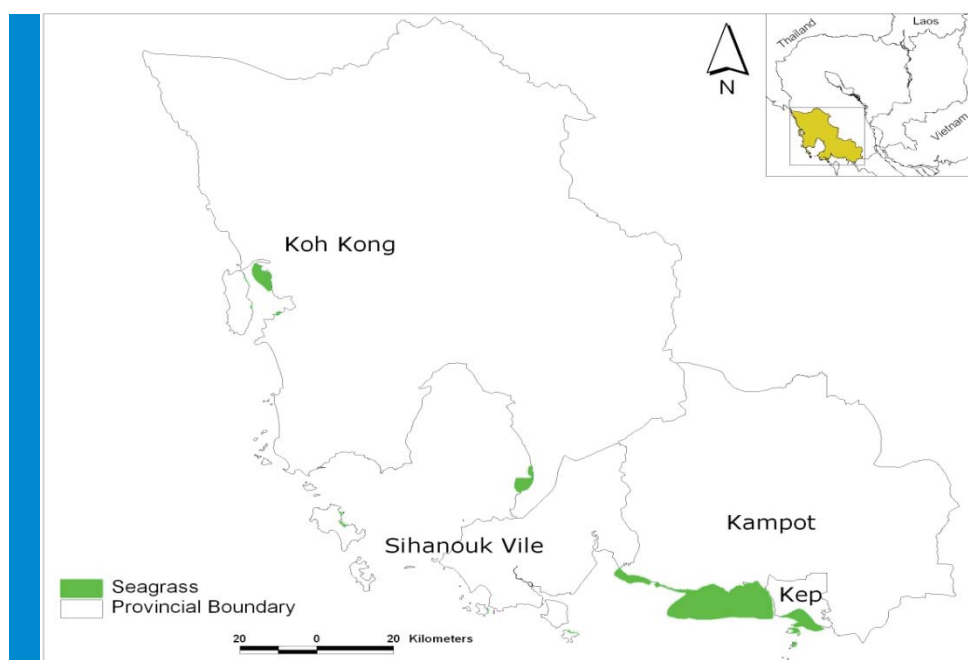
1997 and 1999 (Nelson, 1999), followed by further surveys conducted in 2001 by Wetlands International (Mam, 2001³), and the Department of Fisheries and UNEP in 2002 and 2003 (UNEP, 2003⁴). A team of scientists from the National University of Singapore conducted assessments of coral reefs around the Koh Sdach islands in Koh Kong in 2002 and 2003 (Chou et al., 2002, 2003). These surveys concluded that coral reefs in Cambodia provide both biological and socio-economic benefits and recommended that long term marine conservation schemes be implemented (Kim et al., 2004⁵).

Seagrass bed areas are estimated at between 30,096ha (MoE 2007) and 32,492ha (UNEP 2008). This means that seagrass cover and area more than 10 times larger than that is covered by corals reefs. Obviously this relation is not reflected in maps 2 and 3, which exclusively indicate around which location both ecosystems can be found. Table 10 shows the distribution of seagrass areas per province and municipality.

Table 10: Estimated Sea Grass Area in the Coastal Waters by Province/Municipality

	Kampot	Koh Kong	Sihanoukville	Kep
Sea Grass Area in Hectares	25,241	3,993	164	3,096

Source: MoE 2007



Map 3: Locations of Seagrass in Cambodia

Source: UNEP 2008

³ Coral Cay Conservation, 2011

⁴ Ibid

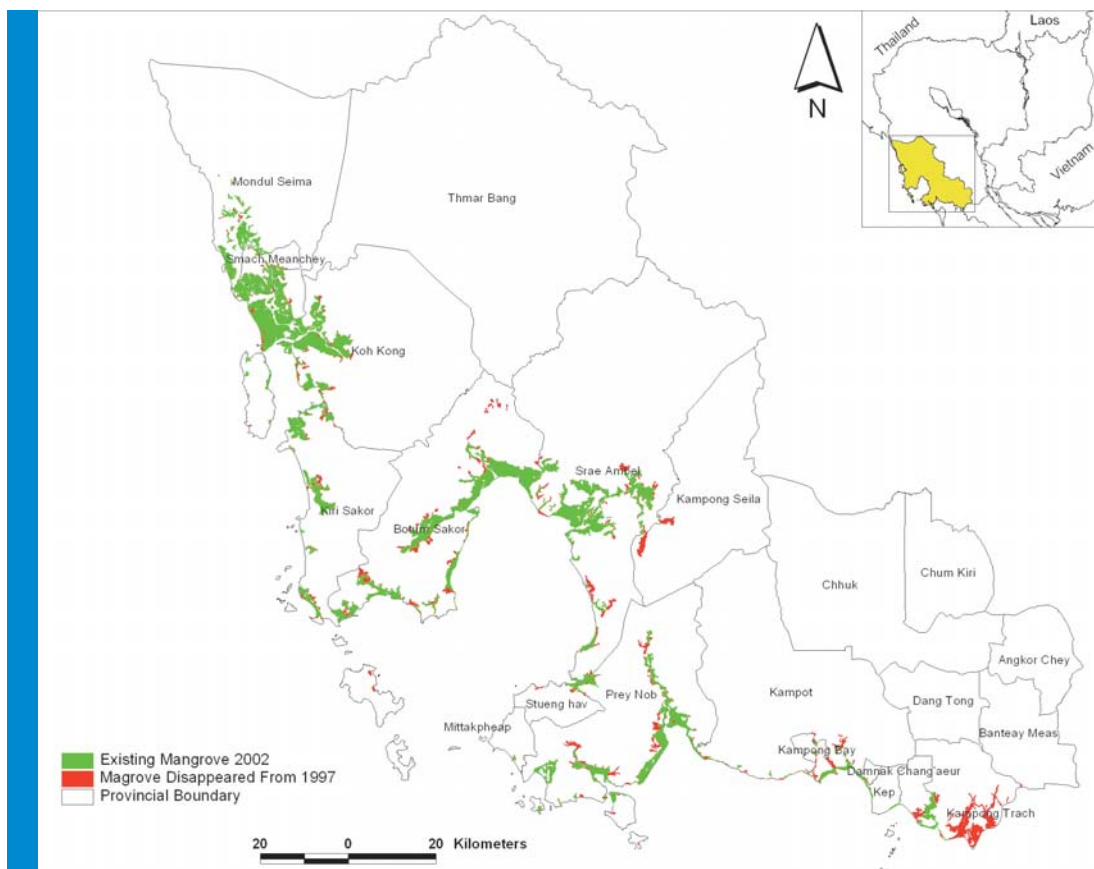
⁵ Coral Cay Conservation, 2011

Seagrasses often thrive along stretches of shallow, protected coastal waters. These seagrass beds provide an environment conducive for juvenile fish to thrive, as well as perform nursery functions for many different fish species. Seagrass along Cambodia's coast can be divided into two types; extensive sea grass meadows along the mainland and paths of seagrass interlinked with coral reefs around islands. Many locally consumed fish and shrimp species, which are also traded in both domestic and international markets, depend on seagrasses. The collection of invertebrates by fishers using snorkel and mask is also popular in inshore seagrass areas (UNEP 2008).

Threats to coral reefs and seagrass beds in Cambodia are much the same as those encountered in neighbouring countries and include destructive fishing practices (particularly motorized push nets, shallow water trawling, and weighted bottom nets which rip up and destroy seagrass meadows, dynamite and cyanide fishing), collection of corals for trade, declining water quality due to unsustainable logging practices, and domestic and industrial waste disposal (UNEP 2008).

Mangroves

According to table 8 and map 4, mangrove forests occur in all four of Cambodia's coastal provinces and municipalities. The largest areas are found in Koh Kong, followed by Sihanoukville, Kampot and Kep.



Map 4: Mangrove distribution in Cambodia

Source: MoE 2007

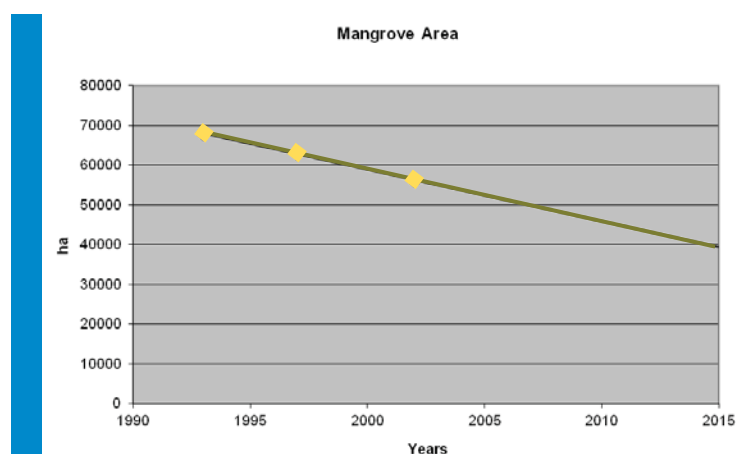
There are estimated to be 85,100ha of mangroves in Cambodia fringing coastal areas along the Gulf of Thailand (Mekong River Commission, UNDP, FAO, 1994). About 75% (63,200ha) of these mangroves were found in Koh Kong, while 16% (13,200ha) in Sihanoukville. The remaining 9% (7,300ha) were located in Kampot. In 1997, the mangrove forest area was reported to be limited to about 63,039ha (Ashell 1997)⁶, and by 2002, it was further reduced to 56,241ha (JICA 1997)⁷. The rapid loss of forest cover and mangrove occurred mainly in Kampot and Sihanoukville coastal areas (MoE 2005).

Table 11: Change in mangrove distribution from 1997 to 2002

District	Area in 1997	Area in 2002	Change	% Change
Kampong Trach	3854	319	-3535	-91.7
Kampot	1179	660	-519	-44.0
Kampong Bay	585	408	-177	-30.2
Botum Sakor	12889	11216	-1673	-13.0
Kiri Sakor	4360	4203	-157	-3.6
Koh Kong	11150	11229	80	-0.7
Smach Meanchey	2085	2265	180	8.6
Mondul Seima	6027	6889	862	14.3
Srae Ambel	11112	10452	-661	-5.9
Kampong Seila	818	0	-818	-100
Mittakpheap	146	45	-101	-69.1
Prey Nob	7402	7479	77	1.0
Stueng Hav	352	191	-160	-45.6
Damnak Chang'aeur	952	666	-286	-30.0
Kep	130	165	35	27.1
Total	63039	56188	-6853	-10.9

Source: State of Coastal Environment and Socio-economic Report, 2005

As graph 1 shows, forecasts based on a yearly loss rate of between 1.73% and 1.76% predict a further decline down to 43,000ha in 2015 (MoE 2005).



Graph 1: Forecast of change in mangrove coverage in the coastal area based on trend from 1993 to 2002

Source: State of Coastal Environment and Socio-economic report, 2005

⁶ MoE, 2009

⁷ Ibid

Mangrove forests are considered vital for providing food source; shelters and nursery for both culture and capture fisheries along the coastal zone. Mangrove forests are especially important to local communities given that more than 70% of the coastal population rely on their products and resources. The conversion of mangroves into shrimp farms, salt farms and charcoals has impacted adversely on the marine fish habitats and its productivity in protection against storm, and in loss of firewood for use by the local community.

