

**A JOURNEY TOWARDS INTEGRATED WATER RESOURCES
MANAGEMENT IN THE LOWER MEKONG BASIN**

2019











A JOURNEY TOWARDS INTEGRATED WATER RESOURCES MANAGEMENT IN THE LOWER MEKONG BASIN



THE WORLD BANK

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FOREWORD BY THE CEO OF THE MRC SECRETARIAT

In 1995, the four countries in the Lower Mekong Basin – Cambodia, Lao PDR, Thailand and Viet Nam – came together to sign the *Agreement on Co-operation for the Sustainable Development of the Mekong River Basin* (the Mekong Agreement). The Agreement established the Mekong River Commission (MRC) and set out to achieve the strategic objectives of integrated water resources management.

The goal, now and then, is to cooperate within all fields of development, utilisation, management and conservation of water and related resources within the Lower Mekong Basin to optimise the multiple use and mutual benefits while minimising the harmful effects.

However, since the beginning, it has been clearly recognised that development decisions by sector agencies in the sovereign riparian countries in the Lower Mekong Basin may have transboundary consequences and impacts. Therefore, dialogue and cooperation not only between sectors, but also between countries, is essential to achieving a well-balanced and sustainable development of the basin, with benefits equitably shared between uses and users.

Cooperation on water development and management across borders has not always been easy. Differing national priorities and needs have at times slowed down progress, but the need for transboundary cooperation has continued to grow.

Today, the MRC continues to evolve. A comprehensive institutional reform is well underway, aiming to make the MRC's core work funded solely by its Member Countries by 2030. It also involves decentralising certain water resource management activities to the national level, with National Mekong Committees and national water ministries addressing new challenges by strengthening capacity and autonomy to sustainably manage water resources. At the same time, the cooperation with the MRC's upstream Dialogue Partners – China and Myanmar – also continues to expand.

More than ever, transboundary dialogue between the Mekong's riparian countries is needed to reduce tension and increase cooperation across borders for better management of our shared water resources.

The MRC's Mekong Integrated Water Resources Management Project, launched in 2013, set out precisely to improve dialogue and cooperation, developing a bilateral plan to strengthen engagement and ensure that transboundary cooperation is ongoing and continues in the future. Cambodia, Lao PDR, Thailand and Viet Nam have collaborated on five bilateral initiatives to promote integrated water resources management practices at the transboundary level. These initiatives are funded by the World Bank and technically supported by the MRC Secretariat.

Fisheries, wetlands, lakes as well as water resources management of the Mekong Delta and the Sesan and Srepok river basins were selected as representative transboundary issues. I invite you to explore this book to learn more about how the countries worked together to negotiate durable solutions and establish new frameworks for sustainable management and development of water and related resources, for the countries' mutual benefit and the people's well-being.

An Pich Hatda

Chief Executive Officer

Mekong River Commission Secretariat



FOREWORD BY THE WORLD BANK

The Mekong River is a transboundary resource of significant socio-economic, environmental and cultural value. It provides water to millions of people living in the river basin, supports irrigation, generates energy and helps conserve ecosystems. In recent decades, growing population, climate change, and urbanisation have put great pressure on the Mekong. In response, the riparian countries have increasingly recognised the importance of working together to resolve common, transboundary challenges. Since 1995, after the creation of the Mekong River Commission (MRC), significant successes have been achieved – the regional cooperation has led to remarkable economic benefits in the Mekong River Basin; water challenges have been addressed through coordinated actions; the riparian countries, with support from development partners such as the World Bank, have together created and tested various tools to achieve improved water management in the region.

The World Bank has a long history supporting the Mekong Basin water resources development, including support for the MRC. Integrated Water Resources Management (IWRM) is one of the World Bank's major priorities in the region. The Bank has supported technical assistance and an ongoing regional operation – the Mekong Integrated Water Resources Management Project (MIWRMP) – to address critical cross-border water resources management issues.

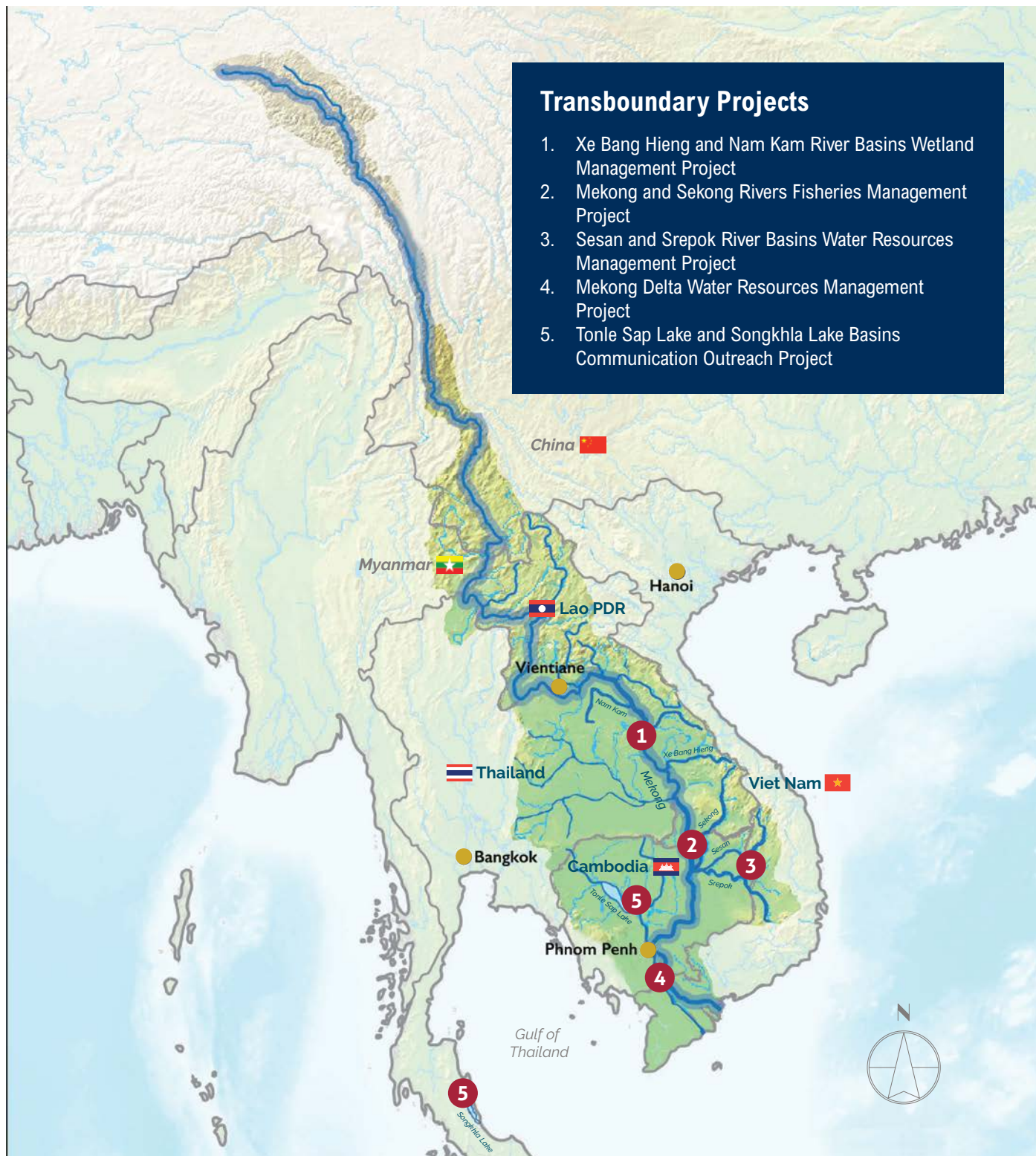
Launched in 2013, the MIWRMP promotes IWRM at both the regional and the national levels in the lower Mekong countries. At the regional level, the Bank's engagement has focused on the facilitation of transboundary dialogue to promote regionally harmonised solutions; establishment of a regional approach for environmental and disaster risk management; improving understanding of regional IWRM principles among stakeholders; and the facilitation of transboundary cooperation. The five bilateral initiatives have considered transboundary issues for fisheries, wetlands, lakes as well as water resources management of the Mekong Delta and the Sesan and Srepok river basins resulting in a bilateral plan to strengthen engagement and ensure that transboundary cooperation is ongoing and continues in the future between Cambodia, Lao PDR, Thailand and Viet Nam.

At the national level, the Bank supports (i) Lao PDR in developing national water resources capacity, hydromet development and river basin management in two Mekong sub-basins, irrigation development, and fisheries management; (ii) Vietnam in river basin management in the Upper Sesan and Srepok rivers (2-S basin), hydromet development in the upper 2-S basin and the Mekong delta; and, (iii) Cambodia in fisheries and aquatic resources

management in the north and IWRM in the north-east. Through these projects and numerous studies, technical assistance programs and strategy development, the World Bank has remained committed to partner with Mekong's riparian countries on regional water development.

This book examines how, despite challenges and differing national priorities, the Mekong's riparian countries have worked together and are continuing to cooperate on transboundary issues. While this is not easy, each country recognises that it is critically important for better water resources management and the World Bank welcomes the prospect of continued collaboration on this important endeavour.





