

Siphandone Wetlands Initial Findings



Prepared for:

**Climate Change Impact and Vulnerability Assessment for the Wetlands
of the Lower Mekong Basin for Adaptation Planning
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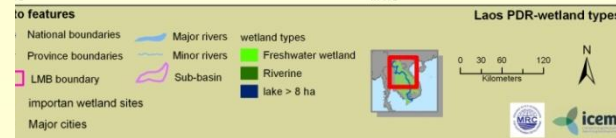
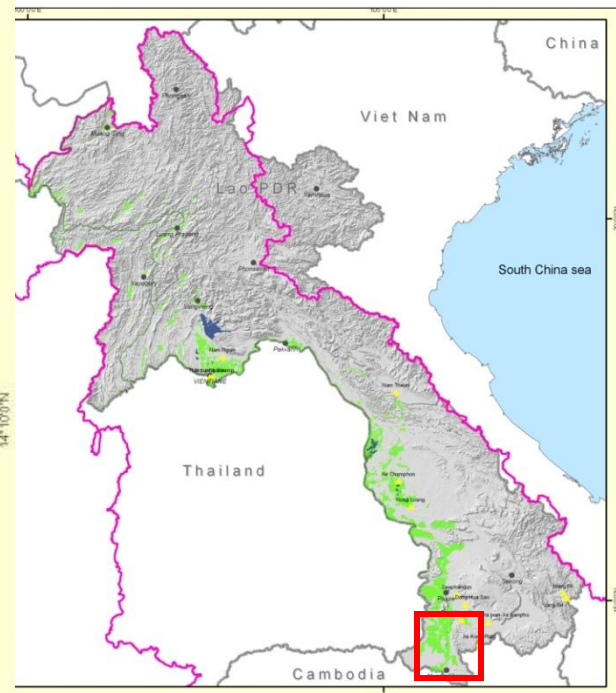
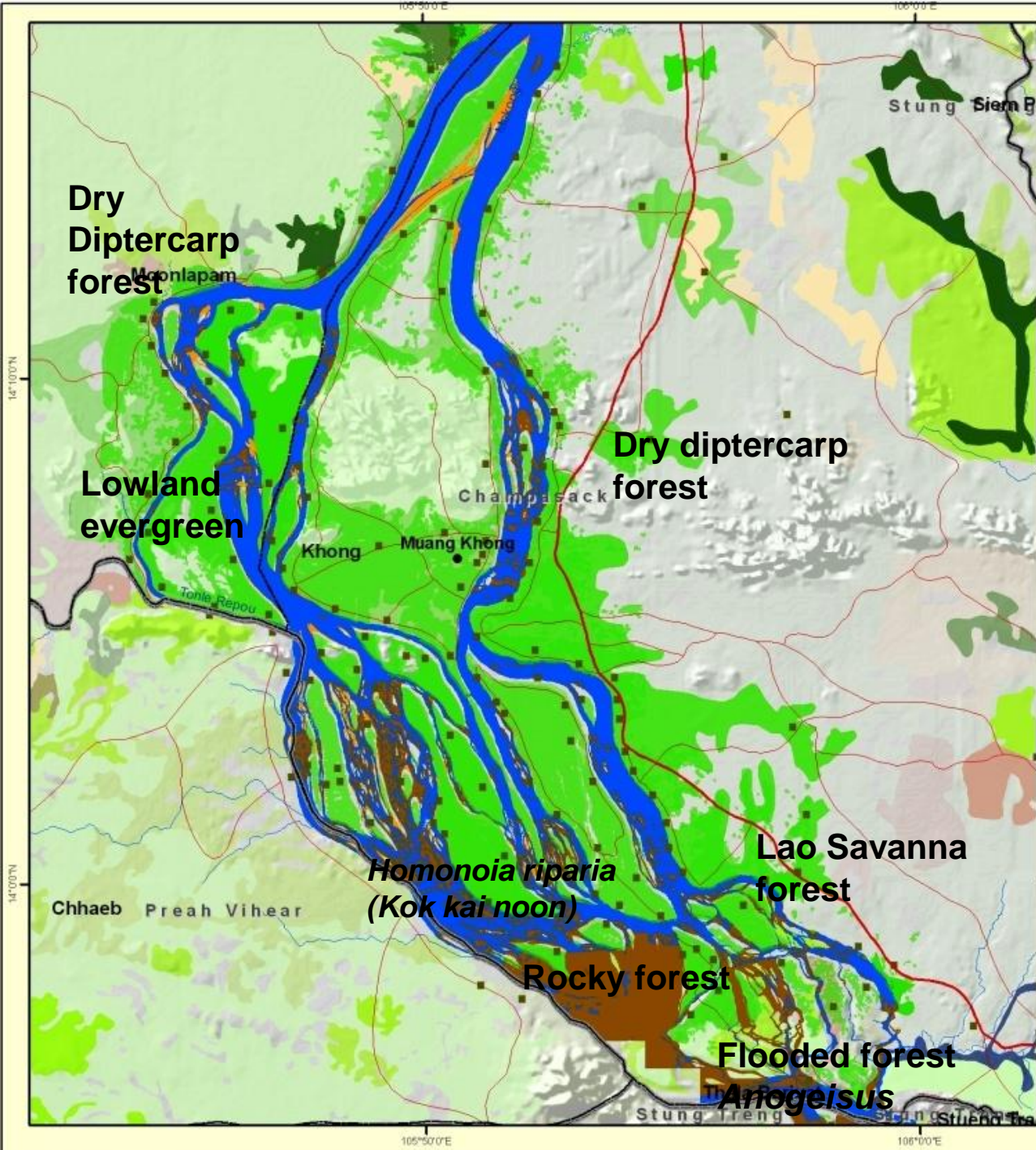
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Outline

