



A Publication of the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme

# Situation Analysis

Stung Treng Province, Cambodia



By Thuon Try and Marcus Chambers

A JOINT UNDP - IUCN - MRC GEF-FUNDED PROGRAMME



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Published by: Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP)



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The content of this publication was correct at the time of writing - April 2005

Citation: Try, T. and Chambers, M. (2006). *Situation Analysis: Stung Treng Province, Cambodia*. Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme, Vientiane, Lao PDR. 93 pp.

ISBN:

Cover design by: Studio Terra Co., Ltd.  
Cover photo: Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme  
Layout by: Studio Terra Co., Ltd.  
Produced by: Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme  
Printed by: Ink On Paper Co., Ltd.

Available from: Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme  
Programme Management Unit  
082/02 Fa Ngum Road, Vientiane, Lao PDR  
Tel: +856 (0)21 240 904, Fax: +856 (0)21 216 127  
Email: [info@mekongwetlands.org](mailto:info@mekongwetlands.org)  
Website: [www.mekongwetlands.org](http://www.mekongwetlands.org)

The text of this book is printed on Art Matte 105 gsm paper

# Situation Analysis Stung Treng Province, Cambodia

Thuon Try and Marcus Chambers

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## Abbreviations and Acronyms

ADB	: Asian Development Bank
ASEAN	: Association of Southeast Asian Nations
BDP	: Basin Development Plan
CAA	: Community Aid Abroad (Oxfam Australia)
CARERE	: Cambodia Area Rehabilitation and Regeneration Project
CBNRM	: Community-Based Natural Resource Management
CEPA	: Culture and Environment Preservation Association
CFM	: Community Fishery Management

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CITES	: Convention on International Trade in Endangered Species
CNMC	: Cambodia National Mekong Committee
CPP	: Cambodian People’s Party
CPRs	: Common Property Resources
CRDC	: Commune Rural Development Committees
CTIA	: Cambodia Timber Industry Association
DANIDA	: Danish International Development Agency
DoE	: Department of Environment
DoF	: Department of Fisheries
EIA	: Environmental Impact Assessment
ESIA	: Environmental and Social Impact Assessment
FAO	: Food and Agriculture Organization
FUNCINPEC	: National United Front for an Independent, Neutral, Peaceful, and Co-operative Cambodia
GAP	: Governance Action Plan
GDP	: Gross Domestic Product
GEF	: Global Environmental Facility
GMS	: Great Mekong Sub-region
ICLARM	: International Center for Aquatic Living Resource Management.
IDRC	: International Development Research Center
IOs	: International Organisations
IUCN	: The World Conservation Union
Lao PDR	: Lao People’s Democratic Republic
LMB	: Lower Mekong Basin (Cambodia, Lao PDR, Thailand and Viet Nam)
MAFF	: Ministry of Agriculture, Forestry and Fisheries
MDCP	: Mekong Dolphin Conservation Project
MOE	: Ministry of Environment
MOWRAM	: Ministry of Water Resources and Meteorology
MRC	: Mekong River Commission
MRD	: Ministry of Rural Development
MW	: Megawatt
MWBP	: Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme
NGOs	: Non Governmental Organisations
NRM	: Natural Resource Management
NTFP	: Non Timber Forest Product
NVDP	: Northeast Village Development Programme
PDWRAM	: Provincial Department of Water Resources and Meteorology
PFD	: Partners for Development
PIPs	: Public Investment Programs
PLG	: Partnership for Local Governance
PoE	: Provincial Department of Environment
PPA	: Participatory Poverty Assessment
PRDC	: Provincial Rural Development Committee
RGC	: Royal Government of Cambodia
SAWG	: Sub-Area Working Group
SEDP I	: First Five-Year Socioeconomic Development Plan
SEDP II	: Second Five-Year Socioeconomic Development Plan
SRP	: Sam Rainsy Party
<i>sp</i>	: specie
<i>spp</i>	: species

UN	: United Nations
UNDP	: United Nations Development Programme
UNICEF	: United Nations Childrens' Fund
UNTAC	: United Nations Transitional Authority in Cambodia
USAID	: United States Agency for International Development
VDC	: Village Development Committee
VFC	: Village Fishery Committee.
YWAM	: Youth With a Mission
WB	: World Bank
WCS	: Wildlife Conservation Society
WTO	: World Trade Organization
WWF	: World Wide Fund for Nature

## Local Terms and Glossary

Local Terms	English or Scientific Terms
<i>Anlung</i>	Deep pool
<i>Bung</i>	Lake
<i>Brochea Thepatai Kampuchea</i>	Democratic Kampuchea
<i>Chamkar</i>	Farming
<i>Chan</i>	A drop-door trap
<i>Chuorn</i>	A V-shape net
<i>Chlous Trey</i>	Torch fishing
<i>Harb</i>	Unit of weight (1 <i>harb</i> = 60kg)
<i>Khet</i>	Province
<i>Khmer Islam</i>	Chams
<i>Khmer Lue</i>	Hill tribes
<i>Khum</i>	Commune
<i>Koh</i>	Island
<i>Kouprey</i>	Wild ox
<i>Krom</i>	Group
<i>Lorp</i>	Cylindrical drum trap
<i>Morng</i>	Gill nets
<i>Nek Srok Krom</i>	Lowland people
<i>Nek Srok Leu</i>	Upland people or uplanders
<i>Nek Torsu</i>	The fighters
<i>O'</i>	Stream
<i>Ourn</i>	Seine net
<i>Phum</i>	Village
<i>Samnahn</i>	Cast net
<i>Santouch</i>	Hook and line
<i>Sathear Ranakrat Khmer</i>	Khmer Republic
<i>Srok</i>	District
<i>Riel</i>	The Cambodian currency
<i>Tchip</i>	Cylindrical current trap or funnel trap
<i>Tmor Kambau</i>	Marble
<i>Thorng</i>	Scoop-net
<i>Tom</i>	Vertical vase trap
<i>Trey</i>	Fish
<i>Try Kes</i>	Glass catfish



<i>Trey Koul Raing</i>	Giant barb or <i>Catlocarpio siamensis</i>
<i>Trey Kranh</i>	Anabantidae
<i>Trey Pa Se Ee</i>	<i>Mekongina erythrospila</i>
<i>Trey Pra</i>	Pangasid catfish
<i>Trey Reach</i>	Giant catfish
<i>Trey Riel</i>	<i>Henicorhynchus caudinaculatus</i>
<i>Trey Tra Sawk</i>	Seven-line barb
<i>Trou</i>	Oblong trap

## Units of Measurement

### Length (metres and kilometre)

1 metre (m) = 100 centimetres (cm)

1 kilometre (km) = 1000 metres

### Areas (hectares and square metres - m<sup>2</sup>)

1 hectare (ha) = 10,000 m<sup>2</sup>

### Weight (kilogram)

1 kilogram (kg) = 2.205 pounds (lb)

1 Harb = 60 kilograms

1 ton = 1,000 kilograms

### The Cambodian Currency (Riel)

4,200 Riel = US\$1

### Temperature (Degree Celsius)

°C = degree Celsius

### Volume

m<sup>3</sup>/s = Cubic metres per second

### Concentration

mg/l = milligrams per litre

# Chapter 1: General Background

## Introduction to Wetlands and Methodology

Stung Treng is one of Cambodia's most remote provinces situated in the northeastern part of the country about 481 km from the capital, Phnom Penh. The province borders Lao PDR to the north, Ratanakiri province to the east, Monduliri province to the south, and Kratie, Preah Vihear and Kompong Thom to the west (Map 1.1). Stung Treng's provincial capital is indeed Stung Treng town.

The Provincial Department of Planning (2003) reports that the Stung Treng province has an area of 11,092 km<sup>2</sup>, which is divided into nine categories of (sometimes overlapping) land use as follows:

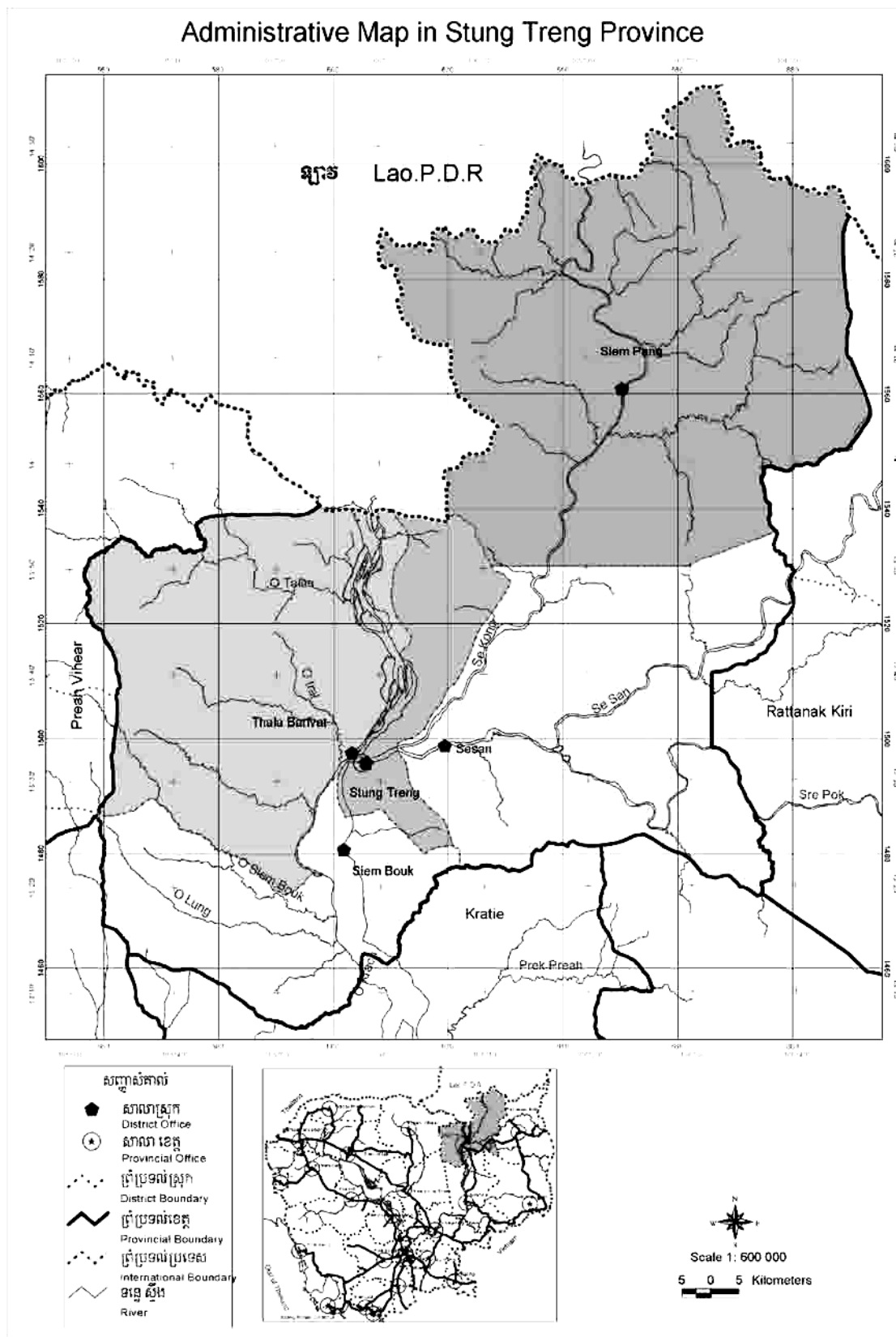
- Forest land (928,000 ha);
- Rice fields (19,000 ha);
- Farm lands (2,193 ha);
- Residential land (103,217 ha);
- Green Industrial Land Concession Company (100,852 ha);
- Flour Industrial Land Concession Company (7,400 ha);
- Roads (2,400 ha);
- River, streams, and canals (41,094 ha);
- Fallow land (13,200 ha).

Ramsar site villagers (Map 1.2) are highly dependent upon the Mekong's wetlands for their food requirements and incomes. Most are rice farmers and fishers. The river and adjacent wetlands (including rice fields) provide most of their collective livelihoods. These resources are coming under increased pressure from a range of developments that jeopardise the capacity of the wetlands resources to continue to provide the villagers' essential requirements.

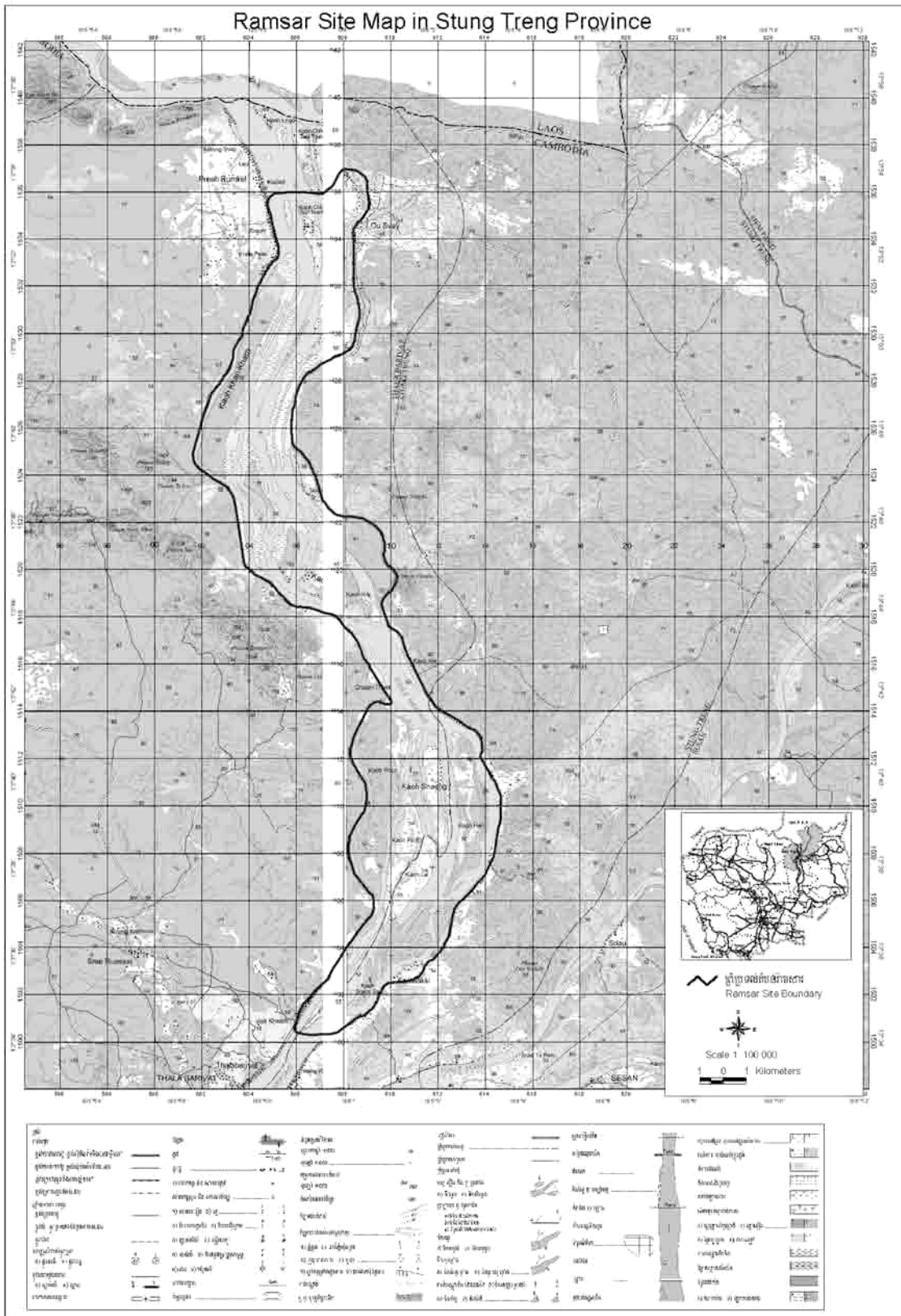
In terms of administration, the Stung Treng province is divided into five districts (Stung Treng, Thalaboriwat, Siem Bok, Se San and Siem Pang) comprising of 34 communes (several villages combined for administrative purposes) and 128 villages. A recent study by the Provincial Department of Planning, shows that the province has 17,608 families with a total population of 91,795 persons of whom 47,236 (51.5%) are women (average family size of 5.2 persons).

The whole population of the province constitutes less than 1% (0.7%) of Cambodia's national population. The annual rate of population growth is 2.49%. The population density is eight persons/km<sup>2</sup> which is low compared to the national density average of 64/km<sup>2</sup> (Provincial Department of Planning, 2003).

Map 1.1 Administrative Map of Stung Treng Province



Map 1.2 Ramsar Site Map in Stung Treng Province



The Mekong River flows through Stung Treng province from north to south. In Stung Treng town, the Mekong meets the Sekong River, which has two more tributaries, the Se San and Sre Pok. All are upland rivers with deep pools, rapids and inundated forest, which do not provide a good situation for transportation, but are very important for fish spawning habitats and fish migration routes that need to be conserved because of special fish such as *Trey Koul Raing* (giant barb, *Catlocarpio siamensis*), *Trey Pa Se Ee* (*Mekongina erythrospila*), *Trey Tra Sawk* (seven-line barb, *Probarbus jullieni*) (Danida 2000). About 90% of the province's population lives along the four rivers and depend on fishing for daily food and income generation (Vannaren, 2002).

## The Ramsar Site in Stung Treng

The complex ecosystem of the Stung Treng Ramsar site is not newly recognised. Its first description can be referred back to the French colonial period in the 19<sup>th</sup> century. During the French expedition (1866 – 1868) along the Mekong mainstream, de Carné described the river's characteristics from Kratie to Stung Treng:

*The stream is sown with islands, which divide it into a great many arms. The opposite bank could only be seen in the foggy distance. The waters, dashing against rocks which formed an almost uninterrupted series of rapids, made a great thundering in the air. Between the islands, these rapids offer a singular appearance; for an incredible quantity of shrubs have taken root on the rocks and shoals, and rise above the surface, their stems bent by the current, as if a forest had been flooded. Some high trees seem to hold on to the earth only by creepers, which bind them to the bank like airy roots. The channels of the river were so twisting where in some places the water boiled as it rushed past.*

(de Carné, 1872)

From Stung Treng town to the Lao PDR border, the characteristics of the river still continue to be impressive. Here de Carné (1872) has described that in some places the water flowed violently through the twisted channels and between flooded forests along the river bed. The river and forest joined one to the other and nothing was heard but the noise of the wind in the high branches of trees, or the roaring of the waters round their roots. The account also shows that when the evening came, some fishers (as now) showed themselves by the flickering light of their torches, which illuminated them with fiery serpent-like beams cast on the waters, and the dying voice of the wind. Elsewhere, the water spreads out, half-veiled by charming trees, which bend over it and dip their ever-fresh leaves, and white and rose flowers, in its coolness.

## From de Carné to Ramsar

This description still holds many truths and realities for the present and future. In recognition of the importance of these areas, in 1987, the Ministry of Agriculture, Forestry and Fisheries (MAFF) declared the provinces, which form the upper part of the Mekong in Cambodia, as protected areas for fish spawning grounds and prohibited fishing lots and large-scale commercial fishing.

In 1999, a 37 km stretch of the Mekong river from about 5 km north of Stung Treng town to about 3 km south of the Lao PDR border (with 500 m on each side of the river) was designated as a Ramsar reserve ('wetland of international importance' under the Ramsar Convention). The site covers an area of 14,600 hectares. Currently, there are

about 13,000 people living at the site. It is located in two districts: Thalaboriwat and Stung Treng, with four communes, 21 villages, and about 40 islands (DoE, 2002).

During the dry season (November-May), forested islands are exposed by the falling water levels and serve as temporary settlement places for migrant fishers from different places as well as good places for ecotourism. Most of the forests located on the islands are different from the forest growing on the adjacent river banks and inland (Rundell, 1999). During inundated periods, their leaves provide fish habitats and food especially for young fish. The Provincial Department of Environment (2002) reported that there are around 100 fish species found in this area, of which 50 % are of economic value to the people living along the river. Vong (2004) reported about 170 species from the same area.

The varied and special ecological conditions of the Ramsar site provide the area with a great diversity of wildlife – mammals, birds, reptiles, fish and vegetation –described in detail in Chapter 4. The four flagship species<sup>1</sup> of the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP) are found in or very close to the Ramsar reserve – the Irrawaddy dolphin, Sarus crane, Mekong Giant Catfish and Siamese crocodile. This gives the area an added significance for the programme.

The Ramsar site has about 40 tributary creeks and streams. The most important of these is O'Talash stream which originates in the Dongrek mountains, 50 km to the northwest of the Ramsar site. It is about 60 km in length and important for its fish habitats, fish spawning and fish nursery areas during the flood season. It is also important for other aquatic resources such as crocodiles, turtles, tortoises, and other wildlife which live in the evergreen forest in these areas.

Try (2004) reported that from September to December every year many people come to settle down and fish in O'Talash, especially people of Lao descent. The stream is considered to have the most productive fishing in the area, which people can exploit through using their traditional practices and access. In the 1990s, during anarchic fishing activities, the stream was sold to a private company for economic exploitation and local people were excluded from gaining access to it. Subsequently, following an NGO's intervention and local protest, the stream was given back to the local people. However, illegal fishing practices are still happening in O'Talash throughout all times of the year, a common problem of the Ramsar reserve.

According to Fiat-Law of Fisheries in 1987, large-scale commercial fishing is not allowed in the Ramsar reserve. Medium and small-scale are allowed. In addition, most fishing grounds have been organised into community fisheries to be managed by the local people. Since the law and regulations are not totally enforced by local people and recognised by outsiders, these fishing grounds remain 'open access.' Therefore from January to May annually, fishers from different places and ethnicities come to fish here, in particular when the fishing grounds along the Sekong River (see Map 4.1) are not profitable or the water level becomes too shallow.

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<sup>1</sup> The flagish species of MWBP have been selected due to their charisma and because they fulfill one or more criteria:

- Inhabit a broad diversity of important wetlands and thus represent threatened wetland habitats and their associated fauna;
- Are regional in distribution and trans-boundary in nature;
- Provide an opportunity for enhancing regional collaboration for biodiversity and ecosystem management.

Some places such as Koh Tonle Mouy in Koh Sneng consist of big sandbars, deep pools, and flooded forests which provide good sites for seine net operation. Accordingly, the Provincial Department of Agriculture, Fisheries and Forestry decided to lease these fishing grounds to the private sector to catch *Trey Riel* (*Henicorhynchus caudimaculatus*), but in practice, the seine nets can catch all types of fish migrating across the fishing territory. This practice has resulted in a fierce resistance from local people to remove the seine net from their fishing ground.

These few case studies demonstrate the importance of fish and fisheries to the Ramsar site. For the people of the area, they are of the utmost importance.

## The Main Issues: Development and Environment Trends



The use of wetland resources in the Ramsar site must be balanced with the environment's abilities and capacities to provide for the sustainable and wise use of natural resources of wetlands and for the benefits of people at the present time and in future generations.

People who live inside and around wetland areas obtain benefits such as: wood as fuel for cooking and heating; plants and wildlife as food and traditional medicines; timber for housing, furniture and ornaments; and basic foods such as rice, fish, meat, fruits and vegetables. Many of these

resources also provide the only opportunity for villagers to obtain a cash income. In general, wetlands provide immense benefits for local communities. If wetlands are lost, all these things will also be lost.

However until now, there is no clear policy or planning from the government to protect all these resources. Such policies are an obligation under the Ramsar Convention, with signatory countries being required to take all reasonable steps to manage and conserve their wetlands (Nga, 2004).

The report, published in 2000, by the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF) suggests that despite northeast Cambodia having large forest areas and a low population density, both legal and illegal logging is resulting in deforestation and forest fragmentation. Although environmental rangers<sup>2</sup> have been recruited recently to prevent some kinds of illegal activities, forest clearing and land encroachment for shifting cultivation and vegetable farms are yet to be prevented. Many people do not understand the importance of the forest.

The report also mentions that further habitat loss and fragmentation is almost inevitable with the increasing pressure on land in the absence of an integrated

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<sup>2</sup> These rangers are government agents whose role is to protect and prevent environmental destruction in their area in particular the Ramsar site. These agents have to report every issue and activity regarding environmental problems to the provincial department of environment. Currently, there are 15 rangers in the Ramsar reserve.

development programme from the government. Current signs indicate that people will continue to convert the forest into settlement areas and field crops (UNDP and GEF, 2000).

Nga (2004) in his brief note on the main threats to the Ramsar site highlighted many problems. These include an uncoordinated sectoral approach in planning among the relevant institutions, a weak policy framework, inadequate awareness and information sharing, inadequate human and technical resources, and lack of options over use of natural resources. Chong (2005) found similar problems and added the lack of understanding of the economic value of wetlands resources to both local people and the country as a whole. Many wetland resources are undervalued or ignored entirely in economic considerations.

Other problems posing a threat to the Ramsar site are from events taking place far from Cambodia. These are threats posed by projects transcending national boundaries, such as the influence of a shipping project from China to Laos that requires river flow modifications, and large hydropower projects along the length of the Mekong River. Mega-projects along the Upper Mekong can impact local livelihoods and sustainability of fisheries, yet local people have little voice in opposing or mitigating the effects of these projects (Try and Vannara, 2004).

Öjendal and Torell (2000) also demonstrated that large-scale development projects such as logging and hydropower are putting pressure on forest and water resources. Cambodia is experiencing an alarming rate of proposed logging concessions. In the early 1990s, illegal logging operations led the forest to be cut at a pace that is three to five times higher than the sustainable rate. Forest exploitation is an example of resource exploitation driven by the individual economic interest instead of a more sustainable development plan supporting the long-term benefit of ecosystems and the population as a whole. Significant forest loss around the Ramsar area will lead to loss of biodiversity and increased vulnerability of residents to poverty and malnutrition.

Hydropower development inevitably leads to local changes in the environment and competes with other economic sectors such as fisheries, agriculture and tourism, for available resources. In this regard, the full environmental and social costs relating to the development of hydropower should be incorporated into the project plan (Öjendal and Torell, 2000).

Baird (2001) and Ratner (2003) have criticised large dams for devastating local fish populations and fisheries in the Mekong and its tributaries. Dams are especially destructive to highly migratory fish species that move up and down, or in and out, of the mainstream. Such species are the most important part of fish catches in the Ramsar reserve. Apart from blocking the migration routes, dams generally alter hydrological patterns, silt deposition patterns, water temperature and water quality leading to massive impacts on aquatic life.

In Cambodia, over 80% of the daily protein intake comes from fish, of which 60% are caught in the Tonle Sap. In this scenario, the depletion of fish and forest resources will have serious implications on the livelihood and food security of the people dependent on them and lead to severe repercussions through the country.



For example, the recent operation of the Vietnamese Yali Falls dam on the Se San river is the most clear and dramatic example to date of the trans-boundary effects of resource development within the Mekong river system. The impacts were felt mainly by communities of indigenous people (approximately 50,000 people). In Ratanakiri province, nine ethnic groups were affected including Lao, Jarai, Kachok, Tompuon, Brao, Krueng, Khmer, Kavet and Chinese people. In Stung Treng province, seven different ethnic groups were affected including Lao, Lao Deum, Khmer, Khmer Kho, Khmer Paduem, Phnong and Krueng people (Baird *et al*, 2002; Hirsh and Wyatt, 2004).