During the 1980s charcoal was still produced for the local market. But by 1992, 300 kilns started producing 24,000 tons of charcoal, mostly for illegal export (ASEAN 2000). An estimated 100,000 tons of mangrove wood was harvested by this activity. The Department of Nature Conservation and Protection (DNCP) tried to reduce the number of charcoal kilns by taking action and destroying any charcoal kilns that were built (<http://www.mekonginfo.org/assets/midocs/0001627-environment-mangrove-forest.pdf>).

The conversion of mangrove to shrimp farms is reported to be a fairly recent trend but it has adversely affected both the coastal people and the coastal biodiversity. For instance, approximately 840ha of 16,000ha of Koh Kong's mangrove forest were used for intensive shrimp farming in early 1994. By end of 1994, 1,240ha of mangrove forest had been converted for the purpose. In the same year, 1,439ha had been proposed for aquaculture development and 1,079ha had been established as fish farms. However, only 197ha of area are legal (Nasuchon 2009). These figures contradict somehow the data provided in table 8, which could be due to the fact that it is very hard to distinguish those land use types through GIS analysis. More recent data and trend analysis on the conversion of mangrove or other land types to shrimp and fish farms is unfortunately unavailable.

It has also been estimated that some 3,500 to 4,000ha of former mangrove lands in Kampot Province and Kep City were converted to salt farms (Mastaller 1999). Salt pans, which not only invade mangrove areas but can also, deteriorate the soil so that nothing can grow anymore. Salt production is mainly carried out in the coastal areas of Kampot and Kep with some small salt pans in Koh Kong. Located on low-graded slopes, these locations enable easy access to seawater and hence are ideal for the extraction of salt.

The major salt production locations are Boeung Rong I and II, Ses Sor, Boeung Touk, Treoy Koh, Kampong Trach and Kep. On the outskirts of Kampot and Kep, it is a common site to see large areas, often spreading for kilometres, under salt production. However, most salt pans are located in between rice fields. This practice causes the leaking of salt water into the rice paddies and results in damage to the crops. This is a frequent cause of conflict between the farmers and salt producers. Mangroves, with their muddy and soft earth and high cost of clearing, are not considered to be ideal locations for salt extraction. It is usually along the inner fringes of the forest, where the area is already damaged and due to stunted growth of the trees the ground is not very muddy anymore, that salt pans are created on sandy ground. Salt pans are actively productive during the dry season from December to May and remain

largely abandoned during the rainy season. This practice also contributes towards soil erosion and other environmental issues. After the rainy season, when salt production activities are resumed, the salt pans are cleared of mangrove growth and the embankments repaired. The residue is thrown into the adjoining mangrove forests causing damage to the vegetation.

Salt production processes and thus the concentration of salinity in the coastal areas directly result in damage to the natural resources and habitats. A study carried out by the Ministry of Environment (1999) quoted salt farming as a major cause of mangrove destruction in Kampot and, as a result, damaging to other marine resources, including shrimp production, in the coastal areas.

Salt production, being categorised as a mining resource, comes under the purview of the Ministry of Industry, Mines and Energy. According to the Cambodian Salt Production Association (2009), there were 4,400ha of land under salt farming producing around 180,000 tons of salt annually. The quality of salt is not of international standards and is thus locally consumed.

Table 12: Land cover for salt production and production figures

Location	Coverage		Production	
	1995-96	1997-98	1995-96	1997-98
Boeung Rong	1,271	1,452	20,000	54,795
Ses Sor	300	562	7,070	18,349
Boeung Tuk	320	320	5,000	9,532
Troeuy Koh	990	990	24,000	34,551
Kompong Trach	540	415	14,000	11,589
Kep	677	830	6,000	22,953
Total	3,098	4,569	76,774	151,789

Source: MoE/Danida

The pressures on mangroves, through competing resource uses, are of ecological and economic significance not only for Cambodia but also for the region. For example Koh Kong has been described as the only site in all of continental Southeast Asia considered appropriate for the establishment of a coastal biosphere reserve (<http://www.mekonginfo.org/assets/midocs/0001627-environment-mangrove-forest.pdf>)

Most mangrove areas in Cambodia have been designated within the protected areas system, such as Peam Krasaop Wildlife Sanctuary Koh Kapik and associate islets situated within Peam Krasaop Wildlife Sanctuary, have been nominated as a wetland of international importance under the Ramsar Convention. However, management plans for these areas are yet to be developed.

Neighbouring countries such as Thailand and Vietnam have seen widespread destruction of their natural coastal resources as a result of unmanaged exploitation. Sound management strategies for Cambodia's mangrove areas are needed to avoid a similar outcome.

In Cambodia, the Fishery Law promulgated in 1987, considered the exploitation of mangroves for any purpose as illegal. Based on several documents, subsequent shrimp farming activities slowed down due to the loss of shrimp productivity which automatically reduced the pressure on mangrove clearance. About 70% of shrimp farms were abandoned by 1996 (Mastaller 1999). It is unknown how many shrimp farms currently exist, but only a few are believed to be operational at present.

In 1994, the Government also issued a decree to ban cutting of mangroves for charcoal along the coastal areas. The Anti-charcoal Kiln Committee was established which consisted of local authority, MoE staff and other relevant agencies to control illegal charcoal activities. The committee was active for only a short time and failed to stop all charcoal production due to lack of resources. Several new government initiatives on coastal projects have been undertaken which have relied on working groups constituted by the provincial departments of MoE, MAFF (especially DoF), MPWT and MoT. In addition, three central-level coordinating bodies exist: (i) the National Committee for Land Management Urbanization and Construction, created in 1997 to regulate construction planning based on a zoning plan; (ii) the National Steering Committee for Coastal Zone Management under MoE, created in 1997 to address coastal management issues; and (iii) the Coastal Coordinating Unit within MoE, addresses environmental problems. These Committees today look after the overall management works in the coastal province and it contributes to the management of mangrove forests including prevention of the conversion of mangrove area for shrimp farming, charcoal production and salt farming.

Fisheries resources

The review of the fisheries component of the UNEP GEF project "Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand" (UNEP 2009) found 525 marine fish species classified in 202 genera and 97 families with a total stock estimated at 50,000 metric tons (Ing, 2003), but the number of reef fish species and invertebrates are unknown. Furthermore, 20 species of marine crabs, 42 species of marine gastropods, 24 species of marine bivalves and 11 species of marine mammals were observed (Tana 1997, Try 2003)⁸. Marine mammals (dugong) and marine dolphins found include the endangered Irrawaddy Dolphin (*Orcaella brevirostris*). Other species of cetaceans known to occur in Cambodia's coastal waters are the Indo-Pacific Humpback Dolphin (*Sousa chinensis*), Common Dolphin (*Delphinus delphis*), Bottlenose Dolphin (*Tursiops truncatus*), Shinner Dolphin (*Stenella longirostris*), and Finless Porpoise (*Neophocaena phocaenoides*) (Kosal 2002)⁹.

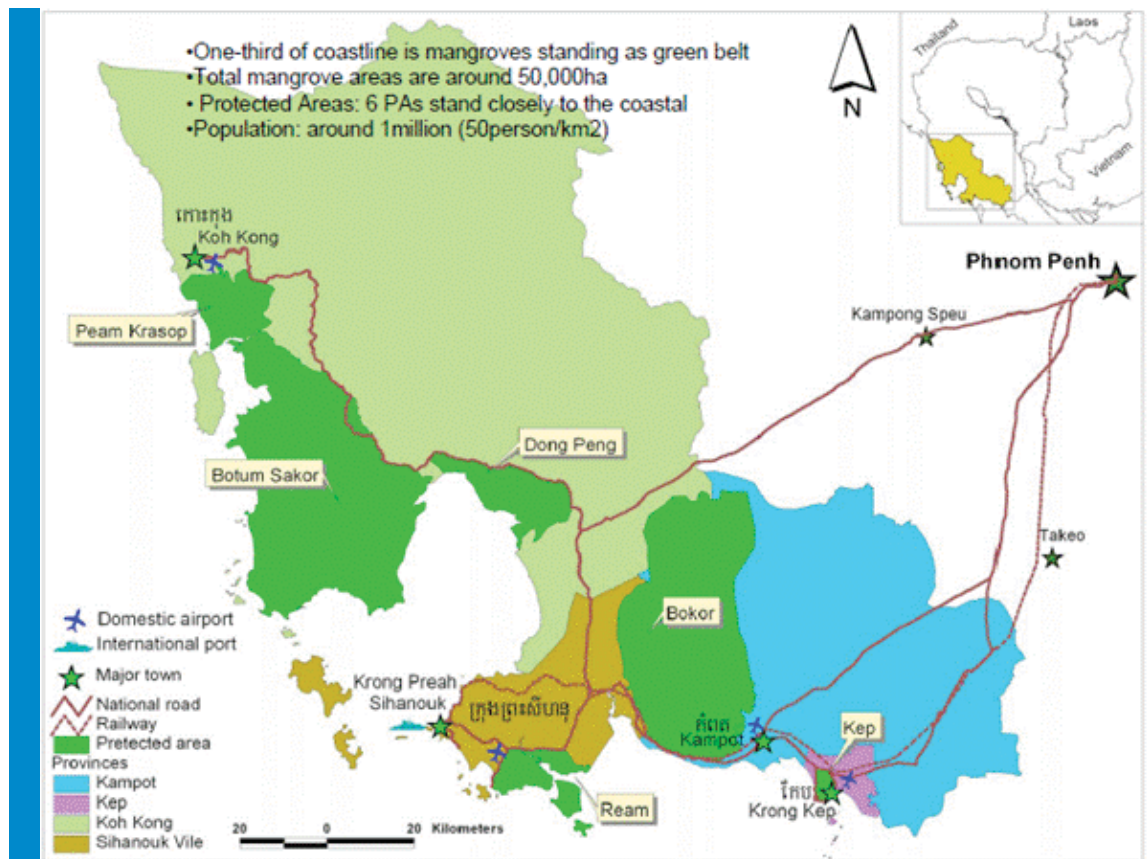
⁸ Puthy, 2007

⁹ World Fish Centre, 2004

Reef Fish are the most valuable and targeted marine species such as Sweetlips (Haemulidae), Snapper (Lutjanidae), Barramundi Cod (Cromileptes), Grouper, Humphead Wrasse, Bumphead Parrotfish, other Parrotfish. These species have been collected in all sizes including juveniles and pre-adults. These types of reef fish have been collected and re-cultivated in cages along the coast, when they reach commercial sizes they are mostly sold alive to both local restaurants and international markets in Hong Kong.

