Baseline Report

Xe Champhone Wetland, Champhone and Xonbuly Districts, Savannakhet Province, Lao PDR

MEKONG WATER DIALOGUES

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MINISTRY FOR FOREIGN AFFAIRS OF FINLAND

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Abbreviations

ADB	Asian Development Bank
CCAI	Climate Change and Adaptation Initiative (MRC)
DAFO	District Agriculture and Forestry Office
DFRC	Division of Forest Resources Conservation
GAPE	Global Association for People and the Environment
GoL	Government of Lao PDR
Ha	Hectare
IUCN	International Union for Conservation of Nature
LARReC	Lao Aquatic Resources Research Center
Lao PDR	Lao People's Democratic Republic
LFA	Land and forest allocation
LNTA	Lao National Tourism Administration
MAF	Ministry of Agriculture and Forestry
MRC	Mekong River Commission
NAFRI	National Agriculture and Forestry Research Institute
NLMA	National Land Management Authority
NPA	National Protected Area
NTFPs	Non-timber forest products
PAFO	Provincial Agriculture & Forestry Office
PFA	Production Forest Area
PWREO	Provincial Water Resources and Environment Office
RIS	Ramsar Information Sheet
SUFORD	Sustainable Forestry for Rural Development
WREA	Water Resources and Environment Administration
WWF	Worldwide Fund for Nature

1. Overview

The Xe Champhone Wetlands is one of Lao PDR's first two sites to be recognised under the Ramsar Convention on Wetlands of International Significance. Xe Champhone Wetlands cover an area of 12,400 hectares (ha), with core areas amounting to 1,500 ha. The wetlands are a large plain containing perennial and seasonal rivers as well as scattered lakes, ponds, fresh water marshes, and rice paddy fields. These become interconnected during the wet season, and the wetlands complex extends into other wetlands areas, including Nong Luang, Kout Koung and Kout Koke. The northern part of Xe Champhone includes rice paddy fields and two large reservoirs, while the southern part contains extensive vegetation, including open woodland, mixed semi-evergreen forest, as well as shrubs and grasses.

The Xe Champhone Wetlands is one of a few areas in the Lao PDR where critically endangered Siamese crocodiles (*Crocodylus siamensis*) have been recorded. Also found in the area are a number of waterbirds species particularly Lesser whistling duck (*Dendrocygna javanica*), a few species of kingfisher, White-breasted waterhen (*Amaurornis phoenicurus*), darter sp., and egrets.

The wetlands also support the livelihoods of local people, who live in remote settlements in the surrounding area. Fish, livestock grazing and traditional rice cultivation take place in and around the wetlands.

A stakeholder analysis of management and other concerned actors is also provided in Annex 1.

2. Location

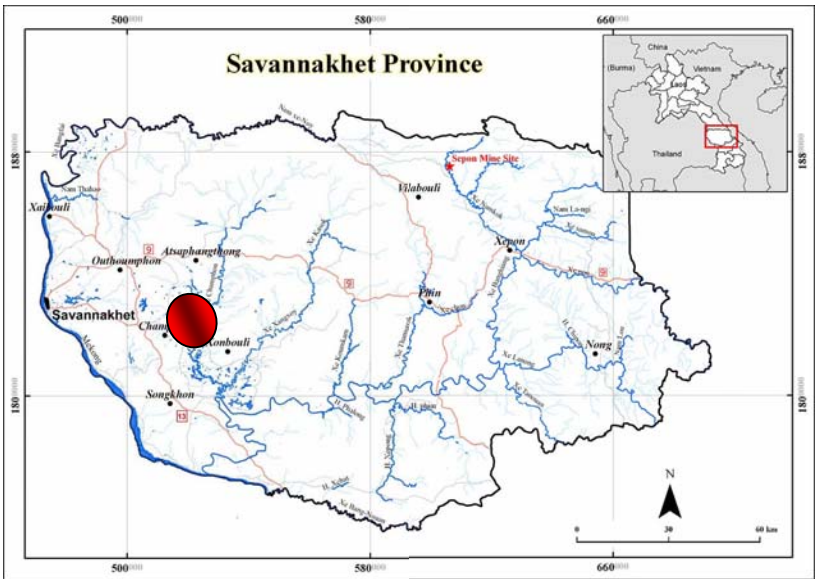
The Xe Champhone Wetlands are in the southern Lao PDR province of Savannakhet, in Champhone and Xonbuly Districts. The main northern portion of the wetlands is about 3 km south of Ban Kengkok in Champhone District, between the Route 9 and Route 11. The southern end of the site adjoins Xonbuly District (see Map 1 below). The wetlands are not located near any national protected areas (NPAs) (see map 2).

The coordinates for the center of site are 16°23'N and 105°13'E; the coordinates of the site's boundaries are as follows:

No.	Y	X	Boundary
1	16°30'13'' N	105°10'03'' E	North-west
2	16°30'12'' N	105°11'20'' E	North-east
3	16°28'00'' N	105°10'30'' E	West
4	16°21'30'' N	105°10'45'' E	West
5	16°18'38'' N	105°14'30'' E	Southernmost
6	16°20'20'' N	105°14'00'' E	South-east
7	16°26'00'' N	105°14'50'' E	East
8	16°25'55'' N	105°12'30'' E	East
9	16°30'12'' N	105°11'20'' E	East