FROM DIALOGUE TO COOPERATION: SIX YEARS OF TRANSBOUNDARY COLLABORATION HAS STRENGTHENED INTEGRATED WATER RESOURCES MANAGEMENT IN THE LOWER MEKONG BASIN

About the Mekong Integrated Water Resources Management Project

The Mekong River flows 4,900 km across six countries. Starting in China, it flows towards the southeast, through Myanmar, Lao PDR, Thailand, Cambodia and Viet Nam, before emptying into the South China Sea. It is one of the largest and most biodiverse rivers in the world, and it is a central lifeline to the more than 60 million people living in the Lower Mekong Basin. ⁽ⁱ⁾

Managing the river and its uses across national borders is essential. Water, fish, sediment and other valuable resources all travel from one country to the next, and the river's ecosystems are highly connected. However, cooperating on water governance has long been a challenge for the countries in the Lower Mekong Basin, due to differing national interests and priorities.

That's why the Mekong River Commission (MRC) supports its four member countries – Cambodia, Lao PDR, Thailand and Viet Nam – to enhance transboundary cooperation through the Mekong Integrated Water Resources Management Project. Improving transboundary dialogue and cooperation is essential to ensuring sustainable and equitable management and use of the river's resources.

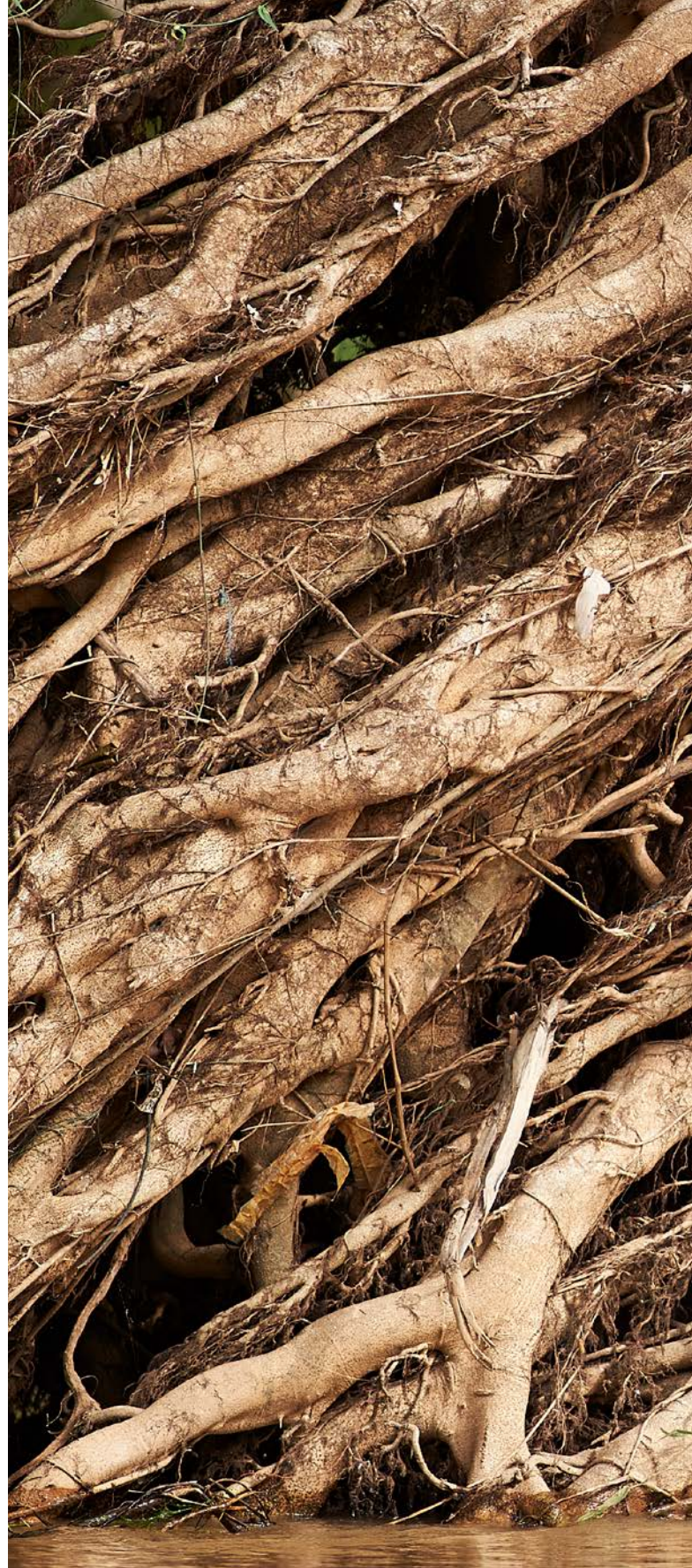
The project originally began in 2009 with three inter-linked regional, transboundary and national components. Under the transboundary component, the four countries set up five bilateral projects that ran from 2013 to 2019. The projects have focused on fisheries (Cambodia and Lao PDR), wetlands (Lao PDR and Thailand), the Mekong Delta (Cambodia and Viet Nam), lakes (Cambodia and Thailand) and river basin management (Cambodia and Viet Nam).

The principles of integrated water resources management have been central to all five projects. This concept promotes the coordinated development and management of water, land and related resources in a way that maximises economic and social benefits, without compromising the sustainability of vital ecosystems. This requires all four countries to work together through a multisectoral approach to coordinate responses to transboundary water issues, such as infrastructural development, pressures from urbanisation and climate change impacts.

Institutionalising the principles of integrated water resources management across the MRC member countries – within water resources management and related sectors – has helped to promote sustainable and equitable development at the national, transboundary and regional levels. It has also directly served to improve the application of the MRC’s water-related procedures in support of the 1995 Mekong Agreement. These procedural rules, sanctioned by the MRC member countries, in combination with the 1995 Mekong Agreement, guide the management and development of water resources for the countries’ mutual benefit and the peoples’ well-being.

Throughout the past six years, the Mekong Integrated Water Resources Management Project has successfully worked with the MRC member countries to establish prime examples of how to implement integrated water resources management in practice. National and regional stakeholders have come together to formulate, design and establish mechanisms and frameworks that are on track to facilitate improved cooperation now and in the future.

Improving data and information sharing; strengthening modelling, mapping and forecasting efforts; and consolidating and updating governance structures and legislation have all been key focus areas. Capacity building of government officials and communities has improved the conditions for responding to the pressing challenges the basin faces today. Finally, improved communication and learning across borders has created unique insights on how to better manage water resources in the Lower Mekong Basin, together.





Flooded forests along the Mekong River
in Stung Treng, Cambodia.

Chapter 1: Exchange and learning for community-led management of vital wetlands

Fast facts:

Xe Bang Hieng and Nam Kam River Basins Wetland Management Project

Countries: Lao PDR, Thailand

Project implementers: Nam Kam working group, Xe Bang Hieng working group

Budget: US\$354,000

Duration: December 2013 – June 2018

Wetlands are rich in biodiversity and natural resources such as fish and plants that local communities rely on for food and income.



Joining forces to meet growing challenges

Wetlands are rich in biodiversity and natural resources, such as fish and plants that local communities rely on for food, income or both. Wetlands also provide important ecosystem services, for example by storing water in the dry season or buffering against floodwaters during heavy rains. Yet, despite their importance, wetlands in both Lao PDR and Thailand are under pressure: pollution from waste and agrochemicals, invasive weeds as well as unsustainable use and increased competition for water threaten to degrade the wealth and health of these vital wetlands.

In response to these challenges, one initiative under the Mekong Integrated Water Resources Management Project set out to improve the management of wetlands through transboundary exchange of knowledge. This initiative worked in two neighbouring river basins: The Xe Bang Hieng basin in central Lao PDR and the Nam Kam basin in north-eastern Thailand.

Soon after the project initiation in December 2013, a technical working group comprised of members of the respective national Mekong committee secretariats, local representatives and national consultants was formed in each of the two basins. Over the next six years, the two groups, with support from an MRC-led team of water specialists, collaborated to develop plans, skills and solutions for improved management of wetlands.

New solutions to safeguard Markmee and Nong Han wetlands

Two wetlands became the focus of the initiative's activities: The Markmee wetland, located within the Xe Bang Hieng basin in Lao PDR, and the Nong Han wetland within the Nam Kam basin, on the Thai side of the border.

The two wetlands share similarities and challenges. They are both of international importance, and they are heavily relied upon for water, irrigation, fisheries, aquaculture, tourism and more. But they are also both under significant pressure.

The Markmee wetland is particularly vulnerable to the impacts of climate change, including severe flooding and drought each year. Floods are worsened by a weed invasion that is filling up the wetland so that it can no longer store excess water to provide relief from floods. With diminishing storage capacity, the wetland might no longer be able to serve as a much-needed water source during the dry season. In the future, as competition over water gets more serious, tensions might arise.



The Markmee wetland in Lao PDR is an important source of food for local people.



To address these challenges, the Lao working group came up with several solutions. First, it collected information from local community members on how the wetland was currently being used. Later, this information formed the basis for a map that outlines the boundary of the wetland and pinpoints what resources are available within the area.