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- An aerial photograph of a river delta system. A large, winding river flows from the top left towards the bottom right. The river is surrounded by a mix of green vegetation and large areas of reddish-brown soil, characteristic of a delta plain. The background shows a hazy landscape with more distant land and water features.
- Wetland description
 - Wetland habitats, biodiversity and ecosystem services
 - Climate and climate change predictions
 - Impacts on habitats & biodiversity
 - Livelihoods and wetland valuation
 - Livelihood trends
 - Development pressures
 - Management context
 - Adaptive capacity
 - Suggestions



- Data gathering
- Consultations were held at: provincial, district and village cluster levels, through field visits and wrap-up workshop



Wetland description

Location: Mekong River at the border of Lao PDR and Cambodia
(GPS for Khong District: EL 90, N14°05'49.4", E105°47'23.4")

Area: app. 60 km²

Wetland type: riverine wetland (braided river channel, islands, rapids, waterfalls, including deep pools, ponds, paddy fields, banks, flooded shrubs and forest, riparian/river system)

Population: 30 villages, c. 100,000 people, mainly Lao Loum and Brao, engaged in farming, fishing, tourism, trade.

Surrounding land use: paddy, forest & savannah areas, villages & towns, transport hub, some plantations.

Key habitats



Deep pools



Forests



Islands



Paddy



Rapids, waterfalls & channels



Lowland evergreen forest found mainly on southern Don Khone, western zone, and border with Cambodia



Bamboo forest found in a small proportion on Don Khone close to Tat Somphamit (*Li Phi*)