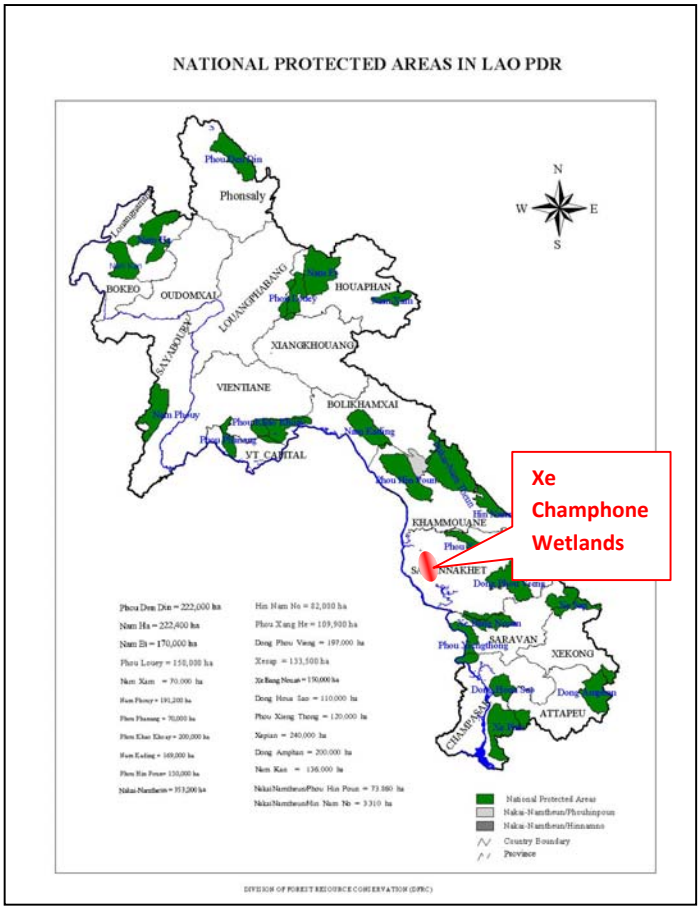
Source: WREA, 2011.

Map 1: Xe Champhone Wetlands, Savannakhet Province



Source: Cox & Phothitay, 2008, in WREA, 2011.

Map 2: Location of Xe Champhone Wetlands in relation to NPAs



Map 3 below shows the core and buffer zones of the Xe Champhone Wetlands Ramsar site.

Map 3. Boundary Map of Xe Champhone Ramsar Site

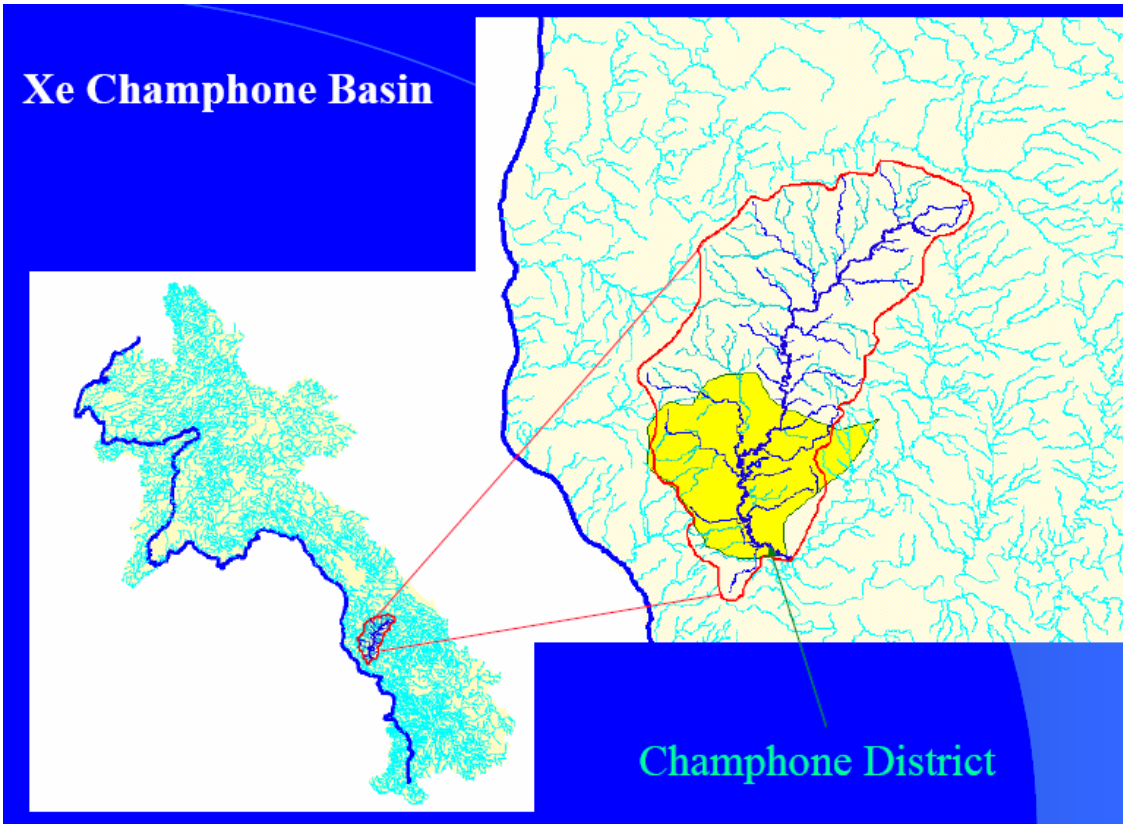
Source: WREA, 2011

3. Catchment area

At the broadest Asia regional scale, Xe Champhone is included in the Central Indochina - tropical lowland plain (MacKinnon and MacKinnon, 1986). The Xe Champhone Wetlands are fed by the Xe Champhone River and the Xe Xangxoy River, which are tributaries of the larger Xe Banghieng River. The Xe Champhone and Xe Xangxoy rivers flow from the Annamite Mountain Range to the east, as does the Xe Banghieng. The Xe Banghieng has a catchment area of around 2 million ha and covers the entire eastern part of Savannakhet Province (Wiszniewski and Lertsirivorakul, 2007). The Xe Banghieng River basin, one of the largest in Lao PDR, has been selected as a pilot site for the establishment of a river basin committee (RBC). Map 4 below shows the catchment area.

Forest found in the watershed is considered important for maintaining the ecology of the wetlands (WREA, 2011). No data is available on the soil in the catchment area, although for the Xe Banghieng Basin, one report states that red soil and sandstone prevail in almost the entire basin, although, in the north, east and the extreme eastern parts, Palaezoic and Precambrian exist (Anon).

Map 4: Xe Champhone catchment area



Source: Sengtianthr, 2007.

4. Landscape and Ecology

The Xe Champhone Wetlands are characterised by numerous meanders, oxbows and deep pools, including both open and closed water surfaces, as well as mats of dense floating vegetation. The Xe Champhone River is the main water body feeding the wetlands; the zigzaging river links the wetlands with various ponds and streams in the area. The lakes, pools and ponds in the area provide vital habitat for fish and other wildlife species, including Siamese crocodiles (*Crocodylus siamensis*) and water birds. The ecosystem of Xe Champhone is also important in supporting villagers' livelihoods, through fishing, livestock grazing and rice cultivation.