Learner (2003) showed that at least 32 people were drowned by excessive water releases. Additionally, crops were damaged by flooding, fish catches declined, water quality deteriorated and illnesses increased. McKenney (2001) also demonstrated that the Vietnamese Yali Falls dam on the Se San River destroyed annual incomes amounting to US\$2.5 million for 3,434 households. The household income decreased from US\$109 per month to US\$46 per month, a drop of 57% in livelihood income. Other tangible losses during 1996-1999, include US\$800,000 from loss of fishing equipment, boats, livestock, housing and rice stock.

Large scale development projects often underestimate the valuation of "free" resources such as fuel wood and species of fish, frogs, snakes, reptiles etc. caught as a secondary product to rice cultivation. Many of these products never reach the market and their importance is often neglected when estimating benefits and costs of large operations. Subsistence farming, fishing and hunting supports the majority of the population (Öjendal and Torell, 2000).

## Summary

The Ramsar site in Stung Treng, Cambodia, is very important for livelihoods and biodiversity conservation. People who live inside and around these wetland areas obtain benefits such as: fuel for cooking and heating; plants and wildlife as traditional medicine to treat diseases; timber for housing, making furniture and ornaments; basic foods such as rice, fish, meat, fruits and vegetables; water for cooking and cleaning; sand and stones for building; and waterways for transport. The Ramsar wetlands provide immense benefits for local communities for the present and future. If wetlands are lost, all these things will also be lost.

However, until now there are a number of barriers to effective management of the Ramsar site which include lack of co-ordination between different sectoral approaches, weak policy frameworks and unsupportive economic environments, an inadequate information base on which to develop wetland policy, planning and management decisions, inadequate human and technical resources and lack of options for resource use by local communities. These result in unsustainable use of the wetland resources.

## Chapter 2: History

### Background

The history of Southeast Asia, including the Mekong River Basin, has evolved through a series of wars, invasions and migrations from different ethnic groups involving Lao, Viet Nam, Khmer, Mon, Chinese and Thai. As a result, mainland Southeast Asia has become one of the most diverse mixtures of races, languages, ethnic groups and cultures in the world.

In Stung Treng, Cambodia, the confluence of the Mekong and its major tributaries in the province has not only created vast natural resources for both human and fish ecologies, but also served as the central strategic position for people settlement and trading. The Pavie account from 1879-1895 illustrates that the province was one of the greatest centres because of its exceptional location at the end of the navigable Mekong and at the endpoint of three great watercourses: the Sekong, Se San and Sre Pok. These watercourses provide a first-rate strategic position and make it an important commercial centre (Cupet, 1898).

During the latter part of the 6<sup>th</sup> century, the empire of *Fu-Nan* in present-day Cambodia was out-competed by the Sunda people at sea and squeezed by the Khmers on the mainland. The Khmers were then largely based along the reaches of the Lower Mekong Basin. With the ascendance of the Khmer, a shift of the political power from trade-based entities towards political entities based on rice growing, as well as a shift from coastal areas to the areas around Tonle Sap, evolved. The famous Angkor era (approximately from the 9<sup>th</sup> to 15<sup>th</sup> centuries) was reliant on sophisticated water management through a series of small earth dams (Öjendal, 2000). This shows that the Khmer empire was perhaps more than any other of the early kingdoms, associated with the efficient utilisation of the waters of the Mekong river basin.

The recent historical review by Ironside and Baird (2003) also showed that Stung Treng province was influenced by many neighbouring countries. These authors explained that Laotians first came to Stung Treng and then to the Ratanakiri area more than 300 years ago. With the Khmers losing their northern territories to the Thais in the 13<sup>th</sup> century, as well as abandoning their capital at Angkor Thom in 1432, the Laotians attempted to take the northern provinces from the Khmers in 1571. The Khmers had already retreated to the south out of the Sekong basin but still held the town of Stung Treng (Ba Chong)<sup>3</sup>.

As a result of the Laotian invasion, Stung Treng was also abandoned and the earlier domination of the Khmers in the Sekong and Se San basin hinterland was temporarily broken. After the fall of Lovek (the new Khmer capital) in 1587 to the Thais, the Khmer king took refuge in Stung Treng under the protection of Laos. In 1621, the Khmer king, Chey Chetha XI, wanted to reassert his control over the Sekong basin, and organised an expedition of 300 Khmer and foreign soldiers, eventually reconquering some of the river. This invasion may well have been the source of the *Khmer Khe* people, who are said to have an accent similar to that of old Siem Reap, and continue to inhabit part of

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<sup>3</sup> Bachong is now the village situated at the confluence of the Sekong and Mekong. The name derives from the old temple, which has since fallen into the river.

the Se San, Sre Pok and Sekong rivers in present-day Se San and Siam Pang districts, Stung Treng province. In 1641, the Khone Falls (Mekong river) marked the frontier of the two kingdoms with the *Moi* hinterland, under their new masters – the Lao<sup>4</sup> (Ironsides and Baird, 2003)

During the 15<sup>th</sup> and 16<sup>th</sup> centuries, territorial expansion by the Vietnamese from the east and, Laotians from the north, had pushed back Cham and Khmer settlements from Stung Treng to the central regions of Cambodia. In the late 18<sup>th</sup> and early 19<sup>th</sup> centuries, as Siamese conquered parts of northern Cambodia and southern Laos, ethnic minority communities were taxed heavily in gold by their new rulers and the slave trade thrived.

In 1814, the Siamese took Stung Treng town. They soon controlled the region of Stung Treng and the lower Sre Pok. Whilst the earliest Laotian migrants into present day Stung Treng and Ratanakiri provinces were merchants or slave traders, many of those that came later were farmers and fishers, with many from the relatively densely populated Siphandone (Four Thousand Islands) area along the Mekong river in southern Laos (presently Khong district, Champasak province).

Around 1882-83, 4,000 Laotian people were registered as paying tax to the chief of Stung Treng district – stretching from Sambor on the Mekong river (present-day Sambor district, Kratie province) in the south to Siam Pang district in the north, and all the forest hinterland of the “wild savages” to the east (Aymonier cited in Ironsides and Baird, 2003). Tax records of 1905, in the Sekong, Se San, Sre Pok and Stung Treng area show 2,018 Khmer and Laotian men aged between 20 and 59 living in 64 villages. From this, Guérin (2001) estimated that the total Khmer and Laotian population in the region was a little more than 12,000 people.

Based on their historical review, Ironsides and Baird (2003) also concluded that despite the subjugation by the Thais and Laotians, the peoples of the hinterland of the Sekong, the Se San and the Sre Pok basins, and the area behind Kratie, (including present day Ratanakiri and Mondolkiri provinces) continued to have commercial relations with the Khmer kingdom. The Khmer and especially the Chinese travelled all the way to the Dak Lak area (present-day Central Highlands of Viet Nam) and traded salt, earthenware, iron, and a few other low value goods (brass, cotton fabric, wine jars) for slaves, rhinoceros horns, gold and elephant teeth.

In 1849, the French established the Kontum mission across the Se San and Sre Pok basins and pushed the Siamese back to west of the Mekong River. In 1863, King Norodom (the great grandfather of the present king) was forced to make Cambodia a protectorate of France. In 1884, the country became a French colony (Sovathana, 2004). Natural resources, including timber products, land and minerals were exploited by the French (Chandler, 1995). With the arrival of the colonial powers, especially France, the regional struggle for space and influence came to a temporary halt, and it has been said that France ‘saved’ Cambodia from being swallowed by the Thais and Vietnamese after its arrival on the scene.

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<sup>4</sup> Aymonier in 1895 cited in Ironsides and Baird (2003) comments that in 1882–83 the indigenes recognised a small island in the Mekong called “the tiger’s head” between Sambor and Stung Treng as the boundary between the Lao and Khmer kingdoms. In the early 1800s he says that the Vietnamese had a customs and surveillance post there.

One reason for French interest in Cambodia was the desire to control the Mekong river which was thought to be the nearest and the shortest route to the coveted Yunnan province in southern China. Strategic and economic motives like these coupled with sentiments of national pride led the French in Cochin-China (South East Asia mainland) to make strenuous efforts to gain control over Cambodia (Reddy, 1970).

But the French were unaware of the complex geography and rapid flow of the Mekong River from Kratie to Stung Treng, and the Khone Falls in Laos which together constitute major obstacles making it impossible to travel by ships along the entire river (Öjendal, 2000). The French Mekong expedition, which began in 1866 and came to an end two years later, was an epic endeavour in an age of heroic explorations. Even now, the fact that the Mekong was explored by Frenchmen seems to weigh against the expedition receiving the credit it deserves.

The other main river transport route is the Sekong-Mekong river corridor. This waterway is navigable between the Lao PDR and Cambodia, providing an alternative international transit corridor to the Mekong (Osborne, 2001).

In 1895, Cambodia lost the areas of Attapeu, Siam Pang and Stung Treng, first to Cochin China, and then to Laos (Colm, 1999). By 1953, at the end of the French colonial administration, the provinces of Stung Treng and Ratanakiri were returned to Cambodia.

### **Political Trends: The Beginning of the Modern Nation State**

After independence from France in 1953, Cambodia came under the rule of Prince Norodom Sihanouk. During this period, northeastern Cambodia was considered to be sparsely populated and the need for resources was also low (Sovathana, 2004). Many provincial and communal government systems have been created. In 1959, the province of Ratanakiri was created in what had been the eastern area of Stung Treng province, closely followed in 1960 by the creation of Mondulakiri province from what was the eastern area of Kratie province.

In the villages, customary practices guided restricted resource use. Natural resources were abundant, but the Royal Government enforced resettlement of ethnic communities and encouraged lowlanders to live in the highlands of northeastern Cambodia. During this time, Royal Government policy was primarily centred on the assimilation of ethnic minority groups into modern society and national territory control. Such assimilation was implemented through the state's education system by teaching ethnic minority groups to dress like the majority of people (Khmer), farm perennial crops and become involved with the market economy.

In general, people were living peaceful and prosperous lives in this *Sangkum Reast Niyum* era, fondly remembered in the social memory of Cambodian peoples. At the same time, the extension and improvement of the road infrastructure were largely for protecting the national border from incursion by the neighboring countries rather than for resource exploitation.

For instance, O'Svay village in the Ramsar reserve was created on 1 January 1964, with an initial population of about 300 families, mostly soldiers who came to protect their country's border. Inhabitants of O'Svay can be identified as *Nak Srok Krom* or

lowland people, and are mostly Khmers, especially the retired soldiers from Takeo, Kam Pot, Prey Veng, Svay Rieng, Kampong Speu, Kandal, Kratie, Kampong Cham, and Svay Rieng provinces, as well as Khmer Kampuchea Krom (Try and Vannara, 2004). Now, O'Svay<sup>5</sup> is one of the four communes in the Ramsar reserve and consists of five administrative villages: Koh Phnov, O'Svay, O'Run, Veun Sean, and Koh Hep with a total population of 490 families and 2,554 people. Most of them are settled along the Mekong River.

Cambodian politics were, however, unstable due to the conflicts arising between the United States and the Soviet block during the Cold War period. In effect, the King's decisions during the 1960s, which met his own short-term political requirements, put an end to royalty in Cambodia (Sovathana, 2004). Later on Cambodia went through civil wars with many regimes.

The Lon Nol regime lasted from 1970 to 1975. It started as a *coup d'état* in March 1970, led by General Lon Nol and captured the throne of Prince Norodom Sihanouk whilst the prince was out of the country. General Lon Nol established a new regime known as *Sathear Ranakrat Khmer* (the Khmer Republic). However, during this period, there was a peasant uprising against General Lon Nol demanding the return of the *Sangkum Reast Niyum* (Kiernan. *et al*, 1982). The uprising was led by the Khmer Rouge rebels that were based in many northeastern provinces, including Takeo, Kampot, Kompong Cham, Kompong Thom and other northeastern provinces. The Khmer Rouge seized the north of Ratanakiri province and the Siam Pang district of Stung Treng province, while General Lon Nol's government rushed to build roads in these areas to expand their power in those regions (Sovanthana, 2004).

Throughout this period, the Lon Nol regime had gained a bad reputation with the people. Some high-ranking officers become timber merchants, and violated existing local communities' regulations extracting the finest trees from the forest. Wild animals such as deer and kouprey (wild ox) were hunted as food for soldiers. Some ethnic communities were resettled, some possessions confiscated, and atrocities carried out against the local people (Zweers *et al*, 2003).

In 1973, the United States army started massive bombing in the northeastern region along the Cambodia-Vietnam border, and along the Mekong and its tributaries in Stung Treng, which destroyed both local communities and natural resources. The Lon Nol government gradually lost its power to control the highlanders in the northeastern region. *Neak Torsur* gained substantial territory and recruited ethnic minorities into their military forces, increasing their support base among local populations.

The Khmer Rouge government from 1975-1979 was known as the regime of banning traditional cultural practices. Pol Pot (Political Potential Patriot) was the name given to the Khmer Rouge leader, Saloth Sar, who defeated the military regime of General Lon Nol in April 1975 and formed a new government known as *Brochea Thepatai Kampuchea* (Democratic Kampuchea). At the same time, the new government

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<sup>5</sup> The commune is one of the first established after independence. New settlements were also founded in other communes such as Samaki after the Vietnamese invasion of Cambodia. Other villages in the Ramsar reserve have long been inhabited by the local communities such as Koh Sneng and Preah Rumkel (which are believed to have existed for almost three centuries). The ethnic diversity in the Ramsar reserve is not so great, mostly Laos and Khmers who live with each other and both languages are commonly practiced in everyday life. Kouy ethnic people are also believed to live in Thalaboriwat district, but not close to Ramsar.

abolished all existing infrastructure and institutions. The new ideology of Democratic Kampuchea introduced agrarian reform in the rural areas, which forced the majority of the population to be evacuated and put to work in the agriculture sector. Overall, the general policy during the Khmer Rouge period was directed towards agricultural development, particularly irrigated rice production. Practices of shifting cultivation and customary law were neglected. Due to its exceptional brutality and aggression against the Vietnamese, the regime was short-lived.

The Heng Samrin regime of the 1980s was known as the starting period of natural resource depletion. In 1979, Vietnamese troops invaded Cambodia and installed a new socialist government known as the People's Republic of Kampuchea. Vietnamese troops remained until 1987. This new government was controlled by Heng Samrin. However, the northeastern region particularly Ratanakiri, Stung Treng, and Monduliri was largely cut off from central Cambodia. It was isolated due to security problems and poor road access. In addition, events in this period revealed that the government intervened in the life of highlanders, marginalising traditional systems of natural resource management and seriously impacting on cultural traditions.

The present government is known as the Royal Government of Cambodia (RGC) whose main stated objective is to fight poverty in the remote frontier. After its civil war, Cambodia remains one of the world's poorest countries and has the highest human poverty index in Asia, reflecting the fact that it has just emerged from 30 years of warfare and displacement. It is estimated that the 85% of the population reliant on agriculture for their livelihoods suffer the greatest incidence of poverty.

After the Paris Peace Accord of 23 October 1991, Cambodia took a significant step towards turning the country from a socialist state into a market economy and from a single to a multi-party political system (Peou, 2000). Cambodia joined international trade organisations and applied policies supporting a market economy to the whole country. Subsequently, the Cambodian government experienced rapid changes, moving from poverty to prosperity in some sectors in a rush of economic growth.

In Stung Treng, these national changes are leading to major opportunities for development. The spectacular scenery along the Mekong River in Stung Treng includes its islands, deep pools, Mekong dolphins, fishing activities and inundated forests, and its diversity of water birds. All are major tourist attractions.

People visit Stung Treng on personal tours since there is no organised tourism industry in the province, but it is indicative of the increasing integration of the area into the regional tourism market. Most of the tourists are foreigners coming from Lao PDR and Phnom Penh as part of their Mekong travel or Southeast Asia journey. This point and the others made above suggest the extent to which people living around the rivers and tributaries are becoming more closely tied into the market system both in Cambodia, and also within the regional economy and market economy.

The important feature of a subsistence economy in a provincial town like Stung Treng is that it requires communities to enter into some form of market exchange to obtain other foodstuffs, particularly rice and vegetables, money or other products which they do not produce by themselves. With the current trend to a market economy, the

Ramsar reserve's many fishers link most of the isolated communities to the outside world and are critical for development of market channels.

As mentioned earlier, the rivers and people of Stung Treng are not totally isolated from the outside world. The new trend of infrastructure development in the province has been a great priority of economic expansion and growth. With a free interest loan from the government of the People's Republic of China, the rehabilitation project of the national road No.7 from Kratie-Stung Treng to the Cambodia-Lao border (187 km) is currently underway. The project is perceived as very significant for the northeast provinces of Cambodia. This road section is part of the Asian Highway (A.11) and the ASEAN Highway (AH.11) connecting Kunming (southern China) to Sihanoukville international port via Vietnam and Laos. This road will serve in the near future not only for regional economic exchange but also for the whole of Southeast Asia. The rehabilitation and improvement of this road section will facilitate all kinds of transportation means for goods and people, which will contribute to improving the national economy through saving time and cost for transportation. It is a key factor in the continuing development of Stung Treng.

## Summary

The confluence of the Mekong and its tributaries in Stung Treng has not only created vast natural resources for both human and fish ecologies, but also served as the central strategic position of people resettlement and trading relations. Traditionally, the Mekong River has been the main avenue when it comes to migration from north to south in mainland Southeast Asia. It is an area of ethnic diversity, as it has experienced successions of people migrating, of which the strongest have occupied the precious plains, driving the earlier occupants to less desirable areas in hilly regions.

From at least 1970 onwards, the Stung Treng area was involved in the politics and wars of the region. The hostilities ensured that there could be no possibility of the development plans so confidently proposed in the 1950s and early 1960s coming to fruition. The contrasting ideologies of superpowers entered Cambodia, creating civil wars from the 1970s to the 1990s. In this regard, the northeast of Cambodia and its people were cut off from the rest of the country.

However, after the Paris Peace Accord of 23 October 1991, Cambodia took a significant step towards turning from a socialist state into a market economy and from a single to multi-party political system. The United Nations Transitional Authority of Cambodia (UNTAC) supported democratic national elections in 1993. Since then, Cambodia has increased its national stability, and the accessibility of many parts of the country. Cambodia joined international trade and applied policies supporting a market economy to the whole country. Subsequently, the Cambodian government experienced rapid changes, moving from poverty to prosperity in some sectors in a rush of economic growth. Meanwhile, large-scale developments such as infrastructures have been a high priority in the northern provinces, which put more pressure on the natural resources such as fishery and forestry as the source of economic development.

Stung Treng is now beginning a new period of integration into the Cambodian mainstream economy and society. It is a future which will bring great changes and

opportunities, but also some risks of environmental change to the Ramsar site and other areas in the province.



## Chapter 3: People and Livelihoods

### Population and Migration

The National Institute of Statistics (NIS; 1999) shows that Stung Treng province has 14,126 households comprising 81,074 inhabitants, which gives an average household size of 5.6 persons with 50.5% of the population being female. Population density in the province is seven people per square kilometre, which is much less than the national density of 64.

As the population is low and the province is endowed with natural resources, the in-migration rate is very high. As shown in the population census of 1998, 19.4% of the province's population has migrated from outside. In 2003, the population in the province had increased to 91,795 in which Stung Treng district and Thalaboriwat district constitute 57.3% of the whole population in the province. The overall distribution of population in each district is presented in Table 3.1.

**Table 3.1** Distribution of Population in Each District of Stung Treng Province

District	# of Families	Population			Sex Ratio (no of men per 100 women)	Per cent
		Women	Men	Total		
Se San	2,756	6,342	6,131	12,473	96.7	13.6
Siem Bok	2,231	5,808	5,441	11,249	93.7	12.3
Siem Pang	2,818	8,096	7,406	15,502	91.5	16.9
Stung Treng	4,930	14,125	13,821	27,946	97.8	30.4
Thalaboriwat	4,878	12,865	11,760	24,625	91.4	26.8
<b>Total</b>	<b>17,613</b>	<b>47,236</b>	<b>44,559</b>	<b>91,795</b>	<b>94.3</b>	<b>100%</b>

**Source:** Provincial Department of Planning (2003)

Most of the people in Stung Treng are poorly educated as this is a remote rural province. The percentage of the literate population aged seven years and above is 48.4%. An analysis of the educational level of the literate population as a whole revealed that about 66.2% of people had not completed primary level. Only 0.3% have completed beyond the secondary level of education (NIS, 1999).

As for people in the Ramsar site (Table 3.2; next page), the village baseline data conducted by the Seila Task Force (2003) shows that the number of illiterate people is also high. There are four communes in the two districts of Thalaboriwat and Stung Treng. In Stung Treng, there is one commune (Samaki) with four villages, which consists of 611 families with 1,973 women and 1,796 men. The total population is 3,769. Among this number there are 279 illiterates of which 150 are women aged 15 years and above.

Thalaboriwat district consists of three communes: Koh Sneng, O'Svay and Preah Rumkel. These three communes have 17 Ramsar villages and 1,764 families with a total population of 9,417 of which 4,944 are women. The number of illiterates is 2,623 of which 1,255 are girls aged from 15 years and older.

Table 3.2 Communes, Villages, People and Illiteracy in the Ramsar Site

No	Communes	Villages	# Of families	Women	Men	Total	#Of illiterates (from 15 up)		
							Women	Men	Total
1	Samaki <sup>6</sup>	Thmey	146	438	401	839	30	27	57
		Hangkho Suon	227	789	672	1461	61	30	91
		Koh Khornden	120	416	396	812	18	45	63
		Kham Phan	77	203	205	408	30	21	51
		Kilo8*	41	127	122	249	11	6	17
<b>Sub-total</b>		<b>4 villages</b>	<b>611</b>	<b>1973</b>	<b>1796</b>	<b>3769</b>	<b>150</b>	<b>129</b>	<b>279</b>
2	Koh Sneng	Koh Sneng	175	493	465	958	196	170	366
		Koh Srolao	85	235	215	450	90	50	140
		Koh key	58	162	139	301	31	22	53
		Chorm Thom	55	185	195	380	27	27	54
<b>Sub-total</b>		<b>4 villages</b>	<b>373</b>	<b>1075</b>	<b>1014</b>	<b>2089</b>	<b>344</b>	<b>269</b>	<b>613</b>
3	O'Svay	Koh Pnov	92	284	240	524	19	10	29
		O'Svay	157	404	400	804	21	14	35
		O'Run	136	361	357	718	25	18	43
		Vuen Sean	32	86	77	163	37	30	67
		Koh Hep	73	174	171	345	33	63	96
<b>Sub-total</b>		<b>5 villages</b>	<b>490</b>	<b>1309</b>	<b>1245</b>	<b>2554</b>	<b>135</b>	<b>135</b>	<b>270</b>
4	Preah Rumkel	Lue	100	270	282	552	104	88	192
		Kandal	176	440	365	805	110	118	228
		Koh Chueteal Tauch	97	235	230	465	105	98	203
		Koh Chueteal Thom	96	299	230	529	131	113	244
		Koh Langor	65	179	161	330	76	80	156
		Krolar Peas	116	471	330	801	140	120	260
		Krom	148	400	368	768	110	116	226
		Anlung Svay	103	266	248	514	113	118	231
<b>Sub-total</b>		<b>8 villages</b>	<b>901</b>	<b>2560</b>	<b>2214</b>	<b>4774</b>	<b>889</b>	<b>851</b>	<b>1740</b>
<b>Grant Total</b>		<b>21 villages</b>	<b>2,375</b>	<b>6,917</b>	<b>6,269</b>	<b>13,186</b>	<b>1518</b>	<b>1384</b>	<b>2902</b>

**Source:** Seila Task Force (2003)

## Health Issues

Detailed information on the health of people in the Ramsar area was not available. Therefore, information has been taken from CNMC (2005a) which considers the health of people living along the Mekong from Kratie to the Lao border. This situation is likely to be representative of the Ramsar site.

Although there is an abundant and essentially unlimited water supply in the area, the people living along the Mekong have the poorest access to safe water in the whole of Cambodia. Less than 20% have access to safe drinking water and this is believed to

<sup>6</sup> This commune is in Stung Treng district, while the rest in Thalaboriwat district.

\* Not in Ramsar

be responsible for the high incidence of intestinal diseases that occur. Some villages have wells, but many more are needed to make a significant improvement to this situation.

Similarly, the area has the highest incidence of malaria in Cambodia. Malaria is more common in higher land away from the Mekong. There is a strong correlation between the incidence of malaria and poverty. Poorer people are less able to prevent its spread or seek cures when infected. Outbreaks of the disease can affect economic development by causing death and /or debilitation of large sections of a village.

According to the report from the Provincial Department of Health (2004) there are nine rural health centres in the province. A total of 36,786 patients visited nurses and doctors at them. Among these figures, 5,003 patients were tested for malaria of which 2,696 were positive. In the Ramsar site there is only one health centre in Preah Rumkel commune. In 2004, there were 146 patients affected by malaria. This number can be classified into five age groups: from 0 to 4 years old (13 cases), from 5 to 14 (28 cases), from 15 to 45 (98 cases) and age from 50+ (7 cases).

As with malaria, the people living along the Mekong have one of the highest proportions of underweight children anywhere in the country and throughout the lower Mekong basin. In some areas up to 50% of children are malnourished and such malnutrition is closely related to high levels of poverty.

A detailed survey conducted by the Provincial Department of Rural Development (PDRD; 2003) provided information on child and maternal health in selected villages of Stung Treng (58 villages, 17 communes, three districts) province. In the surveyed villages of Thalaboriwat district, including some in the Ramsar site, 44.8% of children under the age of five years were underweight, 25.6% were suffering from diarrhea, 57.2% had colds and 43.6% had a fever. Over 20% of women had a body mass index (BMI) below 18.5, indicating a low food intake and malnutrition. All of these statistics indicate poor levels of health and can be expected to be representative of the Ramsar site villages in general.

Schistosomiasis occurs in the Ramsar site. According to an epidemiological survey conducted by the Provincial Department of Health in Stung Treng it occurs in the three main rivers – Mekong, Sekong and Se San. Schistosomiasis surveys have been carried out regularly in 25 target primary schools since 1997 along the three rivers. Among these are six villages and schools in the Ramsar site. Table 3.3 shows the prevalence of *Schistosoma mekongi* in the Ramsar site between 1997 and 2004.

Table 3.3 Prevalence of *Schistosoma mekongi* in the Ramsar Site from 1997-2004

Village/ School	Total Population	1997 %	1998 %	1999 %	2000 %	2001 %	2002 %	2003 %	2004 %
Veal Kscach	529	9.3	0	0	0	0	0	0	0
Koh Sneng	834	17.0			6.6	7.2	0	0	0
O'Svay	712	11.7	8.9	0	0	0	0	0	0
Krolar Peas	491	43.7	31.0	0	0	0	0	0	0
Krom	756				8.8	1.4	0	0	0
Anlung Svay	521		5.7		0	0	0	0	0

**Source:** adapted from Proleung (2005). \*Zero in the above table indicates that the disease was not found.

The data show that the number of affected people is decreasing. Some NGOs such as Medecins sans Frontieres (MSF), Youth with a Mission (YWAM) and Partners for Development (PFD) have provided means of transportation and sanitation programmes such as wells and latrines. Others include WHO and the Sasagawa Foundation which provide financial support and training to people. However, schistosomiasis has been reported to occur in Se San and Siem Pang districts where the Sekong and the Se San rivers provide the only source of water.