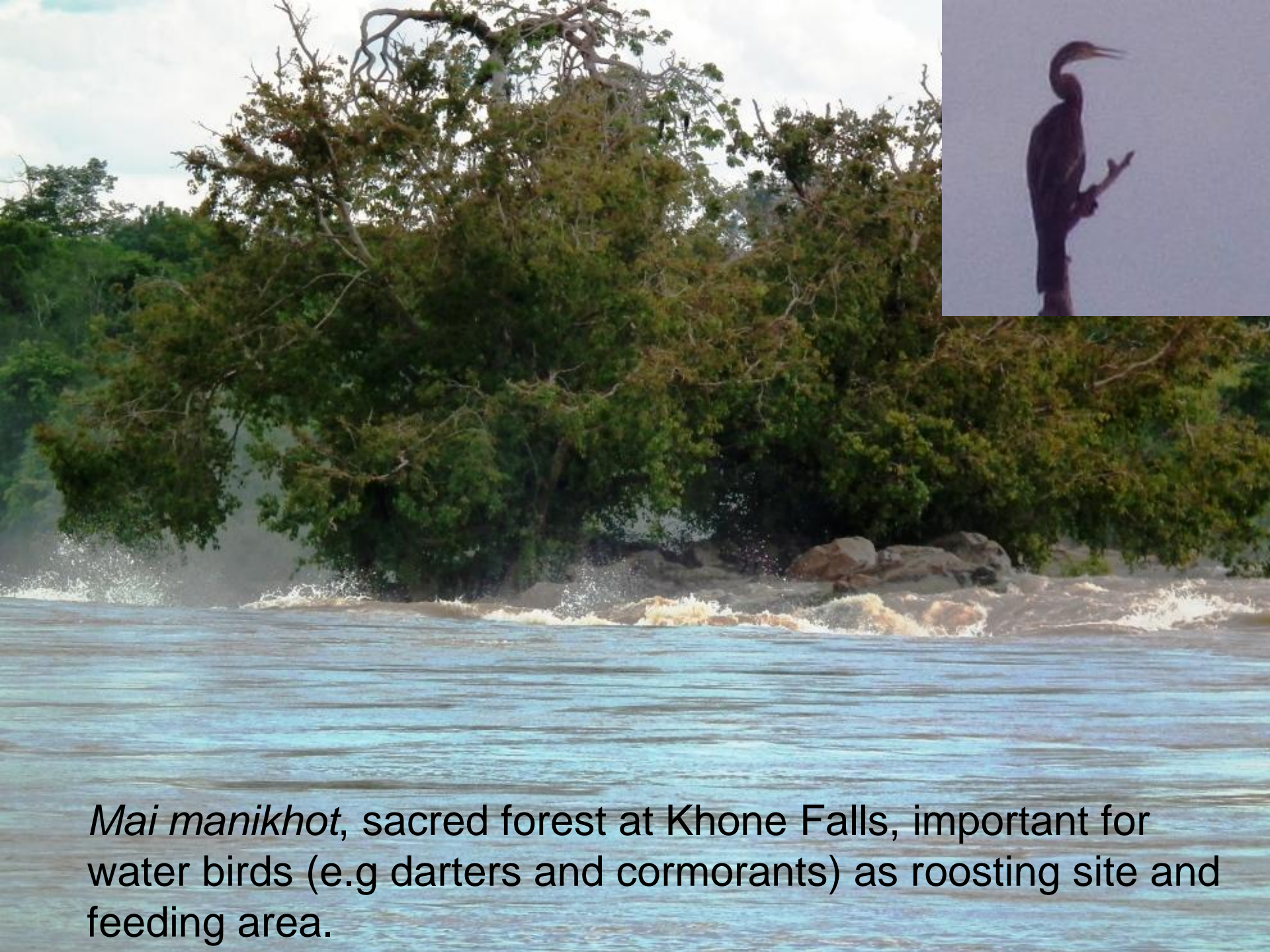
Anogeissus “Kok lamseng” found only in southern Siphandone, at Ban Hang Khone and Don Sadam



Flooded forest found in upper Hang Khone, southern Li Phi area



Fishing trap *Li* at Nok kasoum channel



Mai manikhot, sacred forest at Khone Falls, important for water birds (e.g darters and cormorants) as roosting site and feeding area.

Biodiversity

Fauna:

- About 400 fish species, incl. endangered Giant Catfish, Giant Stingray
- 187 bird species, including Adjutant, Mekong Wagtail, Small Pratincole, River Lapwing, River Terns, etc
- Numerous mammal, reptile species, e.g Mekong Dolphins, Asian Giant Soft-Shell Turtle, Asiatic Soft-Shell Turtle, Long-tail Macaque

Flora:

- 731 plant sps. in 134 families (Dacanto 2001)
- Numerous vegetation types: mixed evergreen forest, deciduous hardwood forest, bamboo forest, flooded shrubs, flooded forest.
- Algae and river weeds