Fisheries management in Cambodia is divided between central and local governments. At the central level, the Fisheries Administration (FiA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF) is in charge of developing research and drafting laws and policies on fisheries (and aquaculture). The FiA is also vested with inspecting powers. At the local level, fisheries are managed by the Provincial-Urban Fishery Authorities, which have the necessary powers to ensure compliance with the law, in the area under their jurisdiction (http://www.fao.org/fishery/legalframework/nalo_cambodia/en).

Protected Areas



Map 5: Protected areas in coastal Cambodia

Source: MoE/Sothee 2008

Table 13: Protected areas per province/municipality

Province/Municipality	Total area (ha)	Protected forest area (ha)	forest area (%)
Kampot	469,325	108,695	23
Koh Kong	1,211,182	550,823	45
Sihanoukville	149,695	33,022	22
Kep	17,495	1,095	6
Total coastal area	1,847,697	693,635	38

Source: FA 2002; In: MoE 2005

A major management response to the demographic and economic pressures on coastal resources was the establishment of protected areas based on a Royal Decree in 1993 (ICEM 2003). Amongst the 23 protected areas (PAs), there are six PAs located fully in the coastal area covering an area of more than 400,000ha. This area does not include the three protected areas that are only partly located in the coastal area. The protected areas are Kep National Park (Kep Municipality), Bokor National Park (Kampot Province), Ream National Park (Sihanoukville), and in Koh Kong Province Botum Sakor National Park, Peam Krasoap Wildlife Sanctuary and Dong Peng Multiple Use Area. The rest of the protected areas are located in the Central Cardamom Mountains. Presently some sites e.g. Koh Rong area, Sihanoukville, have been under evaluation as future potential marine protected areas, but no locations have formally been established yet. Currently, the draft sub-decree on marine protected areas is being prepared (MoE 2005)¹⁰. A regulation or introduction plan for marine protected areas will then be prepared under the new fisheries law and the sub-decree on marine protected areas. The process and collaborative arrangements for management need to have a legal base, which sets out the roles, obligations and authority of various stakeholders.

3 Economy and Livelihoods

3.1 General Information

In coastal Cambodia, as in other parts of the country, the poverty level is very high and a majority of the population face issues such as low levels of education, a poor health infrastructure, and associated services.

Table 14: Demographic, geographic and economic information for Cambodia

Total geographical area	181,035 km ²
Population	13.7 million in 2005
Annual population growth rate	1.81% in 2005
Share of rural population	85% in 2005
Labour force, 10 years and above	7.5 million in 2004
Annual GDP growth rate (constant prices)	7% in 2005
Share in employment (2004)	
Agriculture	35.1%
Industry	26.3%
Service	38.6% (2006 est.)
Per capita GDP (US\$)	350 in 2005
Annual GDP growth rate (constant prices)	7% in 2005

Source: MoP (2006); in: Puthy, 2007

¹⁰At the time of writing this study no evidence was found that the sub-decree has as yet been endorsed by the government.

3.2 Key indicators: Agriculture, Forestry and Fisheries

Table 15: Demographic, geographic and economic information for Cambodia

Key indicators	Unit	1993	2000	2005 Estimates	2010 Projected
Annual GDP (constant prices)	Billion Riels	8,494	14,089	19,294	25,747
Share of GDP: : Paddy & crops	%	18.8	16.5	14.2	12.7
Livestock and poultry	%	8.9	5.4	4.6	4.3
Fisheries	%	13.6	10.8	9.3	8
Forestry	%	4.3	3.3	2	1.6

Source: USAID 2007

Cambodia has an agrarian economy and mainly depends upon productive natural resources for food and income. The primary sectors, comprising agriculture, fisheries, and forestry account for more than 40% of the national GDP (USAID 2007).

As shown in the following tables (NISC 2008)¹, agriculture is still the largest sector for securing livelihoods even in the urban province of Sihanoukville, where rates of service oriented job opportunities are highest. Unfortunately the tables do not provide information on the resource intensive income opportunities that lead to the most pressure on coastal ecosystems, such as charcoal production, salt mining and aquaculture.

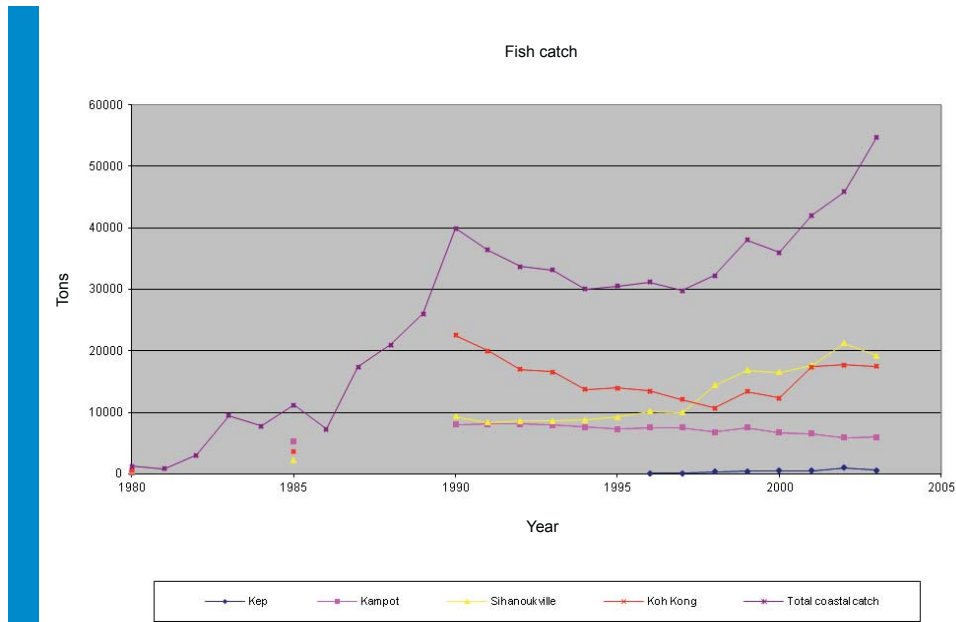
Table 16: Main occupation types in % of families in coastal Cambodia 2008

Main Occupation	Sihanoukville	Kep	Koh Kong	Kampot
Agriculture	53	92	64	92
Rice farming	34	75	31	89
Long-term crops	2	1	4	1
Short-term crops	3	5	3	0
Vegetables	1	4	2	0
Fisheries	11	7	21	2
Livestock	1	0	2	0
Non timber forest product collection	1	0	1	0
Craft work	1	0	0	0
Furniture	0	0	0	0
Metal and glass goods	0	0	0	0
Food production	0	0	0	0
Tire, plastics and rubber goods	0	0	0	0
Textile	0	0	0	0
Other	0	0	0	0
Services	44	2	20	2
Trade	8	1	6	1
Repair	2	1	1	0
Transport	5	1	4	0
Other	29	0	9	1
Not clear or multi	2	6	16	5

Source: National Institute of Statistics Cambodia, Population Census 2008; in: MoE 2009

¹¹ MoE, 2009

The involvement in fisheries remains between 7% and 21% in all provinces. FAO (1999) indicates that the Gulf of Thailand is among the most productive fishing grounds in the world and APIC (2001b) states that Cambodia's coastal area is the most productive in the Gulf. As the following graph shows, the annual catch has been increasing rapidly since the mid 1990s. This has contributed to a dramatic decline of fish stocks of those fishing grounds.



Graph 2: Total annual catch by province and total coastal catch

Source: State of Coastal Environment and Socio-economic Report, 2005

The marine component of the fisheries sector in Cambodia is not nearly as important as that of the inland areas. Reasons for this include a consumer preference for inland fish species and the relatively small fish production, about one-tenth of all fish production, from marine areas. The inland fishery yields around 400,000 tons of fish annually while the marine fish catch was estimated to be about 60,000 tons in 2006 (FiA 2007)¹².

Almost 90% of the marine fisheries production in Cambodia is from two coastal provinces, Sihanoukville and Koh Kong (Table 17). The total catch of finfish is 4,650 tons (FiA 2007)¹³. The trash fish is second in rank among the group species caught, of which Koh Kong and Sihanoukville rank at the top.

¹² Puthy, 2007

¹³ Ibid

Table 17: Statistics of marine product in metric tons of four main coastal areas 2006 (FIA 2007)

City/ province	Finfish	Trash fish	Shrimp/ prawns	Rays	Squid/ cuttle-fish	Lobsters	Crabs	Gastro-pods	Ana-dromous fish	Total marine fisheries
Kampot	2,103	1,674	386	32	130	5	635	415	2,000	7,380
Kep	300	-	35	5	10	-	45	17	18	430
Koh	13,519	10,500	1,622	89	1,100	-	2,000	280	160	29,270
Siha noukvill	9,709	5,020	2,735	350	2,311	110	1,500	185	1,500	23,420
Total	25,631	17,194	4,778	476	3,551	115	4,180	897	3,678	60,500

Source: Puthy, 2007

There have been major changes in Cambodia's marine fisheries during the past decade, including:

- an increase in total catch which, according to the DoF statistical system, has risen from 36,000 mt in 2000 to 60,500 mt in 2006;
- the rise and fall of shrimp aquaculture in the 1990s;
- increased use of trawling gear by small vessels in inshore areas;
- an apparent increase in fishery-related conflicts, mainly involving interaction between users of different types of fishing gear;
- the decline of some important commercial fisheries and associated processing industries; and
- increased interest by Government agencies, donors, and NGOs for supporting community involvement in management of coastal resources.

3.3 Contribution of marine fisheries to the economy

According to a government report, the marine capture fishery has increased from 36,000 tons in 2000 to 60,500 tons in 2006. Thus the average marine capture fishery was around of 50,700 tons per year from 2000 to 2006.

Table 18: Total fishery production marine fishery from 2000-2006 (FiA 2007) Year

Year	Total Catch (tons)
2000	36,000
2001	42,000
2002	45,850
2003	54,750
2004	55,800
2005	60,000
2006	60,500

Source: FAO 2009

The specific contribution of marine fisheries to GDP has not yet been assessed accurately. But some estimations, based on fish catch and market prices, have been made. A proxy value based on estimates starts from an average price for marine fish of US\$ 1 per kg (Terry et al., 2006¹⁴). Even with these low returns, the marine capture fishery can be estimated to value US\$ 50.7 million annually. Excluding illegal exports, the capture marine fishery is estimated at US\$ 15 million to US\$ 30 million (Terry et al., 2006¹⁵). This estimation was at the average market price of trash fish at 0.12 US\$ per kg. The share of fisheries in the GDP or government revenue was 10.8% in 2000 and the estimate for 2005 was 9.30% (<ftp://ftp.fao.org/docrep/fao/007/j1617e/j1617e02.pdf>).

With the predicted annual increase in tourist arrivals of 20% (MoT 2007; in: Puthy 2007), the demand for food consumption for these tourists will increase. This leads to an increase in the domestic market price of marine fish in Cambodia and the marine capture fisheries in 2006 can be estimated to value in total revenue around US\$ 63.5 million.

