Transboundary Fisheries Management Issues

in the Mekong and Sekong Rivers of Cambodia and Lao PDR

Mekong and Sekong Rivers
Fisheries Management Project

under

Mekong Integrated Water Resources
Management Project

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Mekong River Commission
Cambodia, Lao PDR, Thailand, Viet Nam
For Sustainable Development

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MRC Secretariat
184 Fa Ngoum Road, P.O. Box 6101, Vientiane, Lao PDR
Tel: +856 21 263 263
Fax: +856 21 263 264
e-mail: mrcs@mrcmekong.org
www.mrcmekong.org

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Abbreviations

BDS	Basin Development Strategy
CFi	Community Fisheries in Lao PDR
CNMC	Cambodia National Mekong Committee
CPUE	Catch Per Unit of Effort
DLF	Department of Livestock and Fisheries, Ministry of Agriculture and Forestry, Lao PDR
FADM	Fisheries Abundance and Diversity Monitoring
FiA	Fisheries Administration, Ministry of Agriculture, Forestry and Fisheries Cambodia
FMC	Fisheries Management Committee in Cambodia
Ha	Hectares
IWRM	Integrated Water Resources Management
IUCN	International Union for Conservation of Nature
JC	Joint Committee
Kgs	Kilograms
Kms	Kilometres
LNMC	Lao National Mekong Committee
LMB	Lower Mekong Basin
M	Metres
MA	Mekong Agreement 1995
MIWRM	World Bank Mekong Integrated Water Resources Management Program
M-IWRMP	MRC Mekong Integrated Water Resources Management Project
MM	Millimetres
MoU	Memorandum of Understanding
MRC	Mekong River Commission
OAAs	Other Aquatic Animals
PDIES	Procedures of Data and Information Exchange and Sharing
PNPCA	Procedures for Notification, Prior Consultation and Agreement
PMFM	Procedures for the Maintenance of Flow on the Mainstream
PWUM	Procedures for Water Use Monitoring
PWQ	Procedures for Water Quality
TBFMP	Transboundary Fisheries Management Plan
WUP	Water Utilization Programme

1. Introduction and Objectives

In November 2009, the Mekong River Commission (MRC) initiated the Mekong Integrated Water Resources Management Project (M-IWMRP) as a follow up to the Water Utilization Programme (WUP). This was in partnership with the World Bank and the Australian Department of Foreign Affairs and Trading. The project is comprised of three inter-linked components:

- Implementation of an Integrated Water Resources Management (IWRM) regional framework that includes water resources planning and management tools, procedures and guidelines, process and capacity to support the 1995 Mekong Agreement.
- Transboundary initiatives jointly designed and implemented applying IWRM principles and demonstrating mechanisms for joint planning and implementation of projects identified as part of the MRC-led basin development planning process.
- Strengthened policies, institutional arrangements and planning and management capacity for IWRM in the Lower Mekong Basin (LMB) countries.

Commencing in 2012, the six-year World Bank Mekong IWRM Program (MIWRM) has provided support to implement the transboundary and national initiatives of the MRC M-IWRMP. The objective of the MRC M-IWRM Project is to support LMB governments to establish key examples of IWRM practices at the regional, river basin and local levels. Focus areas are IWRM planning and management, institutional support, and strengthening water resources information, data collection and modelling.

It has three phases: Phase 1 (MRC and Lao PDR, 2013-2018), Phase 2 (Viet Nam, 2016-2021) and Phase 3 (Cambodia, 2016-2021). The MRC is responsible for managing the bilateral transboundary projects between the Member Countries under the Phase 1 MRC projects. In the context of the Mekong and Sekong Rivers Fisheries Management Project, the transboundary activity is linked with the national activity in fisheries management occurring within the Champassak province of Lao PDR and the Stung Treng province of Cambodia, under Phase 1 and Phase 3 of the MIWRM Program.

The M-IWRM Phase 1 (MRC) includes five transboundary projects, which one of them is the Mekong and Sekong Rivers Fisheries Management Project, between Cambodia and Lao PDR. The objective of the Mekong and Sekong Rivers Fisheries Management Project is: *fisheries management is improved in the bordering provinces of Stung Treng and Kratie in Cambodia and Champassak and Attapeu in Lao PDR.*

Project outcomes are:

1. A Joint Transboundary Issues Paper, supported by the Cambodia National Mekong Committees, that identifies common issues and challenges, and information and data sharing needs, related to transboundary fisheries management.
2. Development and agreement on coordination mechanisms for sharing information and improving cooperation between Cambodia and Lao PDR to assist in addressing the joint challenges.
3. A Joint Action Plan to implement coordination mechanisms to help address priority transboundary challenges.

This report represents the key output for Outcome 1.

1.1 MRC IWRM-based Basin Development Strategy

The MRC IWRM-based Basin Development Strategy (BDS) 2016-2020 for the LMB replaces the first Basin Development Strategy (2011-2015), building on this strategy through increasing regional dialogue and cooperation, strengthening basin-wide procedures and guidelines, improving water related monitoring and information management and enhancing national plans and projects to increase national and basin-wide benefits, minimise transboundary impacts, and provide water security. It has been jointly prepared by the Member Countries of the MRC (Cambodia, Lao PDR, Thailand and Viet Nam), and shaped by input from riparian stakeholders at all levels.