4.1 Water

As noted by WREA (2011), and in accordance with Claridge (1996), the Xe Champhone Wetlands incorporate many wetland types: perennial river channels, seasonal river channels, permanent freshwater marsh, seasonal freshwater marsh, freshwater swamp forest, lakes, ponds, permanent reservoirs, seasonal reservoirs, seasonal flooded woodlands, rain-fed rice paddy and irrigated rice paddy. The main water bodies of the Xe Champhone Wetlands Ramsar Site are of vital importance for wild animals, domestic animals and people living in the surrounding area. During the wet season, when the water levels are high, the entire area may be considered wetlands. During the dry season, although the landscape is very different, scattered ponds and marshes remain. In the dry season, only the Xe Champhone River and its oxbow lakes retain water and thus provide fishing opportunities and a source of water (Khoa et al, 2005). People in the Xe Champhone area also rely on drilled wells for water. Some shallow wetlands or ponds in paddy fields have poor water quality due to over-use by cattle.

4.2 Forest

Savannakhet Province is mainly drylands, as a major proportion of the land cover is dry dipterocarp forest and without clear watersheds/catchments. During the wet season, however, the province faces flood hazard because of its largely flat land located at low altitude and relatively sparse forest cover, especially along the Xe Champhone River, which suffers the most from flooding. Although, most forest in the province is dipterocarp forest, mixed semi-evergreen forest is also found. WREA (2011) states that forests in the area (mainly the mixed semi-evergreen forest, dipterocarp forest and mixed bamboo) are not healthy and their functions for soil and water improvement are poor. Most the Xe Champhone Wetlands are open, although some are closed with thick bamboo forest. Some closed wetlands in the area are part of what are considered sacred sites, such as Bung Sangha and Nong Maehang, as well as another three sites located outside the Ramsar site boundaries (Nong Luang, Kout Louang and Kout Koke) (Cox and Phothitay, 2008). These sacred sites contain deep water levels and form habitat for Siamese crocodiles.

4.3 Geology & soil

The geology of eastern Savannakhet Province, extending further north to Thakhek and central Lao PDR is considered similar to that of Northeast Thailand, as these areas all lie within the Khorat Plateau, a large saucer-shaped basin tilted to the east. The Plateau

consists of Mesozoic and Tertiary aged sedimentary rocks known as the Khorat Group (Wiszniewski and Lertsirivorakul, 2007). The site's Ramsar Information Sheet (RIS) notes that soil types have not been studied in the area, however, based on observation it is likely sandy-gray (WREA 2011). Wiszniewski and Lertsirivorakul (2007) write that saline soils have recently been identified in parts of Lao PDR, including in the Xe Champhone catchment, near Thakkek and in Vientiane Province, noting that the byevaporite beds and clastic sedimentary rocks of the Khorat Group are a source of salt found in groundwater and surface soils. This confirms Claridge's (1996) assessment that irrigation in the Khorat Plateau may have salinisation and alkalization impacts on wetlands in these areas.

4.4 Climate

The Xe Champhone Wetlands are located in the tropical region and partly in the monsoonal zone. There are two distinct seasons (dry and wet seasons) with the dry season running from November to early May and the wet season from May to October. Temperatures can range from a minimum low of 13^{o}C in January to a maximum high or around 39^{o}C in April. Average annual rainfall at the site is around 1,800 mm. Although there are limitations to the availability of country-specific data and projections on the potential impacts of climate change, average daily temperatures across Southeast Asia have already increased by 0.5 to 1.5°C between 1951 and 2000, and mean temperatures across the Mekong River Basin will most likely increase by another 0.79°C over the next 20 years (IPCC 2007 and Eastham 2008, cited in WWF 2009). The Mekong River Commission (MRC, 2009) notes that climate change is expected to modify temperatures, rainfall and wind in the Lower Mekong Basin, affecting natural ecosystems as well as agriculture and food production, of serious concern in countries that rely strongly on natural resources.

4.5 Ecosystem services

As laid out in the RIS (WREA, 2011) for the site, the Xe Champhone Wetlands provide a number of important ecosystem services, including:

- Storing and maintaining ground water, of particular importance during the dry season.
- Fish spawning grounds, plus habitats for other aquatic and bird species. Fish live in the deep pools and ponds of the wetlands during the dry season, and then travel to upstream tributaries to spawn during the wet season.
- Habitat for other wild animals, including a number of threatened species. The site supports the largest population of the critically endangered Siamese crocodiles in Lao PDR.
- Contribution to securing local livelihoods. The wetland resources at the site are important for the livelihood of some 20,000 people from more than 40 villages who live in and adjacent to the wetland, especially during dry season.

5. Biodiversity

The full extent of biodiversity in the Xe Champhone Wetlands is not known and requires further study. However, with its yearlong water bodies, it is clear that the site provides an important habitat for numerous species of plants and animals.

5.1 Flora

There has been little study so far of the flora of the Xe Champhone area. However, with reference to Claridge (1996), the major flora of the wetlands is dipterocarp forest, mixed semi-evergreen forest and open woodland, including *Lagerstroemia* sp., and scattered bamboo, and an under storey of shrubs and grasses (WREA, 2011). Bamboo is dominant in some areas and can impede access or disturb the wetlands. Tall weeds, such as Pheu (*Cyperus*), Choknoy (*Pista*) and *Chokbai Salvinid* are found in many lakes and ponds in the area. The wetlands are also largely encroached by agricultural development and some invasive species have been reported such as *Mimosa pigra*. While the northern part of the site comprises mainly rice paddies and two large reservoirs, the southern part contains extensive semi-natural vegetation, typically low open woodland (WREA, 2011).

5.2 Fauna

The Xe Champhone Wetlands hosts the largest population of the critically endangered Siamese crocodile (*Crocodylus siamensis)* in Lao PDR, along with a diversity of waterbirds and fish species.

The wetlands include a number of lakes and ponds, providing important habitat for fish during the dry season and for the Siamese crocodiles. An estimated 75 crocodiles live in the wetlands, and vital breeding areas for this species have been identified, including Kout Xelat, Kout Kean and Kout Markpeo (Cox and Phothitay 2008, cited in WREA 2011). Because the Xe Champhone River has many deep water ponds and marshes, the crocodiles can remain all year round despite dry conditions in other areas. A table of crocodile observations and estimates for Savannakhet Province is provided in Annex 2.