## Ethnicity in Stung Treng

According to the report produced by the rural committee of Stung Treng in 1997, there are 14 ethnic groups currently living in the province. These ethnic groups include: Khmer (64,271), Laos (4,928), Kavet (2064), Kuoy (1588), Vietnamese (674), Chinese (458), Phnong (284), Lun (359), Brao (345), Kreung (210), Chams (85), Tum Puon (18), Kachock (14), and Jarai (5). In terms of ethnic relations, the Cambodian people in Stung Treng often refer to themselves as *Nek Srok Lue* (literally 'uplanders') which denotes people who inhabit the agricultural zone and who grow rice and cash crops for either their own consumption or for sale.

Hill tribes or *Khmer Lue*, as they are collectively known, are concentrated in the mountainous regions of northeast Cambodia. There are also lowland Laos inhabitants here, as well as a number of Chinese and Vietnamese, who mainly live in population centres along the very few major roads.

*Khmer Lue* people maintain their distinctive traditional way of life, as peasant farmers, as destroyers of forest or environment and illegal squatters (based on officials' points of view). In addition, these groups of people have been designated as marginal through a long and continuing history of political, economic, and social engagement with the lowlands. However, as development proceeds in northeast Cambodia, the traditional access to land, forest and natural resources in their communities are increasingly affecting the ability of indigenous populations to secure their livelihoods and safeguard their identity and culture.

The Mekong River in Stung Treng is known in Cambodia as the 'upper Mekong' which is why people identify themselves as *Nek Srok Lue* (uplanders) while people from the downstream Mekong are known as *Nek Srok Krom* (lowlanders). The latter are politically and economically more powerful while *Nek Srok Lue* are often less

educated, less civilised, less powerful people who live in peripheral or marginalised regions.

The other ethnic group is the Chams (*Khmer Islam*). They are mostly full-time fishers. They also live in the provincial town and number less than 50 households. They have been almost totally dependent on fishing for many generations and, as such, have developed a range of skills and knowledge better than the Cambodian fishers. Chams normally live separately from the Khmers either in land-based communities or on boats, but for the most part they have no land for agriculture. They are originally from Kompong Cham (central Cambodia) and Phnom Penh. From May to November, more Cham fishers arrive in Stung Treng province. They can be classified as nomadic in the sense that they live for fishing and travel great distances from place to place year round to do this.

The Vietnamese are the final ethnic group involved with fishing in the province. They are relative newcomers, mostly arriving after the Vietnamese intervention in Cambodia in 1979. The ethnic Vietnamese<sup>7</sup> mainly live along the riverbank by the confluence of the Sekong and Mekong next to the commercial port. In early 2003, the community consisted of 175 households with 45 families involved in farming snakehead fish and *Trey Kes* (glass catfish) at the confluence of the Sekong and Mekong rivers.

Besides fish farming, many of these households also raise pigs in cages under their houses and run small shops. They fish the whole season and move irregularly from place to place including Koh Key, Koh Hep and O'Talash in the Ramsar site. They also go out fishing in the Se San, Sre Pok and Sekong rivers.

In brief, ethnic minorities practicing a traditional way of life in the Ramsar site are almost non-existent. The Kuy ethnic people (the majority found in Anlung Chrey commune of Thalaboriwat district) are very much associated with the river, but this is not within the Ramsar site. Others are found in Chorm Thom village of Koh Sneng commune in the Ramsar site. They are all integrated with the Khmer and Laos in everyday life and their livelihood activities are very much like the lowland people. Currently, they are all in the process of assimilation into the economic, social, cultural and political relations with the lowland people.

## Human Settlements

The Ramsar site's 21 villages are spread along the riverbanks and many islands. The largest settlement of people is found in Preah Rumkel commune, located opposite O'Svay on the west side of the Mekong River. People in this commune are mixed Khmer-Lao origin. Unrestricted and unregulated border crossings for these people (as well as those in Koh Sneng and O'Svay) for the purpose of kinship and trading relations with the Lao PDR, are very common.

Some families of the Ramsar villages site set up seasonal houses along the islands, and grow agricultural crops there. Permanent village houses are by and large traditional wooden structures with zinc sheet or thatch roofing. Brick or concrete structures are limited to a few religious buildings on the main islands and the centres of villages or

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<sup>7</sup> These families are not entitled to land ownership under the Cambodian law because of their citizenship status.

communes. Relatively dense built-up areas are found at the commercial centres of Stung Treng, Thalaboriwat and the commercial market centre at the Cambodian-Lao PDR border.

Most of the villages in the Ramsar site are scattered and surrounded by fruit trees. The river banks are often intensely cultivated as vegetable gardens during the dry season. On the large inhabited islands, small patches of forest are frequently found near the villages and are preserved for religious and social purposes.

### Infrastructure and Services

Most of the villages in the Ramsar site are in predominately rural areas, where infrastructure is minimal. Until very recently, very few households enjoyed any power supply. Those who did had either their own generators or used batteries. Almost the entire population relies on fuel wood for cooking needs. Most of the villages have no health centres, the only one being in Preah Rumkel commune. There are two markets at the Cambodian-Lao PDR border: Veun Kham in Lao territory and Veun Khave (created in 2004) in O'Svay commune on the Cambodian side. O'Svay is linked to the national road No 7 running between Stung Treng and the Lao PDR border.

Most of the local products such as agricultural products, fish and other natural resources come from the Ramsar site. Other commodities such as clothes, household goods and articles are taken from provincial towns and Lao PDR. Transport of goods and people is nearly always by boat. However with the upgrading of roads in the area, car and motorbike transport will become increasingly common.

Regular public service boats connect Stung Treng to the Lao border directly. This is sometimes restricted during periods of low water flows. This mode of transport is widely used by local people for trading purposes and is also popular among tourists since it enables them to enjoy the scenery of the Ramsar site. The number of speedboats is increasing (since their introduction in 2001) for carrying passengers, goods and tourists across the Ramsar site. There are concerns about their excessive noise and speed. They are also a liability to wildlife and human safety.

### Livelihood Strategies

Most of the villages in the Ramsar site are situated along the channel of the Mekong River and its major islands. They are rich in natural resources and biodiversity such as flooded forests, water birds, reptiles, amphibians and fish. These natural resources are the main source of local people's livelihoods. Diversified activities for these livelihoods are rice cultivation, fishing, farming and collecting non-timber forest products (NTFPs), livestock raising and small trading (Try, 2004).



Vannaren (2002) demonstrated that about 95% of the provincial population are farmers; the remainder are traders, government and non-government officials. Most farmers use traditional practices. They raise cattle, buffalo for draught power and use simple equipment and indigenous seeds. In Siem Bok district, of the lower Mekong in Stung Treng province, the annual household income of the people is very low if compared to income level in other provinces. Villagers depend on rice, fish and vegetables as food for daily subsistence. Income is used for the household basic requirements such as salt, sugar, clothes, fishing gears etc.

According to the household survey in three villages (Koh Sampeay, Koh Preah and Tbong Khla) incomes were derived from fish production, rice, vegetable and cash crop farming, livestock, NTFPS, wildlife and salary (Table 3.4).

Table 3.4 Sources of Income by Activities for Villages in Siem Bok District

Sources	Amount of Income (Riel)		
	US\$1 = R4,000 approx		
	Minimum	Maximum	Average
Fish Production	30,000	600,000	150,620
Rice Production	30,000	150,000	70,830
Vegetable and Cash Crop	5,000	400,000	71,770
Livestock	20,000	350,000	96,870
NTFPs	30,000	300,000	132,500
Salary	72,000	2,388,000	842,200
Total	187,000	4,188,000	1,364,790

Source: adapted from Vannaren (2002)

The sources of livelihoods of people living along the rivers in Stung Treng are not so different. The recent participatory poverty assessment study (PPA; 2003) in Stung Treng also showed that the livelihoods of the local people both in the Mekong and its tributaries are not fixed to only one activity. Their livelihood activities involve rice farming, fishing, animal husbandry, NTFP collection, wild life hunting, riverbank vegetable cultivation, multi-crop farming, boat driving and small trading relations.

Try (2004) also noticed that most of the villages in the Ramsar site have been characterised as rice-based economy villages. Their access to land and the surrounding resources are most important for their local economy. Historically, most of the villages in the area have been involved in practicing slash and burn agriculture, on a cutting and re-growth cycle of between eight and 13 years, but in recent years, the period of this fallow has been shortening year by year. In Koh Sneng commune, once the villagers clear the land for rice paddy or farm, they register with the commune office and pay 50,000 Riel (about US\$12.50) per year for one hectare.

There are two types of farming systems commonly found in the Ramsar site villages: the first type refers to wet rice and the second refers to *chamkar* (farming). Wet rice cultivation is considered the chief form of production and uses permanent rain-watered fields in the villages and islands. The available land for each family is not so much under pressure as the populations of each commune are still relatively low. In Koh Sneng commune, each family could have land as a property right from one to five

hectares for wet rice cultivation depending on the number or labour availability in the family. The average land holding for each family is about 1.67 hectares. The highest rice production was found in 2000 and 2002 when people could produce from 2,000 kg to 2,500 kg of wet rice per hectare. This figure is higher than the statistic generated by the Provincial Department of Agriculture, Forestry and Fisheries of one to two tons per hectare.

The livelihood survey conducted by Sithik (2000) in Koh Sneng commune showed that the average annual rice consumption for each household is about 36.2 *harb* (1 *harb* = 60 kg) or 2,172 kg. The survey also showed that the average size of the family was about five persons while the biggest was about seven persons. Since most villages along the Mekong and the Ramsar site in particular are situated along the river, flood plain and islands, with the majority surrounded by wet rice paddy field and forest at the end of village. During the rainy season (May to October), all the paddy fields are occupied by wet rice with less space for buffalo. That is why, during this season, the buffalo look thinner than the dry season.

*Chamkar* (dry rice field or farming land) is when forests are cleared by burning undergrowth. In the fertile bed a crop can be grown for a few years without the great input of labour that is required by wet rice techniques. When the soil is exhausted, the farming community can move on, leaving nature to renew itself gradually. This form of agriculture is commonly practiced by the villagers in Koh Sneng commune. There are some advantages with this farming system. It requires little labour once the ground is cleared, and yields of good-quality rice can overlap the lower parts of the range of yields deliverable by wet field cultivation.

Try (2004) has demonstrated that throughout current social changes, resource access and livelihood systems in the villages are also changing. Villagers in Koh Sneng move out depending on the uncertainty of the resource, and the household's livelihood strategies. This adaptive feature of livelihood strategies has been adopted and integrated by different households in order to deal with the inherent uncertainty and dynamism of freshwater fisheries. According to group discussion and wealth ranking with local people, three types of classes have been identified in the village –the better off, the middle, and the poor (see Table 3.5).



Table 3.5 Socio-economic Differentiation of Households in Koh Sneng Village

Social Status	Typical Characteristic of Household
Better off (Nek Mean) (about 20 families)	Local elites, fish buyers and local traders who have strong social and kinship connections both inside and outside the village. Have big house with roof made from tile or zinc. Have more than enough land rice and farm land (three to five hectares). In some cases, they hire extra labour to help them. Have buffaloes and pigs (more than six) and have more than 40 chickens and ducks. Typically, these families could be found to have some of the following assets: motorboat, rice mill, a water pumping machine, video or karaoke for renting and have extra money to lend for interest.
Middle class (Nek Kondal) (about 141 families)	These families have a good house. They normally occupy enough rice and gardening land (from one to three hectares). They also have enough labour resources, which can produce extra incomes or surplus for trading or exchanging with other villagers or neighbours. Normally, these types of family have two boats: one motorboat and one rowing boat. They have enough draught animals, pigs, chickens and ducks for responding to special needs or demands in the family. Most often, these types of families are involved with forests from which they collect NTFPs.
Poor class (Nek Kror) (around 7 families)	<ul style="list-style-type: none"> <li>• Have a small house with thatch roof.</li> <li>• They often own less rice field and farmland because they lack manpower.</li> <li>• In terms of production technologies, such families often own a rowing boat and fewer draught animals such as buffalo. They have fewer pigs, chickens and ducks.</li> <li>• The families are often faced with shortages of rice and money that sometimes requires them to sell their labours for extra income and surplus. Normally, the families are headed by women who are divorced with many dependants.</li> </ul>

Source: adapted from Try (2004)

Each class of people does not share the same advantages in terms of livelihood strategies, resource extraction and exchange relations both inside and outside the village. In this regard, the poor households have limited access to land, labour, transport to markets, health care, or alternative sources of income. They are particularly dependent on fisheries resources on an 'as-needs' basis to generate income to purchase rice.

Land holding is one of the tangible assets to determine people's livelihood. Land uses in each of the four Ramsar communes are shown in Table 3.6. Figures are taken from the five year community development plans.

Table 3.6 Land Use in the Four Ramsar Site Communes

Commune	Land Classification	Area(ha)
Samaki	Residential	752
	Reserved residential	1,504
	Reserved land for other purposes	2,950
	Fallow land	18,854
	Reserved customary forest land	7,420
	Keo Vuthy Land Concession Company Ltd	7,400
	Cultivated land	8,165
	Islands and rivers	3,147
Koh Sneng	Rice field	390
	Farm land	420
	Residential land	38
	Forest land	20,752
O'Svay	Wet rice	345
	Cultivated land	285
	Proposed community forest (some with concession land)	5,000
Preah Rumkel	Rice field	126
	Residential land	153
	Cultivated land	266
	Flooded land	83
	Forest land	1781

Sources: commune development plans (2003)

In Koh Sneng alone, the *chamkar* land size (dry rice field or farming land) is approximately 1.1 ha for each family to grow subsidiary crops and vegetables such as watermelon, tobacco, cucumbers, tomatoes, chillis, potatoes, beans and egg plant etc. These types of agricultural products often grow along the riverbank and on the islands. Villagers in Koh Sneng have extended their *chamkar* to other islands of the commune such as Koh Han, Koh Key, Koh Sambor, Koh Tonle Moy and Koh Kandor. All of these islands are still natural in terms of forests and where the settlements are only temporary. However, some of the islands in Koh Sneng have also attracted villagers from other communes, from Samaki in particular.

Chong (2005) showed that in the Ramsar village of Veun Sean, the Mekong River provided a range of economic resources and services. The most important of these were fish for household consumption and local sale, to an average total equivalent value per household of 1,700,000 Riel (US\$425). Other goods and services are: water for washing cooking and drinking; transport; construction materials; aquatic flora and fauna for consumption, sale and medicines; irrigation; and recreation.

Fishing methods are adapted to the seasonal migration of fish and fish behaviour, and the ecology of the river. Based on this physical and ecological setting, fish spawning and migration can be classified into three parts. The first part is starting from Stung Treng town up to the Lao border, which contains the Ramsar site. The ecosystem of

the area has been described as having good flooded forest and complex river morphology with rapids and deep pools serving multipurpose uses: seasonal fishing; fish spawning zones; support for a great diversity of water birds; land agriculture; and ecotourism resources.

The second ecological area is from Stung Treng provincial town to the Kratie province border. Within this area, several deep pools have been identified as the habitats for many important fish species. Some are the spawning sites for *Trey Tra Sawk* (seven-line barb, *Probarbus jullieni*), *Trey Koul Reang* (giant barb), *Trey Pra* (iridescent shark-catfish), *Trey Proma* (small scale croaker).

The third fishing ecology is the Mekong tributaries, particularly the Sekong, Se San and Sre Pok in which there are deep pools for fish spawning and migration. In the Se San tributary some important deep pool areas have apparently become shallower during the past few years due to the increase in silt deposition resulting from altered flow regimes after the construction of the Yali dam in the upper part of the catchment. For instance, one pool in Veun Say district in Ratanakiri was reported to have gone from 7-8 m deep to just half a metre deep within the last three years and the abundance of many fish species has declined dramatically (Baird *et al*, 2000). In addition O'Talash, O'Kampha and O'Mras (Mekong tributaries), and O' Smorng (Sekong tributary) are recognised as priority spawning areas.

There are at least two types of seasonal fish migrations found in the province. Thuok and van Zalinge (2000) explain that every year long-distance migratory fish species drift (in case of fry) or swim (in case of adult fish) from their spawning grounds in the Mekong of northern Cambodia and southern Lao PDR to their feeding ground in Tonle Sap as elsewhere in the Cambodian wetlands and the Mekong delta in Viet Nam. When mature, they in turn migrate upriver.

Phallavan and Pheng (2000) show that spawning fish migrations begin in the Mekong River at the start of the rainy season (May-August). Fish eggs and fry are carried by the current and swept into the floodplain areas around the Tonle Sap and the areas south of Phnom Penh. When the water recedes, most fish species migrate to deeper waters in the lakes, river or tributaries (lateral migration), but many species will undertake longer migrations (longitude migration) to the Mekong River as far as Stung Treng and Lao PDR.

For instance, Pangasid catfishes (e.g. *Trey Pra*) are thought to use deep pools and areas with rapids in the Mekong, and possibly its tributaries the Sekong, Se San and Sre Pok for spawning. Each female fish lays an enormous amount of eggs to counteract the very high mortality to them and their larvae and juveniles caused by the natural environment. Based on this pattern of fish migration, the Mekong and its tributaries in Stung Treng are not an isolated entity, but are linked to Lao PDR and the Tonle Sap as the fisheries south of Phnom Penh are linked to the Mekong delta (MRC, 2002).

Another important fish species is *Trey Riel* (*Henicorhynchus* spp). It is relatively abundant for the whole period of January through May. The Mekong River in Stung Treng serves as its dry season refuge and spawning ground. There is a small downstream migration of adults from June-August. However, for nearly six months from the end of July to the middle of January almost no *Trey Riel* are landed in Stung

Treng (Phallavan and Phen, 2000). Baird *et al* (2000) reported that the peak migration of *Trey Riel* occurs around the new moon times in December, January and February in Stung Treng province below the Khone Falls.

The endemic fish, *Pa Se Ee* (*Mekongina erythrospila*), is found in the rapidly flowing parts of the Ramsar site and its major tributaries. It occurs only in the north of Cambodia. Rainboth (1996) reported that this fish can grow to 45 cm. The species feeds on periphyton and phytoplankton, and is a valuable and highly desired food fish in the northern provinces and Phnom Penh. It can be caught by using seines, gill-nets, cast-nets and traps. It is reportedly declining in numbers. The characteristics of fish migrations in the Ramsar site are summarised in Table 3.7

Table 3.7 Summary of Fish Migrations in Stung Treng Province

Seasonal Variation	Major Fish Movements
Flood season (July- November)	Lateral movement of adult fish into floodplains and creeks, streams and tributaries for breeding, feeding and growth.
Transitional period (December-January)	Lateral movements of juvenile and adult fish from seasonal to permanent water bodies (mostly from creeks, streams and tributaries to the Mekong river and its deep pools).
Dry season (February-April)	Longitudinal movements to dry season refuges and dispersal.
Transitional period (May-June)	Longitudinal migrations to spawning grounds. Fish also start spawning and downstream migrations.
From June-July	Eggs and larvae drift downstream with the water current and are distributed throughout downstream floodplain areas, which provide optimal rearing condition for young and fragile fish larvae.

Source: adapted from Try (2004)

## Fishing Techniques, Tenure and Management

Fishing techniques and gears used in the Ramsar site provide a good illustration of cultural practice and the evolving aspect of everyday life of fishers. The range of cultural traditions, together with the different topographic settings in which they have traditionally existed, has led to differentiation in the fishing equipment developed by the various ethnic groups. As a result, names for gear types are passed from group to group, and new fishing gears are also being developed or adopted, while the old gears are being abandoned or modified to meet the changing social, economic and environmental conditions. Through literature review and fieldwork, the fishing gears being used and operated in the Ramsar site can be categorised into seven types.

The first type and commonly used in the whole area includes: (1) *Chann* (a drop-door trap). It is used to catch fish in the river during the flood season where there is strong flow in forest areas. From May to July it is used for *Trey Kya* (*Channa striata* and *Clarias* sp). (2) *Lorp* (cylindrical drum trap). It can catch almost every kind of fish in flooded forest, streams, tributaries, and the mainstream. Fish commonly caught are *Trey Proul*, *Trey Kaek*, *Trey Pava*, *Trey Pa Se Ee*, and *Trey Kya*. (3) *Trou* (oblong trap). This is a family fishing gear used to catch fish in the small streams or creeks as the water flows out during the dry season. *Trou* can be used to catch fish in rice fields, small ponds, and canals during the wet season. The most commonly caught fish are

*Trey Andeng* (cat fish), *Trey Ros* (snake head fish), *Trey Kranh* (Anabantidae) and *Trey Riel*. (4) *Tom* (vertical vase trap). This is one of the most popular fishing gears in use to catch fish, in particular *Trey Riel* for daily consumption, and making smoked and fermented fish. It is usually used from February to May when the level of water is lower. (5) *Tchip* (cylindrical current trap or funnel trap). A traditional equipment used by local people to catch fish migrating from the streams, creeks, and tributaries to the river mainstream. It is commonly used at O'Talash where most of the fish caught are highly marketable such as *Trey Kes*, *Trey Chpen*, *Trey Chlaing*, *Trey Tonel*. (6) *Santouch* (hook and line gear) includes different types, e.g. long line, set pole and line, and bottom long line. These fishing gears can be used in all seasons. (7) *Sam Nahn* (cast net) includes different sizes depending on the size of fish to be caught. These are used in particular in deep pools during the dry season.

The second type refers to gill nets or *Morning*. They are popular and commonly used. They can be used in different kinds of water such as river, stream, creeks, channels and deep pools. They can be used in shallow, deep, stable or flowing water during both dry and wet seasons. There are two types of *Morning* to be found in the Ramsar site: *Morning Kaing* (stationary gillnets) in which fishers use a fixed place and *Morning Borndet* (drifting gillnets) which fishers use to put across the river drifting along the current flow of water (mostly in Koh Tonle Muoy at Koh Sneng and Samaki commune).

The third type of fishing gear is seine nets (*Ourn*), which are exclusively for medium-scale fishers operating in Koh Tonle Mouy at Koh Sneng. There are two types: the fixed or target seine net which are allowed to operate in areas demarcated by the provincial fishery office; and the mobile seine net, which can be used anywhere. This type of fishing requires more labour and capital investment and has created much conflict with local fishers as it catches most of the fish migrating along the river corridors and channels.

The fourth type is known as *Thnorng* (scoop-net) which is used in places where river morphology is simple. Most of the fish caught are small and used only for daily cooking or making dried fish.

The fifth type of gear is *Chuorn* (a V-shape net). This is normally used in areas with complex river morphology or around the *Anlung* (pools) where all types of fish hide themselves during the dry season. This type of fishing gear is easy to keep because after using it can be readily cleaned, rolled up and stored under the house.

The sixth fishing method is known as *Chlous Trey* (torch fishing). It is a method of spearing fish at night time, by using torch light, as the fish sleep near the surface of the water leaning on branches of trees. In addition, most of the big fish come out from deep pools looking for food at night. Fishers normally go fishing in groups of from three to ten people walking along the *Bung* and uneven rocks from place to place in the river. It is very popular among the adult men and fishers in Preah Rumkel and O'Svay communes during the dry season to catch snakehead fish mostly.

The last technique is the use of spear guns. This is learnt as part of fishing games by local teenagers in O'Svay and Preah Rumkel as they go out to their farm on the island or look after their buffalo in the river. It is commonly used to shoot frogs living in the flooded forest in March and April mostly. Sometimes spear guns are used to kill water birds which, according to law, is illegal.

In brief, there are seven types of fishing tools and equipments in the Ramsar site. Two categories of fishers use them: small-scale and middle-scale, or non-licensed and licensed fishers. The non-licensed fishers refer to those from inside the village and the seasonal fishers who set up their temporary fishing camps along the river. The licensed fishers use target seine nets, mobile seine nets, and drifting gillnets and come from outside the Ramsar site. The fish tenure and fishing practices in the Ramsar site are diverse and adaptive. The traditional knowledge of the fishers about the complex ecology of the Mekong and its tributaries, as well as its seasonal variations in water regimes, and seasonal migration of the fish, enables them to choose the most appropriate fishing gear and localities.

During the wet season from May to September, access to the fishing grounds is open because the water level is high. Additionally, the large fish species are dispersed at this time. But from October to April, access to the fishing grounds is controlled by the target and mobile seine netters and the drift net fishers from the Koh Sneng commune in particular.

The fishing grounds in the Ramsar site have become more and more desirable to outsiders for profit maximisation. In addition, the current local institutions for community fishery management are unclear and the process of privatisation in the province has created more space to be contested by outsiders for the most productive fishing grounds while leaving the less productive for local communities.

### **Influence of Market and State**

The northeast provinces of Cambodia have maintained a relaxed rural character and, due to a protracted period of isolation, missed out on the rapid economic development and related social change elsewhere in the country. In his research in Lao territory next to Stung Treng province, Daconto (2001) believes that the prolonged civil conflict and instability which have characterised Cambodia for most of the last decades also undermined the opportunity for the Mekong corridor region to take advantage of its strategic position as a trading route.

However, the political and economic climate of isolation and self-reliance has been changing since the mid 80s, following political reforms, which have started to promote private investment and closer relations with neighbouring countries. These factors, combined with the recently achieved peace in Cambodia and the proximity to the much more developed Thailand, now place the northeast region of Stung Treng in an entirely new regional context. This offers a wide range of opportunities for the strategically located people of Stung Treng Ramsar site.

Try (2004) also revealed that natural resource exploitation and commercialisation in the country started in 1989 when macro-economic government policies began to shift from a socialist, centrally planned economy to a market-based economy. This period was accelerated by increasing international support and integration with international market forces during the administration of the UN Transitional Authority for Cambodia (UNTAC) from 1991-1993.

In terms of fisheries resources, export to foreign countries and Phnom Penh from the province started in 1991. A Phnom Penh company was granted the legal right to buy and export fish from Stung Treng to the capital and Lao PDR. In the mid-1990s, fish

buying companies started to operate in the province. Licenses gave exclusive rights to those who won the bidding process. But through the process of licensing, different classes of people compete for these resources both legally and illegally. One form of licence is the selling of a particular section of a tributary, which is mostly done by soldiers and policemen. O'Talash in Preah Rumkel and O'Cheuteal in Koh Sneng were leased to a military officer by the Provincial Office of Fisheries and the stream was blocked from 1995 to 1999. This action was protested strongly by local people and the incident was reported in the Cambodian national press. The protest was successful.

The other form of giving legal license is the fish exporting and importing companies, which obtain direct entitlement from the central government. The access to this bidding process has been strongly linked to political connections and kinship relations. In this way, the local people who do not have a license have become illegal fishers and are excluded from their access to fishery resources through legal process. However, their continued fishing is not illegal because of their customary rights.

Like fishery resources, forestry has also become the target of economic exploitation by the private sector with support from the state level. In 1999, the government approved a land concession of over 7,400 hectares of forestland to the Flour Industrial Land Concession Company. Since then, the rights of community forest resource use came under increasing restrictions as the company asserted that the government had granted the company exclusive rights.

