Climate change vulnerability assessment summary: Bang Pakong River Wetland, Thailand

1 INTRODUCTION

“Mekong WET: Building Resilience of Wetlands in the Lower Mekong Region’ (2017-2020) aims to build climate resilience by harnessing the benefits of wetlands in Cambodia, Lao PDR, Thailand, and Viet Nam. The project is funded by the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). Mekong WET will help the four countries address their commitments to the Ramsar Convention, an international treaty for the conservation and sustainable use of wetlands, and achieve the Aichi Biodiversity Targets.

Vulnerability Assessments (VAs) were conducted at ten sites in the four countries. VAs combined scientific assessments with participatory appraisals and dialogues with local communities and authorities including the Office of Natural Resources and Environmental Policy and Planning (ONEP). In Thailand, two sites were selected: Kaper Estuary- Laemson Marine National Park Kraburi Estuary Wetlands in southern Thailand, and Bang Pakong River Wetland, in Central Thailand which is the focus of this summary.
2 SITE SELECTION

The Bang Pakong River Wetland is part of the larger Bang Pakong River Basin, southeast of the Bangkok metropolitan area and connected to the Gulf of Thailand (Figure 1). The area represents a unique ecosystem with high biodiversity as result of freshwater, brackish water and saltwater habitats. Despite strong expansion of urban areas and industrial development, 70% of local people still depend on the wetland for their livelihood. Intensive land and water use and environmental pollution, however, have put the wetland ecosystem under pressure. Climate change is expected to further exacerbate these problems.

The Bang Pakong River Basin includes 7 provinces, 31 districts, and 217 sub-districts. The Bang Pakong River flows through four provinces (Prachinburi, Nakhon Nayok, Chachoengsao, Chonburi) and 36 sub-districts with a total distance of 122 km. In terms of population, Nah Muang Subdistrict of Chachoengsao Province has the highest population with 39,570 residents, followed by Bang Khla Subdistrict of Chachoengsao Province with 9,307 residents. The total population along the riverbanks is 201,858 (48.2% men; 51.8% women; 83,875 households). Most people are Buddhist, with small groups of Catholics and Muslims.

3 VULNERABILITY ASSESSMENT

Climate change projections for Bang Prakong River Wetland include:

- Increased rainfall during the rainy season coupled with the diversion of water from Thailand’s central region and the Bangkok metropolitan area increasing flood-risks and erosion of riverbanks;
- Decreased rainfall during the dry season and higher temperatures leading to droughts and high levels of water salinity;
- An increase in sea level due to climate change and high tides exacerbating saltwater intrusion, especially during the dry season; and
- Storms and harsh winds increasing coastal erosion in the central plains.
The Bang Pakong Dam was built in the centre of the basin to protect against seawater intrusion and to store freshwater for dry season usage, but dam operations have exacerbated environmental problems including pollution, eutrophication, and erosion of riverbanks.

All habitats in the wetland face increased risks due to climate change. The main ecosystems evaluated under the vulnerability assessment include:

- **Estuary**: highest vulnerability of all habitats assessed due to land use changes, infrastructure development, pollution, wastewater discharge and increased exposure and sensitivity to droughts, floods, high sea levels and storms.

- **Mangrove and Nypoidideae forests**: affected by land use changes and increased development. Expected to be impacted by climate change, but mangrove forests are more resilient and adaptive, partly due to protection and restoration programmes. The Dam has been constructed near the centre of the basin to control saltwater, but it also decreases the amount of sedimentation at the estuaries and causes river banks to collapse.

- **Mainstream river**: affected by the Bang Pakong Dam and the water gates in the canals, built to reduce saltwater intrusion. Expansion of the industrial development has increased water utility requirements and led to waste management discharge and heavy metal contamination. Changes in rainfall will affect the river water levels, but these will be mitigated by the dam.