The wetlands also provide a feeding site for many waterbirds during the wet season. Purple herons (*Ardea purpurea*), a few species of kingfishers, starlings, White-breasted waterhens (*Amaurornis phoenicurus*), Common Moorhen *(Gallinula chloropus)*, and number of egrets are found. Turtles are another key species living in the wetlands (WREA, 2011). Table 1 shows a number of threatened species found.

Table 1: Threatened species found in the Xe Champhone Wetlands

Scientific name	Vernacular name	Common name	IUCN	CITES
Amyda cartilaginea	Pafa ong	Asiatic soft-shell turtle	Vulnerable	Appendix II
Crocodylus siamensis	-	Siamese crocodiles	Critically Endangered	Appendix I
Heosemys	Tao kwaii	Giant Asian	Vulnerable	Appendix II

grandis		Pond Turtle		
Indotestudo elongata	Tao phek	Elongated Tortoise	Endangered	-

Source: WREA, 2011

The Xe Champhone Wetlands is an important area for fish spawning. Fish live in the deep pools and ponds during the dry season, and then travel to upstream tributaries to spawn during the wet season. Fish also migrate to ponds and paddy fields for breeding during the wet season. As mentioned, the Xe Champhone River, as well as two other rivers connected to this site (Xe Xang and Xe Noy in the south-west), are the main water bodies which provide habitat for fish during this critical stage of their life. Fish species found in the wetlands include Padouk (*Clarias batrachus*) Pakho (*Channa striata,*) Patongnoy (*Notopterus notopterus*), Pado (*Channa sp*), Pakheng (*Cirrhinus sp*.) and Pakha yang (*Cirrhinus sp)*.

6. Economic, social and cultural values

6.1 Population

The wetland resources at the site are important for the livelihood of some 20,000 people from more than 40 villages who live in and adjacent to the wetland, especially during the dry season. Thirteen of these villages are located adjacent to the core wetland area, south of Kengkok. Six villages use the wetlands directly for supporting their livelihoods: Ban Tansoum, Ban Laonard, Ban Phonkham, Ban Kadan, Ban Donedeng and Ban Kengkokdong (Phothitay, 2011).

Khoa et al (2005) note that the local economy in their study area around the Xe Champhone floodplain was characterized by a relatively homogeneous population of households, clustered in largely independent villages engaged primarily in subsistence agricultural production. In terms of poverty incidence, the wetlands cover two districts, Champhone and Xonbuly, with the latter only classified as a poor district (Socio-Economic Atlas of the Lao PDR, 2005).

The main ethnic groups living in and around the Xe Champhone Wetlands are Phou Thai and Lao; Makhong and Katang people also live in the area.

6.2 Economic uses

Although a full evaluation of the economic value of the wetlands, in terms of direct and indirect benefits, has not yet been carried out, the wetlands resources are important in supporting the livelihoods of around 20,000 people in more than 40 villages. Fishing, agriculture and tourism are the main livelihood activities evident in and around the wetlands. The wetlands also play a role in recharging groundwater and providing flood

mitigation, although an estimate of the economic value of these services is as yet unavailable[1].

6.2.1 Agriculture

Savannakhet Province is relatively low-lying and flat and is well suited to rice and other crop cultivation. As in other parts of Lao PDR, the majority of people living in and around the Xe Champhone wetlands are subsistence farmers. Traditional wet rice cultivation and grazing of livestock are the main agricultural activities in the area, supplemented by fishing and gathering of non-timber forest and wetlands products. Agriculture is contributing to environmental degradation in the wetlands, as local farmers use chemical fertilizers for their paddies and also DDT for protecting their crops from insect damage (Claridge, 1996, in WREA 2011).

6.2.2 Fishing & other wetlands products

As mentioned above, the Xe Champhone Wetlands provide important fish habitat, particularly during the dry season, and fishing is a significant part of local livelihoods. Fish species found in the area include Padouk (*Clarias batrachus*), Patongnoy (*Notopterus notopterus*), Pado (*Channa sp*) and Pakha yang (*Cirrhinus sp),* among others.

In 2001, an impact assessment for the Houay Thouat irrigation project, a 1000 ha project in a small watershed adjacent to the Xe Champhone wetlands, provided a picture of the importance of fisheries in the area (Khoa et al, 2005). In the project area, fishing activity was concentrated in the Xe Champhone floodplain (below the Houay Thouat catchment) and in rice fields. Wet season fishing was mainly in rice paddies or nearby drainage channels or depressions. Dry season fishing was limited to perennial streams or ponds, and thus often involved greater traveling and was more practiced by men. Fishing was not otherwise gender-specific and was widely practiced by men, women and children in the area. The available fisheries were well suited for households who were also farmers, and fishing was a regular (often daily) activity, carried out in association with farm work. Some 90% of rural households in the area were regularly engaged in fishing, obtaining an average catch of 60 kg per household per year. This was second only to rice production in terms of food security and income generation, providing approximately 15% of household income. In addition, 90% of this fish production came from rain-fed rice fields. Reduction in rice field water storage with irrigation, increased use of agrochemicals and barriers to fish migration created by irrigation infrastructure could therefore threaten fisheries production (Khoa et al 2005).

6.2.3 Other uses

The Xe Champhone wetlands include two man-made reservoirs, aimed at helping to irrigate agriculture in the area. For example, the Houay Thouat irrigation project is a 1000 ha project, distributed over 15 villages, serving about 880 households (Khoa et al, 2005).

Apart from agriculture, fishing and tourism, another economic activity in the district area is mining. Refining of rock salt occurs near the district centre of Kengkok (Wiszniewski and Lertsirivorakul, 2007) and there is reportedly gypsum mining at Sibounheuang and

[1] Economic valuation of the Xe Champhone wetlands will be carried out for an upcoming project supported by MRC in the context of wetlands impacts and adaptation to climate change.

Soklom villages, in Champhone District. A small peat extraction project is ongoing at Nong Salat, Ban Nokkok.