The IWRM-based BDS for 2016-2020 guides water utilization, development and conservation for the MRC Member Countries to address water conflicts in the LMB. More importantly, the IWRM-BDS guides the national governments to develop integrated transboundary water resource management and planning to ensure water, food and energy security for people living along the Mekong River; regional cooperation and integration; national benefits and reduced transboundary impacts.

1.2 MRC Strategic Plan and M-IWRM Project

The MRC Strategic Plan 2016-2020, which replaced the MRC Strategic Plan 2011-2015, was developed drawing from lessons learned from the previous cycle of planning and the implementation of the BDS 2011-2015. The MRC Strategic Plan 2016-2020 sets the framework to achieve its strategic objectives, including the vision for the Basin and the MRC, the long-term goal, the MRC's mission, and the MRC's Core Functions. The Strategic Plan tackles, both medium and long-term needs and challenges for the Mekong River Basin that are at the regional level. The MRC will achieve its strategic objectives through the following seven outcomes identified in the Strategic Plan:

1. Increased common understanding and application of evidence-based knowledge by policy makers and project planners.
2. Environmental management and sustainable water resources development is optimised for basin-wide benefits by national sector planning agencies.
3. Guidance for the development and management of water and related projects and resources, shared and applied by national planning and implementing agencies.
4. Effective and coherent implementation of the MRC Procedures by the Member Countries.
5. Effective dialogue and cooperation between the Member Countries and the strategic engagement of regional partners and stakeholders on transboundary water management.
6. Basin-wide monitoring, forecasting, impact assessment and dissemination of results strengthened for better decision-making by the Member Countries.
7. MRC transitioned into a more efficient and effective organisation in line with the Decentralisation Roadmap and related reform plans.

Building on 16 years (2000-2015) of achievements by the MRC, the M-IWRMP has directly supported and assisted the Member Countries with implementing IWRM approaches in national water resources management and related sectors, to support sustainable and equitable regional development on a basin-wide scale, including fisheries management.

2. Profile of the Mekong and Sekong Rivers

2.1 General Characteristics of the Basins

The Mekong and Sekong Rivers make up the project area for the transboundary fisheries management project. The Mekong and Sekong River Basins covers parts of Champassak and Attapeu provinces in Lao PDR and Stung Treng and Kratie provinces, in Cambodia. **Figure 1** shows the administrative, river basin boundaries and river systems and location of the pilot sites of the Mekong and Sekong project area.

The Sekong River is one of the largest tributaries of the Mekong River taking up a total area of 28,414 square kilometres (km^2), with 22,455 km^2 lying in Lao PDR, 5,417 km^2 in Cambodia and also 541 km^2 in Viet Nam. The total length of the Sekong mainstream from the headwaters, starting in Viet Nam, to the confluence in the Sesan and Srepok in Cambodia, is 516 km (Meynell, 2014). The Sekong River has a shared border between Cambodia and Lao PDR that measures 38 km.

The highest parts of the Sekong catchment reach 2,200 metres (m) above sea level, however the greatest proportion of the river is between 0-200 m above sea level (Meynell, 2014). The average annual precipitation in the upper catchment is 1,400-2,900 millimetres (mm). The lower part of the project area in Cambodia is between 60-100 m above sea level and has an annual precipitation of 1,700-2,300 mm.

The Mekong River functions as one ecological system, providing corridors for fish movement, linking spawning habitats in the upstream, with downstream nursery and feeding habitats, as well as, connecting dry season refuge habitats in the mainstream with feeding habitats on closed water bodies, swamps and flood plains. The Mekong and Sekong Rivers are both important in terms of their ecosystems, providing important natural resources and ecosystem services in situ and also downstream.

The Mekong River has an estimated 800 fish species, with approximately 580 freshwater fish species found in Lao PDR and 500 found in Cambodia. About 213 fish species are recorded in the Sekong River,

of which 64 are migratory (Baran et al., 2013). Of these 15 species are identified as super-endemic to the Sekong River, meaning they are not found anywhere else in the world. The Mekong River in the transboundary project area is characterised by the Khone falls in Lao PDR, with the Irrawaddy dolphin pool defining the border between Lao PDR and Cambodia. The project area is characterised by a low density of people living within the Sekong catchment, with approximately 200,000 living in Lao PDR and 25,000 living in Cambodia.

2.2 Water Demands of Mekong and Sekong River Basins

In the Mekong and Sekong Rivers, there are currently three operational hydropower schemes, two in Lao PDR – the Houay Ho and Xe Kamman 3 Hydropower projects, and one in Cambodia – the Loui Hydropower project. However, there are approximately 22 hydropower schemes planned in Lao PDR. There are also a number of small irrigation schemes in both Lao PDR and Cambodia. The water demands from current and future developments, as well as upstream, will impact on the fisheries within in the project area.

Freshwater capture fisheries are important in the Mekong and Sekong project area, with the total estimated capture fisheries for the LMB generating an annual revenue of US$17 billion (Nam et. al., 2016), with the majority from the Sekong River (99 kilograms (kg) per person per year), (Constable, 2015). In Lao PDR, the direct value of fisheries in Champassak and Attapeu provinces, based on average fish consumption and production from aquaculture, is approximately US$104 million. This figure does not account for the catch that fishers sell (30-70% of the total catch) and indirect value from fisheries related activities e.g. fish marketing, processing, and manufacture of fishing gear. In Cambodia, the total capture fish production is 8,950 tonnes in the Kratie province and 7,845 tonnes in the Stung Treng province, with an economic value at US$17.9 million in Kratie and USS15.7 million with a price of US$2 per kg. Fish consumption is 70 kg per person per annum in Stung Treng (FiA, 2014).