Based on this information, the working group was able to demarcate the boundary of the wetland. By putting concrete pillars to mark the wetland boundary, villagers and local officials are able to monitor the use of the wetland, implement regulations to minimise human impacts and evaluate how it develops.

Finally, the working group developed a new set of regulations for the use of the Markmee wetland. This included establishing no-fishing zones and prohibiting harmful activities. The new rules are complemented by a strategic management plan, aimed to facilitate wise use, conservation and enhancement of the wetland.

Whereas the Markmee wetland remains relatively untouched, the Nam Kam basin in Thailand has seen significant development, particularly irrigation schemes. The Nong Han wetland therefore faces more severe challenges, including insufficient water to meet the communities' needs, water pollution, declining fishery resources and frequent floods.

Just like their neighbours, the Thai working group concluded that they needed to gather more detailed information about the wetland. Therefore, they created an online map of the wetland with many additional layers of information, including on physical and biological resources as well as on how the wetland is used. Government officials working in the Nam Kam basin sub-districts can use the new map to inform their development plans.

As a supplement, the working group created a community water resources development plan that lists potential solutions to the identified challenges. These include building a wastewater treatment plant to reduce pollution and constructing dikes to limit flood inundations. The plan has been shared with the relevant sub-districts for their consideration.

Responding to floods and climate change impacts

Flooding is common in low-land areas around wetlands. Floods are particularly likely to happen when a wetland's capacity to store water is reduced, as for example when new houses, roads or fields are constructed in or around the wetland. Climate change is likely to make flood events more severe and frequent in the future. ⁽ⁱⁱ⁾



Mat weaving from reeds,
harvested from the Markmee
wetland in Lao PDR.

The growing flood risks pose a challenge to those managing the Nong Han wetland, as clearly demonstrated by a severe flooding event in the Thai province of Sakon Nakhon in July 2017. This flood was the worst in decades and reportedly caused upwards of US\$3.2 million in damages. ⁽ⁱⁱⁱ⁾

Realising the severity of the flood challenge, the Thai working group began contributing to another initiative in the basin that brings together all relevant stakeholders to share information and plan necessary mitigation measures, such drainage systems, dikes and coordinated operation of water-control gates. Restoring the Nong Han wetland and others nearby, rehabilitating their capacity to buffer against floodwaters, is also high on the list of proposed solutions.

As for their Lao counterparts, they expect that their efforts to protect the Markmee wetland from human intrusion and impacts will restore the wetland, allowing it to continue to function as an important buffer against floodwaters during the rainy season and a source of water during droughts.

The value of learning across borders

The Lao and Thai working groups met continuously throughout the project's lifetime to exchange knowledge and experiences across borders, such as on how to collect information from local communities as well as on how to organise and use such information to improve the management of wetlands.

Considering the need to make relevant information easily accessible to the many kinds of people involved in the governance of the wetlands, the working groups decided to focus on a particularly useful tool: Geographical Information Systems (GIS) that can tie together information on specific issues – such as water quality – with specific places – such as points along a wetland boundary.

To build the capacity of district and provincial staff, a joint training workshop was organised to showcase how GIS can play a crucial role in the future management of wetlands. It was drawing on these experiences that both working groups eventually developed maps that catalogue wetlands resources and can help track how they change over time.

Going forward, it is hoped that the relevant Lao and Thai government agencies will continue to collaborate with the established working groups, drawing on their tools and lessons learned to continue to improve the management of wetlands.



Mat weaving from reeds, harvested from the Markmee wetland in Lao PDR.



Paddy fields at Ban Pan, Sakon Nakhon, Thailand.



The working groups created Geographical Information Systems (GIS) that can tie together information on specific issues – such as water quality – with specific places – such as points along a wetland boundary.



Chapter 2: Two sister lakes cooperate to ensure long-term sustainability of local livelihoods

Fast facts:

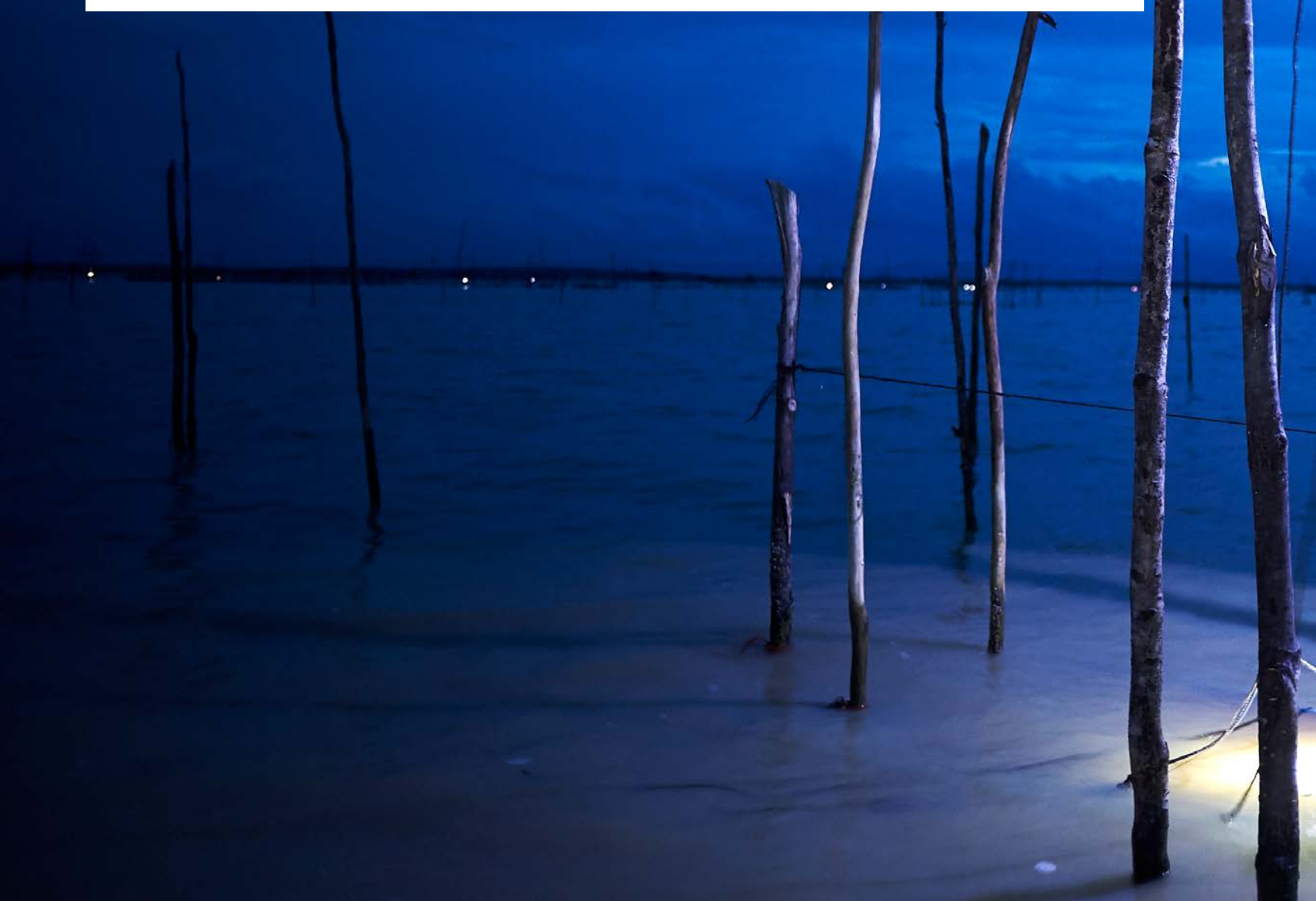
Tonle Sap Lake and Songkhla Lake Basins Communication Outreach Project

Countries: Cambodia, Thailand

Project implementers: Tonle Sap Authority, Songkhla Lake Basin Council

Budget: US\$457,000

Duration: October 2013 – April 2019





A fisherman is setting a fish-trap at twilight, before coming back to collect his catch the next morning. Songkhla Lake, Thailand.

A learning alliance between two great lakes

Thailand's Songkhla Lake and Cambodia's Tonle Sap Lake both offer generous sources of food, livelihoods and other opportunities to the people living on and around them. But as conditions change – with climate change impacts increasing, infrastructure development booming and water flows shifting – these rich ecosystems are under increasingly greater pressure.

To improve how these lakes are managed and used, one initiative under the Mekong Integrated Water Resources Management Project invited communities living around the two lakes to come together to share experiences and develop solutions. They decided to focus on finding the answers to three pressing questions: How to respond to climate change impacts; how to manage and conserve fisheries; and how to empower women to contribute to and benefit from improved lake management?