6.3 Tourism and recreation

The Xe Champhone Wetlands and surrounding areas include a number of tourist attractions, and it is hoped that the new Ramsar designation will further attract visitors to the area. Don Deng, for example, is a sacred wetlands site nearby where turtles are protected. Covering 0.75 hectares, it has become a regional tourist attraction, where the visitors can spot soft-shell turtles (*Amyda cartilaginia*) or other freshwater turtles. There is currently no information available on the number of tourists per year, however. As in other parts of the country, Savannakhet Province has experienced a substantial increase in tourist numbers over the past decade, leaping from 98,962 visitors in 2002 to 474, 826 in 2008, then almost doubling in 2009 to 791,924 (LNTA, 2010).

According to a Provincial Tourism Office promotional material, the Xe Champhone area offers the following attractions:

- Soui Lake: a large irrigation lake, which is stair-shaped and resembles a small waterfall when the rainy season starts. There are many islands in the lake as well as lotus flowers, fish and migratory birds (such as white stork). In the dry season, local people catch fish and snails to offer visitors.
- Monkey Forest: a sacred forest with spirit houses, located in Ban Dong Muong and covering more than 3 ha. The forest hosts a population of macaques, congregating along the pathways, in the temple and in the spirit houses, and easily seen and fed by visitors.
- Hotay Pidok Library: part of the Nonglamchanh Temple, this is an old structure built about 200 years ago. It is an important repository of palm leaf books written in Burmese Pali, Khmer and ancient Lao alphabets. There are currently 4,000 books containing 361 different stories. The books are maintained in good condition by monks and novices, as well as local people.
- Taleo Old Temple: a temple mixing both Buddhist temple and Catholic church features, said to have been constructed in the early 20th century. The temple is decorated with colorful pictures of Buddha and the history of the temple. In 1969, the temple was bombed by American forces, and only the main building remains.
- Turtle Lake: a natural lake in Ban Don Deng. It is believed that ghosts in the spirit house protect the turtles in the lake. There are many turtles of different sizes and ages living in the lake and they can easily be seen. Local children can call turtles from the water for feeding.

6.4 Social and cultural values

The Xe Champhone Wetlands have significant cultural and spiritual value for local communities. A number of marshes in the area are considered sacred and are traditionally protected, such as Beung Sangha and Nong Dongmuang inside the Ramsar site, and several other areas located outside the boundaries, such as Kout Koke, Kout Louang, Kout Chiak and Don Deng (for turtles). Monks are also involved in the protection of these sites. These sacred wetland areas are more likely to be surrounded by forest. For example, Beung Sangha, located at Ban Ponmouang, has an area of around 30 ha, most of which is swamp forest dominated by a species of *Ficus* tree, some bamboo and tall weeds. The use of these wetlands is possible but should follow the local taboos and

rules. For example, villagers are only allowed to go fishing in certain areas between February and April. Nong Dongmuang is another sacred wetland, which is primary forest of about 60 ha, located on the edge of Ban Dongmuang. This area was established many generations ago under the protection of the Buddhist monastery which borders the wetland. The only use that is made of the wetland is as a source of water for the village. No trees may be cut in the wetland or the forest.

Kout Luang and Kout Xelat are important habitats of the Siamese crocodile in the area, and the area is well preserved by local customary regulations. Where there are reports of crocodiles, the areas are better protected from human disturbance because of fears and taboos concerning the animals. Other wetlands within the Xe Champhone area, which lack reports of crocodiles, have been highly disturbed and converted to agriculture. Therefore, the presence of crocodiles has contributed to the protection of some wetlands in the area.

Another) report (Anon.) notes a number of local taboos and customs regarding the wetlands, including:

- Local people believe that if they fish in certain parts of Nong Louang they will suffer from misfortune and may even die. They avoid these areas and if they have to pass through them by boat, they talk only quietly and politely.
- It is said that there is a village submerged under part of the lake and that stones and cooking pots can sometimes be seen at the bottom although they cannot be removed. In this area, the sediment at the bottom is believed to contain human bones.
- It is reported that gill nets and other fishing equipment set in these sacred areas may be moved or damaged by unknown forces.