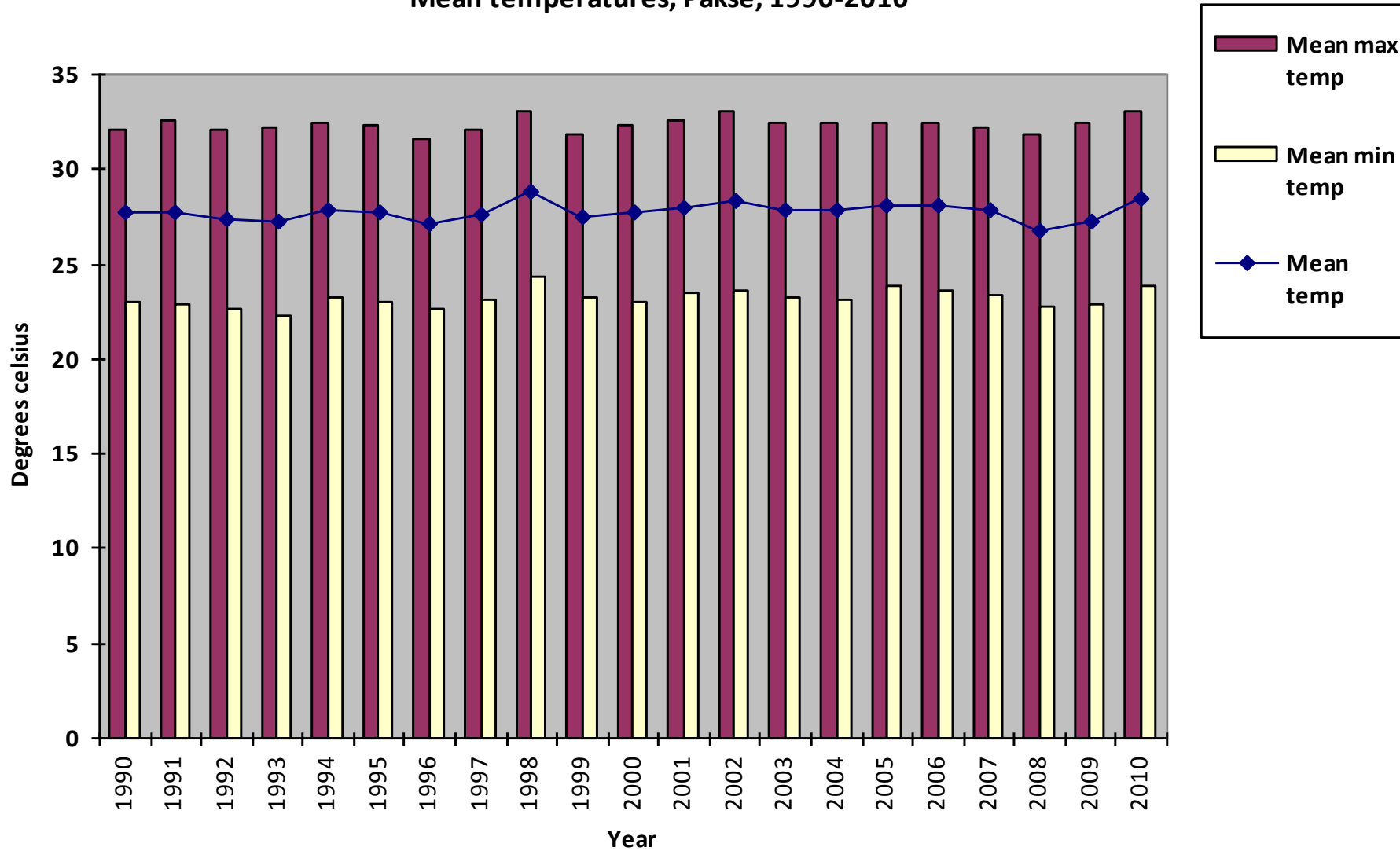
Ecosystem services

| Types of services | River and streams | Seasonally flooded forest | Man-made/ rice fields |
|----------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------|------------------------------|
| Provisioning (food production, esp. fish, rice, vegetables, fuel wood, NTFPs) | Very high | High | High |
| Regulating (climate and water reg, hydro, flows, discharge, water purif. & treatment) | Very high | Very high | High |
| Cultural (spiritual, recreation esp. tourism, aesthetic and education) | Very high | Very high | |
| Supporting (habitat, migration paths, spawning & feeding grounds, sediment retention and nutrient cycling) | Very high | Very high | Med |