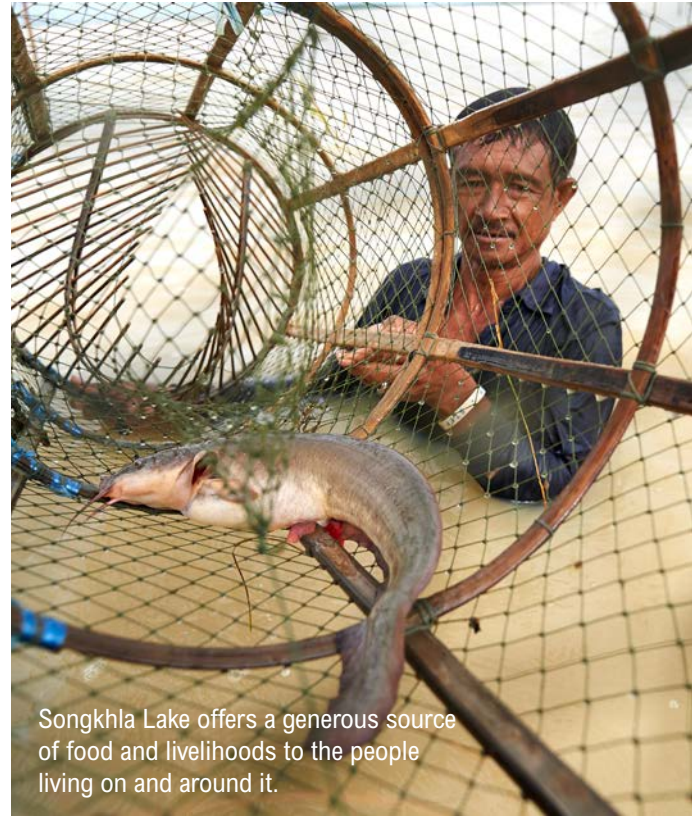
During the past six years, the two sides have made reciprocal field visits and produced videos to showcase local issues and solutions to their fellow villagers. The results are a number of new initiatives that help to preserve the natural resources and environment in the lakes, thus improving people's livelihoods.

Responding to climate change impacts

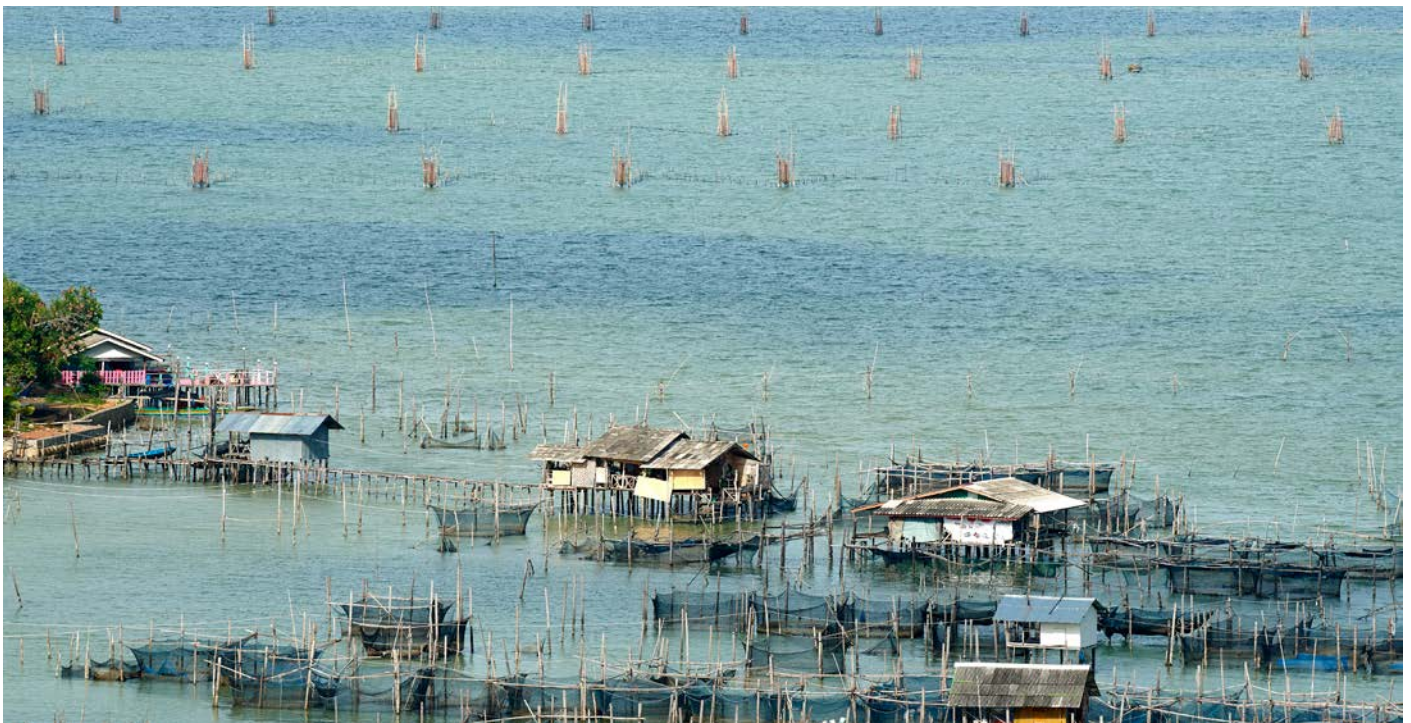
Both lakes are vulnerable to emerging climate change impacts. The consequences for Tonle Sap Lake are expected to be particularly grave, as climate change may affect its unique flood-pulse system. This could alter the duration and extent of annual floods, which are essential for the lake's high productivity of fish, plants and wildlife – all life-sustaining resources for Cambodian people. In fact, Tonle Sap Lake supports the natural hydrological balance of the entire Lower Mekong Basin.

Through consultations with local stakeholders and government officials, it was discovered that fishing communities in Cambodia have coped with environmental variability for many years. It turns out that understanding and supporting these traditional coping mechanisms can help prepare fishery-dependent communities to respond to climate change. A series of trainings also helped the local community learn how to adapt to a changing climate.

For Songkla Lake in Thailand, it is especially the Tale Noi wetlands that are threatened by climate change impacts. Extreme and unpredictable rainfall, frequent floods, extreme storms, severe droughts and new, invasive insect species are among the risks. Forest fires around the lake are already a recurring problem, and more frequent droughts are likely to make the fires bigger and more difficult to manage in the future.



Songkhla Lake offers a generous source of food and livelihoods to the people living on and around it.



To address these risks, a climate change adaptation working group was established, and it carried out activities to raise awareness and prepare local communities. For example, community members shared experiences on coping mechanisms, plans were made for how respond to floods – such as by digging drainage canals, and youth groups were trained on weather forecasting to be able to better predict dangerous conditions. At the government level, a committee responsible for helping local communities prepare to confront climate change was created, and local administrative organisations created climate change adaptation plans.

Conserving fisheries through community-led efforts

Fisheries are incredibly important to the communities around the two lakes and to the Lower Mekong Basin as a whole. Tonle Sap Lake provides around 60 percent of fisheries production in Cambodia and plays a key role in providing income and food security for about 1.7 million people in the region. Similarly, Songkha Lake provides a home for over 9,000 fishing families.

Local Cambodian communities are engaged in community fisheries organisations, which provide a good starting point for conservation activities. Around Tonle Sap Lake, members of these organisations decided to focus on solving some of the most pressing challenges. As a result, steps were taken to raise awareness of and enforce regulations on fisheries to decrease illegal fishing practices. A conservation zone was created in the lake, and inundated forests were restored to improve conditions for fish and other aquatic animals. Additionally, the boundary of the lake was clearly demarcated to prevent any illegal activities within the Tonle Sap land and flooded forests. Finally, alternative income sources, such as ecotourism, were promoted to ease up pressure on fisheries resources.

Similarly, for Songkhla Lake, a fish conservation zone was established to conserve habitat as well as to provide and protect nursery grounds for fish and shrimp stock. Local stakeholders set rules and regulations, and illegal and destructive fishing gear was prohibited. Several community groups also emerged to help find ways for the community to thrive, including by monitoring and responding to disasters as well as saving for and investing in value-added fishery products.

Empowering women to share benefits and boost livelihoods

Through exchange visits and joint learning, successful initiatives for empowering women were identified and supported in both locations.



Mat weaving from grey sedge, a common sedge in Thale Noi, which is usually made into mats, baskets, bags and other handicraft items for sale. Songkhla Lake, Thailand.

Around Songkhla Lake, the Node-Na-Le Center – a women’s empowerment working group – was formed already in 1998. It continues to help women establish small businesses, such as producing soap and food products from sugar palms. The centre contributes to the local economy and provides significant employment to members of the community, including youth. Employees earn up to US\$440 per month.

Around Tonle Sap Lake, women are increasingly involved in the community-based fisheries, managing resources, budgets and conservation efforts. This despite them being poorly integrated into the sector and therefore having difficulties with contributing to its development. This impacts women’s livelihoods, as they may lack the time, skills and budgets to benefit from fisheries.

To respond to women’s poor standing and enhance gender equity, the Cambodian Fisheries Administration produced a gender mainstreaming policy and strategy to integrate and mainstream gender issues into planning and implementation processes. The administration also produced an action plan to promote gender equality and eliminate child labour. Finally, the women around Tonle Sap Lake are also branching out to other income-generating activities, including through a successful savings group and credit scheme.

Recommendations for future actions

Through years of cooperation and joint learning, it became clear that these two sister lakes are very similar. Particularly, the communities living around them share a common goal – to restore and preserve natural resources to ensure environmental sustainability and improve people’s livelihoods.