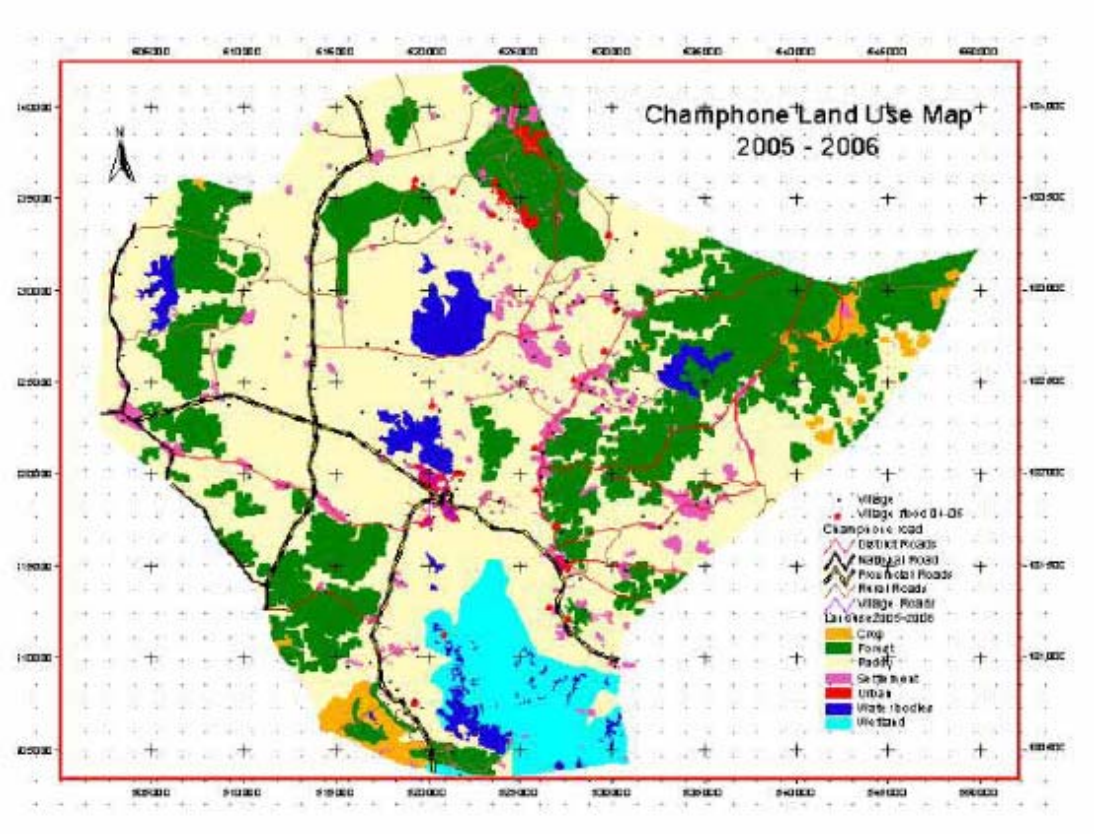
7. Land use, tenure and planning

Within the Xe Champhone Ramsar site boundaries, there are various types of land use and tenure (please see land use map provided below, for example). Land and forest allocation (LFA) has been carried out in the area, allocating land to each household (e.g. paddy land, house and garden plots) as well as common lands, owned by the state yet available for use by communities. Common land includes deep-water pools, forest areas and river channels, and as mentioned above, some wetland areas are considered to be sacred sites.

The primary land use in the area is rain-fed and irrigated rice cultivation, some cash crop cultivation, fishing and livestock production (cattle, water buffalo). The wetlands are a very important water source that remains for livestock during the dry season. Irrigation forms another important feature of land and water use around Xe Champhone. There are currently a number of storage reservoirs in and around the Ramsar site and more irrigation projects are planned. According to Wiszniewski and Lertsirivorakul (2007), more than 22,500 ha or 3.5% of the Xe Bang Hieng catchment land area is currently irrigated; along the Mekong River, a further 4,636 ha is irrigated. Wiszniewski and Lertsirivorakul (2007) also note that some small-scale mining and rock salt refining occurs around Kengkok.

Land allocation is working with little conflict in these areas and the villagers are keen to protect the land from encroachers. However, the communities currently lack the training, resources and recognition to effectively use their wetland products through the wise use approach. As such, the main threat to these areas comes from converting the wetland to other land use (PWREO & DOE, 2010).

Map 5: Land Use in Champhone District



Source: Sengtianthr, 2007.

8. Management and conservation of the site

Different types of formal and informal management arrangements have characterized how the Xe Champhone Wetlands have been managed, exploited and conserved. Government policies, villager practices and exploitation of resources in the wetlands are intermingled, including community regulations for managing living aquatic resources, traditional family based arrangements, and government enforced regulations. This section will describe the evolution of management of the wetlands, including exploitation and conservation.

8.1 Past and present management and research

Formal management efforts in the Xe Champhone Wetlands have been inconsistent. Customary practices to protect species such as turtles and crocodiles, in deep pools, have been a relatively long-standing practice and effective in conserving parts of the wetlands, based on religious and spiritual taboos. For example, these practices help protect sacred sites such as Bung Sangha and Nong Dongmuang. More formally, village regulations were created after the completion of land use planning, but these are not well implemented (WREA, 2011).

Siamese crocodile conservation has been an important focus of work in the Xe Champhone wetlands in recent years. Field surveys were conducted between 2003 and 2005; surveys for a preliminary status review in 2005 took place in 25 wetlands (lakes, ponds, rivers), in three provinces in southern Lao PDR and found that a severe decline in the crocodiles' range had occurred (MWBP, 2006). The crocodile population in the Xe Champhone area is now estimated to be about 75 animals and a number of areas were recorded as breeding sites: Kout Xelat, Mark Peo, Kout Kouang and Kout Koke (Cox and Phothitay, 2008). The Siamese Crocodile Conservation Project, implemented by the Wildlife Conservation Society (WCS) with funding support from MMG Ltd, began in 2009. The project's upcoming activities are described in greater detail below.

Flooding and irrigation have formed the other main feature of management and research work in the wetlands. As mentioned above, the site includes a number of irrigation projects. In addition, it was chosen as a case study for a flood risk assessment in 2007, carried out by several Lao government agencies, including STEA and the Department of Meteorology and Hydrology. The wetlands were also the subject o studies on the impacts of dewatering (Wiszniewski & Lertsirivorakul, 2007) and the impacts of irrigation on inland fisheries (Khoa et al, 2005).

The Xe Champhone Wetlands have also been selected as a pilot site for the MRC's Climate Change and Adaptation Initiative (CCAI). This initiative collaborates with local farmers to assess how they may be affected by changes to the climate in coming years and test out measures to adapt to these changes, particularly in relation to awareness raising and training for villagers and improving water supply (MRC, 12 January 2010). Initial activities have included field surveys to collect information for a preliminary risk assessment, community meetings, and hazard mapping (Tran and Thaicharoen, 2010). Small-scale irrigation works and testing of new rice varieties are also planned.

The Lao Aquatic Resources Research Center (LARReC) is also conducting research in the Xe Champhone area, involving GIS mapping and surveying along the Xe Champhone River.

The National Eld's Deer Sanctuary is found in Xonbuly District, although it does not overlap with the Xe Champhone Wetlands. Eld's Deer (*Cervus eldii)*, an endangered species, was discovered in Savannakhet Province in 2002; the sanctuary was established in 2005, and is managed in cooperation with local communities.

The Worldwide Fund for Nature (WWF) is currently implementing a project on Eld's deer conservation, funded by the Critical Ecosystems Partnership Fund (CEPF). In addition, WWF is carrying out work on community fisheries management and aquatic resource

conservation, supported by the McKnight Foundation/WWF United States, in the Xe Banghieng basin. This includes villages on the Xe Champhone River and other tributaries.

There has also been some road development around the wetlands, and as described above, the wetlands are one of the province's principle tourist attractions. No education or awareness-raising activities on the importance of biodiversity and natural resource wise-use have been conducted in the area.