Try and Vannara (2004) explained that before concessions, local people could go to the forest and collect non-timber forest products (NTFPs) such as mushrooms and traditional medicines. Now they have to ask permission from forest guards whereas they used to enter the forest freely. Moreover, people whose rice fields fell inside concession areas could no longer enter to farm their own rice fields. The concession owners claimed legal proof that all the land, whether rice field or forest, belonged to them. Therefore, the concession effectively displaced local farmers who then had to find new occupations and incomes. In this way, the secondary reliance on fishing has become primary for more villagers. Yet the intensification of demand on fisheries came at the same time as illegal practices were causing staggering depletion.

### **Characteristics, Causes and Extent of Poverty and Vulnerability**

Vulnerability assessment identifies what is at risk in a community and asks why they are at risk. Unsafe conditions may result from inherent structural weaknesses of properties, such as poor construction material for instance, or from socio-economic conditions. Vulnerability assessments indicate the degree of damage that buildings, people or other things such as natural resources would suffer in the event a hazard at a specific magnitude.

In a recent study the World Conservation Union (IUCN) and Action Aid (2003) classified three levels of vulnerabilities in Stung Treng: village level, household level and people capacity level. The village and the household level impact analysis encompassed four main issues: degradation of forest, fish decline, floods and drought. The study found that people used to earn more and now earn less from business. Some households make little income; some other households do not have sufficient rice for consumption eventually becoming bonded in labour and incurring debts. With the decline in natural resources people were forced to change or look for new business ventures that were different from their previous occupation. They do not always have the personal

capacity or skills/knowledge to make such changes. As a consequence, basic household needs were high, and poor households were in a vulnerable condition with threats to survival.

## Village Level

Several causes of vulnerability at village level were identified by the study. First is the frequent drought and floods affecting the crops. As part of the vulnerability assessment, local villagers recorded the timing of seasonal changes as well as break and active periods in monsoon rains. Local perceptions of climate are especially important since Stung Treng province has only one synoptic weather station.

The recent assessment of two villages (Krolar Peas and Koh Chrim) by Docelmascolo (2004) showed that in Koh Chrim the rainy season was about two months shorter than in Krolar Peas village, as the rains began five weeks later and ended three weeks earlier. The two communities also recorded the history of drought in their area. In Krolar Peas, 1999 was remembered as one of the worst drought years, while in Koh Chrim, the years 2000 and 2003 were identified as especially difficult. As a result of the study it became clear that villagers recognised different drought patterns. For instance, the Koh Chrim droughts of 2000 and 2003 were notable for a near complete absence of rainfall during the southwest monsoon. By contrast, in 2002, both villages reported a brief period of drought that interrupted what is normally expected to be the period of heaviest rainfall. Finally, in 1999 and 2001, drought conditions were associated with two breaks in seasonal rainfall, meaning that the dry periods were separated by a period of some rain. It should also be noted that the two villages remembered the 1999 droughts differently.

The second cause of vulnerability is the over-extraction and use of the wetland resources and logging, over-extraction and destruction of NTFPs, wildlife hunting, wildlife smuggling, large-scale forest cutting and slash-and-burn agriculture. The increased pressure from people outside the village, the inability to compete with outsiders in catching fish and the lack of support from government and other agencies are also the main factors in causing vulnerability.

It was clear that some villagers turned to illegal logging to supplement their income. This issue needs to be approached carefully as use rights in these areas are ambiguous and contentious. With NTFPs such as resins and rattan further research is needed to ascertain the impact of climate change on these products.

A baseline survey of villagers regarding these products may be useful but management issues, particularly the question of right of access, needs to be handled carefully. Both villages also rely on a range of aquatic animals, in particular frogs and lizards. Frogs especially are known to be highly sensitive to climate changes. More research in this area may generate some interest with villagers considering the widespread reliance of frogs in local diet.

## Household Level

Major causes of vulnerability at the household level were the loss of wetland resources (forest, wildlife and NTFPs) due to over-exploitation, natural phenomena like floods and drought affecting rice cultivation and other means of livelihoods, the lack of resources to compete with people having motorboat access and other modern means



to catch fish. Law enforcement by relevant institutions and communities also limited and affected the poor due to their inability to compete with those having resources. The poor, the poorest and the widows are among the most vulnerable in the villages. Their situation has deteriorated from the 1990s and households have become more vulnerable to food insecurity.

The poor depended most on natural resources for their livelihood and food security, and their vulnerability increased with degradation and loss of natural resources. In the competition to benefit from depleted natural resources, poor families lacked adequate resources such as motorboats, buffaloes and cows, and businesses within and outside the village. In the aftermath of floods and drought, people often resort to increased extraction of natural resources to compensate for their losses.

### Extent of Poverty

The World Conservation Union (IUCN) and Action Aid (2003) listed the factors by which poverty in the Ramsar site and other villages can be assessed (Table 3.8).

**Table 3.8 The Causes of Poverty in Three Villages**

Koh Chrim	Krolar Peas (Ramsar)	Ban Huoy
<ul style="list-style-type: none"> <li>• Wetland decline</li> <li>• Inequity in extraction of the wetland resources. The rich have more access than the poor</li> <li>• High number of family members. The poor have many children, and cannot afford living with the same size of land</li> <li>• Cost of products is much higher than income</li> <li>• Limited and slow development support from various sectors</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of draught animals</li> <li>• Small areas of paddy land (get little yield)</li> <li>• Paddy land gets flooded</li> <li>• Infertile paddy land</li> <li>• Drought</li> <li>• Pest problems (pests destroying rice)</li> <li>• Existence of chronic diseases</li> <li>• Lack of knowledge and skills</li> <li>• Loss of forest</li> <li>• Decline of natural resources</li> <li>• No market for NTFPs and secondary crop products</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of human resources</li> <li>• To many widows and female headed households</li> <li>• Lack of draught animals</li> <li>• No boat, motor boat for transporting NTFPs and fish</li> <li>• No appropriate equipment for extracting forest products</li> <li>• No modern fishing tool</li> <li>• No skill for extracting forest products and NTFPs</li> <li>• Often affected by natural disasters such as floods, drought and boars eating crops.</li> <li>• Lack of health centres, and people often get affected by epidemic diseases</li> <li>• Spending a lot of money on medical treatment.</li> </ul>

Source: IUCN and Action Aid (2003)

In summary, the nature of poverty and vulnerability, including causes and indicators, differ at each of the sites. People are poor and vulnerable to becoming poor and increasingly disenfranchised in different ways, at different times, in different places.

### Disaster

Stung Treng has high potential water resources such as rivers, streams and creeks but there are no reservoirs or significant irrigation schemes. Table 3.9 shows the economic damage caused by floods in Stung Treng province in 2000, 2001, and 2002.

Although flooding is relatively minor in Stung Treng compared to other areas of Cambodia, losses can still be significant and disastrous to individuals.

Table 3.9 Flood Damages in Stung Treng Province, 2000-2002.

Item of Damages	2000		2001		2002	
	Quantity	Cost estimated(\$)	Quantity	Cost estimated (\$)	Quantity	Cost estimated (\$)
Houses	7	10,500	3	1,500	3	2500
Affected families	4,968		7,543		,440	
Livestock deaths			125	2,000		
Wet rice (ha)	2,854	346,815	2,722	408,300	1,149	172,350
Cultivated crops (ha)	238	119,000	220	32,990	291	35,200
Gravel road (m <sup>2</sup> )	18,000	106,632	2,020	50,500	1,200	30,000
Red soil road (m <sup>2</sup> )	57,000	28,139	49,844	111,110	8,772	19,290
Drainage	1	5,800	46	5,000	24	2,600
Bridge	19	86,380	794	196,000	305	75,300
School buildings	2	1,218	3	10,000		
Total		704,484		817,400		337,240

Sources: Provincial Department of Planning (2003)

As for the Ramsar site, the study by IUCN and Action Aid (2003) in Krolar Peas village shows that the 1999 flood was recognised as one of the most significant in recent memory and was selected as a case study by Dolcemascolo (2004) for his investigation into vulnerability. This found that damage to rice crops was significant; an average of 30% of the crop was lost in any flooding event. Since the average production is one tonne per hectare and a family of five typically requires a minimum of 60 *harb* for annual consumption, this repeated loss is significant. In Krolar Peas, 10 respondents reported crop loss: four reported 40-60% damage, three reported 80-90% damage and three others reported total destruction of paddy production.

Krolar Peas lost valuable banana and sugar cane crops. Loss of chilli, eggplant, pumpkin and other garden vegetables were noted as well. Shortages of fruits and vegetables have a severe impact on nutrition. It can be expected that similar losses occur throughout the Ramsar site during times of floods.

### Strategies Used to Reduce Vulnerability

Strategies to address poverty must be responsive and adaptive to local circumstances. The strategies presented here represent a general approach that will be adapted to address the specific needs in each of the demonstration sites.

Strategies that people at the village level have used to cope with vulnerability include arrangements to extract wetland resources by establishing community forestry, community fishery, development of rice banks for providing low interest loans, credit projects for cash loans and animal banks. In order to better cope with vulnerability, villagers request support from NGOs and other institutions. At the moment, these strategies are not well developed throughout the Ramsar site villages.

Major strategies at the household level that are used to cope with vulnerability include increasing labour. At the household level, people have tried their best to cope with poverty by expanding paddy land and farmland, raising animals, extracting wetland resources such as fish and harvesting NTFPs according to their own ability. Households also attempt diversification of livelihood sources. Households which are lacking human resources and female-headed households, however, find it difficult to obtain human and financial resources to overcome vulnerability imposed by degradation of natural resources and decline in wetlands. Vulnerable families need concerted support to diversify livelihoods and decrease their vulnerability.

There is a great need for institutional cooperation and coordination. In order to restore and improve their living conditions, the villagers believe that NGOs in cooperation with government could help them manage and preserve the resources for the benefits of their livelihood and for future generations. Such measures include community fisheries and community forestry programmes.

## Summary

Most of the village structures in the Ramsar site are historically well established in terms of equitable norms and sharing of resource access. Rice farming (paddy and upland rice) is considered as the main occupation by all families. All families have access to land for rice farming though there are considerable differences in quality and quantity of land possessed. The main livelihood activities in the Ramsar site, as well as other rivers in Stung Treng, are summarised below.

Fishing and rice farming are the most important activities for nearly all families and fishing is done for both household consumption and sale. Animal husbandry (pig, chicken, cow and buffalo) is a supplementary occupation and source of income for many families. Chickens are especially used for household consumption. All livestock may be sold at market to meet urgent cash needs to buy essentials or to pay for medical care, school fees and so on.

Most families are also engaged in collecting NTFPs, which is another important source of supplementary income: some of the items such as rattan and resin are useful for household consumption. In this regard, wildlife hunting is also a supplementary occupation. This is done for household consumption and local sale in village and Stung Treng markets as well as to Lao PDR.

Most villagers live along the rivers with about 30% of families grow vegetables on the riverbed and riverbanks. Some families have vegetable gardens around their houses. People collect wild vegetables from the forest during the rainy season for daily food and sale at market. Bamboo is also collected for construction and for sale to others in and outside the village. In addition, multi-crop farming of banana, beans, corn, potatoes, and watermelon is one of the supplementary occupations. However, with the external pressure of market penetration and increasing commercialisation, these communities will inevitably face internal differentiation in terms of their access to fishery and forestry resources. The political and economic climate of isolation and self-reliance has been changing since the mid 80s, following political reforms, which have started to promote private investment and closer relations with neighbouring countries. These factors, combined with the recently achieved peace in Cambodia and the proximity to the much more developed Thailand, now place northeast Cambodia in

an entirely new regional context which offers a wide range of opportunities for the strategically located people of the Stung Treng, Ramsar site.

Some households make little income while some other households do not have sufficient rice for consumption, and eventually become bonded by labour and incur debts. With the decline in natural resources people are forced to change or look for new business ventures that are different from their previous occupations. As a consequence, the basic household needs have become high and are rising, and poor households are in a more vulnerable situation to survive. Strategies presented in this chapter represent a general approach that needs to be adapted to address the specific needs in particular villages.

The other threat to the area is from natural disasters. In 2000, 2001 and 2002, floods occurred in the province. These were caused by both heavy rain and, in some cases, the release of water from hydropower schemes on the Sekong River in Viet Nam. Droughts occur regularly in the province and destroy the majority of wet rice crops in the Ramsar site. With the rice harvest destroyed or reduced, people have to look for alternative sources of livelihood such as illegal hunting and fishing. This puts more pressure on the wetlands in the Ramsar site where there is no clear legal framework or management of resources.

## Chapter 4: Environment and Biodiversity

### Introduction

This chapter presents information on the environmental characteristics of the Ramsar site and its surrounding areas. In many cases only limited information is available.

### Climate



The climate in Stung Treng, as in the whole of Cambodia, is determined by the monsoon winds which alternately blow from the northeast and southwest. The warmer rainy season commences with the arrival of the southwest season in May and continues until September. The cooler drier season occurs during the northeast monsoon from November to March; April and October are transitional months.

The high coastal mountains of Viet Nam shield the Stung Treng area during the northeast monsoon, the coolest and driest part of the year. At this time, and particularly in December and January, winds from central Asia bring cooler air to northeast Cambodia. From February onwards, light southerly winds bring warmer air and the hottest time of the year until the southwest monsoon breaks in May.

Annual average rainfall data for Stung Treng from 1994-2000 is given in Table 4.1 (CTIA, 2002). These figures show the strong seasonality of rainfall with over 84% of annual rainfall typically occurring between May and October. It is not unusual for any of the months from November to February to have zero rainfall. The highest monthly rainfall figure during this period was 519.3 mm in June 2000. Annual variability is high, ranging from 1441.3 mm (1996) to 2600.2 (2000).

There are six climate recording stations in Stung Treng province. Summarised climate data are currently only available for 2003 and 2004 and these are given as averages for the two stations in Stung Treng town in Table 4.2. Rainfall varied significantly over the two years (1373 mm – 1807 mm) as did annual average maximum temperature (33.0°C to 36.5°C).

Thus climate varies significantly on a year to year basis in Stung Treng province. This variability is a feature of the environment that Ramsar site villagers have to live with and cope with. Rainfall during the rice growing season is particularly important as all rice is rainfed.

Table 4.1 Monthly Average Rainfall for Stung Treng, 1994-2000

Month	Average Rainfall 1994-2000(mm)	% of Annual Average	Monthly Range 1994-2000(mm)
January	0.9	0.1	0-5.1
February	1.2	0.1	0-5.7
March	43.9	2.2	4.0-121.2
April	167.8	8.5	22-403.8
May	249.2	12.7	116.6-443.4
June	245.0	12.5	65.4-519.3
July	289.4	14.7	106.8-424.6
August	333.4	17.0	245.7-404.3
September	308.4	15.7	176.4-458.1
October	228.8	11.6	106.7-389.8
November	82.0	4.2	0-242.0
December	16.2	0.8	0-61.1
Annual	1966.2		1441.3-2600.2

Source: adapted from CTIA, 2000.

Table 4.2 Summarised Climate Data from Stung Treng Town, 2003 and 2004

Parameter	2003	2004
Total annual rainfall (mm)	1373	1807
Annual average maximum temperature (oC)	33.0	36.5
Annual average minimum temperature (oC)	24.0	23.0
Average annual temperature (oC)	30.5	34.0
Maximum temperature (oC)	38.5	40.0
Minimum temperature (oC)	11.5	18.6

Source: Stung Treng Provincial Department of Water Resources and Meteorology, January 2005

## Hydrology

The Mekong is one of the world's great rivers, its basin stretching 2,600 km from the Tibetan plateau to the South China Sea and covering 795,000 km<sup>2</sup>. The river itself is about 4,800 km in length with an annual average discharge of 475,000 million cubic metres, making it the world's 12<sup>th</sup> longest and 10<sup>th</sup> greatest respectively.

The Mekong exhibits significant variations in its annual flow regime reflecting the seasonal variation of rainfall patterns in the basin. Water levels are measured at Stung Treng, Cambodia, at a location just south of the Mekong-Sekong junction (Table 4.3). Between 1999 and 2004 average water levels were highest in August or September with absolute maxima ranging from 10.22 m to 11.92 m. Over the same period, average minimum water levels occurred in March or April with absolute minimum occurring in March, April or May and ranging from 1.16 m to 2.34 m. Annual variations between absolute minima and maxima ranged from 7.89 m (2003) to 9.20 m (2000).

Discharge rates for the Mekong at Stung Treng are provided by Danida (2000) and presented in Table 4.4. Discharge rates varied enormously over the 26-year period.

Thus the average September maximum (37,484 m<sup>3</sup>/s) exceeded the average April minimum (1966 m<sup>3</sup>/s) by about 19 times. The maximum September flow (67,083 m<sup>3</sup>/s) exceeded the lowest minimum flow (May, 1198 m<sup>3</sup>/s) by about 56 times.

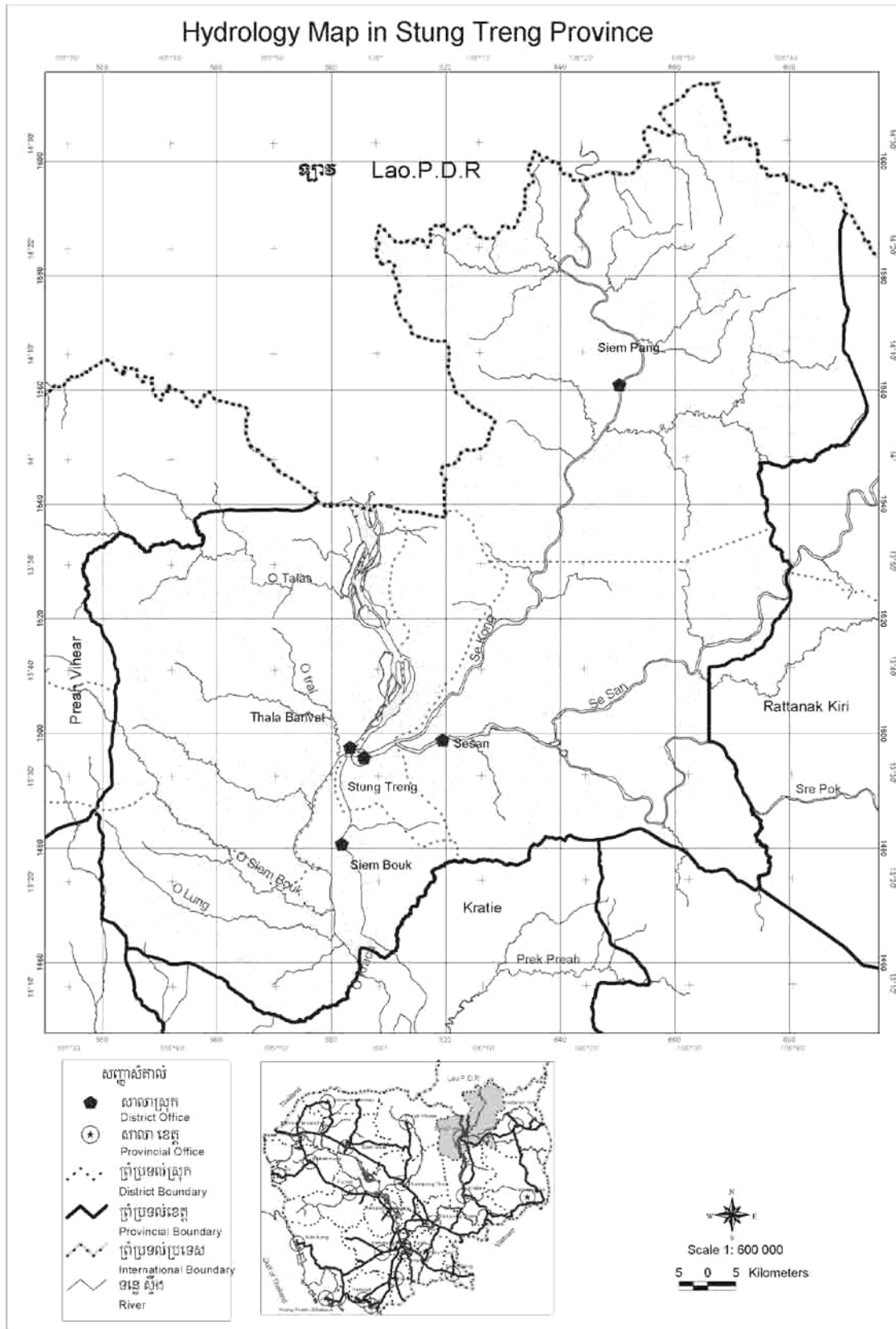
Despite the apparent variability between annual and seasonal river flows, discharge rates from the lower Mekong are relatively constant (MRC, 2003). Variations between years are low by world and Asian standards. Exceptional floods, when they occur, are not much larger than normal average floods. Flooding in the Ramsar site does occur but detailed records are not kept. Most damage is normally restricted to growing rice crops with severe economic loss to individual farmers.

The Ramsar site has numerous small tributaries (about 40) flowing into it (Map 4.1) These are mainly seasonal, the smaller ones at least drying up for several weeks or months during the dry season. During the wet season (November-May), tributaries receive water both from their own watershed and from Mekong backflows. The larger tributaries such as O'Talash are extremely important for fish spawning and as nursery areas for young fish. It is likely that all of these tributaries serve the same functions, with their importance in proportion to their size.

The Ramsar site's watershed areas vary in size between the east and west banks. On the east side it extends about 10 km, with the land further east draining into the Sekong River. On the west side, the O'Talash tributary is about 60 km long and the watershed covers about 5,000 km<sup>2</sup>. Total watershed areas on the west bank exceed 6,000 km<sup>2</sup>. Present throughout all watershed areas (as measured on 1:50,000 topographical maps) are numerous areas of land marked as being subject to inundation and many small perennial or intermittent ponds. The role and values of these areas for fish and wildlife are not presently documented.

About 5 km south of the Ramsar site, the Mekong is joined by its largest Cambodian tributary, the Sekong. The Sekong itself is joined to the east of Stung Treng town by the large rivers Se San and Sre Pok. Together, these three rivers drain large areas of the mountains of southern Lao PDR and west central Viet Nam (the Annamite mountains). In total, the Sekong River contributes about 16.7% of the Mekong's total flow. The quantity and quality of flow of these rivers are important for the maintenance of good hydrological conditions in the Ramsar site. Any significant adverse changes to the hydrology of the Mekong below Stung Treng will be detrimental to the Ramsar site and particularly likely to affect fish migrating upstream.

Map 4.1 Hydrology Map in Stung Treng Province





There is no water quality monitoring data for the Mekong at Stung Treng. The nearest localities studied by the Mekong River Commission (MRC) in their routine monitoring programmes are at Kratie to the south and Pakse (Lao PDR) to the north. Both sites are about 200 km from Stung Treng.

Information from both these rivers is given in Table 4.5. The Mekong water quality as shown is typical of other Asian rivers. The higher values for calcium reflect the presence of limestone in the upper Mekong catchments. These values are diluted in the lower Mekong, particularly by such major tributaries as the Sekong, Se San and Sre Pok which drain rocks low in calcium in the Lao PDR and Viet Nam highlands. Nitrogen concentrations are low whilst those for total phosphorus are relatively high and are probably associated with the levels of suspended solids.

The MRC has carried out regular monitoring for total suspended solids, conductivity, total phosphorus and total nitrogen at Pakse, Lao PDR, since 1982 and Kratie since 1992 (MRC, 2003). During this time, levels of suspended solids have declined at most sites and this is believed (MRC, 2003) to be due to such material being retained by the Manwan dam in China. Conductivity has also decreased at these sites. Levels of nitrogen and phosphorus are little changed over these periods at most sites on the Mekong. Water quality in the Ramsar site is likely to be intermediate between the values for Pakse and Kratie and to show the same trends.

**Table 4.3 Average Monthly Levels (metres) of the Mekong River at Stung Treng Town, Cambodia 1999 – 2004**

Water Level (m)						
Month	1999	2000	2001	2002	2003	2004
January	2.8	2.78	1.99	2.91	3.05	2.46
February	2.52	2.48	1.55	2.59	2.64	2.29
March	2.34	2.42*	1.55	2.40	2.46	2.07
April	2.41*	2.43	1.47	2.32*	2.42*	2.17*
May	3.96	2.85	1.63*	2.83	2.68	2.66
June	6.14	5.5	2.73	5.16	4.06	4.66
July	9.22	7.92	5.32	8.13	5.16	5.79
August	8.37	10.01*	7.98*	9.96*	7.35	9.06
September	10.32*	9.49	8.26	9.76	8.80*	9.25*
October	6.71	6.53	4.63	6.47	5.57	5.40
November	4.52	5.16	3.33	4.50	3.58	3.51
December	3.38	3.55	2.49	3.56	2.84	2.94
Highest	11.49	11.97	10.74	11.53	10.23	10.22
Lowest	2.10	2.27	1.16	2.24	2.34	1.97

Source: Adapted from data supplied by the Department of Water Resources and Meteorology, Stung Treng. Monthly averages are calculated from twice-daily water levels measured at Stung Treng town.

\* Months of annual absolute maximum and minimum water levels. Both may occur in months other than those of the average maximum and minimum levels. For example in 1999 the absolute minimum water level occurred April (2.10 m) whilst the month of lowest average water level (2.41 m) was in March.

Table 4.4 Minimum, Maximum and Average Flows of the Mekong River at Stung Treng, Cambodia, 1962-1988

Month	Minimum Flow (m <sup>3</sup> /s)	Maximum Flow (m <sup>3</sup> /s)	Average Flow (m <sup>3</sup> /s)
January	1986	6050	3528
February	1777	3640	2572
March	1436	2840	2051
April	1250	3177	1965
May	1198	10400	3348
June	2410	37400	10605
July	5032	46638	21104
August	12491	61300	33765
September	20700	67083	37484
October	9621	59320	22933
November	4400	30292	11193
December	2380	11286	5488

Source: Adapted from Danida, 2000

Table 4.5 Monthly Water Quality Data from Kratie (Cambodia) and Pakse (Lao PDR) and Asian River Averages (averages of monthly samples, mg/l)

Parameter	Kratie	Pakse	Asian Average
Calcium	15.5	23.1	18.4
Magnesium	4.1	4.6	5.6
Sodium	6.9	6.7	5.5
Potassium	1.4	1.6	3.8
Iron	1.21	0.18	0.01
Sulphate	9.3	17.1	8.4
Chloride	5.0	8.0	8.7
Silicate	11.4	12.2	11.7
Nitrate	0.1	0.1	0.7
Bicarbonate	62	83	79
Total Suspended Solids	122	215	-
Total Phosphorus	0.02	0.04	-

Source: MRC, 2003

### Climate Change

The most comprehensive assessment of climate change and its effects on the Mekong basin is provided by Chu *et al* (2003). In their study they predict a range of climate change scenarios and assess the possible impacts on the socio-economic conditions of the basin. The impacts of climate change are dependent on an interaction between changes in climate itself (rainfall, temperature etc.) and the prevailing socio-economic factors at the time (population growth, agricultural practices, levels of industrialisation, poverty and income levels etc.). Potential effects on biodiversity will also be dependent on the same factors plus others such as people's attitudes to hunting and wildlife in general. This complexity, combined with the

current lack of knowledge on the ecology of species in the Ramsar site, makes it difficult, if not impossible, to accurately predict the effects of climate change on biodiversity.

In the scenarios chosen by Chu *et al* (2003) for the whole Mekong basin, they predict that average annual temperatures will increase from the baseline 24.3°C (1961-1990 average) to about 29°C by the end of this century. In many months at the end of the century maximum temperatures will be well over 40°C (presently the highest ever recorded at Stung Treng). In the Ramsar site, average annual temperatures are predicted to increase from 25.8°C (1961-1990) average to a maximum of 29.8°C by 2099.