The processing of marine fishery products is undertaken by both small-scale family style operations as well as on a much larger commercial level. Small scale operations primarily comprise the manufacture of pastes, like shrimp, and dried products, e.g., dried shrimp, squid, and shark. According to an estimate about 480 mt of these processed marine items worth US\$1,131,500 were produced in 2000 (Touche and Todd, 2002¹⁶). While most of this production is for family use, significant amounts are sold commercially (Navy, 2002¹⁷). Even though the final product is generally of low value, small scale operations are able to process large amounts of raw product during peak landing periods.

On a larger commercial scale, fish sauce is an important product of marine fisheries in Cambodia. As the sauce traditionally uses anchovy as a primary ingredient, the catch of this fish have declined in recent years, and so has the production of the sauce. Although there were several marine fish sauce factories in the country a decade ago, presently there are only three; one in Kampot and two in Sihanoukville. Larger-scale processing includes a crab meat operation in Kep, a fishmeal factory outside Sihanoukville, and a few other facilities in Sihanoukville for the freezing and export of shrimp and fish.

¹⁴ Puthy, 2007

¹⁵ Ibid

¹⁶ FAO, 2004

¹⁷ Ibid

For the most part, the production of small-scale processing is for domestic use; marine fish sauce being a good example here. Most other commercial marine fishery products are for export. Even with the recent migration of people to the coastlines, the population of Cambodia mainly resides inland and traditionally there is a consumer preference for inland fish species. In addition, the coastline is physically isolated from much of the rest of the country and years of political instability has resulted in a lack of infrastructure development to allow for fresh marine fish to be distributed throughout the country. (O'Brien, 2003¹⁸)

3.4 Fisheries, Aquaculture & Livelihoods

Most coastal fisher folk lack the resources to procure proper fishing equipment for coastal fishing. They, thus, tend to use small-scale fishing gear only appropriate for inshore and mangroves use. The offshore net catch capacity of Cambodian fishers (in the EEZ) is relatively small compared to the available exploitation potential. Official, employment statistics from the fisheries sector in Cambodia only show the number of people involved in fisheries harvesting, processing and culturing. There is an urgent need to appraise the numbers of people employed in other fisheries related activities.

Table 19: Statistics of fishers and processors, 1999-2006 (DoF's Statistics 2000-2006)

Year	Harvesting labour force in marine sector						Processing labour force	
	Family/rice field		Mobile/artisanal Fisheries		Total Fishers		Families	Fishers
Number	Families	Fishers	Families	Fishers	Families	Fishers	Families	Fishers
1999	N/A	N/A	3,910	11,721	3,910	11,721	373	1,527
2000	N/A	N/A	6,557	14,647	6,557	14,647	379	1631
2001	6,445	8,067	4,137	15,350	10,582	23,417	370	1499
2002	24,818	45,940	9,648	26,130	34,466	72,070	1,472	2,379
2003	16,047	28,638	13,159	40,014	29,206	68,652	990	1,815
2004	16,475	31,657	10,865	33,274	27,340	64,931	1,407	4,234
2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2006	18,949	37,990	12,006	36,582	30,955	74,572	1,226	29,412

Source: DoF 2006

The marine production is about 15% of all fish production in the country (FAO, 2011). One reason for that is the preference for inland fish species by local consumers. Another factor is the lack of capacity of the Cambodian fisheries sector to harvest marine areas properly due to poor investment. From an ecological point of view this reduces stresses on fish stocks. But this situation is fast changing with the advent of the free market economy and the opening of Cambodian waters to international fishing companies. Apart from stresses exerted on the marine ecosystem by local communities there is the increasing pressure put on these

¹⁸ Ibid

coastlines; this, coupled with Cambodia's very limited offshore surveillance capability would imply that the number of illegal foreign vessels could be large. According to the Foreign Ministry of Thailand, an estimated 2,810 Thai fishing vessels were operating illegally in the waters of neighbouring countries in the mid-1990s (Butcher, 1999¹⁹). In this light it comes as no surprise that between 40% and 60% of the total catch of Thai vessels comes from outside Thai waters (Butcher, 1999²⁰).

This situation is further exacerbated by the fact that licensing authority is shared between several Government agencies. As a result, it is near impossible to accurately assess the number of vessels operating in Cambodia's waters. For example, according to the DoF anywhere from 167 to 226 Thai fishing vessels were licensed in late 2002 alone.

Evidence for this situation also comes from coastal villagers, who often cite the increasing use of large trawlers in shallow waters, the use of nets, destructive fishing methods, the increasing number of fishers, and aquaculture as major reasons for the decline of important fishery processes (ADB, 1999)²¹. Again, there is a need to investigate further and put in place processes and methodologies so that Cambodia's still juvenile fisheries sector prospers in an environmentally responsible and conscious way.

Thai influence has stretched wide and far in the marine resource distribution of Cambodia, and marine aquaculture production is no different. Utilising Thai technology and investment, with the eventual marketing of the finished product there also, marine shrimp culture was first established in the early 1990s in the province of Koh Kong and quickly spread to Sihanoukville and Kampot municipalities (Terry, 2003). Finfish (seabass, grouper and snapper) cage culture which operated primarily out of Kampot municipality and Koh Kong province declined in 1993 due to fresh water run-off during heavy rainfall (Limsong, 2001)²². Seaweed culture was introduced in Cambodia in 2001. Currently, aquaculture accounts for about 6% of all fishery production in Cambodia which is the lowest in Southeast Asia (FAO 2009).

The fishery sector in Cambodia is still developing and most businesses continue to be single proprietor enterprises. Any consolidation that has taken place appears to be confined to processing/export operations. Citing several industrial studies, O'Brien (2003) pointed out several constraints to the further growth of the fisheries sector in Cambodia; namely,

- lack of major investment in the fisheries sector;
- lack of information regarding fishery products;
- excessive export taxes;
- inefficient and expensive customs and shipping agencies; and
- the need to meet "unofficial" facilitating and gratuity payments.

¹⁹ FAO, 2004

²⁰ Ibid

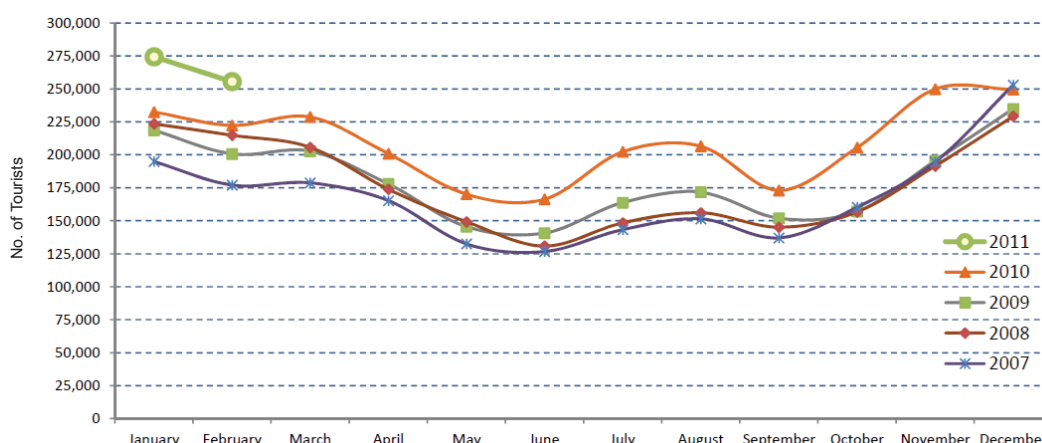
²¹ MoE, 2005

²² FAO, 2004

On the other hand, affordable locations and cheap labour continue to be important competitive advantages for Cambodia.

3.5 Tourism

The tourism industry has become a major revenue generator in Cambodia and is playing an important role in national development. Over the last decade, the number of visitors to Cambodia has increased rapidly, with an annual growth of between 10-15%. In 2010, there were around 2.5 million foreign tourists which generated estimated revenue of US\$ 1.75 billion (MOT 2010). This growth has granted the sector significant importance for the national economy and as such is part of main national development strategies. Along with the ancient temples of the Angkor Empire, the government is also promoting its coastal areas, especially the town of Sihanoukville. During the last few years this coastal town has emerged as a major tourist destination.



Graph 3: International tourist arrivals to Cambodia
Source: Statistics and ICT Department, MOT 2011

Sihanoukville, located about a three and half hour drive from Phnom Penh, has some of the most beautiful beaches in the region and diving opportunities to see the coral reef ecosystems. The government has also developed infrastructure and taken measures for the safety of the tourists. According to an estimate, the tourism market in Sihanoukville comprises 70% domestic tourists while international tourists approximately account for 30% (Ponna, 2009).

The Government of Cambodia, as a part of the National Development Plan, developed a tourism development strategy for Sihanoukville. This strategy adopted an “Open the Sky” policy for investments from around the world for tourism development. The Ministry of Tourism has been promoting investment into coastal tourism as an alternate source of revenue generation for the government and as an employment opportunity for local communities. In the coastal areas, along with Sihanoukville, the towns of Koh Kong, Kampot, and Kep are also attracting tourists. In particular, Ream National Park and Prem Krasop Wildlife Sanctuary are quite popular tourist destinations.

4. Coastal Environmental Issues

In addition to the threat to Cambodia's coastal areas deriving from resource dependent activities, there are further pressures caused by urbanisation and industrialization along the coastline. Urbanization and industrialization in the coastal zone of Cambodia are of a relatively small scale. Most urban and industrial developments are located along the coast of Sihanoukville and Kampot Province. Cement factories are located in Kampot, and breweries, handicraft manufacturing, petrol storage, local and international ports, hotels, and restaurants are being increasingly developed in Sihanoukville.

The absence of clear mandates for incorporating environmental inputs into planning and zoning activities, as well as the absence of integrated management plans, regional plans, research, and monitoring programs, are the main issues which need to be addressed for effective management of urbanization and industrialization along the coastal zones.

Other types of ongoing activities that could damage coastal water quality, ecosystems, and fishery habitats include dredging, untreated domestic and municipal waste, and related heavy construction work associated with port and harbour improvement, maintenance and building.

The impact of these activities has led to an increase in the fragility of the physical coastal ecosystem, oligotrophic, coastal water pollution, eutrophication (due to high concentration of Nitrogen and Phosphate and oily-water), public health deterioration, declining of eco-tourist areas, near shore fishery product decline, etc.

4.1 Further threats to coastal & marine environment

In addition to the already described pressures on coastal ecosystems, there are a number of further closely interrelated threats deriving from urbanization, industrialization and the commercialization of agriculture. The "Water and Environment Partnership in Asia, WEPA" lists the following.