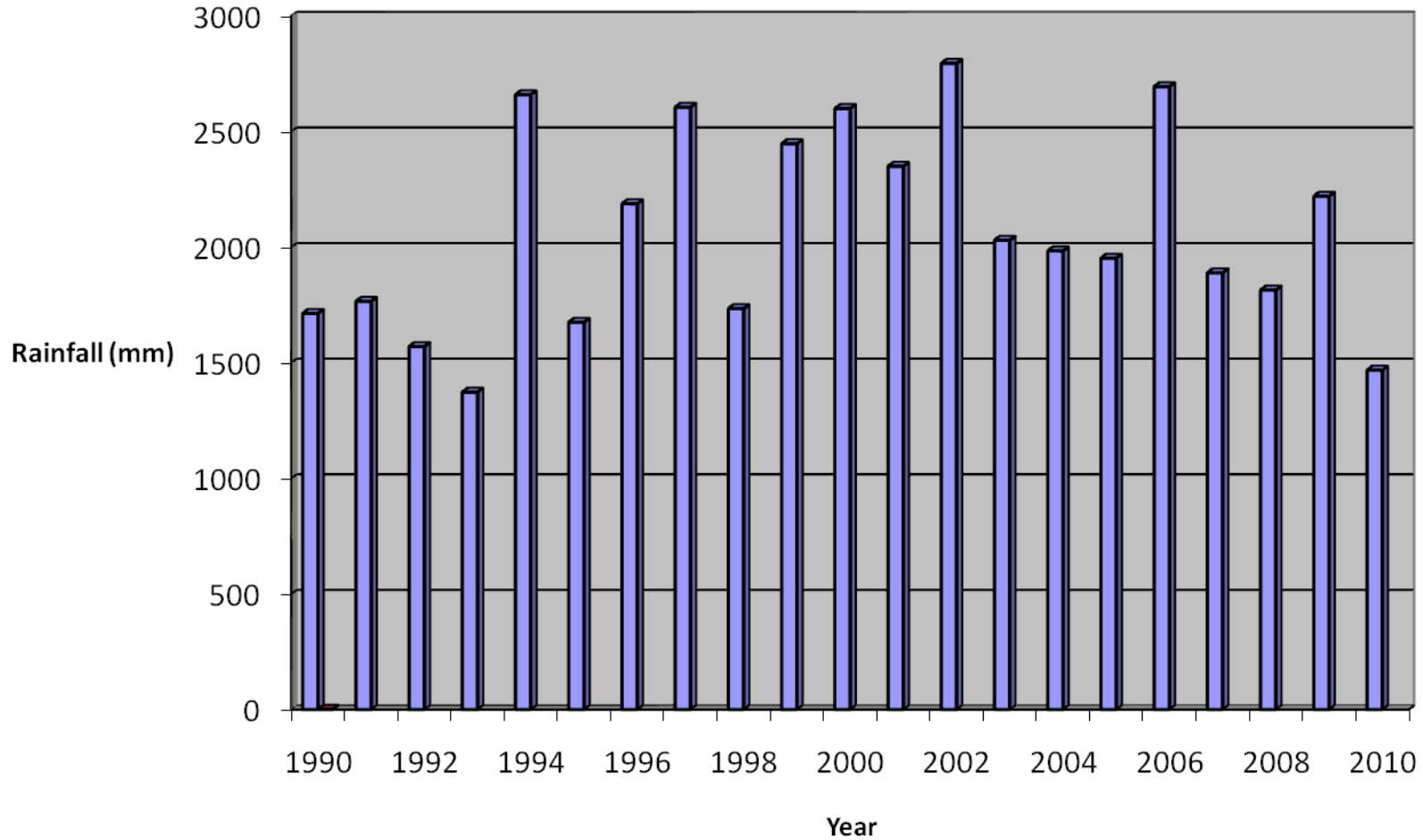
Siphandon's climate

- In a monsoonal zone with dry season (late October-early May) and wet season (late May-October).
- Temperatures can range from an approximate low of 12°C in January to a high of around 39°C in May, with humidity approaching 99% in wet season.
- Average annual rainfall at the site is around 1750mm with up to 1/3 of the rainfall recorded during August.
- Water level varies by an av. 5.5m between wet and dry seasons (up to 7m). Peaks around mid-August, early September. Lowest river levels are around late April, when large areas of sand bar and rocky outcrops are exposed.
- At Pakse, the recorded flow rate varies between 1,060 - 57,800m³/sec, with recorded gauge heights between 0.03 - 14.48m.