Table 1: Attributes of the Project Area within the Mekong and Sekong Rivers

Attribute	Sekong and Mekong	
	Cambodia	Lao PDR
Basin Area (km^2)	5,700 (Sekong)	22,455
Elevation Range (m)	60-100	100-300
Population	509,917	198,115
Annual Precipitation (mm)	1,700-2,300	2,110-2,510
Irrigation (ha)	Unknown	21,537
Existing Hydropower Dams	2	2
Planned Hydropower Dams	0	22

Figure 1: Administrative and Hydrological Boundaries of the Mekong and Sekong Project Area

2.3 General Water Development Trends and Potential Impacts

Under the Greater Mekong Sub-region and ASEAN frameworks, the need and aspiration for electricity and regional economic integration has increased in the LMB. The Member Countries are exploring opportunities for development particularly with regards to hydropower development, transmission line extension (from one country to another), irrigation development for intensive agriculture, and aquaculture development.

The LMB region is also being shaped by rapid socio-economic change as the riparian countries move towards middle and high-income status (Watt, 2015). Existing infrastructure and future developments such as hydropower, mining, agricultural irrigation, legal or illegal logging, and, leases for industrial agricultural development have accelerated in the 3S River Basins (Sekong, Sesan and Srepok Rivers) region, and the project area (Someth et al., 2013).

The Mekong and Sekong River Basins are likely to face many issues and challenges in the future including flood, drought, reduction in the sustainability of fisheries, and sedimentation.

Likely impacts may include: further alteration of river flow regimes; sediment and nutrient transportation; land use change; soil erosion; deterioration of the watershed; an increase in flash floods and drought; water quality degradation and increased pollution; and deterioration of biodiversity and ecology including aquatic ecosystems and fisheries; and decreased sustainability of the livelihoods of local communities. **Figure 2** shows the location of existing and planned hydropower projects in the project area.

2.4 Status of Transboundary Water Resources Management of the Mekong and Sekong Rivers

2.4.1 Overview of MRC Procedures

The 1995 Mekong Agreement is a dynamic “framework agreement” that enables and requires the MRC to adopt and refine rules and procedures to carry out its work in close cooperation and coordination with relevant agencies and member countries. It identifies key activities and mechanisms that support the sustainable and equitable use, utilization and protection of the Mekong water and water related resources. Under the Water Utilization Programme (WUP), the MRC and the Member Countries agreed to develop (at least six) sets of rules for water utilization for the LMB. There are five MRC Procedures, and supporting technical guidelines that have been developed that provide a systematic and uniform process for implementing the 1995 Mekong Agreement, which include:

- Procedures for Data and Information Exchange and Sharing (PDIES) was approved by the MRC Council on 1 November 2001 and the Technical Guidelines for the implementation of the PDIES adopted by the MRC Joint Committee (JC) in July 2002, which provide rules on the sharing and exchange of data and information.
- Procedures for Notification, Prior Consultation and Agreement (PNPCA) was approved by the MRC Council on 13 November 2003 and the Technical Guidelines for implementation of the PNPCA adopted by the JC on 31 August 2005, which provide rules on the referral of a proposed use of water on the mainstream and tributaries of the Mekong.
- Procedures for Water Use Monitoring (PWUM) was approved by the MRC Council on 13 November 2003 and the Technical Guidelines for the implementation of the PWUM was

Figure 2: Existing and Planned Hydropower Projects in the Mekong and Sekong Project Area

adopted by the JC on 5 April 2006, which provide rules on water use that may have a significant impact on the flows or water quality.

- Procedures for the Maintenance of Flow on the Mainstream (PMFM) was approved by the MRC Council on 22 June 2006. The intent of the PMFM is to provide guidance on cooperation on the maintenance of a mutually acceptable hydrological flow regime on the mainstream to optimise the multiple uses and mutual benefits of all riparian countries and to minimise the harmful effects.
- Procedures for Water Quality (PWQ) approved by the MRC Council on 25 January 2011 and the technical Guidelines for the implementation of the PWQ were approved by the MRC JC on 22 November 2016, which provide guidance on water quality parameters and monitoring techniques.

The Procedures are important in guiding the water use in the Mekong River Basin to encourage cooperation between the Member Countries.

2.4.2 Status of Cooperation between Cambodia and Lao PDR

Transboundary cooperation between Cambodia and Lao PDR was originally established in 2006. Within this cooperation framework the focus was on transboundary wetland management, in particular in the Veunkham (Lao PDR) and Anloung Chheu Teal (Cambodia) pools. For example, a meeting on transboundary wetland management in Champassak and Stung Treng held in Pakse, Lao PDR, 24 March 2006, chaired by Mr. Va Vuthara, Vice-Governor of Stung Treng province, and Mr. Somsanith Boutivong, Vice-Governor of Champassak province agreed that the following fisheries management issues required attention:

1. Use of illegal fishing methods (e.g. poison, dynamite) in the dry season.
2. Fishing in the Veunkham/Anloung Chheu Teal (dolphin) pool.
3. Fishing in spawning areas in some areas of the proposed Ramsar site in the Muangkong and Mounlapamok districts, Champassak province and the Ramsar site in the Thala Borivath district, Stung Treng province.
4. Lack of common closed fishing seasons.