A number of recommendations were made to ensure progress towards these goals. For Tonle Sap Lake, simplifying, consolidating and strengthening governance and management structures emerged as a key priority. Including representatives from local communities, especially women and youth, in governing bodies and other decision-making will help ensure that communities’ needs are met. Finally, finding financial support for conservation initiatives will likely continue to be a challenge, and therefore clear business plans, strong relations with donors, and new financing or credit schemes are also recommended.

For Songkhla Lake, the recommendations are focused on reinforcing already successful initiatives. For example, expanding and improving the production of value-added fisheries products can help support livelihoods. In addition, replicating the fish conservation zone elsewhere in the lake and stepping up efforts to end illegal fishing practices can conserve important resources. To support women’s empowerment, more initiatives like the Node-Na-Le Center could be launched.

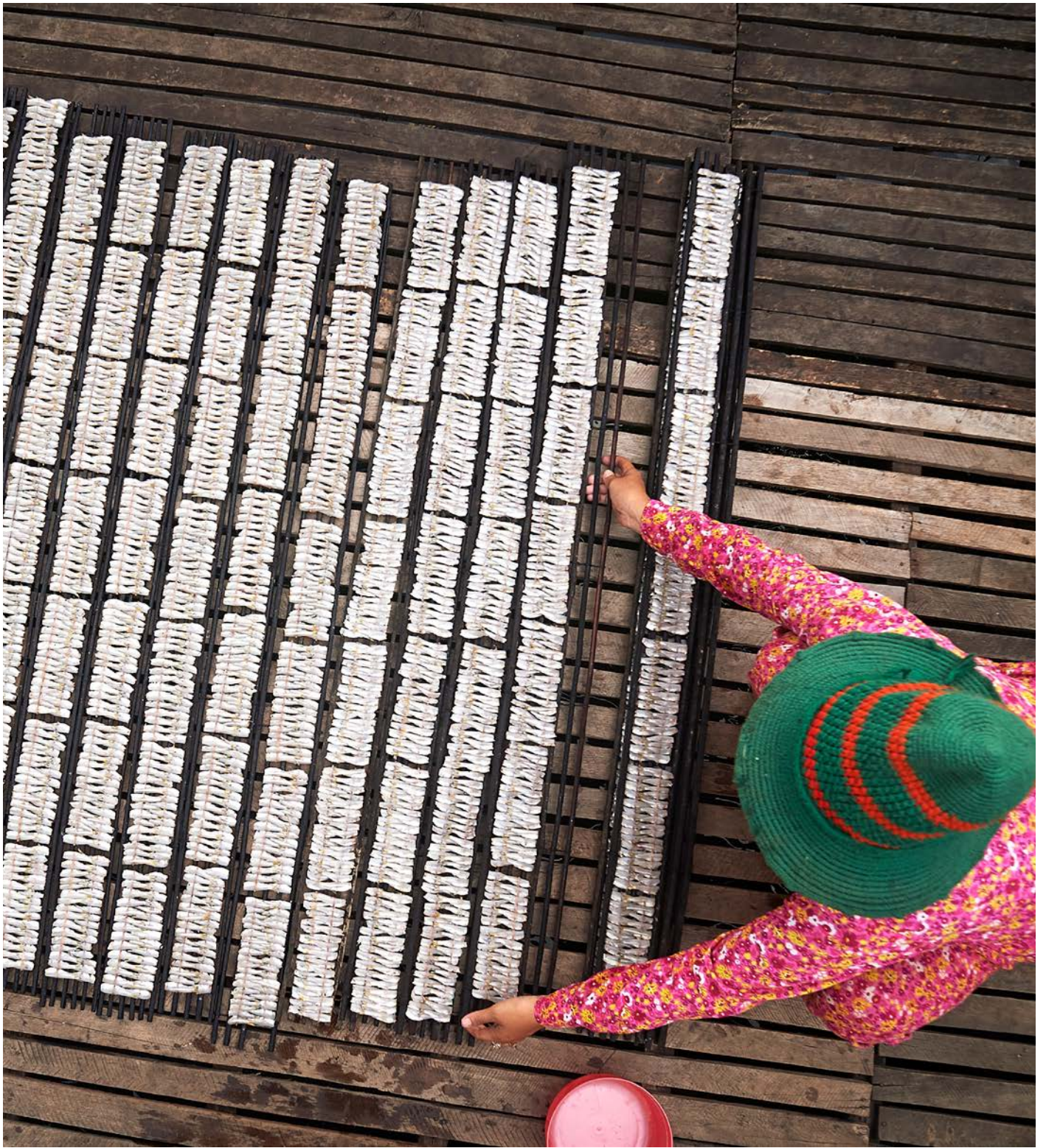


The Node-Na-Le Center in Thailand is a women's empowerment working group. It helps women establish small businesses, such as producing soap and food products from sugar palms.





Around the Tonle Sap Lake, women are involved in the community-based fisheries and conservation efforts.



Chapter 3: Finding ways to safeguard fisheries resources in the Mekong and Sekong rivers

Fast facts:

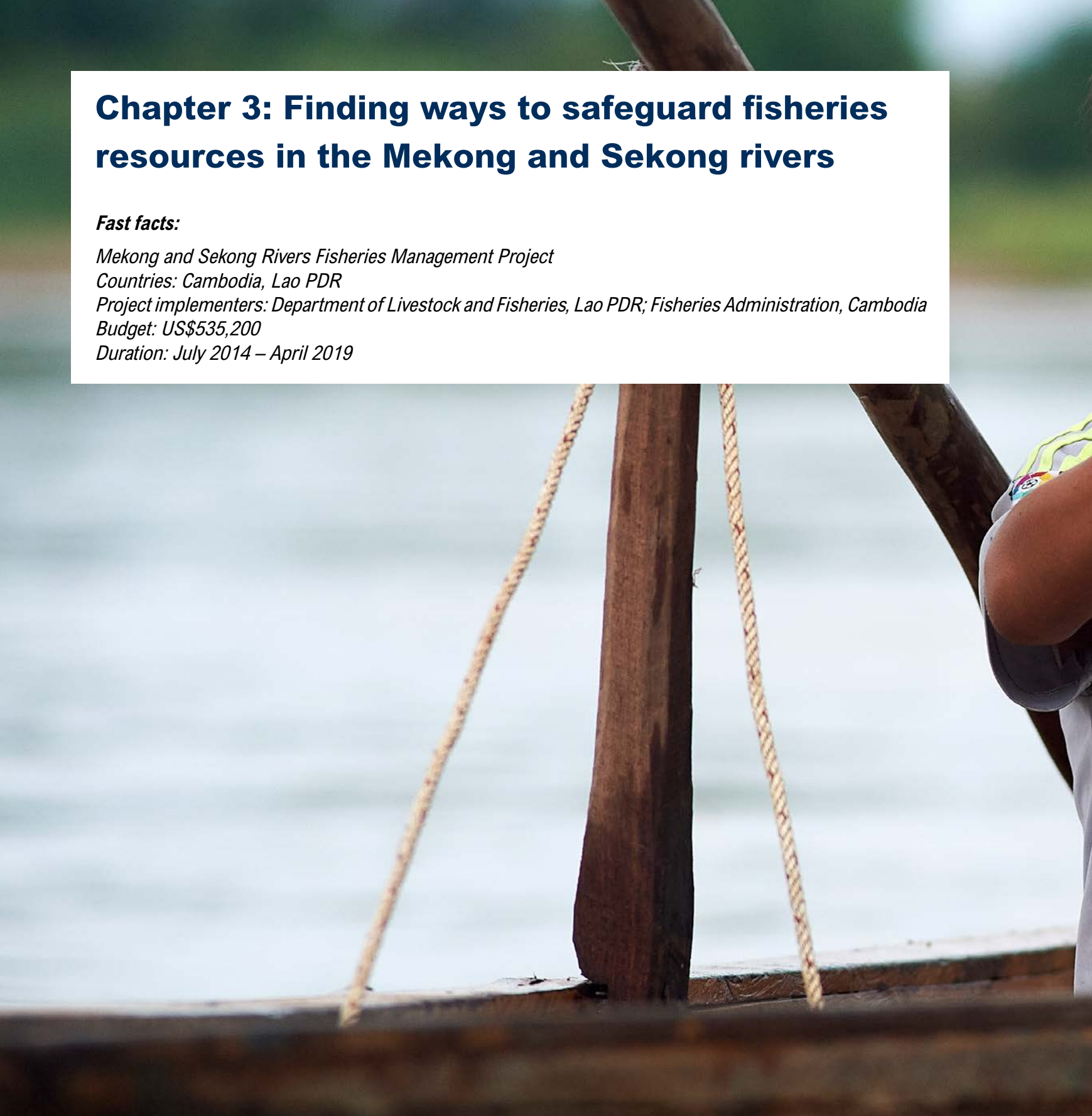
Mekong and Sekong Rivers Fisheries Management Project

Countries: Cambodia, Lao PDR

Project implementers: Department of Livestock and Fisheries, Lao PDR; Fisheries Administration, Cambodia