Table 20: Further threats to coastal ecosystems

Threat	Explanation
Waste from residential areas and industries	<ul style="list-style-type: none"> Waste disposal of increasing population and industry sector mainly in Sihanoukville Poor management of wastewater issues
Waste from recreation areas	<ul style="list-style-type: none"> Waste disposal of increasing tourism sector Land use conflicts between agriculture, protected areas and tourism Additional pressure on coral reefs through poor diving, snorkeling and anchoring practices
Agricultural activities	<ul style="list-style-type: none"> Discharge of more chemicals due to modernization of agriculture Increased sediment runoff due to expansion of rice fields, charcoal production, salt harvesting and aquaculture

Threat	Explanation
Pollution from port and maritime	<ul style="list-style-type: none"> • Ballast water discharged from ships. • Ship accidents, which release oil and other harmful substances • Abandoned ships can disturb maritime transport and fishing activities.
Pollution from offshore development	<ul style="list-style-type: none"> • Oil and gas exploration platforms causing discharge of solid and liquid waste, accidental loss, and accidental spill.
Illegal Fishing Practices	<ul style="list-style-type: none"> • The use of dynamite and poisonous substances by fishermen

Source: compiled from http://www.wepa-db.net/policies/state/cambodia/seaarea3_9.htm

5. Coastal Management

5.1 Legal Framework

The existing legal systems for the management of the coastal zone of Cambodia comprise many Royal decrees, sub-decrees, laws, and other legal instruments related to environmental protection, natural resource management, protected areas, fisheries, forestry, land use, water pollution, industrial development and other relevant areas (MoE 2006).

The “Declaration of the Protection of Natural Areas” was passed in 1993 as a royal decree. Under this, the present system of 23 protected areas was established. In connection with the management of these protected areas, the Law on Environmental Protection and Natural Resources Management of 1996 is considered the principle legal instrument.

The classification of land areas that distinguishes between state-owned and private forest areas is done through the Forestry Law of 2002. The Sub-Decree on Community Forestry Management was approved in 2003 and provides the legal framework for developing co-management arrangements in forestry.

Some key laws and regulations are listed below:

- Law on Fisheries Management and Administration (1989);
- Land Law (1992 and 2001);
- Preah Reach Kret on Creation of Protected Natural Areas (1993);
- Law on the Land Management, Urban Planning and Construction (1994);
- Law on Environmental Protection and Natural Resources Management (1996);
- Law on Forestry (2002);

- Law on Mineral Resources Management and Mining Exploitation (2001);
- Law on Commune/Sangkat Administrative Management (2001);
- Preach Reach Kret on Creation of Fisheries Communities (2005);
- Anukret on Environmental Impact Assessment (1999);
- Anukret on Water Pollution Control (1999);
- Anukret on Solid Waste Management (1999);
- Anukrets on establishment of protected forests, natural resources conservations, wildlife protection areas, protected forest for biodiversity conservation (2002 and 2004).

Law on Commune/Sangkat Administration

The sub-decree on the powers and responsibilities of commune councils was endorsed in 2002. The Department of Local Administration (DoLA) in the MoI proceeded quickly in preparing commune clerks for their roles, and in providing materials to educate new commune councillors on their roles and responsibilities. Longer-term priorities include the redefinition of commune boundaries, and the integration of the Seila methodology into commune administration nationwide (USAID 2001).

The Organic Law was promulgated in May 2008. The Organic Law extends representative deliberative bodies to all levels of Sub-National administration in the country. This potentially represents a fundamental shift of the locus of decision-making and accountability throughout the territory. The Organic Law clearly establishes that transferred functions and responsibilities should be accompanied with appropriate resources (finance follows function). The Organic Law paved the way for the process of developing the National Program for Sub-National Democratic Development (NP-SNDD, 2010). This key document, organized by three platforms and around five program areas, aims at providing the framework for the implementation of the decentralization reforms over a period of 10 years.

Cambodia is also member of many international treaties and conventions which provide a broad legal framework related to coastal management. These include: the Coordinating Body of the Seas of East Asia (1995), Association of South East Asian Nations (1999), MARPOL (1994), Biodiversity convention (1994), CITES convention (1997), Ramsar convention (1999) and Climate Change convention (1995) (MoE 2006).

5.2 Institutional & Administrative Setup

5.2.1 National Setup

There are a number of institutions having responsibility and statutory powers for the management of coastal and marine areas and resources in Cambodia. The key ministries and departments involved are:

- Ministry of Environment
- Ministry of Agriculture, Fisheries and Forestry
- Ministry of Land Management; Urban Planning and Construction
- Ministry of Industry, Mines and Energy
- Ministry of Water Resources and Meteorology
- Ministry of Public Works and Transport
- Ministry of Tourism
- Ministry of Rural Development
- The Forest Administration
- The Autonomous Port Authority for Sihanoukville International Port
- The Communes/Sangkat Councils

The Ministry of Environment (MOE), set up in 1993, is the main body with the mandate to protect the environment in coastal zones. MOE is also responsible for managing the countries Protected Area System. However, this does not include Protection Forest Areas under the management authority of the Forestry Administration within MAFF. Following are the main functions and duties of the MOE:

- To prepare policies and strategies in rural developing pursuant to the Royal Government policies;
- To develop short, medium and long-term rural development plans to improve the socio-economic situation by subsequently conducting poverty alleviation programmes and subsequently reducing the gap between the rural and urban population.
- To participate in the building and developing of the country particularly in the field of rural development starting from family, village and commune levels within the Kingdom of Cambodia;
- To research, collect and manage the data, information and statistics of socio economy and culture of rural areas in the Kingdom of Cambodia in collaboration with the concerned ministries;
- To develop human resources through conducting technical training and transfer know how to the government officials of the ministries;
- To set up a technical and vocational training center for people at regional and local level as needed.
- To promote and increase production levels as well as household incomes
- To coordinate, facilitate and cooperate with international and non-governmental organizations, state institutions, all level of local authorities, concerned private sectors and local population to develop rural areas sustainably.

- To manage, direct and be responsible for the implementation of joint rural development programs at family, village, commune levels including road construction program, water supply, primary health care, community and rural economic development in collaboration with concerned ministries;
- To promote and strengthen all levels of rural development structures, particularly local rural development committees.

The Coastal Coordinating Unit is housed in the Ministry of Environment. The Unit coordinates all coastal related activities, projects, and reporting. Specific activities include:

- Co-ordination and co-operation with donor organisations, government institutions, NGOs and the private sector.
- Promotion of sustainable implementation of coastal and marine projects, ensuring that there is no overlap with projects.
- Reporting to the Minister of Environment on coastal activities, as well as to the departments under the Ministry in the provinces.
- Collection, analysis and provision of advice on information related to the negative and positive impacts of development activities in the coastal zone.

Nature Protection and Conservation Administration (NPCA) works under the Ministry of Environment as its secretariat to manage the protected areas. Its functions include:

- Develop strategic plans, action plans, and technical guidelines for managing the protected areas.
- Make proposals for the establishment and modification of any protected area as required by the Royal Government of Cambodia or pursuant to regional and international conventions, protocols and agreements.
- Prepare guidelines and procedures for effective enforcement of this Law
- Take action to investigate, control, and crackdown on natural resource of fences in the protected areas and file complaints to the courts.
- Promote education and dissemination to the public to participate in the conservation and protection of natural resources within the protected areas.
- Formulate agreements on community protected area development programmes.

The Ministry of Agriculture, Forestry and Fisheries (MAFF), is responsible for managing the coastal mangrove forests, wildlife and fisheries. Overall functions and duties include:

- To prepare and implement agricultural development policies to promote the living standard of citizens;

- To participate in the preparation of policies for reform and use of land;
- To instruct and develop plans for agricultural development;
- To coordinate, follow up, and evaluate the policy implementation and agricultural development activities;
- To monitor the evolution of natural resources of the agricultural field and facilitate such natural resource business to meet the needs of the Kingdom and maintain ecological equilibrium;
- To define provisions for governing, preserving, and protecting natural resources of the agricultural field and follow up its implementation;
- To conduct assessments and human resources training for participation in agricultural development by promoting technical understanding and increasing the effective use of such resources;
- To provide advocacy and necessary technical guidance for farmers to promote agricultural production and productivity;
- To define policies and follow up the performance and promote and improve the functioning of vocational agencies and associations dealing with agriculture;
- To research and disseminate scientific and economic technologies in all agricultural sectors;
- To instruct on land development and land quality improvement and proper use of agricultural land, seedlings, breeding, chemical fertilizers, and agricultural chemicals based on the geographical situation and regional weather to obtain high fields and maintain the natural environment;
- To conduct cooperation at national and international levels with international and non-governmental organizations for all sectors of agricultural development;
- To participate in encouraging and promoting investments, and exportation of agricultural products and food;
- To participate in implementing missions related to the Mekong river under the ministry's jurisdiction;
- To participate in the preparation of price policies and find markets for agricultural products;
- To collect revenues and pay to the State budget or cooperate with the Ministry of Economy and Finance to collect revenues for the State.

Agencies within MAFF include the Forestry Administration and Fisheries Administration. **The Forest Administration (FA)** of Ministry of Agriculture Forestry and Fisheries (MAFF) is the key institution in the management of forests in Cambodia. A Law on Forestry was passed in August, 2002, followed by sub-decrees and regulations according to which the Forestry Administration was established as the government authority under MAFF. The Forestry Administration's

mandate is to manage forests and forest resources ensuring sustainable management according to the 2002 National Forest Sector and the 2003 Forestry Law . Since its establishment, FA has undertaken many initiatives for forest management in the country . Recently, it led the preparation of Cambodia' s National Forest Programme (NFP) as the strategic framework for the Forestry Administration and all stakeholders involved in forest resources development in Cambodia. The NFP is a 20 year national framework for the management of Cambodia' s forest resources for the benefit of all Cambodians and will be implemented from 2010 to 2029 (MAFF 2011).

The Fisheries Administration (FiA) has responsibility for all fisheries related matters in Cambodia. The Department of Fisheries under MAFF was transformed into the Fisheries Administration in 2006. Its main responsibilities are:

- Prepare and establish fishery resource inventory , assess potentiality classified by kinds and follow up the evolution of fishery resource and aquaculture;
- Enact law, regulations and orders for fishery protection and improvement and the management of fishery resource exploitation and monitor the implementation;
- Prepare planning to manage fishery zones, fishery conservation and set up fishery resource development policies and measures to ensure the environmental protection;
- Conduct scientific research study on fishery and aquaculture and establishment of documentation;
- Inspect and manage all activities of fishery resource exploitation and aquaculture;
- Support and encourage any person who takes an initiative on fishery resource protection and takes into consideration aquaculture promotion.

Thus, for the sustainable resource management and conservation of Cambodia's coasts, it is imperative that both MoE and MAFF work in close collaboration with each other.

Other relevant Inter-Ministerial Committees and coordinating bodies include:

- **The National Committee for Land Management Urbanisation and Construction:** established in 1997 with a mandate to regulate all construction activities based on zoning plans. Specific roles include: the preparation of land use plans; protect patrimony, environment, economic development and natural resources; control over construction works and installations; prosecute, stop work and seizure of construction material in accordance with the level of violation.
- **The Commission on Monitoring and Assessing for Suppressing Encroachment into Mangrove land and coastal reclamation:** set up in 2005 with the mandate of tackling issues of encroachment as well as the replanting of mangroves in felled and reclaimed forest areas.