This meeting, recommended solutions to these issues including the organisation of meetings between technical fisheries staff of each country to take actions to reduce the incidence of illegal fishing methods and determine appropriate ways of reducing unsustainable fishing practices within the transboundary locations, and the need for further research and analysis prior to the development of specific action plans to protect spawning areas.

A Memorandum of Understanding (MoU) was also signed in 2010 between the Fisheries Administration (FiA), Ministry of Agriculture, Forestry and Fisheries of the Kingdom of Cambodia and the Department of Livestock and Fisheries (DLF), Ministry of Agriculture and Forestry, Lao PDR. The objectives of the MoU were to: encourage direct communication and cooperation between their respective staff, and promote cooperation within areas of common concern that are mutually agreed upon, through the following activities:

- Exchange of information related to fisheries management, research and development, such as laws and regulations, statistical data, research results and publications, policy papers, extension materials.

- Identification and implementation of strategies and schemes for joint management of shared transboundary fisheries resources, aquaculture development and prevention and spread of fish disease.
- Exchange visits by staff, including joint meetings and workshops.
- Investigation of third parties to support human resource development in the fisheries sector of both countries.

This MoU was effective for five years (2010-2015) and whilst it is renewable this has not yet occurred. The Kingdom of Cambodia and Lao PDR also established the Lao-Cambodia Joint Commission for Bilateral Cooperation. This cooperation is effective at the ministerial level (Ministry of Foreign Affairs-Lao PDR and Ministry of Foreign Affairs and International Cooperation-Cambodia). The commission covers: (a) Politics and security, (b) Economic and technical cooperation, (c) Social cooperation and (d) Regional economic integration. Fisheries activities are included under the economic and technical cooperation category (Agriculture, Forestry and Fisheries). At the twelfth meeting of the Lao-Cambodia Joint Commission for Bilateral Cooperation, on 24 January 2014 both countries agreed to work toward the signing of a MoU between the two Ministries on specific areas for further cooperation in agriculture, forestry, fisheries, livestock and the prevention and control of illegal activities, particularly cross-border trade of timber and wildlife. However, this does not appear to have happened yet.

3. Methodology for Identifying the Priority Transboundary Fisheries Management Issues

An iterative approach was undertaken to identify the priority transboundary fisheries management issues and constraints based on the following general steps:

1. A review of relevant institutional, legislative, policy and planning documents at the national and regional levels (see Annex A).
2. A review of relevant development partner supported documents related to fisheries management and IWRM between Cambodia and Lao PDR.
3. Consultation with central and provincial level government and non-government stakeholders to clarify key challenges.
4. The undertaking of a questionnaire survey and checklist interviews (Annex B) with key relevant provincial government representatives, as well as Community Fisheries chiefs and members and NGO representatives, to identify key challenges and options to address these issues in Cambodia and Lao PDR.
5. The preparation of Cambodian and Lao PDR National Issues Papers on the Transboundary Fisheries Management on the Mekong and Sekong Rivers based on literature reviews and findings from stakeholder consultations and a questionnaire survey.
6. A review of the general status of the water sector in the Mekong and Sekong Rivers project area.
7. The identification of priority issues, constraints and management actions for fisheries management.
8. The MRC holding a number of joint workshops between CNMC and LNMC (May 2016 and

August 2016) to identify the priority transboundary challenges for transboundary fisheries management of the Mekong and Sekong River Basins based on findings from the national issues papers and the identification of five priority fish species for management through the Joint Action Plan (Transboundary Fisheries Management Plan).

9. The MRC holding a joint workshop to agree on the method, approach and next steps for implementation of a Joint Fisheries Monitoring Programme in the transboundary area of the project.

Figure 3 shows steps taken in developing the National and Joint Transboundary Issues Paper for the project.

4. Priority Fisheries Transboundary Issues in the Mekong and Sekong Rivers

4.1 Increased Fishing Effort

Background

The national surveys found in general that the demand on fish within the project sites has increased due to population growth and rapid economic growth in the large cities in Cambodia and Lao PDR, which leads to greater competition to catch large fish for trade. Meanwhile, new fishing gear technology has now been developed that encourage fishers to catch larger volumes of fish and the use of more exploitative fishing gear, more often, has increased fishing effort to satisfy the market demand. Because of the rapid growth of the population and economy, more people are fishing not only to support their own livelihoods but also to sell at the market. Thus, fish catch has declined and the current catch is characteristically dominated by undersized fish, with a notable reduction in large sized fish in the catch.

Concern

The transboundary fisheries resources are at risk from intense fishing pressure caused using more exploitative fishing gear and the irresponsible operations of local fishers. For example, harvesting all sizes of fish, which causes a decline of brood stock and new recruitment in the local fish population.