- **Islands/oxbows**: threats from droughts, especially in dry season when there is less rainfall and the water in the river is low; some parts may have low water levels or be dry for longer periods, causing high salinity. Threatened by flooding and the collapse of riverbanks.

- **Cultivated systems**: both ditches orchards and the unique Na Kha Wang rice system are at risk from floods, droughts, salinity and rising temperature, which affect rice production and aquatic species. Impacts can be mitigated through management practices. Bigger threat for salt farms, which are an important ecosystem for migratory birds.

- **Tributary/canal system and floodplains**: currently moderately vulnerable. Increased floods, saltwater intrusion and deteriorating water quality could increase the vulnerability.

The deteriorating state of habitats also threatens flagship species, keystone species, and economically important species. The conditions are especially precarious for fish, including the rare and critically endangered Somphong’s rasbora (*Trigonostigma somphongsi*), which can be affected by droughts, increased temperatures and salinity changes. The endangered giant freshwater stingray (*Himantura chaophraya*) and Irrawaddy dolphin (*Orcaella brevirostris*) are also at risk from human impacts, water pollution, sedimentation, and water temperature and salinity increase. Populations of economically important species such as giant freshwater prawns (*Macrobrachium rosenbergii*) may decrease due to weather fluctuations and higher temperatures.

The spoon-billed sandpiper (*Calidris pygmaea*) is a migratory critically endangered bird that feeds in the salt farms. Changes in temperature can influence migration patterns, posing a threat to the dwindling population. Seasonal fluctuations and abnormal rain patterns are expected to influence flowering, affecting the food source of the Lyle’s flying fox (*Pteropus lylei*).

The impact on the ecosystem and its species directly affects the people that depend on the wetland for their livelihood. People most vulnerable to changes and the impact of climate change include elderly people who cannot work in the industrial or service sectors. Elderly people and local fishermen will be affected when wetland resources decline and water quality deteriorates. Smallholder farmers that depend on the production of rice, fruits and farmed fish are also at risk from high tides, saline water levels, drought and higher temperatures. The effect of climate change at the community level is reflected in economic impacts such as damage to crops, food sources and capital. Most farmers have no ownership of the land they have been using and therefore lack stability in terms of land rights and title deeds.

The implementation of Thailand’s wetland conservation measures is complex and would benefit from increasing participatory decision-making with communities. Chachoengsao Province has been designated as part of the special Eastern Economic Corridor (EEC), which is likely to increase stress on wetland
resources and small-scale farmers and fishermen. Although there are several policy measures to protect the area, the wetlands conservation approach is lagging.

4 CONCLUSIONS AND ADAPTATION PLANNING

Plans for adaptation to future climate change scenarios can be envisioned at three levels:

- **Household level**: strengthening and raising houses, selection of climate tolerant plant species, sustainable and organic pest control methods, proper land use zoning, digging storage ponds, creating reservoirs and a water circulation system, installing secondary water storage systems, developing alternative livelihood activities, increased aquaculture competency and co-culturing methods. Eco-tourism can also be promoted as an alternative livelihood.

- **Community and local level**: developing local management plans, such as emergency disaster prevention and a relief centre, agreements on rehabilitation of aquatic species, increasing conservation areas, rehabilitating and dredging the canal system, developing public water ways and water sources; urban planning for sustainable land use, regulations on effluent discharge, and disposal of wastewater, including penalty clauses.

- **River basin level**: land use zoning and urban planning to ensure sustainability and environmental protection in the basin; developing legislation and policies to protect the wetlands; developing water management structures and mechanisms in a participatory manner to allocate water for specific sectors and purposes. Research should be conducted for identify ways to prevent fires in the fields during the dry season.

The community, local and national government, relevant NGOs and the private sector should be involved in developing a coordinated and sustainable wetland management plan for the area. In addition, important habitats such as estuary areas, mangrove forests and floodplains (Thung Pak Phlii), should be protected and conserved under law. Special attention must be given to the critically endangered species that use the Bang Prakong River Wetland.

**REFERENCE**