5.2.2 Governance in the Communes and Sangkats

The 2005 Strategic Framework for Decentralization and Deconcentration Reforms defines the key characteristics of the new Sub-National administration system. This administration system consists of elected, albeit indirectly, councils to strengthen and expand local democracy as well as a board of governors, appointed by the Cambodian Government, to enable the establishment of unified administrations. The latter goal implies a significant institutional restructuring and redefinition of the roles, not only of the provincial/municipal and district/khan administrations but also of the deconcentrated line Ministry of offices. The overarching vision of the Government is to develop a system that will "...operate with transparency and accountability in order to promote local development and delivery of public services to meet the needs of citizens and contribute to poverty reduction within the respective territories." In order to develop the Organic Law, which would define the new administrative structures for provinces/municipalities and districts/khans, the NCSC was subsequently replaced by the National Committee for the Management of Decentralization and Deconcentration Reforms (NCDD-1) and its secretariat moved to the Ministry of Interior. Even with a clear vision, and relatively well-defined goals, the passage from strategy to organic law proved to be quite challenging and required almost three years, during which time the second elections of commune and sangkat councils took place, in April 2007.

5.3 Local Governance

Since 1996, the term of local governance has been in use in the development context of Cambodia in one form or the other. The Seila Program was initiated in 1996 with the approach of having a decentralization policy to achieve poverty reduction through improved local governance. Under this programme, initiatives were undertaken to have decentralized commune development planning, financing, monitoring & evaluation and information system (RGC, 2000).

This model was mainstreamed when the implementation of decentralization reform began with the election of Commune/Sangkat Councils in February 2002. The second elections were held in 2007. This process was based on the commune administrative management law and commune council election law.

There are 1,621 Communes/Sangkats in Cambodia. Communes are predominantly rural and Sangkats are normally urban. Each Commune/Sangkat comprises 5 to 11 members, depending on demography and geography, who are elected for five years through a proportional system where nationally registered political parties participate.

The objectives of these decentralization reforms were to:

- promote participatory local democracy,
- promote social and economic developments and,
- reduce poverty.

The Commune/Sangkat Councils prepare development plans and annual investment programs. This Commune/Sangkat Development Plan (CDP) is a 5-year master plan and should be based on strategies for local development, physical infrastructure and non-physical infrastructure to respond to prioritized needs of residents (Mol 2010). Commune/Sangkat Council's development agenda focuses on the following:

- Economic Development
- Social Development
- Natural Resources and Environment Management
- Administrative Service and Security
- Gender issues

To better understand the functioning and mandate of Commune/Sangkat Councils, following is the framework of decentralization:

- Commune/Sangkat Councils (Commune in rural areas and Sangkats in urban areas) are decentralized local bodies
- Commune Councils (CC) are popularly mandated and are legal entities. Development assistance to Communes from the government
- Communes have roles and functions which they can implement without intervention
- Communes follow a participatory planning process
- Communes are entitled to own source of revenue and they can access development and administrative grant assistance from the government on an annual basis.
- Commune access to development and administrative grant assistance through nationally managed Commune Fund which receives share of national revenue and also accesses external assistance to the Communes (Commune Development Fund/ commitment of percentage of national revenue)
- Communes can access grants from outside
- Communes must follow 11 step bottoms-up participatory planning process in order address the needs and aspirations of the citizens. While planning they must give priority to poor.
- At the national level a National Committee to Support Communes is established for policy coordination and support the Communes.
- Ministry of Interior works as the link ministry, and Significant support to Communes and sub-national bodies for capacity development is provided.

Further, these working groups have produced state of the environment reports pertaining to each provincial/municipal area based on available data from rapid surveying and local

knowledge. these reports present the first comprehensive environmental overview of the Cambodian coastal zone. It is thought that the process of their compilation will also identify knowledge gaps and prepare for a more structured information system and monitoring framework.

6. Climate Change and Coastal Areas

6.1 Climate Change Impacts on Coastal Areas

According to the IPCC temperatures in the South East Asia region will increase in the range of 1.5-3.7C for the period 2081-2100. Moreover, there will be an increase in rainfall anywhere from a -2% decrease to a staggering 15% increase. These projections have come about as a result of a study of 21 climate models for the Region. UNDP/Oxford predicts a similar situation. The implications of these changes are nothing short of devastating for the region in particular and the world in general.

One of the most apparent changes will be the sea-level rise. This will be an important issue for Cambodia both because of direct effects on Cambodia's coastline, and the possible indirect effects on the country from sea-level rise in the rest of the region. In 2007 a rise of 0.18-0.56cm rise in sea-level by 2100 was predicted (IPCC); however a number of reports since then have concluded that the IPCC was overly optimistic in their prediction and around a 1m rise is much more likely (e.g. Rahmstorf 2007; in: <http://weadapt.org/knowledge-base/vulnerability/Cambodia>). Again, local effects such as land subsidence may amplify the global effect.

A study indicated that in case of one meter rise in seawater would result in inundation of 56% of Koh Kong city and an area of over 4,400 ha of natural habitat would submerge (MoE 2005). The low lying agriculture and urban lands would be badly affected throughout the coastal areas,

Cambodia already faces the salinization of surface and groundwater resources in its coastal provinces and these climate changes will only serve amplify these issues. In addition, even a minor rise in sea-level will increase coastal erosion and may eventually lead to the inundation of economically important coastal infrastructure such as ports and coastal resorts. Anything more than a slight increase in sea-level is likely to increase flooding from storms and storm surges.

Understanding that sea-level rise is a long-term problem, it is imperative that a strategy to minimise its negative impacts is put in place now. Recognising that this long-term planning cannot be separated from current coastal zone activities the approach to take here

must be two pronged; on the one hand working with stakeholders to infuse environmental sensitive best practices into their areas of work while at the same time put in place measures to combat future climate changes impacts and thereby increase the resilience of the coastal zone.

Current stresses on the coastal zone of Cambodia are numerous and have been discussed in detail in preceding sections. Perhaps the most pressing issues are the destruction of the protective mangrove forests and haphazard coastal development. An approach being used in many countries to address the varied needs and requirements of the different groups of stakeholders in the coastal areas is Integrated Coastal Zone Management (ICZM). The main principle behind ICZM is to try and bring together the varied interest groups and ensure that they work together, along with the promulgation of complementary policies, towards the sustainable development of coastal zones. In other words, ICZM aims to effectively address current coastal issues while at the same time also taking a strategic approach to deal with long-term issues such as sea-level rise (<http://weadapt.org/knowledge-base/wikiadapt/Cambodia>).

About the peoples' perceptions, a recent study by Christian Aid (2011) states:

“The Cambodian people are uncertain whether the changes incurred by climate will continue to affect them in the long-term. Many Cambodians are making decisions about how to respond without receiving information or support from any source outside of their communities (BBC, January 2011). Most Cambodian farmers have not changed their agricultural practices due to resource constraints, risk aversion, lack of information and technical assistance, and lack of crop insurance. Subsistence farmers in Cambodia are understandably resistant to change and lack unwillingness to take risks. These are also barriers in other developing countries. Farmers in Africa mention this similar mentality due to their lack of credit or savings, and for example farmers in Ethiopia, Kenya, and Senegal point to the lack of access to water (WDR, 2008²³)”.

Due to resource constraints, Cambodian farmers may not be able to adapt to climate change without support from outsiders. Water management schemes and better climate change information are potentially cost-effective ways of adapting methods to climate change in Cambodia, but will usually be far beyond the resources available of farmers and communities. These measures will require significant assistance from industrial countries (WDR, 2008²⁴). Due to the fact that climate change has not yet affected Cambodia significantly, and is considered a long-term problem with much uncertainty, the issue is seen by local people as less interesting than more pressing needs. Local voices are missing due to lack of appreciation by local leaders and policy makers, thus leading to small farmers being excluded from roundtable discussions.

²³ DanChurchAid/Christian Aid

²⁴ Ibid

In summary the major challenges are:

- Limited information on local impacts
- Low awareness in government and administration
- Limited institutional, personnel and technical capacities
- Weak cross-sector and cross-regional coordination
- Lacking suitable technologies and data
- Lacking reliable disaster control and forecast mechanisms
- Lacking budgetary funds

Table 21: Main Climate Change Related Projects

Action Titles	Donors	Implementing/ Managing Agency	Implementing Partner	Start Date (mm/yy)	End Date (mm/yy)	Total Budget (USD)
The Cambodian Community Based Adaptation Program (CCBAP)	Sida	UNDP	NGOs	2011		1.6 mil
Cambodia Climate Change Alliance (CCCA)	UNDP, Danida, EU, Sida	UNDP	MoE	Feb-2010	Dec-2012	8.9 mil
Promoting Climate Resilience in Agricultural Practices and Water Resource Management in the Rural Cambodia (NAPA Follow Up)	GEF/LDCF, UNDP	UNDP	MAFF	Sep-2009	Jun-2013	3.1 mil
Support to the MoE to prepare Second National Communications to the UNFCCC (SNC)	GEF, UNDP	UNDP	MoE	2007	2010	1.3 mil
Climate Change Initiation Plan (CC IP)	UNDP	UNDP	UNDP	2009	2010	0.7 mil
Sustainable Forest Management (SFM)	GEF, UNDP	UNDP	FA	2011	2015	4.8 mil
National Human Development Report on Climate Change (NHDR)	UNDP	UNDP	UNDP	2009	2011	0.3 mil
REDD Readiness Plans (REDD)	UN-REDD, UNDP, FAO	UNDP, FAO, UNEP	FA	2011	2012	4.0 mil
Knowledge, Attitude and Practices Study on Climate Change (KAP)	UNDP, Danida, Oxfam	MoE	BBC Trust	Mar-2010	Oct-2010	0.1 mil

Action Titles	Donors	Implementing/ Managing Agency	Implementing Partner	Start Date (mm/yy)	End Date (mm/yy)	Total Budget (USD)
The Project for Introduction of Clean Energy by Solar Electricity Generation System	Japan	JICA		2010		
The Forest Preservation Program	Japan	Japan		2010		
The Program for Improvement of Capabilities to Cope with Natural Disasters Caused by Climate Change	Japan	Japan		2010		
CC Adaptative Initiative (CCA)	AusAID, DANIDA, SIDA, Luxembure, Finnida	MRC	NMCs, national experts, national climate change focal points and core partners such as CSIRO, GTZ, SEI, UNDP, SEA START	Aug-2009	2025	15 mil for the first five years phase until 2015
Green Growth Training	British Embassy		UNESCAP, MoE	Jan-2011	Feb-2011	10,000
Improving the Food Security of farming families affected by volatile food prices	EU	FAO	MAFF/MOWR AM/MOWA	2010	Jun-2011	50,000 for component
Coastal Adaptation and Resilience Planning in Coastal Areas (CCCA Grant)		UNEP	MoE	2010-2012		2.2 mil

Source: Dan Chucch Aid/Christian Aid 2011

6.2 Climate Change Policies & Strategies

Cambodia is actively pursuing the climate change agenda and is part of all the major initiatives regarding climate change adaptation and mitigation. Following is a summary of the measures taken by Cambodia in this connection.