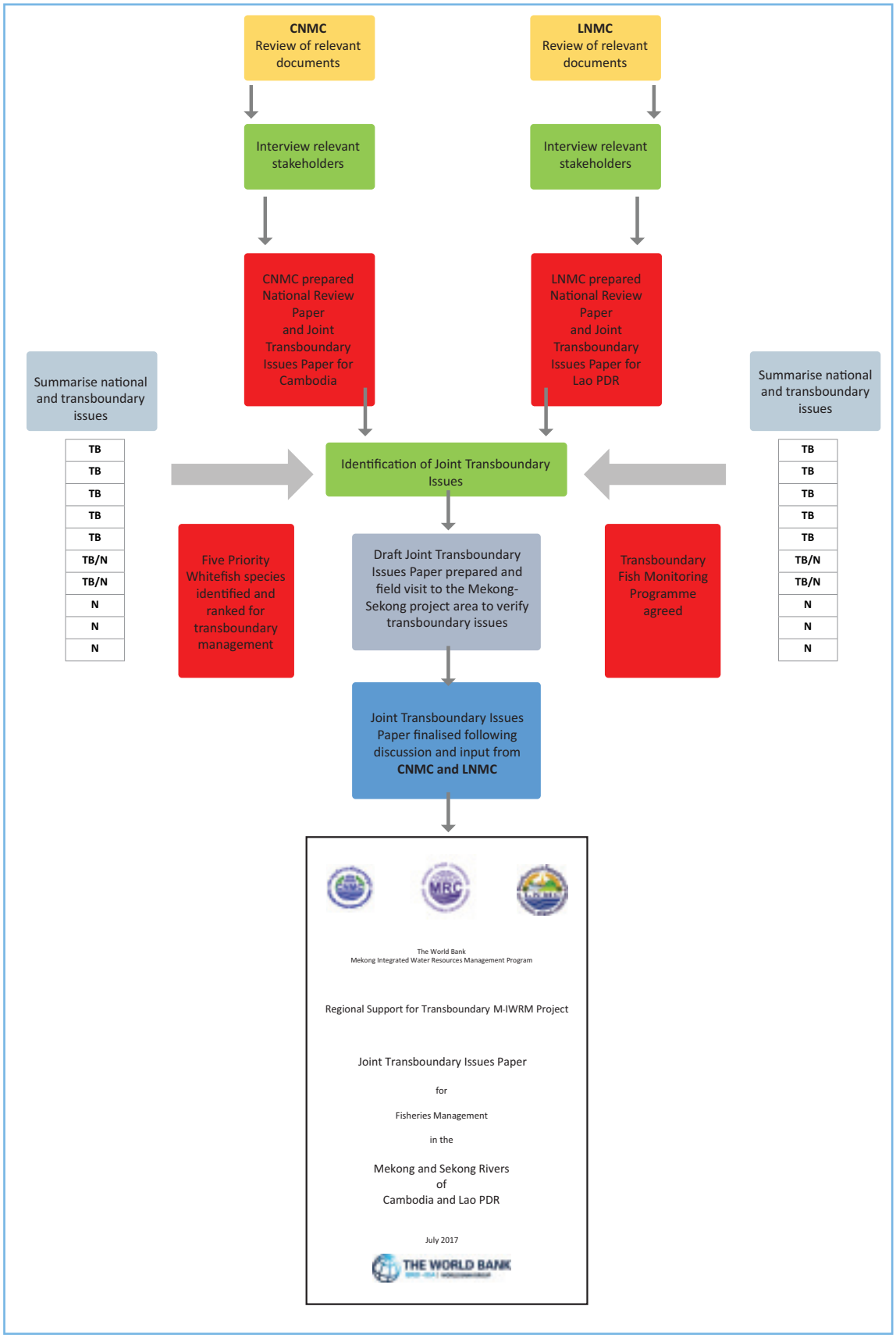
As many fish species follow a long-distance migration pathway from Tonle Sap, Cambodia, to above the Khone Falls, Lao PDR, the increased fishing effort within each country will directly affect the brood stock and new recruitment of fish within the study areas. Solving the problem is complicated and needs an integrated approach that balances the challenge of food security, whilst protecting the fisheries resources. Providing alternative livelihoods, e.g. aquaculture, livestock raising, and ecotourism may help fishers to earn more income to support their families and thus reduce the fishing effort.

4.2 Illegal Fishing Gear Use

Background

The results from the national issues papers showed that illegal fishing operations were the main concern for the fishers in the project areas. It has been reported that illegal fishing practices were undertaken by fishers from both inside and outside the villages, making it therefore very difficult to control and

Figure 3: Steps Taken in Developing the National and Joint Transboundary Issues Paper for the Mekong and Sekong Rivers Fisheries Management Project



manage, especially as fishing is often undertaken at night time and in isolated areas. This illegal fishing practices can lead to conflict as some people gain benefit over others by breaking the law.

Most of the illegal fishing methods, i.e., use of small mesh size, dynamite, poisoning and electro fishing are addressed in the Fisheries Laws of Cambodia and Lao PDR but law enforcement is ineffective and therefore illegal fishing practices are still occurring. It is interesting to note that most catch from illegal fishing practices are mainly used to sell at the market rather than supporting local livelihoods.

Concern

Pressure on the fisheries due to the use of illegal fishing methods and operations in Cambodia and Lao PDR, has seriously diminished fish populations and fish diversity (Phouthavong, 2014, Hortle et al., 2016). Livelihood diversification (e.g. aquaculture, livestock, ecotourism, etc.) and law enforcement are needed to ensure the sustainable use of fisheries resources both for food security and conservation of natural resources for future generations.