8.2 Proposed/planned conservation measures

Since its nomination as a Ramsar site, more management and conservation measures have been proposed for the Xe Champhone Wetlands. For example, in a proposal to the Lao Environmental Protection Fund (2010), the Savannakhet Provincial Water Resources and Environment Office, the National Department of Environment and IUCN identify a number of priority actions in the wetlands, including:

- Establishing a Ramsar Secretariat, wetland network, and community committees at site level
- A rapid assessment of wetland economic values and importance
- Wetland mapping, participatory planning and development of a management agreement
- Biodiversity surveying and zoning
- Awareness raising on the wetlands and the Ramsar Convention
- Training on wetland co-management

The Xe Banghieng River basin, where the Xe Champhone sub-basin is located, has also been selected for the establishment of a pilot river basin committee (under Lao PDR's recent River basin Committees Decree), supported by the World Bank. This process will draw an initial study on the water resources of the basin, conducted by WREA, the Lao National Mekong Committee, and the Water Resources and Environment Research Institute (WERI), as part of the Decision Support Framework (DSF) project (WREA, LNMC and WERI, 2010).

In addition to the CCAI project mentioned above, the Xe Champhone Wetlands are likely to undergo further study in 2011-2012 as part of a number of IUCN wetlands studies, including a case study for an MRC supported project on climate change adaptation in Lower Mekong Basin wetlands, and an update of the Lao national wetlands inventory.

Siamese crocodile conservation work by WCS is also ongoing, which is aiming to restore the crocodile population and launched co-management of crocodiles with local stakeholders in 2010. The project will include a number of components, ranging from reviewing regulations to DNA analysis to small-scale dam building to conservation awareness raising (Phothitay and Hedemark, 2011).

8.3 Key management actors

Wetlands in Lao PDR are managed through a number of government agencies and other actors, at the national, provincial and local levels. Xe Champhone Wetlands management is carried out through three levels of government:

- At the national level, the Department of Environment (under WREA) is responsible for Ramsar implementation in Lao PDR, and at a technical level the Living Aquatic Resources Research Centre (LARReC , under the National Agriculture and Forestry Research Institute, NAFRI) is involved in studying and managing wetlands resources. The National Committee for Wetlands Management for the Ramsar Convention, responsible for implementation of the convention in Lao PDR, includes high-level representatives from a number of Lao PDR ministries (such as WREA, MAF, NLMA and NTA) and is chaired by Vice Prime Minister Asang Laoly. The Committee held its first meeting in January 2011.
- At the provincial level, the Savannakhet Province Agriculture and Forestry Office (PAFO) and Water Resources and Environment Office (PWREO) are involved in managing the site, as well as influencing factors, such as agriculture, irrigation and environmental management in the area. The Provincial Tourism Office (PTO) plays a role in promoting and managing tourism at the site.
- At the local level, the District Agriculture and Forestry Office (DAFO) of Champhone District, and village councils and institutions are involved in on-the-ground management of the wetlands. Communities play an important role in the protection of certain sites with spiritual significance.

However, as the site lacks a management plan or regulation, clear roles and responsibilities are not yet specifically defined for the Xe Champhone wetland management.

Additional actors influencing the management and conservation of the site are:

- The Mekong River Commission (MRC) projects on climate change adaptation have a focus on the Xe Champhone Wetlands.
- The International Union for Conservation of Nature, IUCN, is carrying out a number of activities in the wetlands and is the Communications, Education and Public Awareness (CEPA) focal point for the Ramsar Convention in Lao PDR.
- The Wildlife Conservation Society (WCS) is continuing to implement site-based conservation for Siamese crocodiles at Xe Champhone.

More information on stakeholders associated with the wetlands is provided at Annex 1.

9. Changes and threats

There are a number of factors (past, present or potential) adversely affecting the site's ecological character and the sustainable use of natural resources, including changes in land and water use. For example:

- Conversion of the wetlands and surrounding areas by removing forests and/or draining the wetlands for agriculture and gardening purposes (except the sacred wetland areas which seem relatively well protected from conversion).
- The use of chemical fertilizers and pesticides for agriculture is wide spread around the wetlands.
- The Siamese crocodile, a key species, has become more threatened, as hatching areas on the shores have been disturbed and collection of crocodile eggs has been reported.

- Some parts of the wetlands are flooded due to the construction of weirs, such as Phai Cheo (which also destroyed a crocodile hatching area). Irrigation weirs, pumps and canals also affect the wetlands and the Xe Champhone River through the diversion of water to agricultural uses.
- Population growth may be expected to generate increased pressure on the wetlands' natural resources. Increased numbers of cattle, particularly buffalo, may also generate more pressure on the carrying capacity of the wetlands.
- Insufficient human and financial resources to implement management of the wetlands, apart from the well protected sacred wetlands. As in other parts of Lao PDR, the government departments charged with managing wetlands, the environment more generally and local planning, are often under-funded and poorly equipped. This can lead to patchy implementation of laws, policies and plans.
- Environmental and social issues which may be associated with tourism expansion have not been properly studied or addressed, such as the impact on turtles, monkeys and crocodiles in the wetlands. The Ramsar status of Xe Champhone, along with improved infrastructure and increased tourism numbers more generally, can be expected to boost the number of visitors in the future. Further assessment of the environmental and social risks of tourism in the area is required, along with measures to ensure that negative impacts are minimized while benefits are shared among the communities of the wetlands. If well-managed, tourism can offer an important contribution to local livelihoods and the management of the site.
- Flooding and drought, as the Xe Champhone Wetlands are in an area of the country prone to these natural impacts. Climate change may exacerbate floods and drought in the area. Increasing salinity is also a concern in the area.
- Invasive species, particularly plants such as Mimosa pigra and water hyacinth, are found in many parts of the wetlands; the flood and drought conditions of the wetlands encourage the spread of these invasives, which have become worse in recent years.