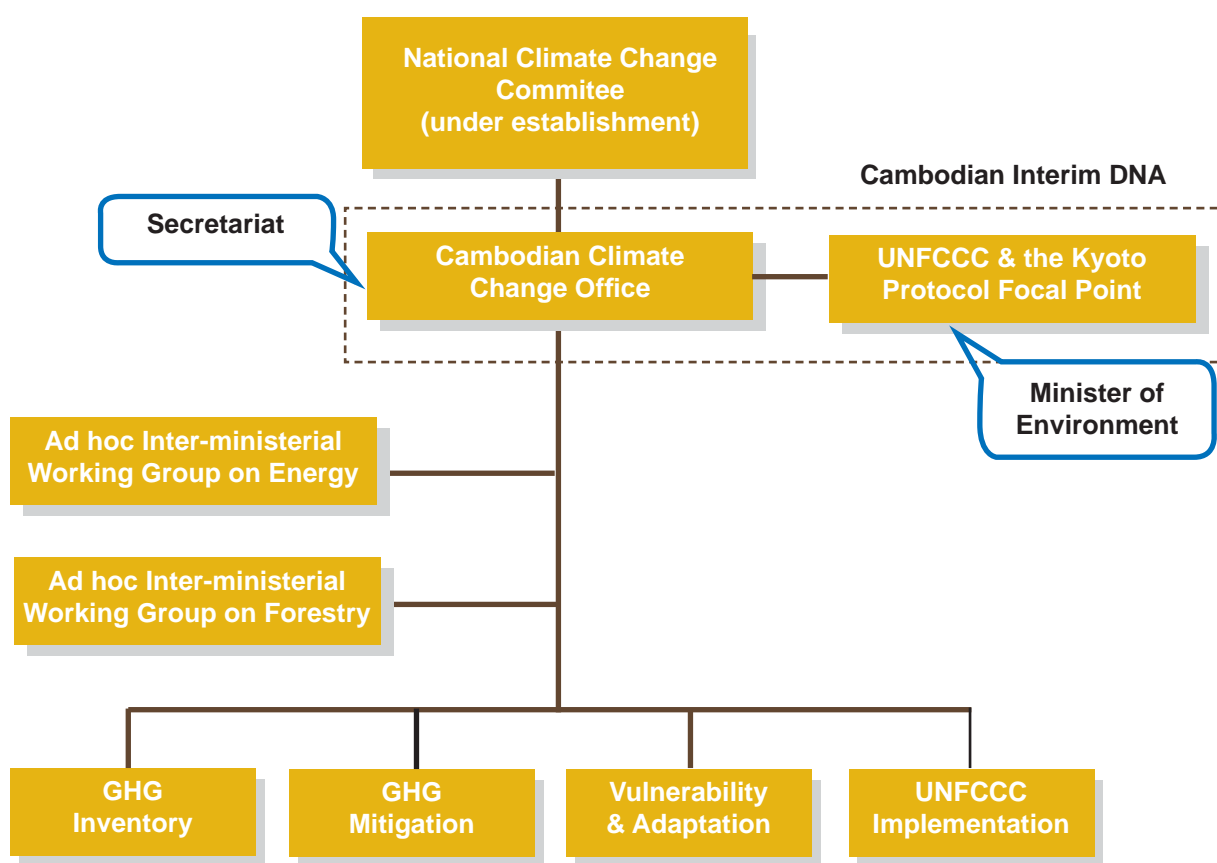
Table 22: Climate change strategies and policies

Item	Description
UNFCCC & Kyoto Protocol	Cambodia ratified UNFCCC on 18 December 1995 and Kyoto Protocol in July 2002.
National Green Growth Roadmap	It was developed in December 2009 with a view to reducing greenhouse gas emissions to maintain sustainable economic growth.
National Adaptation Program of Action to Climate Change (NAPA)	NAPA was developed in October 2006 through stakeholder involvement. NAPA aims to (i) understand coping mechanism to climate hazards and climate change at grassroots level; (ii) understand the main characteristics of climate hazards in Cambodia; (iii) improve agricultural productivity through the expansion of irrigation and the management of water resources to reduce vulnerability to natural disasters; iv) identify and prioritize adaptation activities to climate hazards and climate change; and v) understand existing programs and institutional arrangements for addressing climate hazards and climate change.
Cambodia's Initial National Communication (INC)	In August 1998, the Government of Cambodia and the UNDP/GEF signed the project document enabling Cambodia to prepare its First National Communication in response to the UNFCCC. Thus, this INC was articulated on how Cambodia, as a Non-Annex 1 country committed to the Convention. This Communication gives information on the national circumstances and national GHG inventory for 1994, which covers three main GHGs (CO ₂ , CH ₄ and N ₂ O). It also describes Cambodia's capability to respond to the impacts of climate change and measures that have been or need to be taken to mitigate and adapt to climate change in the country.
Second National Communication (SNC)	The Second National Communication undertook studies for climate analysis, which included: (i) trend analysis to assess the presence of significant trends in historical climate data, (ii) the development of climate change scenarios, and (iii) the development of a model for generating daily climate data from monthly ones.
National Strategic Development Plan 2009-13	This plan covering the period 2009-2013 has a strong component of climate change and identifies necessary activities to address this through capacity building, mainstreaming, developing a National Strategy, establishing a climate change fund, implementing and up-dating NAPA, developing CDM mechanisms, etc.

Source: own compilation

6.3 Institutional Setup for Climate Change

The Cambodian Climate Change Office (CCCO) was established in 2003 by the Ministry of Environment and the National Climate Change Committee (NCCC) was set up in 2006. These are the main governance mechanisms overseeing climate related initiatives in Cambodia. The NCCC consists of representatives from 19 ministries and acts as a policy-making body. It coordinates the development and implementation of policies, plans, and measures to address climate change issues in the country. The NCCC is the focal point for all engagement on climate change within the Government of Cambodia. The CCCO works closely with all relevant government agencies, NGOs, private sector, local communities, and donors. Its main function is to coordinate development and implementation of national climate change related policies and programmes.



Graph 4: Key organizations dealing with climate change in Cambodia

Source: <http://weadapt.org/knowledge-base/wikiadapt/Cambodia>

Table 23: Relevant Ministries involved in climate change policies

Ministry	Responsibility
Ministry of Environment	Focal Point for Climate Change and Biodiversity Conventions, and GEF
Ministry of Agriculture, Forestry and Fisheries	<p>Focal point for UNCCD; its Forestry Administration is responsible for REDD, Forestry, Climate Change and Innovative Financing Working Group.</p> <p>The Forestry MAFF is well placed with having has a network at the national, provincial, district and commune levels. The Forestry Administration has the mandate for the management of Protected and Community Forests.,</p> <p>Given this broad mandate, there is substantial overlap with the MoE in the perception of functions and responsibilities. It is noteworthy that the 2006-2010 Strategic Agriculture Development Plan does not take climate change adaptation or mitigation into account.</p>
Ministry of Water Resources and Meteorology	Responsible for water resources management; collection and management of meteorological data and natural disasters
Ministry of Land Management, Urban Planning and Construction	Responsible for the formulation of development plans and land use plans at the national and district and local levels.

Ministry	Responsibility
Ministry of Industry, Mines and Energy	Responsible for energy policy and planning including renewable energy. Also looks after industrial water use and hydropower development.
Ministry of Rural Development	Responsible for supplying small-scale water supply infrastructure to households; primary health care; and small-scale infrastructure in the rural areas in Cambodia.
Ministry of Health	Responsible for the development of the health sector
Ministry of Tourism	Responsible for preserving the scenic beauty and natural resources of the country
Ministry of Public Works and Transportation	Responsible for construction of roads and infrastructure
Ministry of Woman Affairs	Responsible for women development. Part of climate issues special working group, focuses on gender and climate change linkages

Source: Christian Aid 2011

In 2010 Cambodia set up the **Cambodia Climate Change Alliance (CCCA)** supported by the EU, UNDP, SIDA, and DANIDA. The aim is to (a) support capacity development and institutional strengthening in order to prepare for and mitigate climate change risks; and (b) directly help vulnerable communities by enhancing their resilience to climate change and other natural hazards (DCA/CA2011).

CCCA initially would cover a period of three years (2010-2012) with a trust fund of 8.9 million U.S. Dollars which is being handled by UNDP, would eventually be transferred to a government managed trust fund. Along with capacity building, CCA will also provide grants to government agencies and civil society for climate change adaptation initiatives.

Table 24: Disaster Management Polices & Law

Law	Description
Disaster Management Law	National Committee for Disaster Management (NCDM) is working on a Disaster Management Law in consultation with all the relevant line ministries and civil society organizations. This law has 10 chapters and 99 articles. This process is expected be completed in 2012. The main objectives are: The objectives of this law are: (i) protect and care for social safety (ii) protect human life and health, social welfare and the environment, (iii) protect rights, fundamental lawful interests and assets of the people, (iv) avoid the adverse effects of disaster on people' s livelihoods and social-economics, e) manage and mitigate disaster risk, prepare for , respond to, and recover after disaster, (v) prevent any infraction that causes disaster risk and leads to the occurrence of a disaster , and (vi) prevent and cease irregularity in the performance of disaster management.
Strategic National Action Plan 2008-2013 for Disaster Risk Reduction (SNAP-DRR)	SNAP-DRR was developed in response to Cambodia's commitment to the Hyogo Framework of Action (HFA). This strategy aims at enhancing resilience of people to the affects of any forms of disaster by integrating disaster risk reduction components into sectoral policies and investment planning. The SNAP-DRR presented a "road map" for development and strengthening of institutions, operational mechanisms and capacities of disaster management committees at all levels. It includes a comprehensive framework to guide and monitor the implementation of DRR, the mechanisms for coordination and cooperation among stakeholders, and the efficiency of resource allocation and utilization in disaster reduction.

Law	Description
National Strategic Development Plans 2009-2013 (NSDP)	The National Strategic Development Plan (NSDP) 2009-2013 is an updated version of NSDP 2006-10 by the Ministry of Planning with participation and consultation from various stakeholders including government ministries and institutions, external development partners and civil society groups. NSDP is an overarching document aiming at influencing public policy for poverty reduction and achievement of socio-economic development goals for Cambodia.