In Lao PDR, law enforcement is ineffective, with numerous illegal fishing methods being used that are exploitative and this is having a large impact on fish populations. Whilst these illegal fishing methods are prohibited under national fisheries law, people still use them. Similarly, in Cambodia, illegal fishing methods are carried out in many areas and it is difficult to control due to the lack of resources and control capacity to stop illegal fishing gear use.

In addition, illegal fishing methods are very difficult to detect as they are often practiced in isolated areas or at night. Illegal fishing gear and practices are not only harmful to the fish population and production because it can kill all living organisms in the water, but it also can affect human health if no safety protection measures or uncertified equipment is used. For example, some fishers have been killed due to unsafe use of homemade electric fishing equipment (Hortle et al., 2016). Based on Article 20 of the Fishery Law in Cambodia 2006, all fishing operations in the fishery domain where illegal fishing gear practice is prohibited.

Table 2 outlines the prohibition of illegal fishing gear and fishing methods under the National fishery law for Cambodia and Lao PDR.

Table 2: Prohibition of Illgeal Fishing Gear and Fishing Methods under the National Fishery Law for Cambodia and Lao PDR

Cambodia	Lao PDR
Use of electrocuting devices, explosives and/or all kind of poisons.	Use of poison, explosives, weapons
Use of all means of pumping, bailing, drying any part of fishery domain, which may cause disaster to the fishery resources.	Use of electrical devices
Use of brush parks, Samras or other devices to attract fish and other aquatic animals.	Use of bright lights
Use of spear fishing gear, Chhbok, Sang, Snor with projected lamp.	Use of noise making devices
Use of fixed net or all kind of boa nets.	Disposal of waste or discharge waste water or chemicals into the bodies of water
Use of net or all kind of seine with mesh size less than 1.5 centimetres in inland fishery domain.	Use of any fishing gear which unduly obstructs the passage of aquatic fauna such as nets, drag nets, lee traps;
Use of pair trawler or encircling net with attractive, illuminated lamps for fish concentration.	Use of (to trap fish) any natural body of water either by blocking a stream, a marsh, a channel or by digging a pond or by draining a permanent natural pond or by fishing in the spawning season;
Use of fishing gear made of mosquito net in inland fisheries.	Damage to fish conservation zones and to catch aquatic fauna in fish breeding areas and places which form the habitat of many species of fish and natural spawning grounds as identified by the Management Committee for Fisheries in a Body of Water or the village fisheries management regulations.
Use of all kinds of trawling in freshwater, and mechanized push net (Chhip Yun).	Catching immature offspring of fish or other aquatic fauna that are protected or controlled.
Use of all kinds of bamboo fences with mesh size of less than 1.5 centimetres.	
Use of all kinds of transversal string and any measure that makes fish escape.	
Use of damming with all kind of fishing gears.	
Use of all kinds of modern fishing gears; newly invented fishing gears or fishing practices that lead to the destruction of fish, fishery resources and fishery ecosystem, or which are not listed in the proclamation of the Minister of Agriculture, Forestry and Fisheries.	

4.3 Habitat Degradation

Background

Agriculture systems are currently changing in the region from traditional subsistence agricultural activities to commercially oriented agriculture. As a result, there has been a significant change in land use from relatively low impact subsistence plantings to commercial tree plantations such as cassava, teak and rubber plantations. This shift in cultivation practices is consequently causing a loss in forest and groundcover. The impact from a loss in forest and groundcover includes soil erosion and an increased vulnerability to land degradation. High economic development and population growth is therefore placing an increased demand on the land, which is causing habitat degradation.