Concerning rainfall, the average for the whole Mekong basin is predicted to rise by up to 9.8% by 2099 from the 1961-1990 average. Around the Ramsar site however rainfall is predicted to change by from -2.3% to -3.8% during the years 2010–2039 and by +1.6% to -1.5% during the years 2070–2099. Any changes in biodiversity in the Ramsar site will depend in part upon a combination of local rainfall and basin-wide rainfall changes. Mekong river levels at the Ramsar site for example are more dependent on upriver rainfall than local rain.

Other climate conditions are predicted to change in the Mekong basin by the end of the century compared to their 1961-1990 levels. Thus solar radiation levels will rise slightly, wind speeds will increase and relative humidities will decline.

The impacts of these climate changes are difficult to predict as many other factors are involved in whatever changes will occur. Chief amongst these are the expected doubling of the population every 35 years with obvious consequences for pressures on the environment to provide additional food resources, the prevailing levels of industrialisation, irrigation and hydropower (water demand) and levels of afforestation/deforestation (run-off, water demand). For a range of these conditions Chu *et al* (2003) make the following predictions for changes in river flow in the lower Mekong by the end of this century:

- minimum monthly flow to change by -9.3% to -100%;
- maximum monthly flow to change by +30% to +41%;
- average monthly flow to change by -10% to +8%;
- maximum daily flow to change by +13% to +35%.

Whichever development scenario actually occurs, it is likely there will be major changes to the Mekong's flows at the Ramsar site and elsewhere. These can be predicted to have major impacts on fish ecology and the fisheries of the area. Fish migrations and spawning behaviour are adapted to present conditions of the river. Major changes brought about by climate change and increasing water demands will affect them, probably adversely. Predictions of impacts on individual species cannot be made at present due to insufficient information on their ecological requirements.

A doubling of the human population in the Ramsar site will lead to increases in requirements for farming land and other forest resources. Thus the area of woodlands can be expected to decrease, quite apart from any other changes resulting directly from climate change. Without any changes in current attitudes to wildlife, massive increases in hunting will occur. Loss of forest and intensified hunting will cause

biodiversity to decrease. This would, in fact, be a continuation and possible intensification of the present trend.

To understand more fully the likely effects of climate change on the Ramsar site a study similar to that of Chu *et al* (2003) is required which focuses exclusively on the area. This study could provide coping strategies for the Ramsar site as Chu *et al* (2003) do for the Mekong basin in general.

### Geology and Minerals

The geology of Stung Treng province is shown in Map 4.2. The Mekong river channel through the Ramsar site is dominated by Quaternary deposits (present day deposits) of silts, clays and sands carried from upstream and also derived from local weathering. These overlie the base rocks, which around the Ramsar site, are mainly composed of Devonian-Carboniferous sandstones. There are small outcrops of marble (*Tmor kambau*) in several localities along the eastern banks of the Mekong.

There are several mineral deposits (personal communication, Stung Treng Department of Industry, Mines, and Energy, 2005) in Stung Treng province, but with the exception of alluvial gold deposits in the Sekong River (on the border between Stung Treng and Ratanakiri provinces) none is commercially exploited. Coal deposits occur on the Sekong and Se San rivers, the former being commercially mined from 1960-1970 and the latter from 1970-1979. These deposits are currently being appraised for the possibility of renewed mining. Iron and copper deposits occur in Stung Treng province but no information was available on their locations or economic potential. Dolomite, marble and semi-precious gems also occur in the province. Mining feasibility studies are proposed for dolomite and have been completed for marble, but no development has yet been proposed.

Given the interest being shown in the mineral deposits in Stung Treng province mining operations are possibilities.

### Soils

Soils in the Ramsar site (Map 4.3) belong to four major groups and are described briefly below.

On the majority of the west bank and the lower 40% of the east bank are shallow acid lithosols derived from sandstone parent rock. They have a pH from 4.5-6.5 and a depth up to 15 cm. They are not fertile soils and their optimal uses are for forestry and livestock rearing in the dry deciduous forest that is their characteristic vegetation. Close to the river the soils may be modified and richer due to flooding and increased water supply.

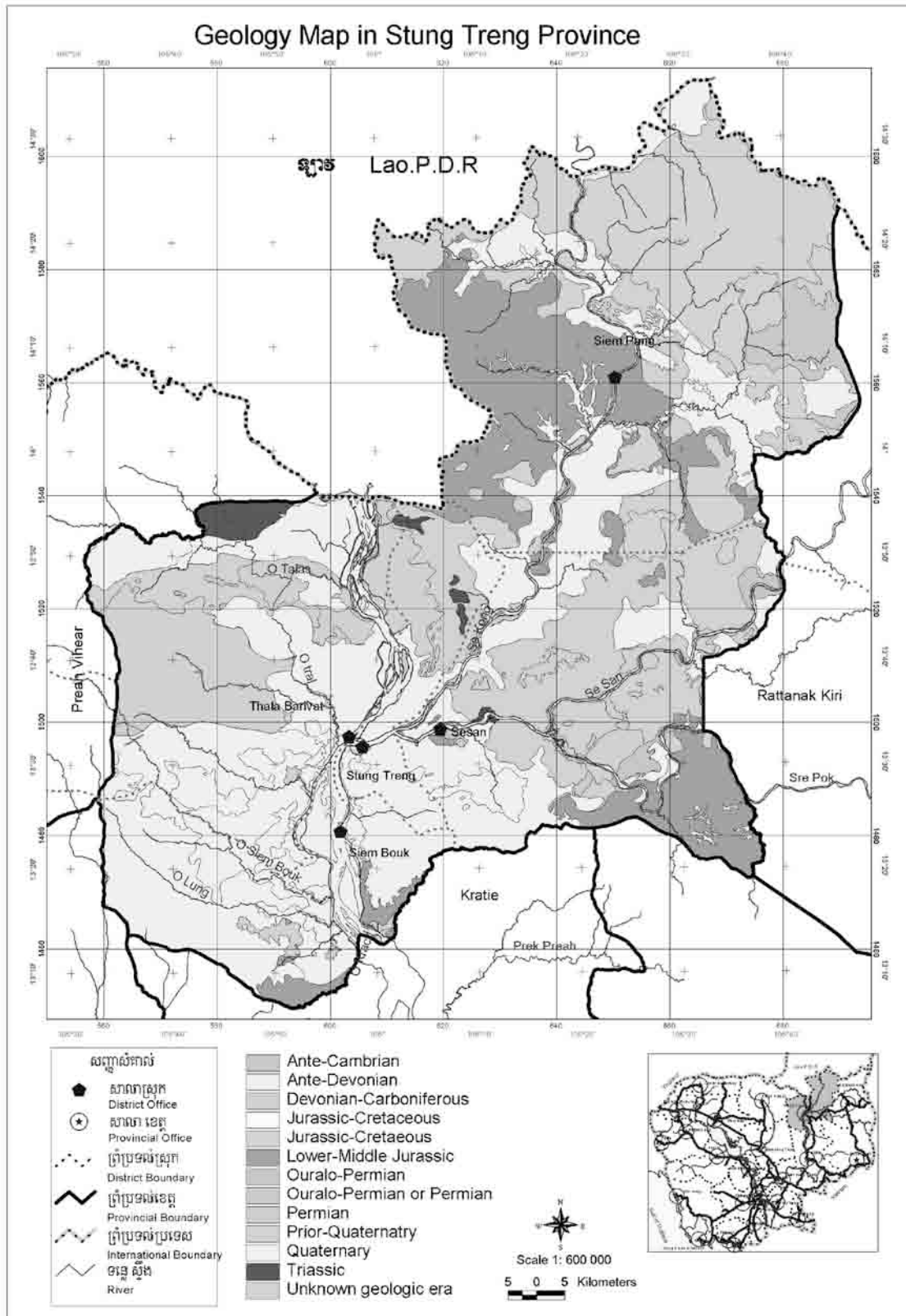
Along the major west bank tributaries (O'Talash and O'Tral) and where they join the Mekong, the dominant soils are river alluvials. These have a low pH (4.5-6.5) as well but are good soils further improved by the addition of green manure, phosphate and potash fertilisers. A large range of crops and trees can be grown on these soils.

The Mekong islands and middle 40% of the Ramsar site's east bank are characterised by brown alluvial soils. These have a higher pH (5.0-6.8) and are good fertile soils suitable for all crops.

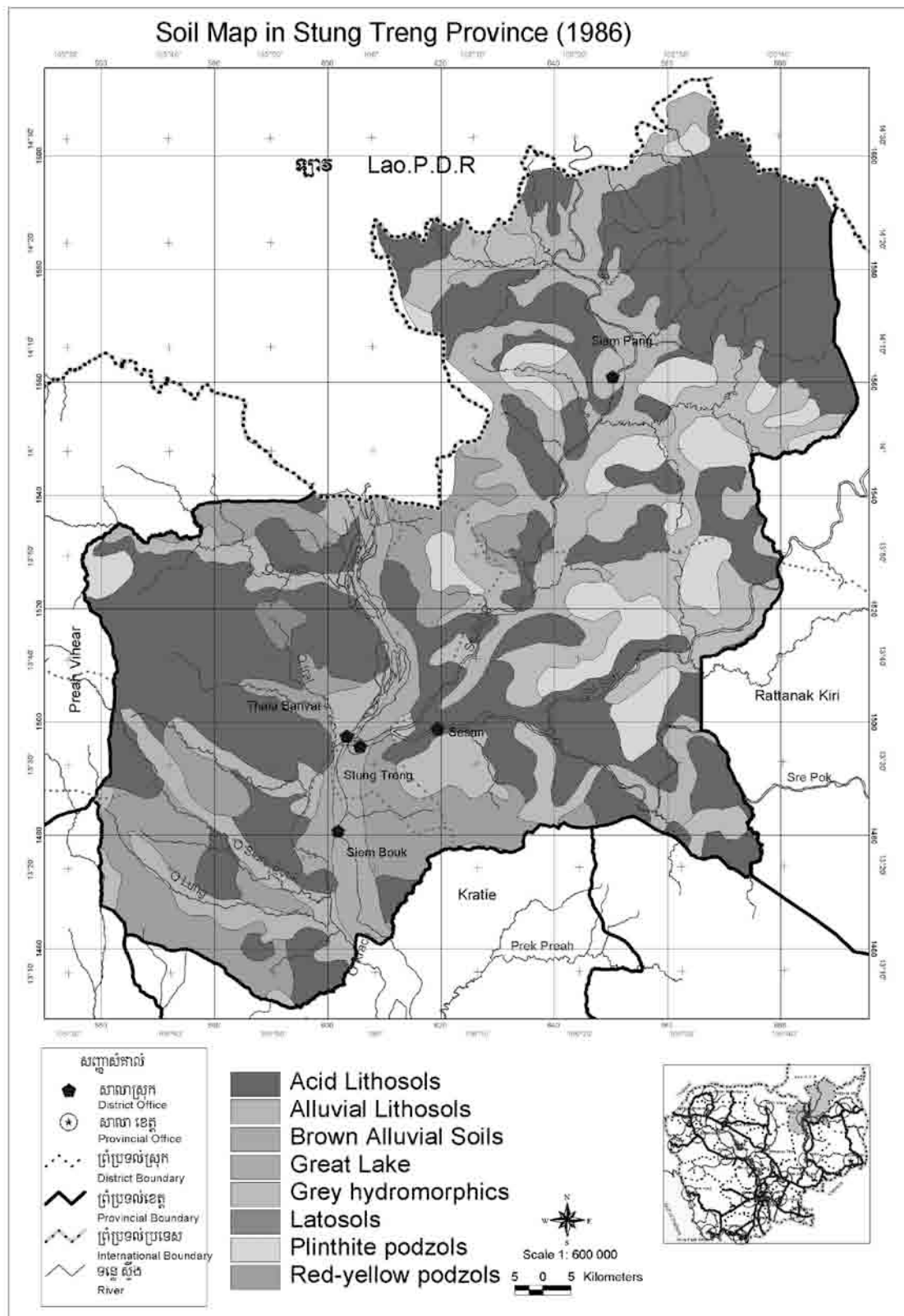
From about O'Svay to the Lao PDR border the dominant soils are red yellow podsols. These have a low pH (4.2-6.8) with poor structure and are easily destroyed. They are rapidly leached by the heavy rainfall and have poor nutrient status. They require chemical and organic fertilisers and cover crops to achieve reasonable crop growth.

The Ramsar site's soils are therefore a mix of good and poor. Better soils occur along the site's major tributaries and on the islands. Poorer soils cover much of the Ramsar site and limit agricultural potential. The soils of the Ramsar site are not particularly well studied: no information appears to be available to the farmers about how to get the best out of their soils.

Map 4.2 Geology Map in Stung Treng Province



Map 4.3 Soil Map in Stung Treng Province, 1996.



## Vegetation

The Ramsar site and adjacent terrestrial areas have a variety of distinctive vegetation types. These occur because of the differing ecological conditions created by the Mekong river channel, the seasonally flooded sandy/rocky islands of the river bed, and the northern and eastern plains through which the river flows. Much of this vegetation, in and away from the river, is minimally disturbed and provides attractive landscapes often with a wilderness appeal. This variety of vegetation is the basis for much of the animal diversity that occurs within and adjacent to the Ramsar site.

The Ramsar site and adjacent areas have the following distinct vegetation types (Rundell, 1999):

- forests on the seasonally flooded sandy and rocky islands on the Mekong's river bed;
- riverine or gallery forest along the Mekong's river banks and the larger islands;
- deciduous dipterocarp forests mostly outside but close to the Ramsar site;
- semi-evergreen forest mostly outside but close to the Ramsar site.

The forests on the seasonally flooded sandy/rocky islands of the Mekong's main channel give the Ramsar site much of its visual appeal. This type of forest is rare anywhere in the world and although it occurs in the Mekong as far south as Kratie it is best developed in the Ramsar site. The islands are flooded by the Mekong up to depths of about 10 metres or more in the wet season and completely exposed for about half the year. There is no soil development, only a coarse sand with interbedded rocks. Accordingly, drought and water shortage occur during periods of exposure.

These severe ecological conditions result in a very restricted and specialised vegetation, with few species able to survive. Dominant trees are species of *Barringtonia*, *Eugenia*, *Acacia*, *Ficus* and *Anogeissus rivularis*. Individual trees are fairly widely scattered and some show adaptations to drought (narrow leaves) and aerial root production up to about four meters above soil level to improve oxygen uptake as well as providing buttressing against the strong river currents. Many trees have a 'waterswept' appearance, with the upper branches bent and aerial roots growing on the downstream side of the tree. This type of forest has little or no understorey, ground flora, lianas, epiphytes etc. A species of *Morindopsis* may occur as a shrub layer. The same species may also occur as the only species in dense thickets on some sandbars/islands in the Mekong channel.

The vegetation of this habitat appears to be more or less intact. These flooded forests are believed to be important refuges and feeding grounds for fish and to serve as fish spawning sites during flood periods. Their continued existence is undoubtedly of major importance for the Ramsar site, both for their scientific and aesthetic values as well as their importance to fisheries.

The riverine or gallery forests occur in patches along both banks of the Ramsar site and on its larger islands. They vary greatly in structure and diversity (Rundell, 1999). At their best the trees grow to 30 m in height on alluvial soils subject to seasonal flooding and grade into semi-evergreen forests. Dominant tree species are typically semi-evergreen dipterocarps such as *Dipterocarpus alatus*, *D. dyeri* and *Hopea*



*odorata*. The floras of these forests have affinities with the wet evergreen forests of Cambodia's Cardamom and Elephant mountains (south west Cambodia), perhaps serving as corridors between these mountains and the Annamites to the east. The gallery forests have been subject to some clearance for settlements and agriculture. However, good areas remain and serve as spiritual sites on some of the Ramsar islands where they are presumably protected by local traditions (Vong, 2004).

The deciduous dipterocarp forests (also known as dry dipterocarp forests) are the dominant vegetation of Cambodia's northern and eastern plains. The Mekong River in the Ramsar region is the dividing line between these two areas. Such forests grow on skeletal or arid soils up to an altitude of about 600 m. They are dominated by a small number of dipterocarp species (*Shorea siamensis*, *S. obtusa*, *Dipterocarpus tuberculatus*, *D. obtusifolia*, *D. intricatus*) that lose their leaves in the dry season. Typically the structure is a single layer of trees 5-12 m high with scattered emergents to 20 m. The forests usually have an open woodland appearance with 50-70% canopy cover. The understorey is dominated by grasses amongst which *Imperata cylindrica* is usually common. There are few epiphytes.

A regular feature of deciduous dipterocarp forests is fire, and to some extent they may represent a fire climax vegetation. Such forests adjacent to the Ramsar site are regularly burnt both for clearing land for rice growing and hunting. Many birds and large mammals have adapted to living in this forest type but the latter in particular are now rare or locally extinct due to hunting.

Semi-evergreen forests also occur on the alluvial plains to the east and west of the Mekong River, particularly where soils are deeper and more fertile and perhaps wetter than those of the deciduous dipterocarp forests. When undisturbed, semi-evergreen forests may have dipterocarp emergents to 50 m in height above a dense canopy growing to about 30 m. Such forests have a complex structure with abundant lianas and epiphytes and a rich herbaceous ground flora. The occurrence and distribution of this forest type is not well known in Ramsar site but it does occur for example along the road to O'Svay and the Lao border. It may also occur on some of the larger Mekong islands.

Mixed deciduous forest is similar to semi-evergreen but with a higher proportion of deciduous species. Some authorities do not consider it to be a distinct vegetation type but merely a variant of semi-evergreen forest (Rundell, 1999). Its occurrence in the Ramsar site is therefore open to debate and not in any case well documented.

A further vegetation type common in the Ramsar site is dense stands of bamboo. This occurs where the original vegetation has been cleared. It is common along the river banks and throughout the villages.

The vegetation of the Ramsar site and adjacent areas is not well studied. Such investigations should be undertaken, particularly for the forests of the seasonally flooded sandy islands in the Mekong, on the larger Mekong islands and, more generally, within the boundaries of the Ramsar site communes. The vegetation of major tributaries such as O'Talash is little known, and that of the Dangrek mountains in its watershed is likely to be of particular interest.

## Mammals

To date approximately 100 species of terrestrial mammals have been recorded from Cambodia (Smith, 2001). Biogeographically, Cambodia lies entirely within the Indochinese sub-region and, for mammals, can be divided into four areas. Two of these are the lowland deciduous dipterocarp and mixed deciduous forest mosaic of Cambodia's northern and eastern plains. The former lie to the west of the Mekong, and the latter between the Mekong and the Viet Nam border. The Mekong River in Stung Treng province, of which the Ramsar site is an important section, therefore forms a zoogeographic boundary. The eastern and northern plains are important habitats for many globally threatened or little recorded mammal species, especially tree shrews, monkeys, dogs, cats, deer and cattle.

Vong (2004) provides the most comprehensive account to date of mammals recorded from or close to the Ramsar site. A total of 26 species were found to be presently or recently living in or close to it (Table 4.6). Small mammals (bats, rats, mice, shrews, otters, civets etc) were not included in the study. The total number of mammals in the Ramsar site will therefore be considerably higher than 26. Most of the Ramsar site mammals were reportedly hunted and together with habitat loss/degradation and loss of prey species this has contributed to the reported decline and local extinction of many species. Hunting appears to be carried out extensively and is done for both local consumption and sale for meat, trophy and medicinal purposes.

Smith (2001) lists the major threats to Cambodia's IUCN *Red List* species – those mammals whose continued existence is at risk. The threats for those species recorded by Vong (2004) are shown in Table 4.7. Thus under threat are 18 of the 26 species believed to occur or to have recently occurred in or near the Ramsar site. Additionally Smith (2001) lists a further five species (slow loris, jungle cat, leopard cat, leopard and sambar) whose conservation status is causing concern. The situation described by Vong (2004) shows that all of these 23 species are subject to hunting, and/or habitat loss/degradation in the Ramsar site. The local situation therefore mirrors the national picture.

Van Song (2003) reports that Cambodia is one of the two most important sources for the flourishing illegal wildlife markets of Ho Chi Minh City, northern Viet Nam and China. An important route for this trade is along the Cambodian national highway 78 through Ratanakiri province to Duc Co in Viet Nam. It is reasonable to assume that wildlife (mammals, birds, reptiles) illegally caught in and around the Ramsar site is smuggled out along this road.

A population of the Irrawaddy dolphin (*Orcaella brevirostris*) is located in the Chheu Teal deep pool between the northern end of the Ramsar site and the Lao PDR/Cambodia border (MDCP, 2004). This population is small (8 – 10 animals) and is the remnant of a previously larger group. The only other group of Irrawaddy dolphins in the whole of the Mekong is found north of Kratie and numbers about 70 animals. Considerable efforts are being made to conserve these dolphins (MDCP, 2004). The future of the small border population, at least, is uncertain. Threats come from the use of large mesh gill nets (over 25 cm) which entangle and drown the dolphins, unrestricted use of fast and noisy tourist boats, harassment of dolphins by tourist boats and possibly overfishing leading to scarcity of dolphin prey species. The Irrawaddy dolphin was previously much more abundant than now and occurred in the

Se San, Sre Pok and Sekong rivers. It is rarely seen there now, the latest being the finding of a dead specimen in January 2005 in the Sre Pok River in east Cambodia, in the province of Stung Treng-Ratakiri and Mondol Kiri.

Table 4.6 Reported Occurrence of Mammals in or Near the Ramsar Site

English Name	Scientific Name	Occurrence and Comments
Sunda pangolin	<i>Manis javanica</i>	Outside Ramsar area, rare and declining. Hunted
Long-tailed macaque	<i>Macaca fascicularis</i>	Common in Ramsar. Hunted occasionally
Pig-tailed macaque	<i>Macaca nemestrina</i>	Occurs on some Ramsar islands and O'Talash river
Asian wild dog (dhole)	<i>Cuon alpinus</i>	Occurs outside Ramsar. Rare
Asiatic jackal	<i>Canis aureus</i>	Believed to be rare around Ramsar
Sun bear	<i>Ursus malayanus</i>	Formerly in Ramsar, rare and declining outside. Hunted
Asiatic black bear	<i>Ursus thibetanus</i>	Formerly present. Now believed absent from Ramsar
Jungle cat	<i>Felis chaus</i>	In areas close to Ramsar, e.g. O'Talash. Rare. Hunted
Leopard	<i>Panthera pardus</i>	Occasionally in Ramsar
Tiger	<i>Panthers tigris</i>	Reported from Preah Rumkel commune
Asian golden cat	<i>Catopuma temminkii</i>	Not recently recorded and believed absent from Ramsar
Leopard cat	<i>Prionailurus bengalensis</i>	Present in Ramsar site. Hunted
Fishing cat	<i>Prionailurus viverrinus</i>	Formerly common now believed only in O'Talash. Hunted
Clouded leopard	<i>Neofelis nebulosa</i>	Reportedly in O'Talash. Rare. Hunted
Southern serow	<i>Naemohedus sumatrensis</i>	Recorded at O'Savy in 1993. Hunted
Banteng	<i>Bos javanicus</i>	Rare in Ramsar. Hunted
Gaur	<i>Bos gaurus</i>	Believed to occur in forests outside Ramsar. Hunted
Wild water buffalo	<i>Bubalus arnee</i>	Absent
Sambar	<i>Cervus unicolor</i>	Absent from Ramsar but occurs in nearby forests. Hunted
Eld's deer	<i>Cervus eldii</i>	Absent from and near Ramsar
Indian muntjac	<i>Muntiacus muntjac</i>	Ramsar islands and O'Talash
East Asian porcupine	<i>Hystrix brachyura</i>	Common. Hunted for medicinal purposes and food
Wild boar	<i>Sus scrofa</i>	Common in Ramsar. Hunted
Asian elephant	<i>Elephas maximus</i>	Occurs in or near Preah Rumkel
Slow loris	<i>Nycticebus coucang</i>	Occurs in or near Ramsar. In decline and hunted
Pygmy loris	<i>Nycticebus pygmaeus</i>	Absent

Source: adapted from Smith (2001) and Vong (2004)

Table 4.7 Major Threats to Cambodian IUCN *Red List* Mammal Species That Occur or Used to Occur in or Near the Ramsar Site

IUCN Status	Species	Targeted Poaching	General Hunting	Habitat Loss	Loss of Prey
Endangered	Banteng	x	x		
	Elephant	x	x		
	Tiger	x	x		x
	Wild water buffalo	x	x		
Vulnerable	Gaur (wild cattle)	x	x	x	
	Serow (wild cattle)		x		
	Dhole (wild dog)				x
	Pygmy loris (squirrel-like primate)	x	x		
	Pig-tailed macaque (monkey)	x	x		
	Clouded leopard	x	x	x	x
	Asiatic black bear	x	x	x	
	Asian golden cat		x		
Near-threatened	Fishing cat		x	x	
	Long-tailed macaque (monkey)		x		
	Sunda pangolin	x	x		
	Eld's deer	x	x		
Data deficient	Sun bear	x	x	x	
	Slow loris (squirrel like primate)	x	x		

Source: adapted from Smith (2001)

## Birds

To date, over 500 bird species have been recorded from Cambodia, but with further exploration of some presently little-studied areas the total is expected to rise to about 600 species (Smith, 2001). Cambodia is divided into six distinct geographical areas so far as its birds are concerned. Two of these, the Mekong river channel and the dry dipterocarp forests of the northern plains to the east and west of the Mekong, are well represented in the Ramsar site and its adjoining areas. In total, 39 species of Cambodian birds are designated by BirdLife International (2003) as being globally threatened or near-threatened. Six of these occur along the Mekong, showing the Ramsar site and its adjacent forests to be key bird conservation site.

BirdLife International (2003) has identified 40 important bird areas (IBAs) for Cambodia. One of these is the Mekong river channel from Kratie to the Lao PDR border, which includes the Ramsar site. This IBA contains seven globally threatened and near-threatened species: the critically-endangered white-rumped vulture (*Gyps bengalensis*) and white-shouldered ibis (*Pseudibis davisoni*) and the near-threatened black-bellied tern (*Sterna acuticauda*), grey-headed fish eagle (*Ichthyophaga ichthyaetus*), the red-headed vulture (*Sarcogyps calvus*), oriental darter (*Anhinga melanogaster*), and the Mekong endemic the Mekong wagtail (*Motacilla samveasnae*). Vong (2004) recorded all these species as occurring in the Ramsar site.

In the most comprehensive bird survey undertaken to date in the Ramsar site and adjacent areas, Vong (2004) recorded 231 species. This is nearly half the total currently known from Cambodia. These records include birds from both the Mekong river channel and the northern plains to the east and west of the river. Smith (2001) identified 39 key Cambodian bird species of which Vong (2004) recorded 17 from the Ramsar site area (Table 4.8). It is very clear therefore that the Ramsar site and adjacent forest areas are of major importance for the conservation of Cambodia's birds.