Mean temperatures, Pakse, 1990-2010



Annual rainfall, Pakse station, 1990-2010



Local opinions on climate change

- **Flooding** is not a significant issue; the islands rarely flood.
- **Drought** is considered a more serious problem; last year, Champassak Province suffered drought in 10 districts, including SPD, affecting 17000 families.
- **Insects** are becoming a bigger problem for farmers; some years there are many and crops are destroyed, with sometimes 50% lost in a bad year. 20-30 years ago they did not have this problem, but now seasons have been changing and insects come every 1-2 years.
- The **seasons** seem to be changing; for e.g., cool season seems non-existent or very short, rains do not “come on time”, and the dry season is longer & hotter, lasting 8-9 months of the year. Winds also seem stronger.

Climate change predictions

- 0.6 – 0.75°C increase in mean annual temperature in 2050 (A2 & B2):
 - minor impacts on evaporation from river, bigger impact on evaporation from ponds/paddy
 - Increases in water temperature?
- Up to 200mm increase in mean annual rainfall in 2050 (A2 & B2):
 - Minor impact on flooding expected
 - Greater variability, esp. Between wet and dry season
 - Important impacts for communities reliant on rainfall (e.g. for agriculture)



Climate change predictions, cont.

Increase in wet and dry season flows expected:

- Most significant impacts expected here, esp. on wet season peak and dry season minimum.
- Increased flows may affect vegetation, key habitats like deep pools, and agriculture (e.g. when water table rises/falls on islands).

| average flow | Baseline | with Climate change | | | | | |
|------------------------|-----------|---------------------|-----------|-----------|-----------|-------------|-----------|
| | 1986-2000 | 2010-2019 | 2020-2029 | 2030-2039 | 2040-2050 | 2020 - 2050 | 2010-2050 |
| Dry | 3,329 | 3,387 | 4,053 | 3,940 | 3,693 | 3,895 | 3,680 |
| Wet | 14,727 | 14,048 | 15,952 | 16,879 | 14,671 | 15,834 | 15,255 |
| annual | 9,385 | 9,426 | 10,263 | 10,681 | 9,474 | 10,139 | 9,997 |
| % change from baseline | | | | | | | |
| Dry | | 1.8% | 21.8% | 18.4% | 10.9% | 17.0% | 10.6% |
| Wet | | -4.6% | 8.3% | 14.6% | -0.4% | 7.5% | 3.6% |
| annual | | 0.4% | 9.4% | 13.8% | 1.0% | 8.0% | 6.5% |

Potential impacts on habitats & species

| Wetland habitat | Potential impacts of climate change | Other threats? |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Deep pools</p> <p>(72 deep pools identified as FCZ)</p> | <p>Change in flow expected to affect river water level and transport of sediments.</p> <ul style="list-style-type: none"> • Deep pools become shallow through filling up with sediments. • Whirl pool changes (filling up of hollows) <p>(No new deep pools are created nor reported, unlikely to reverse changes naturally)</p> | <ul style="list-style-type: none"> • Upstream dams may also affect flow, but reduce sediment? |
| <p>Sand bars</p> | <ul style="list-style-type: none"> • Increased flow/water level may erode sand bars • Increased sediment may increase • Increased rainfall/run-off • Longer dry periods, with lower water levels may reduce transport of sediment <p>(Some sandbars washed away but some more appear in other places)</p> | <ul style="list-style-type: none"> • Increasing presence of m. Pigra • Effects of dams on sediment? |
| <p>Riverine flooded forest e.g Anogeissus</p> | <ul style="list-style-type: none"> • Impacts of increased flow, higher water levels may not affect trees <p>(Small area of this habitat, mainly south of Khone falls)</p> | <ul style="list-style-type: none"> • Harvesting for fuelwood in dry season or to get to fish • Impact of upstream dams on flow/water level |