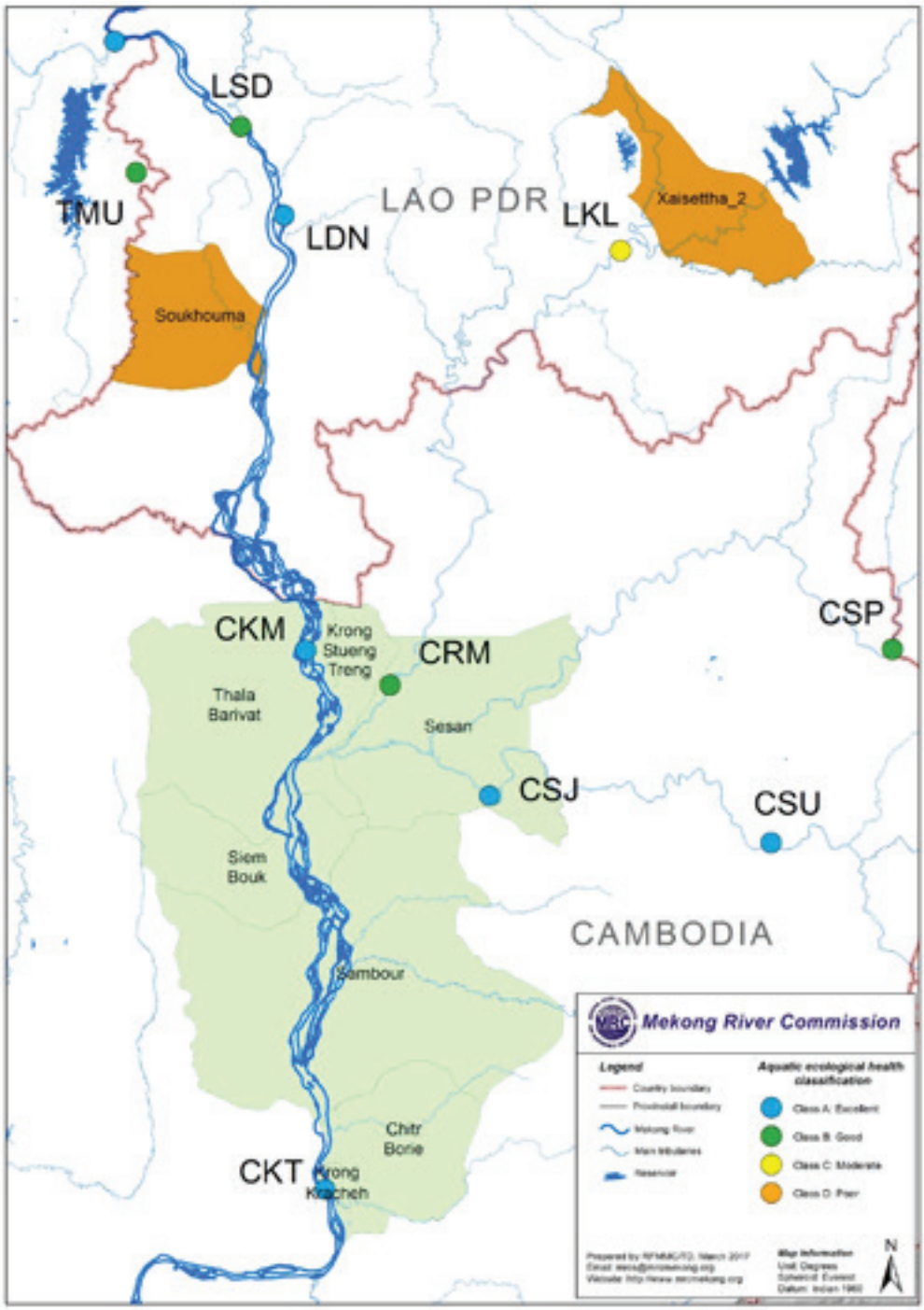
Logging activities that result in the clearing of flooded forest around the Tonle Sap Great Lake, are damaging spawning and breeding habitats in the floodplain areas (Nao & Van, 2001). Blasting and dredging of rapids to improve dry season navigation in the north of Lao PDR (Baran et al., 2013) has destroyed the diversity of habitats including shallow rapids and deep pools that act as dry season refuge habitats for many fish species, which has implications downstream.

Mining in the Mekong tributaries are destroying fish habitats as polluted water, such as mercury pollutants, affect fisheries and fish habitats. Proposed dam construction on the mainstream and tributaries of the Mekong and Sekong Rivers will alter upstream fish migration to important breeding sites and create a barrier to downstream fish migration for feeding and movement to refuge habitat in the dry season where there is no fish passage. A reduction of cumulative sedimentation due to trapping by dam development will also impact the productivity of the freshwater fisheries. **Figure 4** shows the location of the aquatic health monitoring sites in the project area, which indicate the health of the aquatic environment in that location.

Concern

Fish need various habitats to complete their lifecycle, for example, spawning, nursing, feeding and refuge habitats. Those habitats are located a considerable distance from each other and migratory fish need to migrate across the border to find breeding and refuge habitats. For example, *Pangasius krempfi*, an important commercial species, spends part of its life at sea and in the brackish water habitat of the Mekong Delta before returning to spawn in a freshwater habitat, whereas *Cirrhinus siamensis* and *Cirrhinus lobatus*, two important species for Dai fisheries in Tonle Sap and the great lake system spawn in the floodplain of Tonle Sap and migrate to the Mekong River beyond the Khone Falls for shelter in the dry season. Large numbers of those species also enter the Sekong River. If one of these habitats is lost due to the cumulative impacts from water development projects, industrial projects and agriculture development, this will also impact on fish populations and fish production in the project area, as well as, to livelihoods and the food security of the fishers in the Mekong and Sekong Rivers. To minimise the impact of habitat degradation integrated development planning that considers implications for fisheries management is required during the feasibility phase of proposed developments (Barlow, 2016). **Figure 5** shows the primary wetlands and environmental hotspots in the project area.

Figure 4: Aquatic Ecological Health Sites in the Mekong and Sekong Project Area[1]



[1]The aquatic ecological health sites were selected as biomonitoring sites that support the Mekong River Report Card on Aquatic Ecological Health, through measurement of key functional groups of organisms living in rivers. Rich species diversity and high abundance of indicator species reflect good river health, while low diversity and abundance indicate poor health (ratings are Excellent, Good, Moderate and Poor). In Lao PDR, the monitoring site near the Xaysettha pilot site is classified as moderate, and for Soukhouma pilot site rated as excellent. In Cambodia near Krong Stueng Treng on the Mekong River, the area is classified as excellent, and as good along the Sekong River.

Figure 5: Wetlands and Environmental Hotspots in the Mekong and Sekong Project Area

4.4 Decreasing Fish Catch and Changing Species Catch Composition

Background

Recently, evidence has shown that fish catch of some species has reduced in terms of the volume of fish and the size of the fish (Halls et. al., 2013, and Phouthavong & Boualaphan, 2015). In Cambodia, most of the surveyed fishers reported that their catch had declined and that smaller sized fish dominated their catch. A decline in a fishery system is often based on the cumulative impact of water development, changing of land uses, deforestation, and climate changes. The presence of large migratory species has declined compared to small migratory and non-migratory species. For example, in Lao PDR, fluctuations of catch were observed in recent fish catch monitoring results where undersized fish dominated the catch. It is thought that the decline in fish catches were caused by cumulative impacts from pressures including: water development projects, climate change, illegal fishing methods that are more exploitative, and demands made for wild fish due to high market prices and population growth.