**Table 4.8 Key Cambodian Bird Species Found in or Near the Ramsar Site**

English Name	Scientific Name	Occurrence and Comments
Spot-billed pelican	<i>Pelecanus philippensis</i>	Reportedly occurs August to November. Globally threatened – vulnerable
Oriental darter	<i>Anhinga melanogaster</i>	Globally near-threatened
Painted stork	<i>Mycteria leucocephala</i>	Globally near-threatened
Lesser adjutant	<i>Leptoptilos javanicus</i>	Globally threatened – vulnerable
Greater adjutant	<i>Leptoptilos dubius</i>	Globally threatened – endangered
White-shouldered ibis	<i>Pseudibis davisoni</i>	Globally threatened – critical
White-winged duck	<i>Carina scutulata</i>	Globally threatened – endangered
Lesser fish-eagle	<i>Ichthyophaga humilis</i>	Globally near-threatened
Grey-headed fish-eagle	<i>Ichthyophaga ichthya</i>	Globally near-threatened
White-rumped vulture	<i>Gyps bengalensis</i>	Globally threatened – critical
Cinereous vulture	<i>Aegypius monachus</i>	Globally near-threatened
Red-headed vulture	<i>Sarcogyps calvus</i>	Globally near-threatened
White-rumped falcon	<i>Aquila clanga</i>	Globally near-threatened
Green peafowl	<i>Pavo muticus</i>	Globally threatened–vulnerable
Black-bellied tern	<i>Sterna acuticauda</i>	Globally near-threatened
Indian skimmer	<i>Rhyncops albicollis</i>	Record needs confirming
Great hornbill	<i>Buceros bicornis</i>	Globally near-threatened

Source: adapted from Smith (2001) and Vong (2004)

BirdLife International (2003), Smith (2001) and Vong (2004) all identify similar threats to the birds of Cambodia. The greatest of these is believed to be hunting, including collection of eggs and young birds in addition to the killing and capturing of mature birds. These activities are carried out for a variety of reasons – for food, international trade, traditional medicines, for prayer release at Buddhist temples and for pets and zoos. Habitat loss and degradation are also important. This is occurring through the drainage of wetlands for agriculture, felling of large nesting trees, logging operations and the manipulation of river flows by dam construction. The latter has led to major declines of sandbar nesting birds on the Se San River (Claassen, 2004).

The Sarus crane (*Grus antigone*) is reported by Danida (2000) to occur at O'Svay and Preah Rumkel communes as well as other communes near the Ramsar site. Vong (2004) did not record this species. This is a globally threatened (vulnerable) species which breeds in grasslands and open spaces in the dry dipterocarp forests of the northern and eastern plains of Cambodia. It is one of Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme's (MWBSP) four flagship species and

therefore its reported occurrence in and/or close to the Ramsar site is of major significance.

### Reptiles and Amphibians

The occurrence and distribution of Cambodia's reptiles and amphibians are less well known than other groups such as mammals and birds. Vong (2004) recorded 43 species of reptiles from in and around the Ramsar site whilst Smith (2001) described 41 species and Stuart *et al* (2001) recorded 18 species of turtle. Both these latter numbers include five species of marine turtles.

The 43 species found by Vong (2004) are listed in Table 4.9 (see pages 54-55). Of these 23 are considered by Smith (2001) to be of conservation importance. It is clear therefore that the Ramsar site, its tributaries and adjacent forests have a significant diversity of reptiles. Over half the species recorded to date have an international significance for conservation (IUCN status category or CITES grouping) or are otherwise so considered by Smith (2001).

From the evidence collected by Vong (2004) it is obvious that many of the reptile species are hunted. This is for sale in local markets or for home consumption, and for export to Laos and Viet Nam for meat, skins or medicine. Such local hunting and capture is the biggest threat to the continued local survival of many of these species. Many of the aquatic species are also reported by Vong (2004) to be incidentally drowned following entanglement in gill nets.

There is no available information on the occurrence of amphibians in and around the Ramsar site. Given the great diversity of wetlands and terrestrial habitats it is expected that there will be many species in the area. Frogs are caught in rice fields and streams for home consumption and local sale throughout the Ramsar site.

### Fish

Over 850 fish species have been recorded from the lower Mekong and Tonle Sap and can be divided into two groups – 'white fish' and 'black fish'. The white fish require higher levels of oxygen in the water and lower pH than the black fish. They migrate regularly between the Tonle Sap and the upper Mekong and its tributaries entering the Ramsar site when the river rises in the wet season. They thus form the basis for much of the Ramsar site's important fisheries. 'Black fish' are permanent residents of Tonle Sap (Ashwell, 1997).

In the most comprehensive survey to date of fishes in the Ramsar site, Vong (2004) recorded 167 species to be present. Undoubtedly many more occur. Of this total, 21 species were identified to be particularly important for Ramsar fishers and these are listed in Table 4.10 which also shows the species listed by Smith (2001) as being of conservation importance for Cambodia.

The seasonal migrations of fish between the Tonle Sap and the upper Mekong and its tributaries during the wet season provide important fishing for the Ramsar site's residents. To a significant extent their lives and livelihoods are built around this annual mass migration of many species. A great number of techniques and fishing equipment are used to capture them. Fishing is primarily for home consumption and sale in the local markets.

Table 4.9 Reptile Species Occurring in or Close to the Ramsar Site

English Name	Scientific Name	Comments
Siamese crocodile	<i>Crocodylus siamensis</i>	Recorded from Koh Keo island and O'Talash. Globally threatened –critical. CITES I. Hunted
Chinese softshell turtle	<i>Pelodiscus sinensis</i>	On sale in Veun Sean village (Ramsar)
Asian giant softshell turtle	<i>Pelochelys cantorii</i>	Globally threatened-endangered. Hunted
Asian leaf turtle	<i>Cyclemis</i> spp	Globally near-threatened. Hunted
Asiatic softshell turtle	<i>Amyda cartilaginea</i>	Globally threatened –vulnerable. Hunted
Yellow-headed temple turtle	<i>Hieremys annandalii</i>	Globally threatened-endangered. Hunted
Giant Asian pond turtle	<i>Heosemys grandis</i>	Globally threatened –vulnerable. Hunted
Asian box turtle	<i>Cuora amboinensis</i>	Globally threatened-threatened. Hunted
Malayan snail-eating turtle	<i>Malayemys subtrijuga</i>	Globally threatened-vulnerable. Hunted
Elongated tortoise	<i>Indotestudo elongata</i>	Globally threatened-endangered. Hunted
Bengal monitor	<i>Varanus bengalensis</i>	CITES I. Hunted
Water monitor	<i>Varanus salvator</i>	Reportedly common. CITES II. Hunted
Indo-Chinese water dragon	<i>Physignathus cocincinus</i>	Reported from Ramsar islands. Hunted
Garden fence lizard	<i>Calotes versicolor</i>	Very common in Ramsar
Spotted gliding lizard	<i>Draco maculatus</i>	Widespread in Ramsar
Common gliding lizard	<i>Draco volans</i>	Widespread in Ramsar
Common butterfly lizard	<i>Leiolepis belliana</i>	Hunted
Eastern butterfly lizard	<i>Leiolepis reevesii</i>	Hunted.
Northern forest crested lizard	<i>Calotes emma</i>	Found in Ramsar villages
Long-tailed lizard	<i>Takydromus sexlineatus</i>	Reportedly in Ramsar villages
Reticulated python	<i>Python reticulatus</i>	Reportedly common. CITES II
Burmese python	<i>Python molurus</i>	CITES II
King Cobra	<i>Opiophagus hannah</i>	CITES II. Hunted
Monocled cobra	<i>Naja kaouthia</i>	CITES II. Hunted
Indochinese spitting cobra	<i>Naja siamensis</i>	CITES II. Hunted
Banded krait	<i>Bungarus fasciatus</i>	Occurs in Ramsar
Viper	<i>Trimeresurus</i> sp	Occurs in Ramsar
Common mock	<i>Psammodynastes pulverulentus</i>	Common in dry forest near Ramsar
Rainbow watersnake	<i>Enhydris enhydris</i>	Common in Mekong streams. Hunted
Bocourt's watersnake	<i>Enhydris bocourti</i>	Mekong and tributary streams. Hunted
Puff-faced watersnake	<i>Homolopsis buccata</i>	Mekong tributary streams
Chequered keelback	<i>Xenochrophis piscator</i>	Occurs on Ramsar islands
Cave dwelling snake	<i>Elaphe taeniura ridleyi</i>	Reported to occur in Ramsar
Radiated rat snake	<i>Elaphe radiata</i>	Common in dry deciduous forest
Indochinese water dragon	<i>Physignathus cocincinus</i>	Ramsar islands, tributaries. Hunted
Indochinese rat snake	<i>Ptyas korros</i>	Common along O'Talash. Hunted
Striped kukri snake	<i>Oligodon taeniatus</i>	Common in Ramsar
Golden tree snake	<i>Chrysopelea ornata</i>	Occurs on Ramsar islands

Tokay	<i>Gecko gecko</i>	Widespread. Hunted for medicine
Spiny-tailed gecko	<i>Hemidactylus frenatus</i>	Common in village houses
Flat-tailed gecko	<i>Cosymbotus platyurus</i>	Common in Ramsar
Many-lined sun skink	<i>Mabuya multifasciata</i>	Occurs on Ramsar islands
Speckled forest skink	<i>Mabuya maculata</i>	Ramsar islands and river bank

Source: adapted from Smith (2001) and Vong (2004)

Table 4.10 Important Fish Species of the Ramsar Site

Khmer Name	Scientific Name	Comments and English Name
Trey Reach *	<i>Pangasianodon gigas</i>	Giant catfish. Declining
Trey pra thom	<i>Pangasianodon hypophthalmus</i>	Iridescent shark catfish. Declining
Trey koul raing	<i>Catlocarpio siamensis</i>	Giant barb. Declining
Trey tra sawk *	<i>Probarbus jullieni</i>	Seven-line barb. Declining
Trey tra sawk	<i>Probarbus labeamajor</i>	Declining
Trey pa se ee	<i>Mekongina erythrospila</i>	Mekong endemic. Delicacy
Trey kes chhom rau	<i>Micronema apogon</i>	Target species. Expensive
Trey kes prak	<i>Micronema bleekeri</i>	Target species. Expensive
Trey kya	<i>Hemibagrus wyckioides</i>	Target species. Expensive
Trey chhlang kmau	<i>Hemibagrus wycki</i>	Reportedly declining
Trey stuck	<i>Wallago leerii</i>	Reportedly declining
Trey khlar	<i>Coius undecemradiatus</i>	
Trey popruy	<i>Pangasius sanitwongsei</i>	
Trey kbork *	<i>Tenualosa thibaudeaui</i>	Laotian shad. Declining
Trey ses/pasanak	<i>Adaptosyax grypus</i>	Reportedly declining
Trey om boung	<i>Channa grandinosa</i>	Reportedly declining
Trey pro mak	<i>Boesemania microlepis</i>	Small scale croaker. Declining
Trey romeas	<i>Osphronemus exodon</i>	Reportedly declining
Trey trochiek damrey	<i>Osphronemus gouramy</i>	Reportedly declining
Trey krolong/proul	<i>Cirrhinus microlepis</i>	Reportedly declining
Trey kanchrouk *	<i>Botia sidthmunki</i>	Ladderback loach

\* Species of conservation importance

\* Target species are those which are selectively fished or targeted by fishers.

Source: adapted from Smith (2001) and Vong (2004).

Fishers report that catches are declining, a situation mirrored elsewhere in Cambodia. There are no detailed studies on the amounts of fish caught in and around the Ramsar site. Increased human populations, and therefore higher numbers of fishers could be a factor in reported fish declines. The *Trey Reach* (giant catfish, *Pangasianodon gigas*) does appear to be declining throughout the country and is now rarely caught in Cambodia's upper Mekong.

The migratory and resident fish of the Ramsar site breed throughout the river system. Of special importance, however, are the deep pools (*Anlung*) and the tributaries that enter the reserve, particularly O'Talash. Ramsar fishers report that there are 25



important deep pools in the Ramsar site, mostly in Thalaboriwat district (Vong, 2004), which are listed in Table 4.11.

**Table 4.11 Deep Pools of the Ramsar Site**

Name of Deep Pool	Locality and Comment
Chheu Teal	Koh Lagnor village. The dolphin pool
O'Talash	O'Talash village, Preah Rumkel commune
Veun Khao, Ta heng	O'Svay village/commune
Veun Sort, Sen Lay, Khy Khe	O'Run village, O'Svay commune
Kra La peas, Loung Lork, O'Ta Prey,	Veun Sean village. The first four are reportedly silted
O'Doung, Boung Krak, Veun Sean, Veun Pong	
Loung Kandor, Thmor Thom,	Koh Sneng village/commune
Ta Prom, Ta Thao, Veun Kham Kom Bor, Kan Theay	Chorm Thom village, Koh Sneng commune
Veun Dok, Veun San, Veun Ta Loun, Kantouy Koh Tang	Thmey village, Samakki commune

Source: adapted from Vong (2004)

These pools provide dry season refuges for resident fish as well as spawning and nursery areas for resident and migratory spawning fish. It is important for fish conservation that these pools are protected from overfishing and that good water quality is maintained. This first priority can be realised through locally derived and enforced conservation measures and management procedures. The latter is dependent on ensuring that major river developments both upstream and within the Ramsar site catchment (e.g. dams, irrigation, channel blasting etc) do not cause major changes to river flows and water quality.

The major threats to fish stocks and fisheries in the Ramsar site listed by Vong (2004) include:

- illegal and destructive fishing practices in the deep pools such as explosives, poisoning, and electro-fishing;
- the use of nets to surround and catch fish aggregated in the deep pools in the dry season;
- the use of gill nets with mesh size in excess of 20 cm. Larger fish such as *Trey Koul Raing* (giant barb, *Catlocarpio siamensis*), *Trey Tra Sawk* (seven-line barb, *Probarbus jullieni* and *P. labeamajor*), and *Trey Pro Mak* (small scale croaker, *Boesimania microlepis*) are particularly threatened by this method;
- the practice of putting nets and traps across the mouths and channels of tributary streams and creeks, in turn, catching all fish and wasting young fish.

The fish of the Ramsar site and its tributary creeks and streams are extremely diverse. They are of great biological interest. At the same time they are the basis for subsistence fishing and income generation for virtually all the 13,000 residents. Anecdotal evidence indicates that many species are declining and whilst at least some contributory causes can be listed, the scale and significance of such declines is not well known. Ramsar site fishers are keen to manage their fish stocks to safeguard future catches, but to date community fisheries' activities are not believed to be sufficiently effective in ensuring this. The maintenance of healthy fish stocks is, however, of the highest significance for Ramsar site residents.

## Invertebrates

There is no information available on the invertebrates of the Ramsar site and adjacent areas. Snails, bivalves (clams), prawns and crabs are collected extensively throughout the area both for consumption and sale in local markets. These species should be identified and studies undertaken to determine their ecology and contribution to health and livelihoods.

In the Siphandone wetlands of southern Lao PDR the snail *Tricula aperta* occurs and acts as an intermediate host for the human parasite *Schistosoma mekongi*, the cause of schistosomiasis. This disease occurs also in the Mekong and its Cambodian tributaries.

## Summary

Information is available for much of the Ramsar site's important environmental features. Usually though, it is limited and not very detailed.

The climate of the area is dominated by the seasonal northeast and southwest monsoons. In particular, rainfall is highly seasonal with over 80% typically falling between May and October. This determines the seasonal patterns of rice growing and fisheries, the main subsistence and cash-generating activities of most Ramsar site's residents. It is the rainfall patterns upstream of the Ramsar site that determines the Mekong's strongly seasonal flows. The lack of hydrological data, combined with insufficient knowledge of the ecology of fish and other aquatic fauna and flooded forests, prevent an understanding of the river flows necessary to maintain these biological resources. This issue is likely to grow in importance as pressure increases on these resources due to population growth, higher demand on the Mekong's water for hydropower, irrigation, forestry and climate change. There is virtually no information on water quality in the Ramsar site. Whilst it is currently believed to be quite good, it could decline in future as river development and land-based industries increase. The water quality required to maintain healthy fish populations is not known.

There is little available information on the Ramsar site's geology and mineral resources. As economic development speeds up in the future there will be increasing interest in exploring and exploiting commercial deposits. Such developments will be potentially damaging for Mekong water quality in and/or below the Ramsar site. It is essential that water quality is maintained at a good standard throughout the Cambodian Mekong to maintain river conditions suitable for the migratory fish on which so many Ramsar site residents depend.

The vegetation of the Ramsar site is poorly described. The main interest is the flooded river bed forest, a near-unique ecosystem in the world. These seem to be little disturbed at the moment and should be a conservation priority. Similarly, riverbank (riverine or gallery) forests are of major importance for maintaining biodiversity, protecting against river bank erosion and for providing much of the site's attractive scenery. These too should be a conservation priority.

The fauna of the Ramsar site and its adjacent areas is undoubtedly of major ecological and biodiversity significance. That of the reserve itself (a 500 m strip of land on either side of the river) is too small to be, by itself, of any significance for most if not all the

terrestrial species. It may be important for semi-aquatic animals such as otters, which are dependent on a close association with water, but no information is available.

The Ramsar site and adjacent area has a high proportion of their known terrestrial species in endangered conservation categories. Thus, 18 of the 26 mammals are so threatened, 17 of its bird species and 23 of its 43 reptiles. A high proportion of these vertebrate species are hunted for both local consumption and international trade. Local residents report that many are declining and some have disappeared within recent years. Hunting is probably the greatest threat faced by these animals in the Ramsar site and Cambodia generally. Without a major reduction in hunting, due to strict law enforcement or a major change in attitudes to hunting, it is impossible to be optimistic about reversing the declining trends in so many species.

The Ramsar site contains many fish species – at least 167 are known and the true figure will be much higher. A large proportion of these are caught by local fishermen and are essential as daily food and for providing cash income from market sales. Many of these fish are migratory, moving upriver from Tonle Sap during the rainy season to breed in the Mekong and its tributary streams and creeks. There are about 40 of these tributaries entering the Ramsar site, the most important of which is O'Talash. Especially important for these breeding fish are their spawning and nursery sites in the tributaries, deep Mekong pools and the flooded forests. Protection and management of these sites is essential if these fish populations are to be maintained in the long term. Given that young fish raised in the Ramsar site migrate back to Tonle Sap and form an important fishery there, the reserve is an important national asset for maintaining fish stocks.

An indication of the Ramsar site's importance to the MWBP is provided by the fact that the site, and adjacent areas, are home to all the four 'flagship' species – the Mekong Giant Catfish, Irrawaddy dolphin, Sarus crane and the Siamese crocodile. Given that only the giant catfish occurs regularly (though rarely) in the Ramsar site, it is apparent that the reserve is not able by itself to support and maintain these species by itself. The Ramsar site should be seen rather as the core of a much larger area that is essential for the health of this larger area. In turn, the Ramsar site is dependent upon good environmental conditions in this wider area for its own well being. This wider area is comprised essentially of the tributary creeks and streams that enter the Ramsar site together with their watersheds.

Climate change is an important issue for predicting how the Ramsar site will change in future. Temperature and rainfall, along with river flows, are expected to alter significantly this century. Effects on biodiversity are difficult, if not impossible, to presently predict as they are also bound up with population growth and levels of water demand arising from hydropower, agricultural and industrial developments during the 21<sup>st</sup> century. It is likely, however, that the combination of all these factors will add considerably to the pressures that flora and fauna, including fisheries, currently face.

## Chapter 5: Development Trends

### Introduction

Recent development trends including regional cooperation are changing the way development decisions are made. Population growth and movements have created stresses on local resources including wetlands and biodiversity. The private sector takes an increasing interest in new opportunities for resource extraction. Dam construction for hydropower and irrigation is one of the highest priorities of the states in the region. New markets are opening up within the region and globally for resource-based products. Major developments are planned for Cambodia's northeastern provinces of Stung Treng and Ratanakiri. All decision-makers in the region, Cambodia and the provinces have to try to navigate development in a complicated interplay of macro-level forces of change, sector development patterns and conflicting and competing stakeholder interests.

It is against this background that development in the Ramsar site will proceed and by which it will be affected from projects occurring outside its boundaries.

### Main Development Strategies

#### Mekong River Commission

In the 1950s, the Mekong River Commission (MRC) was established to assess the river's economic potential in terms of hydropower, water diversion and irrigation, forestry, navigation, fisheries and tourism. This led to the formulation of an ambitious water plan in 1970, whose main component was the building of a cascade of dams to generate 23.3 GW of power and to store 136 billion cubic meters of water. This plan was later amended in 1987 (revised indicative plan) for development of the Mekong's land, water and natural resources. These phases failed through being too ambitious, expensive and largely ignoring the wishes of the countries that share the Mekong (Öjendal, 2000).

In 1995, the agreement for the sustainable development of the Mekong river basin was signed by the six Mekong countries and is the current basis for the operation of the Mekong River Commission (MRC). Only four countries (Cambodia, Thailand, Lao PDR and Viet Nam) belong to the MRC and are bound by its decisions and actions. China and Burma have yet to join and whilst they work with the MRC for some of its activities, they are not bound by its decisions.

Ahmed and Hirsh (2000) noted that the costs of the Mekong development agenda are felt at the local level, where the livelihoods and environmental impacts of infrastructure development are most apparent. The current challenge for sustainable development of the basin is to reconcile local interests, common to the majority of the basin's farmers and fishers, with the broader development vision. The prospect of large-scale development is predicted through the exploitation of the Mekong basin as a shared resource.

In this regard, the changing perspectives towards development also influence policies that affect the basin's natural resources. Economic development, combined with a

high rate of population growth and high dependency ratios, has led to an ever-growing set of demands on water, land, forests and fisheries of the basin.

Local common property is both directly and indirectly impacted by infrastructure development, the growth of commercial production, new property relations and many other changes affecting the region. The fact that water, fish, land and forest resources are common property leads to their appropriation and exploitation without due concern for their value in supporting the livelihoods of local people. The role of common property has often been neglected in the assessment of the benefits and costs of development schemes, and their resource value has been systematically underestimated (Hirsh, 2000).

The MRC agreement is based on the interests of the participating countries, while the 65 million farmers and fishers living in the Mekong river basin have certain common interests irrespective of nationality. Their livelihoods are strongly dependent on natural resources and ecological wealth created by the Mekong River. Strong linkages and interdependencies between private and common property resources have long been recognised as integral to their livelihood.

For instance, while most farmers in Cambodia do not have title to the land they work, their right to live and operate on that land is generally recognised. At the same time they also fish, hunt, collect, gather and harvest goods and services from the common land, water and forest.

To date, there have been no significant developments of the Mekong in the vicinity of the Stung Treng Ramsar site or its immediate watershed.

### **Development Triangle Master Plan**

In 2004, the development triangle master plan produced by Viet Nam showed that the border area of the three countries (Cambodia, Lao PDR and Viet Nam) has become a priority for development cooperation among the three countries. This plan came into reality during the second meeting<sup>8</sup> of the three prime ministers in Ho Chi Minh City, Viet Nam, on the 25<sup>th</sup> and 26<sup>th</sup> of January 2002. The triangle development covers the territory of seven provinces, namely Kon Tum, Gia Lai, and Dac Lak (Vietnam), Attapeu and Sekong (Lao PDR), and Ratanakiri and Stung Treng in Cambodia. The development triangle has a combined area of 85,648 km<sup>2</sup> with a total population of over 3.7 million people. The population density of the entire area is 44 inhabitants per square kilometre, but is unevenly distributed. In Stung Treng it is eight per square kilometre.

The provinces of the three countries are highland provinces situated in their adjoining border areas. They share many similarities in terms of natural, economic and social conditions. The development level of the provinces is generally low compared to the average level of each country. Unlike a number of other development triangles (territories) in the region, the development triangle in the former Indochina has no focus for development (like Singapore) and hence it has to find its own way to develop.

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<sup>8</sup> The first meeting was in Vientiane in 1999 in which all sides agreed that the consolidation and strengthening of solidarity, cooperation and mutual assistance among the three countries in the traditionally fraternal and friendly spirit is a significant factor for the stability and development of each country under the present circumstances.

According to the master plan the development triangle occupies a strategic position in each country in terms of politics, economics, society, security, national defense and natural environment. The whole is connected to the Vietnamese seaports by the economic corridors located along the axis of the national roads no.78 (of Cambodia), nos.18 and 16 (of Lao PDR) and nos.14, 19, 24 and 49 (of Viet Nam). At the same time, the area is connected to Phnom Penh and Vientiane by the axis of the national roads no. 7 (of Cambodia) and no. 13 (of Lao PDR), and to Ha Noi and Ho Chi Minh City by the national road no. 1A and the Ho Chi Minh route. These constitute one of the favourable conditions for the three countries to expand their exchanges and alignments with one another for the sake of socio-economic development.

### **Cambodia's Priority Interest**

In Cambodia, the development triangle master plan proposes many major projects for Stung Treng and Ratanakiri provinces. Whilst these are mainly located outside the Ramsar site area they have the potential to affect it. Such effects could arise because of development occurring in the watersheds of rivers that flow into the Ramsar site, e.g. O'Talash and those (Se San, Sekong, and Sre Pok) that flow into the Mekong below it. Any adverse changes to water quality in the Mekong below the Ramsar site could have serious effects on the Ramsar site itself, particularly on fish migrations up and down the river.

A major basic provision of the master plan is to upgrade all the main roads in the two provinces. This is seen as necessary to facilitate the proposed industrial and agricultural developments. Good links will therefore be provided with major Cambodian cities and the roads of Viet Nam and Lao PDR. At the same time it is proposed to develop more transport facilities on the Mekong, Sekong, Se San and Sre Pok. Such developments would inevitably involve blasting and riverbed excavations at a number of localities.

The most significant proposed development is for a series of hydropower dams to be built (five in total) on the Se San, Sre Pok, and Sekong rivers. These would inevitably involve massive changes in river flows with effects on fisheries, wildlife and agriculture and possibly involve also re-settlement of villages in the project areas. In addition, it is proposed to construct small and medium-sized dams on the tributaries of these major rivers, which are again likely to affect the livelihoods of people living on them.

The master plan envisages Cambodia becoming an exporter of energy to Viet Nam. In connection with these dam schemes the master plan also proposes the development of irrigation schemes would affect river flow and water quality throughout the whole river system. Based on such plans, the master plan envisages the development of large-scale agricultural activities (rice, other cash crops and livestock) throughout the two provinces which would become food exporters to the rest of Cambodia as well as Viet Nam. At the same time, fisheries would be developed through large increases in aquaculture in fish ponds, natural lakes and cages.

The master plan also proposes major increases in forestry. Thus it recommends increasing forest plantations to 1.6 million hectares by 2010. This would then support wood and paper industries as well as providing timber for export. Other proposed

industrial developments include mining, fertiliser factories, food processing plants and animal food production.

The development triangle master plan clearly has, when implemented, massive implications for Stung Treng and the Ramsar site. Unless very carefully carried out, major adverse changes will occur to river flows and water quality. Traditional ways of life will change as many job opportunities will arise. At the same time, many people are likely to be brought into Stung Treng province to both build and establish the projects and later to work in them. The whole socio-economy of the province is set to change in major ways.

Projects similar in type and scale are proposed for both Laos PDR and Viet Nam. The region is clearly entering a period of transition and the Ramsar site will be affected by it. Whilst opportunities for improved earning, training and job opportunities are to be welcomed, much effort must be put into ensuring that the changes to the natural environment will not be unacceptably high.