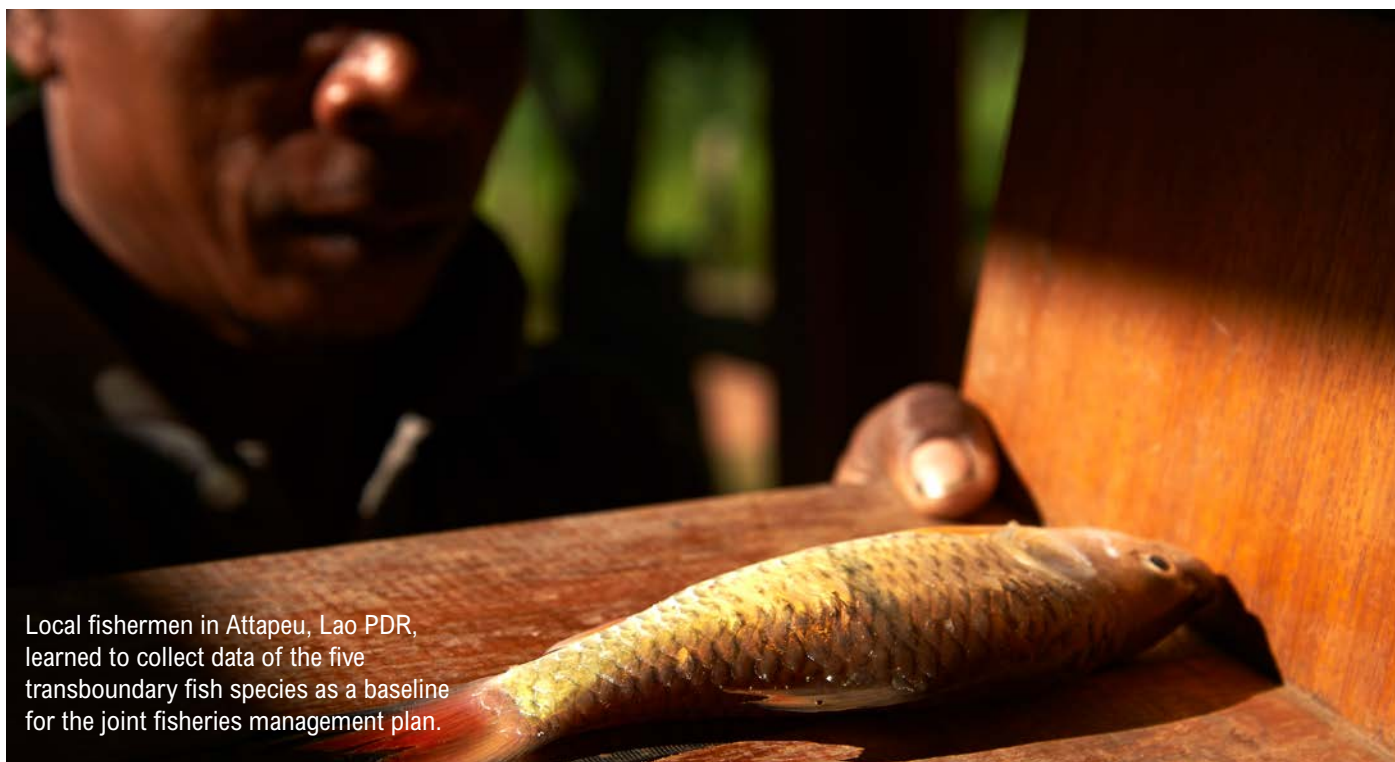
Budget: US\$535,200

Duration: July 2014 – April 2019





Local people fishing in the Mekong River in Stung Treng, Cambodia.



Local fishermen in Attapeu, Lao PDR, learned to collect data of the five transboundary fish species as a baseline for the joint fisheries management plan.

Cross-border cooperation to conserve fisheries

The Sekong River originates in the Central Highlands of Viet Nam and flows through southern Lao PDR and north-eastern Cambodia to join the mighty Mekong River. Both rivers are rich in resources, with more than 210 fish species, including the endemic Irrawaddy dolphin and more than 60 migratory fish varieties, counted in the Sekong River. ^(iv)

The rivers provide a migratory corridor for many large, highly prized whitefish species, and they offer spawning, refuge and feeding habitat for many other species of fish. The area where the two rivers meet, along the Cambodian–Lao border, is among the richest fishing grounds in the Lower Mekong Basin.

Yet, both rivers face many threats. Exploitative fishing practices and accelerated infrastructure developments, such as hydropower and irrigation schemes, degrade fish habitats. To address the issue of declining fisheries resources, the Mekong Integrated Water Resources Management Project dedicated some of its efforts to improve transboundary conservation and management of these rivers' ecosystems and fisheries resources.

Declining fisheries resources threaten livelihoods

To begin, this initiative identified common issues affecting both rivers. Declining fisheries resources quickly rose to the top of the list. Growing demand, illegal and exploitative fishing methods, and climate change lead to fewer and smaller fish being caught in the area, with knock-on consequences for livelihoods and incomes.

In addition, impacts from development projects, particularly upstream hydropower dams, are causing trouble. As fish are no longer able to migrate upstream to important breeding sites, nor migrate downstream for feeding and refuge during the dry season, productivity is declining. A reduction of cumulative sedimentation due to dam development is also expected to negatively impact freshwater fisheries.

Finally, limited provisions and capacities for sustainably managing fisheries on both sides of the border have made it difficult to respond to these challenges. Current arrangements are hampered by a lack of skills, funding, resources and cross-border communication. Limited data and information also make it difficult to integrate fisheries management into current development plans and policies. Therefore, an improved transboundary coordination mechanism and a shared management plan are needed to successfully cooperate on restoring the fisheries resources that support food security and economies.

A new transboundary management plan for fisheries conservation

The project partners, under the auspices of the national Mekong committees, and with the technical support of the MRC, have prepared a transboundary fisheries management plan to begin addressing these transboundary issues.

This management plan is focused on regulating the multi-gear fisheries operating in Champasak and Attapeu provinces, Lao PDR, and in Steung Treng and Kratie provinces, Cambodia. The goal is to increase migratory fish stocks to levels that maximise their sustainable yields.

To achieve this goal and specific objectives described in the plan, the fisheries authorities of Cambodia and Lao PDR have agreed to reduce prohibited and harmful fishing practices in key locations. To evaluate the impact, five select species of migratory whitefish stocks were monitored: *Pangasius larnaudii* (black spotted catfish), *Pangasius conchophilus* (snail-eating Catfish), *Cirrhinus microlepis* (small-scale river carp), *Mekongina erythrospila* (striped river barb) and *Helicophagus waandersii* (pangasid catfish).

These five species were prioritised for monitoring due to their commercial importance, contribution to food security, need for long-distance migrations, and occurrence in the Mekong and Sekong rivers. Whether they were listed as threatened by the International Union for Conservation of Nature also played a role.

The performance of the plan will be evaluated each year, based on targets related to fish abundance and illegal fishing operations. If the plan proves successful, its scope may be broadened to include other management measures, geographic foci and objectives in the future.

Next steps: Putting the plan into action

A new transboundary fisheries management body has been formed to represent key stakeholder institutions from national and provincial fisheries administrations, local authorities, research centres and the Lao and Cambodian national Mekong committees.

The project partners met in April 2019 to formalise their commitments to jointly implementing the new management plan and to convene the first meeting of the transboundary fisheries management body, which will be tasked with scheduling, implementing and evaluating activities to conserve and manage fisheries in the area between the two countries.



Fish is the most important protein source in Stung Treng, Cambodia.







An Irrawaddy dolphin in the Mekong River,
Prek Kampi, Kratie, Cambodia.



Chapter 4: Working across borders to share water, reduce risks and maximise benefits

Fast facts:

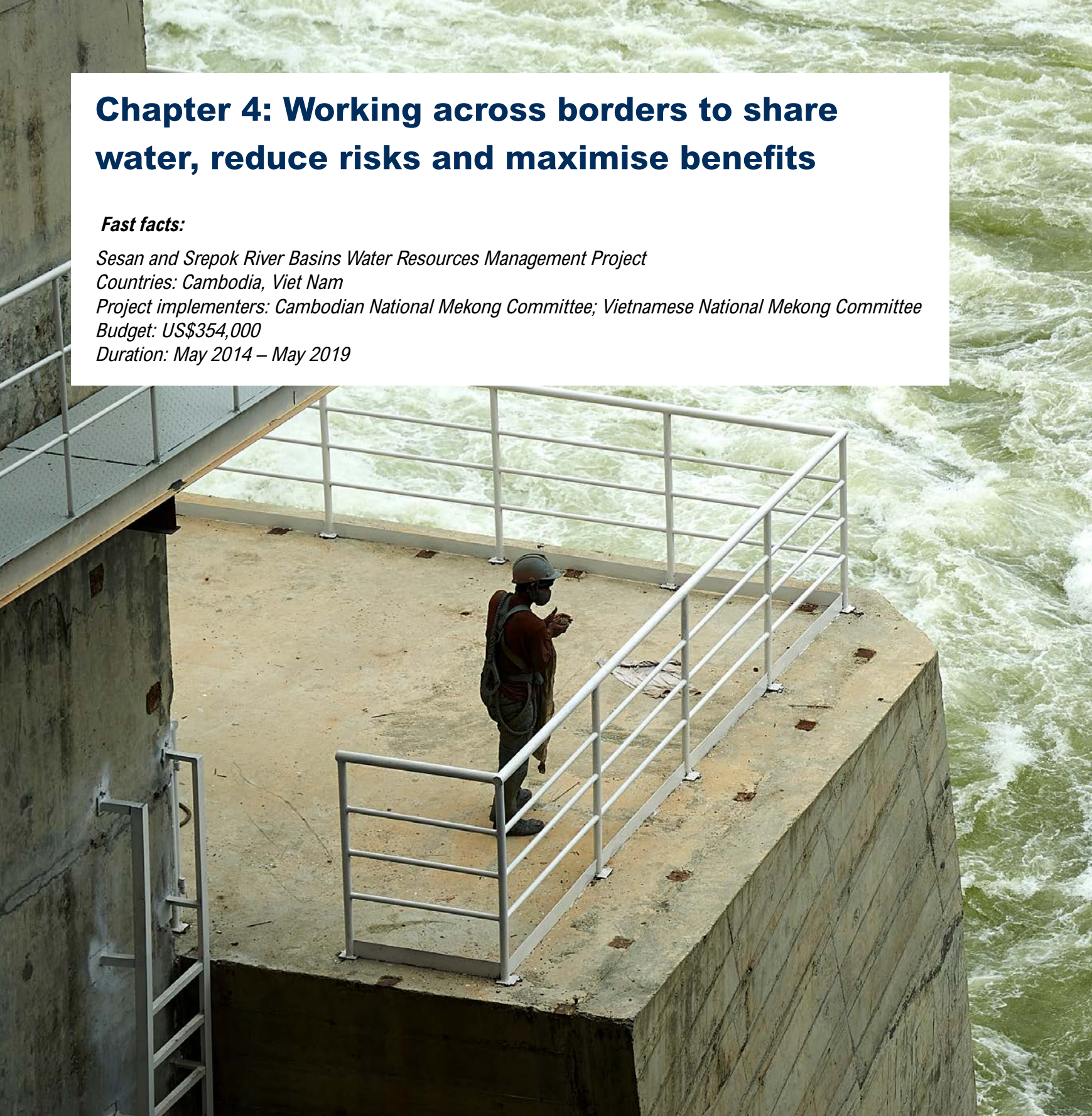
Sesan and Srepok River Basins Water Resources Management Project

Countries: Cambodia, Viet Nam

Project implementers: Cambodian National Mekong Committee; Vietnamese National Mekong Committee

Budget: US\$354,000

Duration: May 2014 – May 2019





The Sesan 2 hydropower project in
Stung Treng, Cambodia.



The Sesan River and the Sesan 3A hydropower project, Gia Lai, Viet Nam.



Female staff in the control room of the Srepok 3 hydropower project, Ban Me Thuot, Viet Nam.

Sesan and Srepok: two major rivers give life to Cambodia and Viet Nam

The Sesan and Srepok Rivers are two of the Mekong River's greatest tributaries. They flow from the Long-Range Mountains in Viet Nam's Central Highlands and down to north-eastern Cambodia where they join the Mekong.

Both river basins are known to have important ecosystems with many different fish species. Importantly, more than 80 different species depend on the free flow of rivers to be able to migrate from the Tonle Sap Lake and Cambodian floodplains into the Sesan and Srepok river basins to spawn. These basins provide crucial benefits for the 3.2 million people living within their bounds. ^(v)

In Viet Nam, the upper reaches of the two rivers have been heavily developed, with infrastructure for hydropower and irrigation. The upper Sesan River has seven hydropower dams, including the Yali Falls dam. The total electricity capacity of these dams is 1,866 MW. The upper Srepok River also has seven hydropower dams, with a total electricity capacity of 787 MW. ^(vi)

On the Cambodian side of the border, the lower parts of these two rivers have been less developed, except from the existing Lower Sesan 2 hydropower dam. Because Cambodian farmers have had few opportunities to store and access water during the dry season so far, new, large-scale irrigation schemes drawing water from the Sesan and Srepok Rivers are likely to be developed over the coming years.

However, the existing infrastructure has already significantly modified the natural hydrological regime of both river systems. The upstream hydropower dams mean that large volumes of water are now stored upstream, until released when beneficial for power production. This does not necessarily meet the needs of other users and uses within the basins. The results include flash floods and droughts, soil erosion, deterioration of the watershed and degradation of water quality beyond borders.

Future hydropower and extensive irrigation developments would further disrupt the water quality and health of the aquatic ecosystems, leading to a decline in fishery resources and a loss of biodiversity that would affect the quality of life in the riverine communities.

To address these challenges and better manage water resources in these two basins, one initiative under the Mekong Integrated Water Resources Management Project has worked to improve the framework for cooperation between Cambodia and Viet Nam since 2014.

Managing risks and trade-offs from large-scale water infrastructure

As a first step, the MRC facilitated discussions between the respective National Mekong Committees and other national stakeholders to identify the top barriers to fair and equitable management of the shared water resources.

Overall, the biggest challenges were identified to be the lack of transboundary cooperation mechanisms, insufficient sharing of information on water flows, inadequate flood control and warning systems as well as limited mitigation measures to address the impacts of hydropower development.

Both countries are all too aware of the dangers of such shortcomings. In 2000, during the construction of the Yali Dam on the upper Sesan River, the dam operators tested the spillway gates during the dry season, resulting in an unexpected flood that caused loss of lives and assets downstream in Cambodia. While the government of Viet Nam immediately established a range of mitigation measures, opportunities to better prevent, prepare for and respond to such disasters still exist.

That's one of the reasons why flood forecasting, control and warning at the national and transboundary levels has been prioritised as a key focus of future cooperation. Likewise, comprehensive basin-wide monitoring and assessment of water flows has been deemed essential.

Finally, stakeholders agree that successful cooperation on water resources management hinges on the open disclosure of information. Data sharing between Cambodian and Vietnamese government departments will be important, and it will be equally crucial to include local communities in decision-making process for how these rivers are managed and used.

Planning a better framework for transboundary cooperation

The governments of Cambodia and Viet Nam have agreed to establish a joint transboundary cooperation mechanism that can function as a framework under which the countries can strengthen cooperation and dialogue to improve long-term sustainable management of the basins.

The mechanism will feature several sub-mechanisms – such as high-level decision-making committees, technical working groups and emergency response teams – that will work together to address issues at the political, strategic, technical and operational levels. These efforts will complement the work of existing departments and regulatory bodies at the national and basin levels, and they will supplement existing

MRC procedures and high-level councils that work to further transboundary cooperation.

It is envisioned, for example, to establish a transboundary emergency planning team to strengthen communication between relevant Cambodian and Vietnamese authorities to improve the efficiency of response to major floods, such as the one from the Yali Falls dam in 2000. Similarly, a basin storage managers group, comprised of staff from hydropower projects and representatives from provincial authorities across the basin, is planned. This is to ensure that the dams and weirs across the river basin are operated and maintained in accordance with current operation rules as well as to ensure that water is released from the dams in a coordinated and safe manner.

Finally, it has been proposed to streamline and consolidate existing information-sharing systems, making them more accessible to those that live within the river basins. Such systems could include improved data and information on rainfall, stream flows, water storage levels, water quality and more.

The next steps for this new cooperation mechanism include formulating a joint action plan, which is expected to be completed by mid 2019. The Cambodian and Vietnamese national Mekong committees will champion the joint action plan and move ahead with its implementation.



Staff working at the Highland Regional Hydro Meteorological Center, Gia Lai, Viet Nam.



The Cambodian girl is pointing out marks that show how high the water rose during a sudden flood in 2000.



The house inundated by the Sesan 2 hydropower project has been abandoned in Stung Treng, Cambodia.



The sudden flood in the year 2000 left a yellow stain on the classroom wall in the Phum Phi School, Cambodia.



Local people in Phum Phi village, Ratanakiri province, Cambodia.

Livelihood activities, Gia Lai, Vietnam.



Coffee is a major crop grown in Viet Nam's Central Highlands.





Public water source with clean drinking-water in a village inhabited by the Jarai ethnic group, Gia Lai, Viet Nam.



Livelihood activities, Gia Lai, Vietnam.