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ANNEXES

Annex 1: Stakeholder analysis for Xe Champhone Wetlands

Level	Actor	Interests/activities
National Govt	**Water Resources & Environment Administration (WREA)**	o Responsible for Ramsar implementation in Lao PDR and water resources in general o Partner in a number of upcoming wetlands projects in Lao PDR, such as MRC/IUCN update of wetlands inventory, as well as in RBC implementation o Member of National Committee on Wetlands Management for the Ramsar Convention
	Division of Forest Resources Conservation (DFRC), MAF	o Responsible for wildlife management o DFRC is focal point within MAF for the Ramsar Convention in Lao PDR
	Department of Livestock & Fisheries, MAF	o Responsible for fisheries in Lao PDR
	Ministry of Planning and Investment (MPI)	o Responsible for economic planning and investment strategies in Lao PDR, including issuance of concessions and investment permissions (above a certain level, e.g. 1000 ha)
	National Land Management Authority (NLMA)	o Responsible for land use planning and titling, as well as land surveys and advice on concessions o Member of National Committee on Wetlands Management for Ramsar
	LARReC (under NAFRI)	o Lao Aquatic Resources Research Center, which is the main body for aquatic species and fisheries research in Lao PDR o Also the Scientific Focal Point for Ramsar in Lao PDR
Savannakhet Provincial Govt	**Provincial Agriculture & Forestry Office (PAFO)**	o Key partner in environmental and livelihood programs in the wetlands and the province more broadly o Will play key role in implementation of Ramsar at provincial level
	Provincial Water Resources & Environment Office (WREO)	o Responsible for implementation of environmental laws & policies at the provincial level, including monitoring environmental impacts of businesses and development projects o Will play key role in implementation of Ramsar at provincial level, as well as in climate change and RBC initiatives
	Provincial Land Management Office (PLMO)	o Responsible for land use planning and titling, as well as land surveys and advice on concessions at the provincial level
	Provincial Tourism Office (PTO)	o Oversees tourism in the province and the wetlands, including involvement in granting of tourism concessions o PTO/JICA EWEC Project lists the Xe Champhone

		circuit as a priority project in 2011-2015, incl. infrastructure development, training, tree planting, etc.
	Provincial Department for Planning & Investment (PDPI)	o Responsible for economic planning and investment strategies for Savannakhet Province, including issuance of concessions and investment permissions (at a certain level, e.g. 100 - 1000 ha)
District/local govt	**District Agriculture & Forestry Office (DAFO)**	o Key partner in environmental and livelihood programs in the wetlands and the province more broadly o Key partner in the development of any wetlands management plans, regulations or structures
	Khumbans	o Village development clusters; likely to be engaged in any the development of local wetlands management regulations, plans or arrangements
Villages	**Wetlands villages**	o 13 core and 40 surrounding villages in the wetlands o Currently implementing local customary protection of parts of the wetlands o Key partners in any development of local wetlands management regulations, plans or arrangements
Local people & organisations	**Local villagers**	o Approx. 20,000 people in 40 villages are considered beneficiaries of the wetlands o Customary use of the wetlands involves allocation of use rights for paddies, fishing, etc, to villagers, as well as customary protection of sacred sites
	Ethnic groups	o Main ethnic group in the area is Phou Thai; also Makhong people living around the wetlands.
	Mass organizations	o Mass organizations such as the Lao Women's Union (LWU) and Lao National Front maintain a network at the village level
International organizations & NGOs	**Ramsar Convention**	o The Ramsar Convention on Wetlands of International Importance accepted Lao PDR as a party in September 2010, after many years of preparation o Two sites were nominated by Lao PDR as wetlands of significance: Beung Kiat Ngong in Champassak Province and Xe Champhone in Savannakhet Province o Joining the Convention signals commitment to work actively to support its "three pillars": 1) ensuring the conservation and wise use of wetlands it has designated as Wetlands of International Importance, 2) including as far as possible the wise use of all wetlands in national environmental planning, and 3) consulting with other Parties about implementation of the Convention, especially in regard to transboundary wetlands, shared water systems, and shared species.
	IUCN	o IUCN supported the GoL in preparations for joining the Ramsar Convention and has been named CEPA focal

		point for this Convention in Lao PDR. o Ongoing work in the wetlands will be supported under IUCN's Mekong Water Dialogues project (Phase 2) and a number of other projects, including case studies under the MRC/ICEM climate change adaptation project and the IUCN Rights-based Approaches to Conservation project (funded by Germany's BMU).
	WCS	o Involved in Siamese crocodile conservation efforts in the wetlands for some years, including current partnership with MMG to implement a site=based conservation project for the species
	WWF	o Community fisheries project active in villages in Xe Champhone??
	JICA	o Funding EWEC tourism development project with PTO for Savannakhet Province, including for the Xe Champhone circuit. o JICA also has other projects in Savannakhet, eg one district one product, education activities.
	SNV	o Savannakhet is a target province for SNV's pro-poor sustainable tourism programme, e.g. capacity building, strategic development, marketing o SNV is also working on renewable energy, WATSAN, agriculture and other areas.
	World Vision	o Active in Savannakhet Province, including pilot early childhood care & education project in Xonbuly District in 2010 (now being extended).
Private sector	**Tourism operators**	o Savannakhet province Eco-guide Unit involved in promoting sites around Xe Champhone and taking tours o Local businesses benefit from tourism to the wetlands; potentially operators in Savannakhet town or other parts of the country may take travelers to the site.
	Industry	o No industrial companies currently directly draw on the wetlands for water (?) o Gypsum mining (Gypsum Co. Mining Ltd) takes place in Champhone District, where the country's first gypsum mine is located. Salt and coal mining as well (?) o Although their mining operations are not in the area, MMG/LXML supports crocodile conservation with WCS at Xe Champhone, as well as broader land use planning and conservation efforts in other parts of the province. MMG is also represented on the MWD National Working Group.
	Household businesses	o Household businesses may be an important source of income in the area, including handicrafts, transportation services, restaurants and small shops. This needs

		further study.
Other	**Savannakhet City**	o Xe Champhone is located 54 km southeast of Savannakhet City, the provincial capital. Although whether the city receives direct benefits from the wetlands, such as water supply or flood mitigation, is unknown, the site does provide: - Tourism destination and business opportunities for city-based operators - Support for food production, particularly important in dry season (?)

Annex 2: Crocodile population estimates in 2008 for Savannakhet Province (from Phothitay and Hedemark, 2011)

Site	Crocodiles observed	Nests	Adult trails (w/out nests)	Dung	Local estimate of population (min)
Kout Kouang -		2 new (infertile)			2 A
(Kout Koke)			1		1 A
Kout Mark Peo		1 not finished		1 J ≥1 A	*ca*. 50 (J + A)
Kout Xelat Kadan	1 Y	1 old hatchling			12 J + 2 A
Kout Kaen	1 Y				2 J + 1 A
Nong Maehang	1 A				1 A + 4 J
TOTAL	3	4	1	2	about 75