Additional development scenarios for the Stung Treng area are proposed by the Mekong River Commission (MRC) as a part of their Mekong basin development plans (CNMC, 2005a and 2005b). They overlap to some extent with those of the development triangle proposals. The Cambodia National Mekong Committee (CNMC) plans are grouped under several objectives including those to improve basic food security, increased agricultural production, sound natural resource and environmental management practices, tourism development and increased human resources development. The strategies and projects to realise these objectives include:

- development of irrigated agriculture to achieve food security and to supply domestic, regional and international markets;
- conservation of Mekong deep pools and dolphins through habitat protection, improved fishing practice and law enforcement;
- implementation of integrated watershed management to improve soil and water conservation, maintenance of biological resources, and water use planning;
- expansion of cultural and ecotourism to benefit local people;
- improvement of water supply, waste management and sanitation;
- development of small-scale hydropower schemes;
- improved navigability of the area's rivers;
- flood and drought control management;
- promotion of private sector involvement in rural development;
- capacity building and human resources development in both the private and government sectors;
- increased participation by local people through community-based natural resource management.

The plans proposed by CNMC (2005a, 2005b) are less ambitious than those of The Socialist Republic of Viet Nam (2004). However, they still include the possibility of large-scale hydropower development on the area's rivers. They take more account though of the environmental aspects of development planning.

## State Policy for Economic Growth

After the Paris Peace Accord of October 23<sup>rd</sup> 1991, Cambodia took a significant step towards turning country from a socialist state into a market economy and from a single to a multi-party political system (Peou, 2000). In an ambitious effort to boost economic development, the first socio-economic development plan, 1996-2000 (SEDP I), was implemented as part of this new economic orientation. The plan focused on improvement in the formal health and education systems as well as the establishment of a rural water supply and sanitation program (RGC, 1997).

The “Triangle Strategy” of the government, adopted after the July 1998 election, was designed to achieve this development vision. The first side of the triangle had the aim of restoring peace and stability and maintaining security for the nation and people. The second was integration into the region and normalisation of relationships with the international community. Based on this, Cambodia has gained its seat at the United Nations and became the 10<sup>th</sup> member of the Association of South East Asian Nations (ASEAN) and the process of joining the World Trade Organization (WTO) is well advanced. The third side of the triangle was the promotion of economic and social development through the implementation of an extensive reform programme. Significant progress has been made in the implementation of these reforms, and economic growth has been strong in the last two years despite the impacts of the 2000 floods.

Specific strategies were also developed to address the poverty and social problems faced by local communities living in northeastern Cambodia. Efforts were made to develop rural infrastructure facilities, and to promote the agricultural sector and off-farm employment in upland areas. In addition, development projects aimed to empower local people to participate in and benefit from access to natural resources such as land and forest, as well as health and education services, appropriate technology, and credit.

During this period, the promotion of international trade for national economic development has meant that northeastern Cambodia is considered by the government as an economic zone and a source of state revenue. This has led to an increasing demand for resources in the area including timber, land, minerals and fish. Due to an absence of effective regulations however, the forestry sector has remained open to a multiplicity of users including the military, local entrepreneurs, farmers, migrants from the lowland and foreign investors, giving rise to large-scale exploitation of natural resources.

Meanwhile, as the conversion of forestlands into plantations by private business interests escalated, the government development agencies have generally been unmoved by criticism of these projects. Various forms of government pressure have been placed on the local communities, who have suffered from degraded local natural resources, a more vulnerable status in terms of lack of legal title to land, and misunderstandings between local communities and the government development agencies over issues such as community rights and local practices. As a result, local community groups have gradually lost access not only to their land, but also their rights to local community resources.



These factors are a result of the government granting land and forest concessions to national and international entrepreneurs, and also expanding lowlander settlement in the northern provinces. In this situation, migrants and commercial entrepreneurs have often taken advantage of local communities by applying for land certificates through local and provincial authorities.

In the early 1990s, the state development plan started promoting agro-industry by expanding agricultural land for the growing of coffee, rubber, oil palm and other cash crops, in Ratanakiri particularly, and subsequently to Stung Treng. The intensive cropping system implemented to increase agricultural output exhausted much of the accessible arable land. This, in turn, exerted pressure on marginal lands and led to increased deforestation. The demand for agricultural land has meant that lowland, national and international investors have increasingly encroached upon local community areas generating conflicts with ethnic minority communities.

In 2002, the second socio-economic development plan 2001-2005 (SEDP II) was approved by the Royal Government of Cambodia (RGC) in order to direct the national economic growth and poverty reduction strategy. To implement this strategy, the government plays the role of facilitator and uses its power and resources to control the development process to achieve desired socio-economic outcomes (RGC, 2002).

The SEDP II vision is to have a socially cohesive, educationally advanced and culturally vibrant Cambodia without poverty, illiteracy and disease. Realising the vision will require adherence to the values of social justice, human welfare and empowerment and the formulation and implementation of policies to reduce poverty by promoting sustainable economic growth and better governance.

The interim poverty reduction strategy (IPRS) was developed in accordance with SEDP II to promote the development objectives, strategies and policies of the government. The strategies are: (1) to foster broad-based sustainable economic growth with equity, with the private sector playing the leading role; (2) to promote social and cultural development by improving the access of the poor to education, health, water and sanitation, power, credit, markets, information and appropriate technology; and (3) to promote sustainable management and use of natural resources and the environment: (4) to improve governance through effective implementation of the governance action plan (GAP).

In 2004, to achieve economic policy priorities, the RGC developed another development strategy known as the "Rectangular Strategy". Meanwhile, good governance is considered a core concept and includes: fighting corruption, legal and judicial reform, public administration reform, and armed forces reform and demobilisation.

The first aspect of the rectangular strategy is the enhancement of the agriculture sector, which includes improving productivity and diversification, land reform and mines clearance, fisheries reform and forestry reform. The second is the further rehabilitation and construction of physical infrastructure, which includes further construction of transport infrastructure, management of water resources and irrigation, development of the energy sector and electricity network, and development of information and communication technology. The third is private sector development and employment generation, which includes: strengthening the private sector and

attracting investment, creating jobs and ensuring improved work conditions, promoting small and medium businesses and ensuring social safety nets. The fourth aspect of the rectangular strategy is capacity building and human resource development, which includes: enhancing quality of education, improving health services, fostering gender equality and implementing population growth policies (RGC, 2004).

Following SEDP I and II, many state development programmes have been introduced in Stung Treng province. Decentralisation of state power has been developed to offer new opportunities for political representation and to facilitate direct participation of the poor in the local decision-making process, in particular to assist the coping strategies of the poor and to channel local government resources to their support and diversification. In this regard the first commune council elections were held in 2002.

Since then projects have been implemented by the state in the province. The Northeast Village Development Project (NVDP) is under the Ministry of Rural Development funded by the World Bank. The project costs US\$5.6 million and covers four provinces: Kompong Thom, Kompong Cham, Kratie and Stung Treng. In Stung Treng, the project ran from 2001 to 2003. It aimed to develop rural infrastructure in the province, in particular in Siem Bok and Se San districts. At the moment the project is inactive and awaiting further funding support from the World Bank.

In 2003, the Seila programme was introduced to Stung Treng. Its main focus is to reform the commune structure, and also to locally implement the policy guidelines of the Ministry of the Interior. The commune structure is considered as the local administrative unit to manage and control the local community, thereby shifting power from provincial development institutions to local administrative units. Commune councils encourage villagers to participate in development activities such as building rural infrastructure and food security. The councils have been involved in reorganising community social structures in order to control local people and resources in ways imposed by the state.

According to the progress report provided by Seila, Stung Treng has received US\$204,844 and the community fund of the provincial development committee 890,231,000 Riel. As for the investment fund of US\$62,000, the committee has entered into contracts with different provincial departments to implement their projects (Seila Task Force, 2004).

### **Civil Society Development Activities**

Recently NGOs have been playing an important role in developing rural communities along the Mekong River, though since the 1990s there are fewer working in the villages along the Mekong river in Stung Treng. However, there are some effective NGOs programmes in the Ramsar site. Their work had been varied, including projects in the education sector and community development.

Partners for Development (PFD) have been involved since 1994. Various schemes have been supported including construction of pumping wells, sanitation, village roads and bridges, village bank development, handicrafts and village development committees (VDC). Partners for Development (PFD) cooperates with the provincial departments of education, youth and sport, health, agriculture, forestry and fisheries and rural development. However, the programme finished in 2002. Even though it

could not support every need of local communities there had been improvements in most of the villages in the Ramsar site in terms of people participation, model home gardening, infrastructure development and other forms of community development. Since 2002 PFD has remained active in the province, mostly focusing on primary health care and primary education in collaboration with the departments of health and education.

Sithkormar (a programme with financial support from UNICEF) has taken over PFD's activities in the Ramsar site. It is one of three programmes dealing with home gardening, small credit and construction of wells. The programme is based in the Provincial Department of Rural Development (PDRD). Villagers have reported that they never received any credit from the programme, but received vegetable seeds and equipment for home gardening. The other two projects of UNICEF include those in health working with the provincial department of health, and in education working with the provincial department of education, youth and sport including non-formal education in primary schools.

In terms of natural resource management there are two main NGOs working in the Ramsar site in response to the crisis of access and anarchy in natural resources in the province in the 1990s. Community based natural resource management (CBNRM) has been strongly advocated by these NGOs. Since the early 1990s, access to common property resources such as fish, forests and land, have been a source of tension. In fisheries, tensions have arisen over the use of illegal fishing gears and other stock-damaging practices, struggles over assignment rights and resource entitlements, and the absence of efficient law enforcement with the consequent use of privatised enforcement and violence.



In 1998 to help overcome this crisis of access, Oxfam Community Aid Abroad (CAA) with cooperation from Stung Treng Fisheries Office set up the first community fishery in the province. At the present time, CAA and Stung Treng Department of Fisheries have established 34 community fisheries, four of them in the Ramsar site. The majority are in Siem Bok district (southern Stung Treng) and along the Se San River.

In 2000, the Culture and Environment Preservation Association (CEPA) established their office in the province. The first community fishery was set up in Koh Sneng commune, then in O'Svay. Presently CEPA has extended its activities to other communes in the Ramsar site: Samaki and Preah Rumkel and has now set up community fisheries organisations in 17 of the Ramsar site's 21 villages, working in association with the department of fisheries. At the present time the community fisheries organisations of CEPA and CAA are not fully effective in realising their objectives of preventing illegal fishing and safeguarding local fish resources. Further assistance is required for these to be met.

Community fisheries are run by an elected committee of five individuals. Committee members must not work for any political party or any other outside body with interests in fish resources. The overall duties of the committee are to prepare and disseminate information related to fisheries, take action against offenders who violate the village fishery community regulations (VFCR), contact concerned agencies and local authorities for technical assistance, and report monthly to the provincial fishery office through line institutions such as the commune council. Typical fishery regulations developed by the villagers and local NGOs can be summarised as follows:

- ban on using explosives;
- no use of electro-fishing and any kinds of poison;
- fishing nets cannot be used to block streams and creeks;
- no cutting of inundated forest;
- forbidden to catch fingerling fish and endangered fish species such as *Trey Reach* (giant catfish), *Trey Tra Sawk* (seven-line barb) and *Trey Koul Raing* (giant barb);
- cannot use large mesh gill nets (more than 18 cm) to catch endangered fish living in the deep pools;
- ban on pumping the creeks/streams.

Since the formation of community fisheries no (or little) destructive fishing is conducted by villagers in their own fishing grounds. Villagers from one local community fishery may, however, conduct illegal fish in a neighbouring communities fishing ground area. However, community fisheries alone cannot easily stop illegal fishing. Most of the illegal practices are reported in remote areas or in O'Talash in the deeper forest where few people can get access to the area (Try and Vannara, 2004).

Other activities help to reinforce resource conservation and wise use principles. In June 2001, World Environment Day was conducted for the second time in Koh Sneng in order to raise awareness of environmental issues. The first time was in 1998 when 100 trees were planted in the commune as a symbol of environmental awareness. The villagers admitted that it was the first time they had seen the provincial governor in their village. World Environment Day now has participation from the provincial governor and representatives from line departments of the provincial offices.

At the same time, a signboard was installed in the landing port of Koh Sneng to symbolise conservation of three endangered fish species: *Trey Reach* (giant-catfish), *Trey Tra Sawk* (seven-line barb), and *Trey Koul Raing* (giant barb). The signboard says *Please help to save and to protect these endangered fish living in the deep pools in the river*. Awareness raising on environment and conservation issues among the Ramsar site residents, authorities and NGOs is being increasingly undertaken.

With these partially successful outcomes in community based fisheries resource management in mind, people in O'Svay commune have initiated demands to create community forestry. In particular, they want to take back from the concession-managed zone their 7,400 ha of rice fields and forest, and the right to enter the area to collect NTFPs. Culture and Environment Preservation Association (CEPA) is helping other local people to advocate for community forestry in two Ramsar site communes: O'Svay (about 5,000 hectares) and Koh Sneng (about 7,400 hectares). The internal regulations for the community management proposed by CEPA are not much different from the fishery ones. The short-term objectives are to stop illegal practices, promote

sustainable use, equal sharing of resources among the community, and to demand access and right for the local community in managing their own resources.

Although community fisheries management has some successes, research also shows a number of problems or obstacles. The local people have only limited knowledge and this constrains their ability to follow community regulations and participate in forming the rules. The incidence of fishing violations remains high, with the continued use of destructive methods like electro-fishing. The other major obstacle was the lack of a sub-decree or law to allow people to create the community fisheries as well as other community-based natural resource management projects. Since there was no official written approval, policy on community fisheries was supported only by speeches from leaders such as the prime minister, deputy prime minister, and the minister of environment (Try and Vannara, 2004). The recently-passed community fisheries sub-decree (June, 2005) will rectify this difficulty.

Since the territory of fishery communities can be large and without clear boundaries, members really find it difficult to control the illegal conduct of outsiders. In addition, they do not have enough funds to buy petrol for patrol boats. Cooperation between technical institutes and the community is still limited.

Besides the difficulty of enforcing community standards within their boundaries, outside activities cross boundaries and disrupt the environment. The use of speedboats traveling back and forth from Veun Kham in Lao PDR to Stung Treng, carrying tourists, local traders and commodities, has risen rapidly in recent years. These speedboats create much loud noise driving fish away from their natural habitats to other places. Their noise pollution can be heard at distances of 15 km, disturbing local residents while rendering wildlife panic-stricken as well.

In brief, conservation and natural resource management in the Ramsar site is well developed compared with other parts of the province. All the development intervention projects imposed by the government, private sectors and NGOs have been felt by Ramsar site residents. Some progress has been made in improving local livelihood conditions and raising local awareness of national laws and local rights in natural resource conservation.

Community development NGOs have been appreciated by most of the local communities. Not all are happy though and some villagers summarise their opinions as follows: (1) they are not fully responsive to their needs, (2) they have left some unresolved problems surrounding conflicts between local people, local elites, and companies, (3) the rights of local communities over control of land, forest, fish and other resources are not fully recognised (open access), (4) the rights of local communities (including the ethnic minority) to receive social services such as health care and education are still limited.

### **Wetlands and Water Policies**

The management of wetlands in Cambodia is the shared responsibility of a number of government agencies (World Bank, 2003). No single one has overall control. In terms of conservation and management of wetlands biodiversity, both the Ministry of Environment (MoE) and the Ministry of Agriculture, Forestry and Fisheries (MAFF) are involved. The MoE is responsible for managing protected areas and for seeing to Cambodia's commitments under the Ramsar Convention and the Convention on

Biological Diversity. The MAFF is responsible for the obligations under the Convention on Trade in Endangered Species (CITES). The Department of Fisheries has the responsibility for all fisheries legislation and its enforcement including fishing concessions, fish sanctuaries, inundated forests, swamps and other fish producing areas e.g. lakes and ponds (Torrell *et al*, 2004).

This fragmentation of responsibilities leads to inefficiencies concerning the management of wetlands. At the present time the Cambodia National Mekong Committee (CNMC) is preparing a national wetlands action plan. Hopefully this will rationalise the development and management of Cambodia's wetlands and provide impetus for such efforts.

At present, through a variety of national laws and obligations under national conventions Cambodia has many relevant policies for its wetlands. The Law on Environmental Protection and Natural Resource Management (1996) seeks to protect, manage and enhance the environment and promote sustainable economic development. The MoE is responsible for its implementation which includes requirements for environmental planning, pollution control and public participation. Requirements for environmental impact assessment (EIA) are further detailed under the sub-decree on EIA (1999). The Royal Decree on the Creation and Designation of Protected Areas forms the basis for Cambodia's protected area programme, which the MoE is responsible for implementing.

The Forestry Law (2002) is mainly concerned with regulating the issuance and implementation of forest logging concessions. As a requirement of such concessions logging companies are required to respect user rights of local communities. These include forest use for subsistence, non-commercial use and bartering of non-timber forest products (NTFPs) including common wildlife species. A particularly important aspect of forestry law is the community forest sub-decree. This establishes the structure and procedures by which local communities can manage, use and benefit from their local forest resources. Such local scale exploitation can be carried out in protected areas subject to approval from the MoE.

Fisheries legislation and implementation is a key issue in Cambodia. Of major importance to the Stung Treng Ramsar site is the community fisheries sub-decree. Following its passing in June 2005 the sub-decree provides the legal basis and guidelines by which local communities can manage their own fish resources. Those in Ramsar are not functioning too effectively at present. Assistance is required from government and NGOs to improve their effectiveness.

At present the responsibility for much of Cambodia's abundant water resources lies with the recently-created (1999) Ministry of Water Resources and Meteorology (MOWRAM). The ministry has widespread jurisdiction over the management and development of water resources including irrigation, flood control and hydropower. These are all key issues whose development is proposed in or near the Ramsar site. A draft law on water resources management is currently being considered by the national assembly and a draft national water resources policy is before the council of ministers.

## International Conventions

Cambodia is a signatory to several international conventions concerned with biodiversity and environmental matters. Thus in October 1999 Cambodia ratified the Convention on Wetlands of International Importance (the Ramsar Convention). The Stung Treng Ramsar site was the 999<sup>th</sup> Ramsar site to be declared in the world. This convention obliges Cambodia to take all reasonable steps to conserve and manage its wetlands in a sustainable way. The MWBP is an important component of fulfilling this obligation.

In 1995, Cambodia acceded to the Convention on Biological Diversity. This requires the country to conserve its biological biodiversity and to promote its sustainable use. As a part of this obligation Cambodia has prepared its biodiversity action plan (MoE, 2002). Key policies in the action plan are:

- maintaining biological diversity and productivity of ecological systems by protecting the various species of living organisms in their natural and manmade environments, especially forests, freshwater and marine ecosystems, wetlands and agricultural land;
- managing human activities and utilising biological resources in a way that preserves for the long term the basic natural resources, which are necessary for human livelihood and development;
- ensuring that the benefits coming from the sustainable use of biological resources contribute to poverty reduction and improved quality of life for all Cambodians.

These policies are very much in line with MWBP's objectives for the Stung Treng Ramsar site.

Cambodia is also a signatory to the Convention on International Trade in Endangered Species (CITES). Although signed in 1975, the convention was not implemented until 1999. CITES requires Cambodia to regulate trade in species of wildlife that are in danger of decline and extinction both nationally and globally. Trade in such species should be entirely prohibited or be allowed under strict control. Many species of mammals, birds and reptiles that occur in the Ramsar site are included in the CITES convention. Cambodia does not yet have the resources to fully implement its CITES obligations and illegal trade is carried out involving species from the Stung Treng Ramsar site.

Cambodia has a significant body of existing or planned national legislation and international treaty obligations to direct its efforts in the conservation and management of wetland protected areas and biodiversity. At the moment, however, the capacity to enforce and implement these provisions is weak. This applies to both national (ministry) level operations and the provincial line departments. The latter are often bypassed and not consulted in the environmental management issues of relevance to the province. Until capacity at both national and provincial levels is improved the effective management and development of wetlands will be delayed. It is a matter of some importance therefore that such improvements are undertaken as a priority.

## Summary

Development in Stung Treng is taking place in response to both national and international plans and proposals. The MRC was the first organisation to plan the

development of the Mekong's resources. The four member countries (Cambodia, Lao PDR, Thailand and Viet Nam) undertake a range of scientific and social studies to guide this development. At the present time the MRC is preparing basin development plans for the Mekong and its tributaries.

The Vietnamese government in association with Cambodia and Lao PDR has prepared an ambitious development plan for Stung Treng and Ratanakiri provinces. This envisages a massive redevelopment of the Sekong, Se San and Sre Pok valleys. Projects include hydropower, irrigation, logging, intensive agriculture, tourism, river and road transport infrastructure and agro-forestry based industries.

Cambodian state policies for national development (SEDP I and II) also envisage such developments as well as increasing education, social justice, incomes, government capacity and good governance, and reform of fisheries and forestry management by both the private sector and local organisations through community management processes. There is a move to decentralisation of power and control over natural resources. The capacity of government and local people is low however to effectively manage resources at present and much assistance is required.

NGOs play an important part in the Ramsar site. So far as natural resource management is concerned both CEPA and CAA have been very active in developing community fishery and forestry projects.



## Chapter 6: Politics and Institutions

### Introduction

This chapter discusses the following aspects: the overview of governance, the role and capacity of state institutions and administration, the influence of institutions in resource management, public participation, and the key stakeholders such as government, NGOs and the private sector.

### Overview of Governance and Decentralisation

The issue of governance has become something of a catch-all to describe the ways in which the activities of a multitude of agencies, including government, NGOs and international organisations increasingly overlap. It describes a complex arrangement of competing authority claims (Dore, 2003).

In the wake of Cambodia's peace process in the early 1990s, the government initiated major development projects aimed at improving the quality of people's lives. To coordinate these projects the need to build up institutional capacity at provincial and lower levels was required. The Ministry of Rural Development (MRD) had the responsibility for the establishment of Provincial Rural development committees (PRDC), Commune Rural Development Committees (CRDC) and Village Development Committees (VDC). These have been established throughout the country with the aims of establishing decentralised planning, management, implementation and monitoring of projects and programmes on rural development (Sam Ang, 2002). During Second Five Year Socioeconomic Development Plan (SEDP II), the decentralisation of state power was developed to offer new opportunities for political representation namely to facilitate direct participation of the poor in the local decision-making process, enhancing their coping strategies and enabling them to channel local government resources to their support and diversification (RGC, 2002).

In 2002, to respond to this decentralisation programme, the first communal elections were held with participation by the Cambodian People's Party (CPP), FUNCINPEC, and the Sam Rainsy Party (SRP). The CPP gained most votes and subsequently took the positions of chief, first deputy and secretary general in the development committees, with the second deputy from FUNCINPEC and the third deputy from the SRP. In effect, the CPP and FUNCINPEC are in alliance whilst the SRP is in opposition.

Because of the existing power relations, every decision related to resource management, for instance the leasing of fishing grounds, common land and forest land to the private sector, is made by the CPP and FUNCINPEC. The SRP tends to disagree with this approach and demands that such resources be controlled and managed by local people. As a result, the SRP has sometimes been considered a troublemaker in the commune.

The commune structure is considered as the local administrative unit to manage and control the local community, thus shifting power from development institutions (national and provincial government). The latter is an attempt to persuade villagers to participate in the development process through building rural infrastructures and increasing food security. However community committees have been involved, under

state direction, in reorganising village social structures in order to control local people and resources (see also Chapter 5).

This programme started in 2003 in Stung Treng province and now covers all districts. The committee of the Seila task force consists of representatives from seven provincial departments: women's affairs, water resources and meteorology, finance, interior, agriculture, forestry and fisheries, planning, and rural development. Its primary focus has been to promote an integrated local governance approach to development. The Seila programme has operated this local governance through a hierarchy of provincial, district, commune and village development committees. Commune and village-level development committees were formed through local elections facilitated by the Provincial Rural Development Committee (PRDC).

National economic development policies have often placed pressure on local people to distance themselves from their traditional ways of life (ADB, 2000). There may be little room left for the powerless or the poor to exercise freedom and access to resources they need. The distribution of resources is mainly managed by the powerful that are part of the military patronage system and local elites, ensuring that their friends and relatives are the most immediate target beneficiaries.

### **Role and Capacity of State Institutions and Administration**

The institutional capacity throughout the Royal Government of Cambodia (RGC), especially at the provincial, district and commune levels, is limited. This is due to several reasons including the loss of almost an entire generation of people during the late 1970s, a poorly qualified and paid public sector workforce, run-down infrastructure, and inadequate financial resources. Against this background, the structure of the state administration is outlined below.

The Cambodian state administration has a structure and working methods built on the Vietnamese system developed in the 1980s. It is designed to attain political control and maintain political stability. This system constitutes an important feature both when pursuing development and in trying to understand the role of the Cambodian state in development affairs. The formal organisation of the state administration follows a hierarchy of national (*Cheat*), provincial (*Khet*), district (*Srok*), commune (*Khum*), village (*Phum*), and group (*Krom*) organisations. Along this chain the Cambodian People's Party (CPP) has a strong influence (Öjendal, 2000).

The province is, for most Cambodians, the centre of administrative power. The district is the centre for rural administration, whilst the commune is the lowest bureaucratic level. The groups do not exist as a formal administrative unit. The village chief is the state's local representative. The village chief and his deputies are by far the most frequent and important contact point between state structures and ordinary Cambodians. This administrative hierarchy is fairly strictly adhered to in bureaucratic matters. However, a lot of 'business' now goes on outside, and parallel to, this structure which is less authoritarian than it used to be. Recently a number of development initiatives have been occurring outside this administrative and political structure.

#### **Provincial level**

Provincial level administration is, to a large extent, a reflection of the central level with

courts, line departments and so on. It is headed by a governor who is appointed by the central government. The strength of the governor's office varies and depends on the person in charge and on his local power base. Provincial governors are normally rather strong and often control their 'own' armed forces, or have close relations to those who do. Civil servants from the provincial administration rarely visit the villages.

### District level

The district level is the major level for local administration. The district offices do not have the resources to run line departments as the provinces do. Rather, responsibilities are divided along personal lines. In reality, high priority has been given to security aspects in the rural areas since the 1980s and development efforts have been of lower priority.

### Commune office

The commune office is next in this bureaucratic hierarchy. This level is formally involved quite a lot in the day-to-day affairs of the villages. It is responsible for minor scale projects such as village roads and bridges. The commune chief mediates inter-village and intra-village conflicts. The commune offices are officially responsible for the collection of village statistics, for maintaining local security via the local militia, and preparing community development plans and priorities.

### Village level



In the village, the chief is the only person employed by the state. Financial resources and technical capacity for investment and extension services are extremely limited. It is not usual for local government to work directly with the villagers, although the village chief has much day-to-day contact with the villagers.

In terms of natural resources management since decentralisation, some power has been given to commune councils. Thus some natural resources and domestic items are now taxed at the village level. These include

the cutting of timber, the selling of buffaloes, locally made wine, rice mills and motorboats. In the Ramsar site, such payments are required. In some communes, for example Koh Sneng and O'Svay, villagers pay a tax of 30,000 Riel per cubic metre of harvested timber to the commune council. The commune elite, however, want the exclusive right for one group or family to cut timber for sale to villagers who need to buy it – in effect, privatising the resource (Try, 2004).

In Koh Sneng, parts of the fishing grounds were leased only by the provincial authorities for seine net operations. Following the formation of the commune council however, their permission is now also required. This means additional payments for the seine net operators. Accordingly, seine net fishers now believe that they have exclusive rights to fish in the areas assigned by the local elites. They, therefore, exclude all other fishers from their fishing grounds.