Chapter 5: A new plan for managing precious water resources across the Mekong Delta

Fast facts:

Mekong Delta Water Resources Management Project

Countries: Cambodia, Viet Nam

Project implementers: Cambodian National Mekong Committee; Vietnamese National Mekong Committee

Budget: US\$354,000

Duration: May 2014 – May 2019

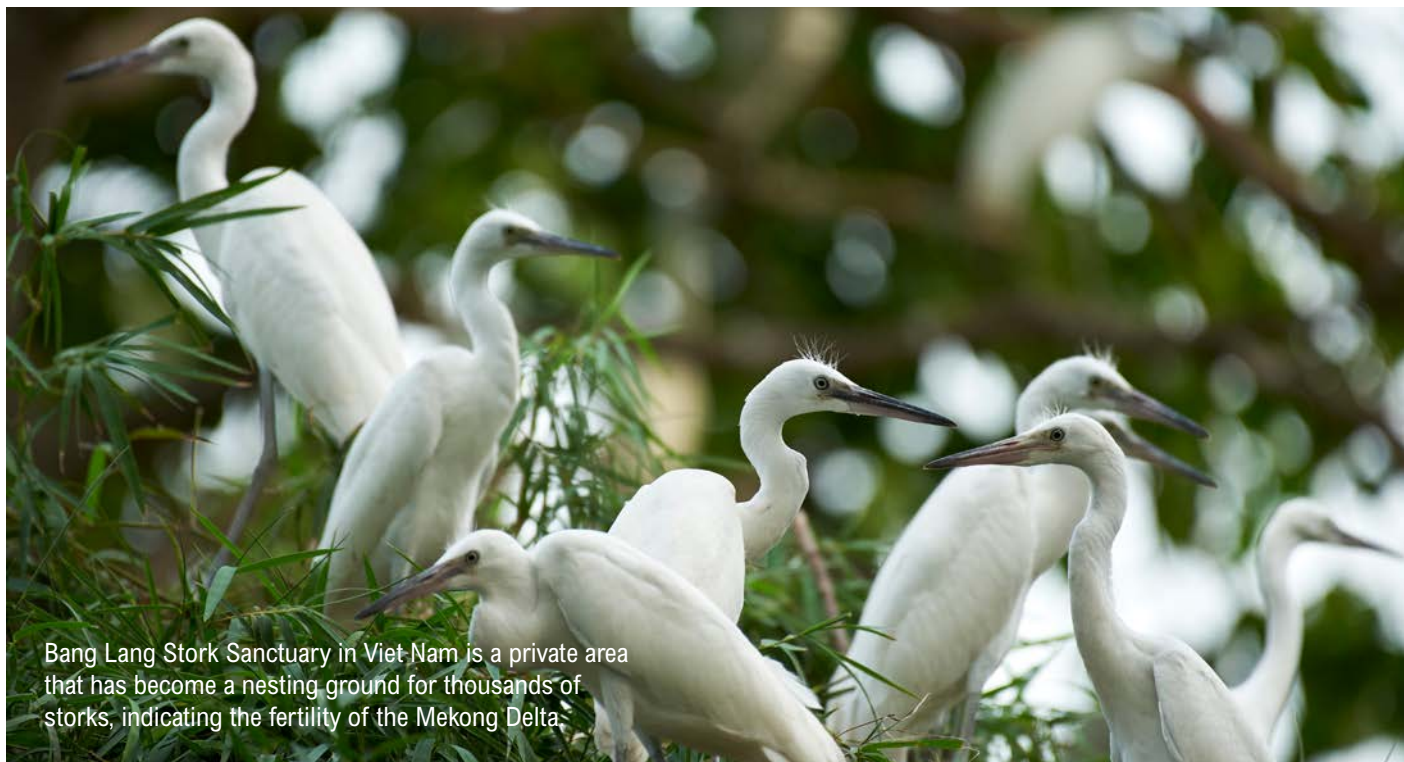


A local resident carries small fish-traps in Takeo, Cambodia.





The network of irrigation systems in An Giang, Viet Nam, supports a vast area of paddy fields.



Bang Lang Stork Sanctuary in Viet Nam is a private area that has become a nesting ground for thousands of storks, indicating the fertility of the Mekong Delta.

A unique delta provides food and livelihoods for millions

The Mekong Delta is the world's third largest delta, spreading across more than 68,000 km² of fertile floodplains, marshes and wetlands.^(vii) To the west, the delta borders Kratie town, located on the Mekong River in central Cambodia, while it extends to the East Sea in southern Viet Nam.

About 24.6 million people live in the delta, which provides a wide range of ecosystem services to support fisheries, aquaculture, agriculture and local livelihoods.^(viii) The delta has been nicknamed the region's 'rice basket' due to its highly significant contribution to food production in both Cambodia and Viet Nam.

Long-time infrastructure development in the Mekong Delta has been aimed at managing water resources. During the past 300 years, an extensive network of canals and dikes has been constructed, now amounting to 7,000 km of main canals, 4,000 km of secondary canals for on-farm systems and more than 20,000 km of protection dikes.

These developments, which have almost exclusively taken place on the Vietnamese side of the border, have served to protect against floods, control salinity and divert water for irrigation. On the Cambodian side, however, there is a lack of efficient irrigation infrastructure.

Despite its current riches, this region is highly vulnerable to adverse impacts from upstream hydropower projects, climate change and unsustainable water use. Consequences include severe floods and droughts, saltwater intrusion from the rising sea and water pollution. That's why the Mekong Integrated Water Resources Management Project in 2014 set out to improve the cooperation between Cambodia and Viet Nam to improve the framework for coordinating infrastructure development and water management.

Top challenges to conquer through future cooperation

Under this initiative, the MRC facilitated cooperation between the Cambodian National Mekong Committee and the Vietnamese National Mekong Committee as well as with national representatives to improve transboundary management of water resources.

As a first step, representatives from both countries worked to identify the issues that represent the biggest threats to the delta. These notably include a lack of transboundary flood and drought control, uncoordinated development of water infrastructure as well as limited understanding of how climate change and upstream hydropower projects impact resources in the delta.

The view from the top of Phnom Chisor shows a vast area of paddy fields and irrigation systems in Takeo province, Cambodia.



The cycle of floods and droughts is complex in the Mekong Delta. Cambodia and Viet Nam normally experience heavy annual floods in the wet season and drought in the dry season. The annual floods are essential for rice production, but also pose risks. The many canals and dikes also affect flood patterns, but the consequences are not always well understood. For example, flood-control infrastructure in Viet Nam may cause devastating floods in Cambodia and vice versa. Better coordination between the two territories is needed to ensure that new infrastructure has the intended effect, while not having negative impacts elsewhere.

Another key concern is the cascading hydropower project development upstream on the Mekong River and its tributaries. This is likely to cause much greater fluctuations in water flows, with knock-on consequences for livelihoods and productivity, such as increased salinity intrusion and decreased deposits of nutrient-rich sediments that are essential for agriculture.^(ix) Climate change has exacerbated these impacts recently and also further complicates the likely impacts of cascading hydropower dams in the Mekong Basin.

Proposed priorities for future cooperation

Due to the significant overlap in challenges and geographical scope, the joint transboundary cooperation mechanism detailed in the previous chapter is envisioned to ensure cooperation not only within the Sesan and Srepok river basins, but also across the Mekong Delta.

The draft action plan, which Cambodian and Vietnamese stakeholders have collaborated on, identifies priorities specific to the delta. These include a focus on improving water security to support rural development, food security and the environment. This hinges on creating better access to high-quality data and information on the current state of the environment and hydrological systems.

As in the Sesan and Srepok basins, better management of floods and droughts is also considered an important objective. It is envisioned, for example, to establish a flood and drought warning system using mobile technology so that people living even in rural areas will be able to prepare for and respond to emergencies.

A transboundary group of technical experts will facilitate knowledge sharing and skills building within the areas of meteorology, hydrology and ecology. It is expected that such efforts will further evidence-based, collaborative management of water resources in the Mekong Delta.

The joint action plan for water resources cooperation between Cambodia and Viet Nam will, once finalised and put into action, seek to ensure integrated water resource management and sustainable development of the Mekong Delta as well as the Sesan and Srepok river basins to build the business community's confidence to invest in the region, while preserving the social and environmental benefits for current and future generations.



Lor Terk Trey village, Takeo province, during the wet season when paddy fields are covered by floodwater.







Coconut fibres are collected and exported to Malaysia and China for making carpets. Ben Tre province, Viet Nam.



Children at a local floating market in Chau Doc, Viet Nam.

ENDNOTES

- i MRC. (n.d.) *Mekong basin*. Available at <http://www.mrcmekong.org/mekong-basin/> (accessed on 14 March 2019).
- ii MRC. (2018) *Mekong Climate Change Adaptation Strategy and Action Plan*. 58 pp.
- iii The Nation. *Sakon Nakhon flood damage estimated at over Bt100 million* (29 July 2017). Available at <http://www.nationmultimedia.com/detail/breakingnews/30322185> (accessed on 21 February 2019).
- iv Baran, E., Chheng, P., Johnstone, R., Nao, T., So, N. and Touch, B. (2013) Mainstream dams in Cambodia and their impact on food security. Mekong Environmental Symposium. Ho Chi Minh City, Viet Nam, 5–7th March 2013.
- v Watt, B. (2015) Strategic priorities for trans-boundary water cooperation in the Sekong, Sesan and Sre Pok (3S) basins. 48 pp.
- vi MRC. (2017) Transboundary water resources management issues in the Sesan and Srepok river basins. 44 p.
- vii Mak, S., Pheng, S., Khuon, K., Sin, C., Tes S., Chea T., Vang, R., and Sou, V. (2011) Profile of the sub-area Stung Treng (SA-6C).
- viii Mekong River Commission (2017). Transboundary water resources management issues in the Mekong Delta. 32 pp.
- ix DHI. (2015) Study on the Impact of Mainstream Hydropower on the Mekong River.

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