Source: Christian Aid 2011

Table 25: Examples of Major Initiatives for Coastal Management

Project	Supporter	Objectives
Environment Management of the Coastal Zone (1997-2007)	DANIA	Coastal Zone Management; Capacity Building;
Integrated Coastal Zone Management in Sihanoukville (2000 and 2006)	PEMSEA and IMO	The prevention and mitigation of multi-use conflicts in coastal areas and as they related to preservation of marine resources utilization
Participatory Management of Coastal Resources (1997-2007)	IDRC	Community Based Coastal Resource Management in the Peam Krasaop Wildlife Sanctuary in Koh Kong Province
Commune and Community Based National Resource Environment Management in (2004-2006)	Ministry of Foreign Affairs of Denmark	The project provided budget to the commune councils for implementing natural resource management which targeted 166 communes
Integrated Coastal Zone Management in Sihanoukville (2005-2007)	SEFDEC-TD and Department of Fisheries, Cambodia	Improving the rural livelihoods, while enhancing food security and sustainable resources use
South China Sea Regional (2000-2006).	Supported by funds from GEF and implemented by UNEP	The project was implemented in seven countries bordering the South China Sea. The aim was enhance capacity of the participating Governments to integrate environmental consideration into national development planning

Source: own compilation

7. Conclusions and Recommendations

Over the last few decades, the increasing rate of development in the coastal areas has resulted in an exponential increase in migration of people from areas not undergoing such development. As a result, the pressure on local natural resources and environmental conditions is also increasing. This situation is further exacerbated by the near complete lack of facilities and coordination between the line agencies and departments responsible for coastal management in Cambodia.

Coastal environmental resources such as forests, mangroves, coral reefs, seagrass, and wetlands are all showing signs of marked degradation. If current trends are not halted soon, the poor environmental conditions coupled with climate change impacts would seriously jeopardise human well being and local economic development in these areas. Recognising this, The Government of Cambodia is encouraging community-based natural resource management. One such example is the setting up of Community Fisheries Groups, established in the backdrop of the Cambodian Fisheries policy 2000. Through these groups, the central Government transferred fisheries management responsibilities to the community level. In the beginning, 165 such groups were established, a number which reached 509 by December 2007. (ref). The need now is to consolidate these efforts; a consolidation which must be supported with technical and policy guidance.

In terms of tackling challenges associated with climate change, Cambodia is one of the most vulnerable countries in Southeast Asia due to its low adaptive capacity. There are major issues pertaining to required technical knowledge, which together with poor technology and infrastructure, and low socio-economic conditions call for urgent measures to cope with the impending hazards. Lack of coordination and budgetary constraints have been cited as major obstacles in the implementation of NAP A. It is imperative for any initiative aimed at sustainable use of natural resources and enhancing climate resilience to recognise that conflict of mandates among agencies, lack of coordination and information sharing and limited technical capacity, are just some of the issues that will have to be tackled.

Thus, in order to guide and control development in coastal areas, and thereby ensure socioeconomic improvement, environmental quality and sustainable natural resource usage in Cambodia's coastal areas, management structures and capacity at national, provincial and district levels must be strengthened. This institutional strengthening will also contribute towards positioning relevant line agencies and stakeholders to better access global climate related funding mechanisms.

Along with addressing governance issues at the national and provincial levels, it is also critical to undertake strategic interventions aiming at developing and enhancing local communities' capacity to respond to climate hazards. Strengthening ongoing commune level participatory engagement would be the most effective methodology in this connection through integrating of Ecosystems-based Adaptation approaches into overall mainstream development initiatives.

7.1 Summary of Proposed Action by Stakeholders

Enhancing resilience for climate change has been prioritised to be integral part of all proposed actions and recommendations.

Table 26: Proposed actions by sector

Sector	Issues	Proposed Action
Forestry/Mangroves	Forest cutting; encroachment for infrastructure development, agriculture, aquaculture, private ownership	Law enforcement; awareness raising; capacity building; community forest management; reforestation; conservation/protected areas; research and knowledge management
Fisheries	Illegal fishing; increased population and fishermen; habitat destruction; pollution; destructive fishing gears; poor law enforcement; lack of data	New fish stocktaking; law enforcement; habitat rehabilitation; new areas of protection; gear regulation; conflict resolution among fishers; awareness and education; strengthening of institutions and local NGOs; alternate livelihoods support; community based coastal fisheries management
Solid Waste	Lack of waste collection means; limited understanding for waste disposal; lack of field disposal sites	Waste processing; private sector involvement; proper disposal sites; law enforcement; commune based waste management; waste composting & recycling
Land use	Lack of land classification for agriculture, protected areas; immigration flux; improper land reclamation; road construction	Awareness and law enforcement; legal & policy review; land tax application and reforms; land use classification;
Water Resources	Water shortage in coastal communities; limited information	Water assessment; rain water harvesting; commune based water management;
Coastal Habitat/Biodiversity	Limited data on coral reefs and sea grass; mangroves depletion due to ill planned development, logging, fuel-wood collection, and aquaculture	Mangroves protected areas; commune based management; sustainable use of mangroves through zoning and community management; protection of coral reefs and sea grass; awareness raising; promotion of ecotourism; law enforcement
Climate Change	Policy gaps; lack of climate data; poor dissemination of existing knowledge; on ground implementation of strategies; technical capacity; replicable adaptation models;	Promotion of Interagency collaboration; capacity building of local stakeholders; awareness and understanding of ecosystems based adaptation; Scenario based planning; Risk Assessment; Information sharing and knowledge management; institutional strengthening and networking

Table 27: Proposed Province Specific Actions (Consultations and Reports)

Province	Issues	Proposed Action
Kampot	Mangrove degradation due to silt panes, shrimp farming, and charcoal production; Coral reef degradation in Karaing Island and Ampil River ; freshwater shortage; flooding;	<ul style="list-style-type: none"> Mangrove restoration and protection; promote public awareness/pressure, enforce Kret Chbab Regulation through commune; Review the status and build upon the transboundary initiative for NRM between Kampot and Kien Giang province of Vietnam
Koh Kong	Mangrove degradation; Habitat destruction; Biodiversity loss; issues pertaining to marine culture; sand mining; flooding;	Mangrove protection and restoration; Community based mangrove protection and restoration; training for sustainable fishing
Sihanoukville	Environmental issues related to port; land reclamation; solid waste management; coastal pollution due to industrial effluents; sea intrusion	Integrated Coastal Zone Management and environmental protection with relevant agencies for industry self-regulation and make economic incentives for the public and for the industry; capacity building and awareness raising;
Kep	Mangrove and sea grass degradation; illegal and destructive fishing; shortage of water;	Commune based management systems;; capacity building of community for community based ecotourism; training for sustainable fishing

7.2 Recommendations

In the short-term, the goal should be to develop coastal resource management models for sustainable economic development and thereby enhance community resilience. The process and implementation of these models should be documented for efficiency and effectiveness for the purpose of replication.

The long-term goal should be to promote the tested models as part of provincial and commune based coastal management programmes where they can be replicated and adopted throughout the province and nation. During this process it is also important to undertake policy legislation, and institutional review to support this process through creating an enabling environment.

A criterion, based on vulnerability assessment, socio-economic conditions, and willingness of local communities to participate etc., should be developed, through a participatory process involving the key stakeholders for the selection of the Communes, for pilot testing of the above mentioned models.

It is strongly recommended that the approach undertaken here should be to develop strategic partnerships with an ongoing similar initiative. This will help in not only overcoming the delay in project implementation but also help in pooling of resources to achieve a sustainable long-term impact.

Overall, at the provincial level, the following priority areas are recommended

- Koh Kong: mangrove conservation and restoration interventions in collaboration with relevant government agencies, NGOs, and communes.
- Kampot and Kep: coral reef and seagrass conservation and management.
- In Sihanoukville: integrated coastal zone management; ecosystem rehabilitation and mitigation of impacts of port related activities; sustainable ecotourism.
- In Sihanoukville, Kampot, and Kep: review of national parks management systems.

7.2.1 Short and medium term

- Systematic research into social and cultural aspects of co-management; identification of conflicts and potential resolution opportunities
- Design and implement a demonstration project through Commune Based Mangrove Management Plan with the involvement of communities, local authorities, and relevant agencies
- Use of terrestrial management cases for comparison and lessons learned
- Develop an awareness raising program for the conservation and sustainable management of natural resource such as mangroves, fisheries and marine resources targeting coastal communities, local authorities, militaries and provincial government officials
- Explore, in collaboration with mainstream development organizations, the provision of sustainable alternative livelihoods to mangrove dependent communities. Seaweed farming is being undertaken on commercial basis in Kampot and Kep.
- Develop a compendium of hotspots of coastal biodiversity and undertake advocacy for their protection
- Policy advocacy through policy briefs, workshops, and seminars

7.2.2 Ecosystems Based Adaptation

General

- National level Stakeholders' awareness and capacity building for ecosystems based adaptation
- Collaboration with mainstream climate change adaptation initiatives to incorporate ecosystems-based adaptation principles into ongoing projects
- Comprehensive locale-specific strategic action planning for select communes

- Conserve and restore select ecosystems which has high value for enhancing resilience and economic well being
- Local institutional strengthening for ecosystems based adaptation
- Documentation and dissemination of lessons learned
- Development of replicable module
- Policy review and advocacy in light of on ground experiential learning

Data Base Management Plan

A major constraint in the development of this situational analysis was the lack of accessibility or unavailability of relevant, accurate and up to date information on Cambodia's coastal resource situation. In this light, it would be very strategic to set up a data base where all information related to coastal resources management in and of Cambodia can be found easily. The MoE, Coastal Zone Management Unit seems to be the obvious potential hub of this activity.

7.2.3 Mid to long term

- Policy review to identify gaps for incorporation of environmental aspects into coastal resource management and climate adaptation
- Legal and Institutional Reviews of coastal policies and institutions for coastal resource management
- Promote ecotourism: develop guidelines for sustainable tourism; awareness raising and capacity building of tour operators; regulation review; coordination amongst stakeholders
- Land use zoning in the coastal area in collaboration with the MoE and other related agencies
- Develop inventory of major coastal wetlands and develop management plans
- Review the management status of Marine Protected Areas
- Livelihoods diversification should be promoted through developing linkage with mainstream development organizations.
- Advocacy for Fish Stocktaking – FAO/Fisheries Administration

7.2.4 Specific Recommendations (IUCN stakeholders' consultations):

- National Coastal Steering Committee set up by the Ministry of Environment could be an appropriate vehicle to investigate for establishing an National Coordination Body for MFF. PEMSEA and other relevant organizations could also be contacted in this regard.

- In Kampot province, small scale mangrove restoration could be explored with Prek Thnort Fishery community which has experience of working with UNDP on similar initiatives.
- Prek Thnort Protected Area Community, Bokor National Park, could be a potential partner in promoting sustainable livelihoods including eco-tourism. The community is working with WWF on a similar project.
- PEMSEA is interested in working with IUCN for the development of protected area plan for Prey Nup. It is a 3,500 ha area declared as an MP in Sihanoukville, Prey Nup district, but the zonation process etc. has not yet been undertaken. Joint proposal could be developed to seek required funding.
- UNHABITAT is working in Sihanoukville under its 'Cities and Climate Change' initiative and working on generating data for knowledge sharing platform. IUCN could explore the possibilities of undertaking some collaborative activities for awareness raising and capacity building in Sihanoukville.
- IUCN Cambodia has worked in Peam Krasop Wildlife Sanctuary (PKWS) under the LLS project. IUCN should continue to work here to build on the achievements under the LLS project.

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