This process has created more conflict between the local fishers who have no rights and the seine net fishers and land concession owners who receive exclusive rights on the natural resources. This experience shows that the decentralisation of authority is not accompanied by adequate funding, training, or capacity building among the officials charged with implementing policies. The policies may either fail to be implemented or be implemented differently at the local level than intended by the policymakers.

### Public Participation

The term 'participation' has been defined and used in different ways by various researchers, planners and administrators. The nature of participation in the development process gives rise to much controversy regarding the definition since there is not a single universally accepted one. Participation of the rural poor through their own local organisations benefits not only them, but also the government administration. This dual benefit facilitates rural development for several reasons (Vannaren, 2002) explained below.

Vannaren (2002) has proposed three aspects of participation in relation to rural development: *what*, *who* and *how*.

- *what* refers to the kinds of participation e.g. survey, voting, committees;
- *who* especially describes the participants such as local residents, local leaders, government personnel and foreign personnel;
- *how* is concerned with the way in which participation takes place.

In the Ramsar site, the issues of public participation in conservation (fishery, forestry, birds, NTFPs etc) are complex. However, there are many ways for local schools, business people (including guest house owners and tour guides), Buddhist monks, village elders and other local people with concern for the future of the natural resources, to contribute through their combined efforts. Many villages are already taking measures to actively manage their natural resources, e.g. through community fisheries with help from Culture and Environment Preservation Association (CEPA) and Community Aid Abroad (CAA).

Based on his study of community fisheries, Vannaren (2002) argued that there are several factors that influence people's participation including social, economic and institutional factors. First, social factors include two major aspects: education and household size. The people who have poor education are less involved in project activities than those who have higher education. The study found that the larger households have a higher level of attendance at meetings, make more suggestions at meetings, contribute more labour and are more involved in project evaluation. Secondly, economic factors include landholding size, annual household income, and annual fish catch or benefit from wetland resources. Thirdly, institutional factors are those that create encouragement or obstacles for people's participation: policy and technical support, fishery training services, extension and incentives.

In brief, public participation in Stung Treng seems quite active. Many people who are involved in resource exploitation and management have attended meetings, workshops and consultations. Decision-making, however, is still in the hands of powerful elites. In this regard, organisation of community-based natural resource management is believed to present the best model for public participation. The basic

idea of establishing community fishery or forestry committees is to involve local communities and other stakeholders in the management of local resources on the assumption that this will ensure sustainability. However, villagers require considerable external support for this to be successful.

### Key Stakeholders

Stakeholders are those people (e.g. residents or tourists) or agencies (e.g. government, NGOs or private sector) who are involved in, or otherwise interested in what is occurring or will happen at the Ramsar site in the future. Those most involved and affected are the people who live there whilst the various agencies are interested in promoting and developing their own sectoral interests. Ideally, it is possible to meet the wishes of all key stakeholders but conflicts can occur if parties have non-compatible objectives. In such cases, consultations and compromises can be sought to reach agreement.

The 13,000 residents of the Ramsar site are the most important stakeholders. The great majority directly obtain their food and many other requirements from the available natural resources as well as selling them to obtain cash for material purchases. Incomes are low however, and the resources subject to natural variability as well as declines resulting from over-exploitation e.g. hunting. It is right and proper that Ramsar residents are fully involved in how the area is managed and developed. They are the ones who stand to lose, perhaps massively, if resources are damaged by inappropriate development such as hydropower, large scale irrigation and intensive agriculture.

The Ramsar site residents have various ways in which to express their preferences for development. These include commune development plans, community fishery and forestry committees, and consultation with government and NGO agencies working in the area. Such consultations should be carried out fully and frankly. The idea is that projects which are against the majority wish do not proceed. Total agreement of all residents on any major project is unlikely as, in all peoples, there are bound to be differences of opinion.

Both national and provincial government departments have legitimate interests in the Ramsar site. Both wish to promote their sectoral objectives and carry out national policies. Those most involved are environment (responsible for protected areas), fisheries (management of fish resources), and forestry (for species conservation and forest management) departments. The provincial departments based in Stung Treng are most closely involved with the Ramsar site. Their capacities are low however and all have insufficient trained human resources. Technical and financial resources to properly pursue the objectives laid down at their respective national levels are weak. Such weaknesses are a major constraint in developing and managing the Ramsar site. Other departments with minor interests at the moment (e.g. water resources and meteorology, industry, mines and energy, and tourism) are likely to become more important in the future as hydropower, irrigation, mining and tourism projects are implemented.

The two NGOs most closely involved with the Ramsar site are CEPA and CAA. Both have set up community fishery and forestry projects and carried out training in natural resources management. These projects are extremely important and must be continued into the future. Both are also involved in other aspects of livelihoods e.g.

agriculture. Other NGOs such as Partners for Development (PFD) carry out important tasks in health and sanitation, and construction of village infrastructure. Without the present significant input from NGOs the future prospects of Ramsar site villagers would be diminished.

The private sector currently has little involvement with the Ramsar site. Its main potential input is from the development of tourism, particularly hotel development and associated activities. The private sector should be encouraged to participate in the area's development but only in full consultation with residents, government and NGOs.

Other key stakeholders are international NGOs (e.g. IUCN, WCS, WWF) with interests in promoting sustainable use of the Ramsar site and maintenance or improvement of biodiversity. These agencies fund a variety of projects to meet their own requirements, but apart from IUCN have little direct involvement with the Ramsar site. IUCN's role is detailed in Chapter 1. The organisation will be very influential in what happens in the Ramsar site over the next five years at least. To be effective in the longer term, IUCN must work with and establish a whole range of functioning and capable organisations amongst residents and government agencies at the national and provincial levels.

In general terms, local government officials and the provincial governor may want to support community management of natural resources. Without a clear mandate or policy for this they are reluctant to act. Even how such measures would be interpreted at provincial, district, and local levels is open to debate. For this reason, it is important, where possible, to gain informal support for community-based processes to illustrate the strength of such an approach and to bring policy makers on side. This is why the work of CEPA and CAA in the Ramsar site is so important.

Again more generally, Bryant and Bailey (1997) pointed out that common property resource use e.g. fish and forests typically involve two things: well-defined resources and resource users, and strict controls on access and use so as to prevent over-exploitation. Thus 'open access' resource use is not permitted since strict controls are created by the community, and external people are usually excluded. As Bromley (1991) argued, common property represents private property for the group of co-owners (since all others are excluded from use and decision making). Second, resource use is based on local control and decision-making, enabling the adjustments of management practice in the light of altered social and environmental conditions. Third, resources are never fixed in space or time but fluctuate depending on environmental circumstances and social conflicts among stakeholders. Fourth, shared resources provide for flexible institutional means by which grassroots people can combine resource use with environmental conservation.

So long as resource conservation remains the top priority for all stakeholders from the village to national levels then the future for the Ramsar site is optimistic. Should other sectoral interests prevail and bring about resource degradation then the future for the Ramsar site residents is not bright. Although the Ramsar site residents are the most important stakeholders, they are not the most powerful and their interests may be ignored in the pursuit of other goals.

## Summary

Natural resources such as fish, forests, water, and grazing land, among others, are vulnerable when they are subject to 'open access' because often people will maximise profits by exploiting resources as much as they can. In contrast, if the state eventually takes complete control over resources, it may lead to a situation of over-exploitation and exclusion of people who traditionally used to have access to these resources. To solve this problem there is need for strong institutions to regulate the use, conservation and exploitation of resources in a sustainable way.

In Cambodia, the state institutional framework, administration and working methods were built on the Vietnamese system introduced in the 1980s. The formal organisation of the state administration follows a hierarchy of national, provincial, district, commune, village and group organisations. The Cambodian People's Party (CPP) has the most influence at all points of this chain.

In this regard, the introduction of local governance and decentralisation of authority has been confusing and sometimes leads to local conflict between the resource users. These factors have been caused by unequal power relations among key stakeholders, a legal system which is out of date and in which there are many laws and sub-decrees in draft stages. The responsibilities of institutions are not clearly defined, they are inadequately funded and poorly trained and there is low professional capacity amongst officials charged with implementing policy. In Stung Treng, many projects such as community based forestry, fisheries and wetland conservation have been ongoing. These projects have been welcomed by all stakeholders, but without a clear legal mandate or policy, local authorities are reluctant to support them fully.

## Chapter 7: Analysis

### Introduction

This chapter presents an analysis of the vulnerabilities, risks and threats to livelihoods and natural resources in the Ramsar site. To a large extent they are inter-connected since livelihoods depend so much on the availability of the area's natural biological and physical resources. Also considered are opportunities for future management and development of the area including the needs for additional research and the possibility for further MWBP intervention.

### Vulnerabilities

The Ramsar site provides virtually everything its residents require – fuel wood for cooking and heating, plants and wildlife for traditional medicines, timber for housing, furniture and construction, foods such as rice, meat, fruits and vegetables, water for washing and horticulture, sands and gravels for building, waterways for personal and commercial transport, and recreation. These resources provide the immediate day-to-day needs and many can also be sold to provide cash for clothes, household goods, fishing equipment, school fees boats etc. For the great majority of villagers the Ramsar site is the only source of livelihood available.

Incomes and living standards are low however. The great majority of the Ramsar site residents are poor and vulnerable to any reduction in the availability or quality of the natural resources. At the present time a number of issues make residents vulnerable to adverse changes.

The most important requirement is for rice. All rice production is from rain-fed fields and yields are amongst the lowest in Asia. At the present time there does not appear to be a general shortage of land, with rice being grown in both permanent paddy fields in or near the village and on temporary fields created by slash-and-burn of the forest. Rice yields are vulnerable to natural variations in climate, with both floods and droughts being responsible for partial or complete loss of crops. As most families can only farm enough land for their own annual needs, assuming no losses, any reduction is serious.

Thus, rice production is vulnerable to annual variations in climate and in the longer term to climate change. The latter is predicted to cause higher temperatures and changed rainfall patterns in the Ramsar site. Production is also vulnerable to loss of land and this has occurred through land being acquired by private companies (O'Svay) or road building and land speculation (Samaki). A significant loss of rice production will have a number of consequences for affected families – reduced food supply, available money spent on rice with other requirements not being affordable (e.g. school fees, medicines), extra pressure put on other resources e.g. fish, wildlife, NTFPs.

Livelihoods are vulnerable to reductions in fish catches. Anecdotal evidence from across the Ramsar site suggest these are declining and many reasons are given – usually to do with illegal fishing methods such as the use of explosives, poisons and electro-fishing and methods that catch and waste too many fish such as draining of ponds, streams and river pools, and netting the whole width of river channels. Apparent declines may also be caused by population increases – with more people



fishing, average family catches may decline. Reductions in fish catches, the most important source of protein, make people vulnerable to health and nutrition problems and reduced market sales and loss of cash for essential goods and services. As with rice losses, fish reductions can lead to increased pressure on other natural resources.

People's generally low level of education throughout the Ramsar site is another source of vulnerability. As changes in technology occur and new job opportunities arise many people are poorly placed to take advantage of them. They risk being left behind as the area develops with jobs going to outsiders from elsewhere in Cambodia. Should many people in fact leave their villages to take up new jobs (generally as unskilled and poorly paid workers) the loss of manpower in them will have serious consequences for those left behind as rice growing and fishing would be neglected. Thus traditional livelihoods and village social fabric are vulnerable to development changes as proposed for Stung Treng province.

Wildlife and other natural resources are vulnerable too. Hunting for mammals, birds and reptiles in particular is widespread and common in the Ramsar site. Available evidence suggests that some species have become locally extinct and many others are in decline through hunting. People hunt to get food to eat and to sell locally for meat or to dealers for cash. There is no reason to think that hunting will decrease in the foreseeable future. Rather it is more likely to increase as populations rise and other resources such as fish decline.

NTFPs and wetland aquatic products (e.g. plants, shellfish) may also be vulnerable to additional pressures and over-exploitation as populations increase, other natural resources decline and access to some forest lands is denied as they are acquired by the private sector. Any such declines will adversely affect the Ramsar site residents through their own decreased consumption (fruits, vegetables, medicines etc.) and sales e.g. of resin and honey.

Fish and other aquatic resources are extremely vulnerable to changes in Mekong water quantity and quality. Such changes can occur slowly through climate change and more rapidly from projects such as hydropower, irrigation and logging. Such developments are proposed throughout the Mekong and its tributaries. Significant reductions in water quantity and quality would have serious consequences for fish migrations, breeding, ecology and numbers. These changes would be disastrous for the Ramsar site residents and are largely outside their ability to influence or control.

The flooded forests of the Mekong are also vulnerable to changes in water flow from project development or climate change. At present the composition and structure of these near-unique forests is in equilibrium with present flow characteristics. If these change significantly the forests will change in character too. Should low flow periods be increased in duration, a likely scenario, then the forests would become more terrestrial in nature and their importance for fish ecology and breeding reduced. Additionally the attractive scenic values of these forests would decline, a loss to any future tourism development.

## **Risks and Threats**

Risks and threats to the Ramsar site come from a continuation of present trends, future development projects, low capacity of its residents, poor village infrastructure and low capacity of government departments.

Present trends include declining natural resources (especially wildlife) and fish catches. The continued decline of wildlife seems inevitable given its importance in local diets and for generating cash. As wildlife declines so its values to residents decrease who in turn become more vulnerable to dietary and money losses. Additionally the national value of the Ramsar site to biodiversity declines and the ability of Cambodia to meet its international obligations for wildlife protection is reduced. The tourism potential of the area would also be decreased.

Significant declines in fish populations would be disastrous for the Ramsar site. There is a very real risk of this from a continuation of over-exploitation by an increasing population, illegal fishing methods and changed hydrology of the Mekong and its tributaries from hydropower, irrigation and logging, and pollution from proposed industrial projects. Any such declines would not only be serious for the Ramsar site but for Cambodia as a whole for the Mekong around Stung Treng is an important fish breeding area for fish from Tonle Sap.

The flora of the Mekong, in particular the flooded forests, is also at risk from threats of a changed hydrological regime in the river. This would arise from the proposed major dam developments in the upper Mekong. These would alter the flows that presently enable the forests to thrive and inevitably result in changes to them. Their present values as fish breeding and rearing sites would decline with adverse impacts on both local residents and national fish stocks.

The present low education/high illiteracy levels of the Ramsar site residents are a threat to their ability to absorb new technologies and employment opportunities. The latter are perhaps more likely to go to people from elsewhere in Cambodia. The worst case scenario is one where declining fish and other natural resources lead to further impoverishment of the Ramsar site residents who are unable to adapt to new opportunities arising in the area. In turn this could lead to ever-increasing pressure on natural resources and migration to towns and cities in the search for jobs. Any significant loss of people from the villages would be deleterious to the quality of village life and threaten them as viable entities.

The poor infrastructure and low development levels in the villages is also a threat to the future of their residents. In particular the road system is poor, with most people relying on river transport. This makes the movement of goods and people slow and expensive. At times of low river levels such movements are impossible in some parts of the Ramsar site Mekong. Those villages on the Mekong's west bank and the islands suffer in particular from poor communications and rely entirely on the river. On the east bank, with the new road being built, the situation is better. None of the villages is electrified and none has a postal or telephone system. These disadvantages therefore limit the prospects for small business development. Due to the remoteness of many Ramsar site villages this poor infrastructure is unlikely to improve for many years.

As the Ramsar site residents are in the main following a subsistence livelihood they have very limited cash resources. There are no banking facilities in any of them and loans are only available from private money lenders at high rates. The ability of most therefore to consider taking loans to develop livelihoods is severely limited. This is a threat to the ability of most to take advantage of new opportunities that arise.

The present ability of government agencies to significantly assist villagers to improve their livelihoods is low and therefore a threat/risk to village development. Government departments such as environment, fisheries, forestry and agriculture have very limited technical and financial resources to assist villagers with training, expertise, capital, goods and materials. This situation is not likely to change in the near future, although national policies are for such support to be given. Nearly all village-level activities are undertaken by NGOs, a situation which to some extent removes pressure from the government to be similarly effective.

## Opportunities

The identification of vulnerabilities, risks and threats to the Ramsar site and its residents provides a way of looking for opportunities to remove or lessen them.



The main requirements are to increase rice yields and to improve the effectiveness of community fishery and forestry organisations. The former is primarily the responsibility of the department of agriculture whilst the latter can be done by combined efforts from NGOs and the departments of fisheries and agriculture. Improvements in these areas represent the greatest assistance that can be given to villagers. All require considerable inputs of time (years), expertise and technical and financial resources.

With the likely decline of natural resources the villagers will need to develop new livelihoods. They require assistance to do this – in the identification of new jobs/businesses, training and the provision of technical and financial resources. The latter can come from loans or grants from NGOs as well as the provision of access to loans from financial organisations. To assist with such new developments village infrastructure – transport, power supplies and communications – need to improve. The search for new opportunities should include those from developing wetlands products and adding value to existing products such as fruit and vegetables by bottling, preserving etc.

Any development of new livelihoods opportunities, particularly those involving agro-forestry, should be matched to the land use capability of the village/commune. This is not well known at present but can be assessed through land use and land capability studies. There may be the opportunity to provide pumped water supplies for agriculture either from the river or groundwater. At the moment the Ramsar site villages are surrounded by a virtually unlimited water supply that is hardly used at all for any commercial reason.

As fish stocks and/or fish catches decline in future the opportunity and need for aquaculture will arise. There is considerable expertise in Cambodia for this and with NGOs and government working together there is potential for this. Such developments would likely need pumped water supplies.

Another opportunity for developing livelihoods is through tourism. The Ramsar site has enormous potential for this which at the moment is little realised. Presently considerable attention is given to the dolphins on the Cambodia/Laos border, both for their conservation and tourism values. To some extent the latter are over-rated as sightings are generally infrequent and at distance. Other attractions of the river – its rapids, flooded forests, bird life, interesting villages, scenery, and beaches – are virtually ignored. It is these however, that provide the Ramsar site's real attractions and which need to be developed by the combined efforts of NGOs, government, the private sector and villagers themselves.

There is much need and opportunity for training at all levels. In particular villagers require assistance (technical and administrative) with developing new livelihoods and in running community fisheries and forestry projects. Without this it is unrealistic to think they will be adopted or succeed. Government also needs its technical abilities to be upgraded. Until and unless this is done, both for people on the ground and those more senior, the present low levels of government assistance will continue and village development will be hindered.

Government officials also need training, resources and motivation to enforce existing wildlife laws. Such officials include the police and customs/border forces. Training is actually only part of the problem. Many officials probably know the law full well but are not prepared to enforce it.

Opportunities for wildlife conservation exist but would be difficult to realise. Hunting is probably the main cause of wildlife decline and is widespread in the Ramsar site. Its root causes are poverty and a probable uncaring attitude to wildlife in general. These are very difficult to eradicate. It is likely that tourism development will be the best way to protect wildlife in the Ramsar site – through the realisation that wildlife has a commercial value quite apart from that of local or overseas markets.

### **Research Gaps**

Information on the hydrology, including water quality, of the Ramsar site Mekong and its major tributaries, is the main gap in scientific knowledge. With implementation of the proposed hydropower, irrigation, logging and industrial projects in the future major changes in river flows are inevitable. It is likely that these changes will take place without adequate knowledge of their impacts on fisheries, wildlife and people. Little is known of the ecological requirements of fish, flora and fauna and therefore impacts are difficult to predict. In general however all are adapted to the present flow regimes and water quality. Significant changes to them will cause major changes in the dependent fish and wildlife.

There is also little available information on the soils and land use capabilities of the Ramsar site. If and when available such information can be used to assist with identifying new livelihoods opportunities in the villages – by matching appropriate projects to the abilities of these natural resources.

The occurrence of some categories of wildlife is poorly known – all aquatic and terrestrial invertebrates and amphibians in particular. For even the relatively well-known groups (mammals, birds, reptiles and fish) the available information is little

more than species lists. Details of the ecological requirements of these species from the environment are virtually unknown.

Similarly, little is known of the occurrence and distribution of plant communities in the Ramsar site. Again, little more than species lists exist. It would be particularly useful to know more about the flora so that important and useful areas could be given protection and management should this be required.

Little is also known about the types and importance of NTFPs and wetland aquatic products collected in the Ramsar site. These are important sources of food, medicines and materials for both consumption and sale. It would be useful to know more about the types and values of such products and from where they are collected. If required, protection or management can then be given to important collection places.

### **MWBP Intervention**

Based on the preceding discussions there are a number of areas in which the MWBP can become involved. Some of them are already proposed in the five-year work programme and are further discussed here.

One such issue is ecotourism. The Ramsar site has enormous potential for this which at the moment is almost completely untapped. The site has multiple attractions, the principal ones being the spectacular flooded forests of its islands and sandbars, its prolific bird life, the numerous fish species and traditional fishing methods, the river itself with whirlpools, rapids, deep pools and beaches, mammal biodiversity, the vegetation, scenic values of the Mekong and principal tributaries such as O'Talash, and the dolphin pool just outside the reserve. In combination these provide a tremendous resource for activities such as boating, photography, bird watching, camping, swimming, picnicking, and hiking. In addition there are the many traditional villages which can be developed for overnight stays and demonstrating traditional activities.

To develop these resources requires skilled inputs from experts. An important requirement is information – the production of high quality leaflets, posters, booklets etc. about these attractions. Tourists that presently come to this part of Cambodia are unaware of the attractions and significance of the area, as they rush through on their way to Laos or Phnom Penh.

The livelihoods of the Ramsar site residents are vulnerable to many changes. The largest of these will originate from outside the reserve – major river developments in China and Laos, and the ambitious development plans proposed for Stung Treng and Ratanakiri provinces. There is a concern that these developments will take place without effective integrated planning and in a piecemeal fashion. Environmental impacts are not likely to receive proper attention. To help prevent environmentally damaging projects it is recommended that the MWBP establish a mechanism whereby their environmental impacts are assessed in advance. This process should require all proposed projects to be submitted to this body for review and advice. Only after receiving environmental clearance should projects be allowed to proceed. In many cases such approval would require the preparation of a high quality EIA. Presently the standard of EIAs in Cambodia is abysmal.

The dangers from these developments are adverse effects on the natural resource availability (e.g. forests and fisheries) to the Ramsar site (and other) residents and

degradation of water quality. The former would further increase the vulnerability of residents to poverty and loss of livelihoods whilst the latter would affect fish migrations to and from the Stung Treng Mekong.

Community fisheries and forestry are two key issues for Ramsar site residents. Both attempt to secure the resource base for villagers' health and incomes. Both are under pressure from developments on the river and land as well as population increase. Securing the rights to use these resources and efforts to maintain their sustainability are of prime importance. MWBP must do everything it can to secure these resources. Fishery and forestry projects are part of the five-year work programme. In effect this means a long-term commitment with its partner organisations to improve the effectiveness of such community activities. If fishery and forestry projects fail then much of what MWBP attempts to do in the demonstration site will fail too.

Another key issue is the boundary of the Ramsar site. At the present time it includes the river channel and its islands as well as a 500-metre strip of bank on either side. This is not a natural unit particularly because it excludes the 40 or so tributaries that enter the reserve and are an essential part of its viability. These streams and creeks are important fish breeding/rearing sites and contain much of the bird and mammal biodiversity associated with the reserve and areas of good forest. As presently constituted the Ramsar site has limited value in protecting and maintaining terrestrial biodiversity.

The planned biodiversity survey should provide the opportunity to examine any extension of the Ramsar site boundary. It is not realistic to think that all watersheds can be included (many thousands of square kilometres) as such a large area would be unmanageable. Any proposed extensions, be they core or buffer zones, must be relevant to maintaining biodiversity and livelihoods.

There is presently a lack of good hydrological data on which to base the proposed hydropower and irrigation projects for the Mekong and tributaries. All such developments have the potential to create adverse effects on river quality, flora and fauna, fisheries and livelihoods. The reports prepared to establish such projects should be critically reviewed, in particular for their hydrological studies and conclusions. This means they should be reviewed by impartial experts of high international reputation. If necessary the MWBP should itself ensure such scrutiny. This could be done as part of the wider review of the environmental assessment of the proposed developments.

At the present time little information is available about the collection and use of NTFPs and non-fish aquatic products in the Ramsar site and adjacent areas. Such products are an important part of livelihoods and incomes for residents. The MWBP should therefore undertake surveys to assess and identify these products, the areas they come from and any job or business opportunities they provide for diversification of livelihoods.

In the medium to long term Ramsar site residents need to develop less reliance on natural resources for livelihoods. The available evidence suggest that these have been in decline for sometime, and with future population increases combined with likely resource degradation this trend is likely to continue. In this context the alternative livelihoods projects of MWBP are of prime importance. The recommendations coming

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from such studies should be implemented with all necessary technical and financial resources coming from or arranged by MWBP.

There is some anecdotal evidence that some Ramsar site residents are beginning to suffer from "NGO fatigue". Many NGOs work in the province and the results from these efforts are not always apparent to people. To prevent such scepticism arising from MWBP's efforts it would undoubtedly be beneficial for results, instead of surveys and reports and workshops, to be seen quickly. In this context MWBP's proposed community development initiatives should have a high priority and not necessarily be restricted to projects directly concerned with the use of wetlands. Projects to ease the burdens of village life would likely be more appreciated.

### **Management of the Ramsar Site**

Central to the challenges facing the Ramsar site is the requirement for its effective management. This requires cooperation and integration of the efforts of the many government, private and NGO agencies, and the villagers themselves in implementing well planned developments. Such developments need to be within the overall framework of an agreed development and management plan for the Ramsar site. A priority for the future therefore is the formulation of such an agreed management plan.

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## Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme

The Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP) is a joint programme of the four riparian governments of the Lower Mekong Basin – Cambodia, Lao PDR, Thailand and Viet Nam – managed by the United Nations Development Programme (UNDP), the World Conservation Union (IUCN) and the Mekong River Commission (MRC), in collaboration with other key stakeholders. With funding from the Global Environment Facility (GEF), UNDP, the Royal Netherlands Government, MRCS, the Water and Nature Initiative (WANI) and other donors, the programme addresses the most critical issues for the conservation and sustainable use of natural resources in the Mekong wetlands. MWBP aims to strengthen the capacity of organisations and people to develop sustainable livelihoods and manage wetland biodiversity resources wisely. It is a five-year (2004-2009) intervention at three levels – regional, national and local – with demonstration wetland areas in each of the four countries: in the Songkhram river basin, Thailand; in Attapeu province in southern Lao PDR; in Stung Treng, Cambodia; and in the Plain of Reeds in the Mekong Delta, Viet Nam. The programme aims to:

- Improve coordination for wetland planning from regional to local levels
- Strengthen policy and economic environments for wetland conservation
- Generate and share information
- Train and build capacity for the wise use of wetlands
- Create alternative options for sustainable natural resource use and improve livelihoods

MWBP is a partnership between governments, aid agencies and NGOs, and provides a framework for complementary work for wetland conservation and sustainable livelihoods in the Lower Mekong Basin.

PROGRAMME MANAGEMENT UNIT  
PO Box 4340, 082/02 Fa Ngum Road, Vientiane, Lao PDR  
Phone: + 856 (0)21 240 904 Fax: + 856 (0)21 216 127  
Email: [info@mekongwetlands.org](mailto:info@mekongwetlands.org)  
Web: [www.mekongwetlands.org](http://www.mekongwetlands.org)

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