| Wetland species | Potential impacts | Other threats? |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Spirogira sp. (Thao, Algae sp.)</p> <p>(found mainly in upper Khone Falls, shallow areas & ponds)</p> | <ul style="list-style-type: none"> • More thao occurs in still/stagnant water, e.g. in a longer dry season • More thao = less oxygen, increased toxins, negative impacts on fish habitat | <ul style="list-style-type: none"> • Impacts of dams on river flow |
| <p>Orcaella brevirostris (Mekong dolphin)</p> | <ul style="list-style-type: none"> • Changes in flow may impact habitat, eg deep pools may benefit from increased flows but suffer if dry season longer, pools become shallower from sediment • Potential impacts on food sources e.g <i>pasoi</i> <p>(Very small population and limited habitat)</p> | <ul style="list-style-type: none"> • Impacts of dams on flow • Increased water pollution • Over-fishing • Barriers to fish migration |
| <p>Cirrhinus microlepis (Pa phone)</p> | <ul style="list-style-type: none"> • Migrates in dry season when river at lowest (Apr-May); longer dry season may reduce levels • Increased dry season flow may benefit? <p>(Large range with biogeographic connectivity)</p> | <ul style="list-style-type: none"> • Impacts of dams on migration channels • Increased fishing |
| <p><i>Rana capito</i> (Kop, frog)</p> | <ul style="list-style-type: none"> • Breeding failure due to longer dry season/increased evaporation, after some rains in begin of wet season | <ul style="list-style-type: none"> • Increased consumption • Water pollution? |
| <p><i>Phalacrocorax sp.</i> (Nok ka nam, cormorant)</p> | <ul style="list-style-type: none"> • Increased temperature may prompt more migration north (eg more of this bird sp. migrates to the Khone Falls during wet season in recent years). <p>(Large population but limited suitable habitat/trees)</p> | <ul style="list-style-type: none"> • Increased fishing (food source) |

Economic value & livelihoods

Main uses:

- Agricultural production (rice, other crops, livestock)
- Fishing
- Tourism

Estimated economic value:

- Very important food and income source for local people;
- Over 90% of people living in SPD are engaged in occupations related to the wetland (farmers, fishers, tourism service providers, etc.)
- Total production of wetland (Khong District data) is estimated to be over USD 110 million; about 70 % comes from agriculture: about 20% comes from fisheries and about 10% comes from tourism.
- About 30-40% of wetland products particularly fish and fish products, are exported to Pakse and Vientiane Capital.



Livelihood trends

Wet rice production:

- Reduced wet rice harvest areas due to drought and pests, by around 20% or about 2,470 ha every year in Khong District;
- This results in an estimated economic loss of about USD 2.6 million every year;
- Increasing wet rice production costs of around 20%:
 - Increased use of chemical fertilizers
 - Increased use of insecticides
 - Increased water pumping/irrigation

Livestock production:

- Deaths of over 2,800 cattle and buffalo every year, because of insufficient food, unclean water and livestock diseases (Khong District);
- Estimated economic loss of over USD 800,000 every year.

Livelihood trends, cont.

Fishing:

- Significant reduction in fish population (by around 70 % during last decade), likely due to numerous reasons, such as increased commercial fishing;
- To maintain and/or increase their income, fishers have increased their time spent fishing by around three times during last decade, and use more types of fishing equipment.



Livelihood trends, cont.

Health:

- Dengue fever (224 cases in Khong District in 2010);
- Malaria (661 cases between 2007 and 2010)
- Diarrhea (1,504 cases between 2007 and 2010)

Living costs:

- Increasing food (rice, fish, vegetable, meat, etc) prices, by around three times during last five years, due to declining natural resources and increasing demand.



Changing livelihood strategies

- Changed mode of rice production:
 - Increasing irrigated and dry season rice production (where possible);
 - Using more hand tractors, water pumps, chemical fertilizers and insecticides to increase productivity.
- Changes to livestock production:
 - More livestock vaccination.
- Change in fishing practices:
 - Increasing fish farming in ponds;
 - Importing pasoi from Cambodia;
 - Releasing papia.
- Increasing role of tourism sector.
- Many people migrate to seek jobs and income generation activities in the non- agriculture sector.

Other pressures

- Rapid development in SPD, from small-scale local to large-scale investment projects:
 - Proposed hydropower projects
 - Increasing tourism and tourism developments
 - SEZ, incl. airport
 - Bridge construction, road upgrades
- Increasing invasive species (e.g. *Mimosa pigra*)
- Increasing tourism management issues & dissatisfaction
- Increasing population & migration
- Increasing waste management issues
- Increasing pressure on fisheries
- Irrigation problems
- Decreasing water quality



Management context

International level: Cambodian cooperation and border management; international trade & tourism; international attention; international agreements eg MRC, CBD, etc.

National level: Ramsar Committee; oversight of key national departments; national policies and plans (eg FS2020, Water Strategy, NAPA); National role in considering investment projects.

Provincial level: Prov. Ramsar Committee; oversight of PWREO for Ramsar and other wetlands; provincial plans (eg 5 Year Plan, Wetlands Strategy, SPD Master Plan); SPD Office

District level: key role in on-ground management; key agencies like DAFO, DWREO; cooperation with provincial level & SPD office; assistance with village regulations.

Community level: local NR managers, especially for fisheries; develop and enforce regulations, eg FCZs; strong local knowledge; respect for regulations.

Special management features of Siphandon



- Regulations, although based on national/provincial laws, are developed at village level in consultation with the district, based on local realities and practices.
- Relatively strong implementation of NRM regulations.
- Fisheries are vital; basis of livelihoods, NRM regulations and coping strategies.
- SPD's international significance is extensive: resource use, tourism, trade, attention.
- Lack of management status for SPD; tension between development and conservation is difficult to manage.

Key management challenges in the context of climate change

- How to manage rapidly increasing development pressures in Siphandon, like population growth, tourism and hydro, in context of climate change?
- What will potential fisheries changes/declines mean for broader natural resources management in Siphandon?
- How will adaptation to climate change be coordinated? Who decides?
- How can longer/hotter dry seasons be managed, when current livelihoods are largely based on fish and rain-fed rice?

Adaptive capacity

| Strengths | Constraints |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Flooding not a significant issue | Drought becoming more significant yet lack of coping strategies |
| Local people have relatively high understanding/respect for NRM regulations | Over-reliance on fisheries for livelihoods, coping and management |
| Income sources are increasingly diverse | Rapidly increasing development pressures (may affect adaptation options) |
| Good multisector cooperation for the disaster committees, especially at district level | Tourism, population and waste needs improved management, in order to reduce pressures on habitats & resources |
| Provincial govt is proactive on wetlands management | Lack of protection status/instruments for SPD, or a clear vision, makes balancing development & conservation more difficult |
| Political reforms in MAF & WREA may lead to better coordination on wetlands | Lack of formal cooperation on wetlands at district level |

Suggestions for increasing resilience

- Improve natural resource management to build resilience and framework for adaptation:
 - Give Siphandon a management status and formalise through the development of a Wetlands Regulation/Plan. Ensure that it includes consultation, existing local regulations & agreements, sustainable tourism, etc.
 - Establish a committee for the SPD wetlands, made up of district representatives (incl. both Khong, Munlapamok Districts)
- Review irrigation schemes and proposals; these may not be sustainable/useful in the long term.
- Review proposed development projects (eg hydropower) with regards to potential changes to sedimentation.

Suggestions, cont.

- Extend protection/management beyond fish to other habitat types & species:
 - Ensure village regulations include flooded forest, riparian forest, village forest, as occurs with FCZs.
 - Strengthen regulations to ensure that water duck, soft-shell turtle, common butterfly lizard, frogs, some certain trees e.g. *Anogeisus*, *diptercarpus alatus*, *diptercarpus intricatus*, are protected.
- Remove mimosa pigra from islands, particularly the Don Muang islands. Further, establish this area as a turtle protection zone. Consider how to help young turtles can reach water.
- Consider planting some native vegetation species, e.g. that can help protecting banks from erosion.
- Number of fishing traps/li should be decreased.



Thank You!

KEY MESSAGES:

- Siphandon is a highly productive wetland; biodiversity, especially fish, is key to local livelihoods
- Flooding is not a significant problem in Siphandon, in contrast to other wetland sites; drought is already an issue
- Siphandon has international significance: as a transboundary wetland ; as a home for species of international conservation significance; because of its role in international, trade, tourism, investment, etc.
- Siphandon lacks any management status, making it difficult already to balance conservation and development priorities
- Fisheries dominates the management approach and livelihood strategies in Siphandon ; other species, habitats, and livelihood options need equal attention

DISCUSSION POINTS:

- Munlapamok District and the Dong Khanthung/Xe Lamphao area is interesting and should be included
- Need more clarity on size of Siphandon and where district-level data has been used
- How to distinguish between general management recommendations and specific CC adaptation recommendations? Or how to link the two?
- Need to better link in with Stung Treng case study, transboundary aspects.
- Need a strong link between wetland types, habitats and species: which species will be affected by CC in which areas?