Concern

Decreasing fish catch and changing fish species catch composition was the main concern for both national issues papers not only in terms its impact on fish species diversity but also the socio-economic status and well-being of the rural people, whose livelihood depends on fisheries for food and income generation. Less fish will impact the food security of the poor as they have fewer alternatives to sustain their livelihoods and are most vulnerable to food and nutrition deficiencies. To overcome this issue, there is a need to formulate a transboundary fisheries management plan that includes measures to protect important fish habitats, and introduce fishing season and areas closures, as well as gear restrictions and responsible fishing practices.

4.5 Joint Transboundary Fisheries Management Mechanism

Background

A joint transboundary fisheries management mechanism was initiated in 2006 with a framework for cooperation under transboundary wetland management in the Veunkham (Lao PDR) and Anloung Chheu Teal (Cambodia) pools. Under this agreement, common issues were identified regarding fisheries management in the transboundary areas, such as: illegal fishing methods, fishing operations in the dolphin pools, fishing in spawning areas and a lack of a closed fishing season. A MoU was signed in 2010 between the Fisheries Administration, Ministry of Agriculture, Forestry and Fisheries of the Kingdom of Cambodia (FIA) and the Department of Livestock and Fisheries (DLF), Ministry of Agriculture and Forestry Lao PDR. The MoU focused on encouraging communication between staff and promoting cooperation within areas of common concern. However, due to limited funding to support limited activity was carried out.

Concern

The existing MoU for joint transboundary fisheries management between FIA and DLF is very broad and applies to all transboundary areas. It is difficult to implement a joint transboundary fisheries management coordination mechanism not only due to minimal communication between staff but also due to the difficulty in engaging the Director Generals who are burdened with many other commitments. Therefore, transboundary fisheries management in the Mekong and Sekong of Cambodia and Lao PDR needs a coordination mechanism that will enable and enhance communication at the provincial level, with the proposed level for the MoU to be between the Provincial Fisheries Office (Cambodia) and the Champassak Livestock and Fisheries Division (Lao PDR).

4.6 Limited Fisheries Data and Information including Sharing and Dissemination to Stakeholders

Background

Fisheries data and information in the project area is limited. For example, in Lao PDR the basic statistics, such as fish catch and production, are estimated based on fish yield per unit of water body. Knowledge of fish species diversity is poor, including the understanding of long distance migratory species, and information on fish consumption and other aquatic animals (OAAs). The lack of basic data and information is a main concern in managing and planning for the sustainable use of the fisheries resource. Despite the importance of capture fisheries and aquaculture to food security and the rural economy in Cambodia and Lao PDR, this issue has largely been overlooked and priorities have been given to other sectors such as agriculture (rice farming), hydropower and mining. As a result, the fisheries sector has limited support, which makes it difficult to place mainstream fisheries activities into national agendas.

A mechanism for sharing data at the national and transboundary levels does not exist. Many research reports at the national level are not shared with the provincial and district levels. Despite many attempts to exchange information through meetings and workshops at the transboundary level only limited information on technical papers has been shared, and the local management issues including rules and regulations as well as management practices are therefore not addressed.

Concern

It is difficult to integrate fisheries activities into national development agenda due to the lack of available data and information, as well as absence of sharing and disseminating information to stakeholders. In addition to developing a fisheries management plan at the national and regional level, there is a need for sufficient data to support management planning, including data on fish trends, production and values. To fill the information gaps, it is necessary to identify and assess the production, fish species composition and values of fisheries including OAAs and aquaculture of the local community. A joint coordination mechanism such as a joint management body for the sustainable use of fisheries resources and information sharing therefore could enable improvement in information sharing to understand better the fisheries management issues within the area. An important aspect of this is the engagement of the local community and to create the awareness to share resources/costs and benefits. The joint coordination mechanism would need to be supported by a working group to address technical issues relating to data and information sharing.

4.7 Limited Capacity and Resources for Fisheries Management

Background

In general, the government has limited staff with adequate capacity in fisheries science and management. The issue is particularly acute at the provincial and districts levels. Most staff members specialize in livestock management or veterinary science. This limited capacity and resources results in inadequate fisheries management at the national and transboundary levels leading to poor outcomes, such as unsustainable fisheries management. In addition, emerging issues, such as gender, climate change and transboundary fisheries management, require specific skills that are lacking. The provincial and district staff have limited skills in both fieldwork (data collection, analysis and report writing), and public administration and communicating with internal and external stakeholders.

Concern

An inadequate capacity to deal with fisheries management at the national level for both Cambodia and Lao PDR will affect the success of cooperation and collaboration on transboundary fisheries management issues. Therefore, capacity building and training packages that provide capacity in developing a fisheries management planning, undertaking fish catch monitoring, and project management is needed. In addition, on the job training in specific field research and communication is also necessary. This will assist in maintaining and strengthening capacity to manage the fisheries resources as well as to support the ongoing dialogue between the two countries.

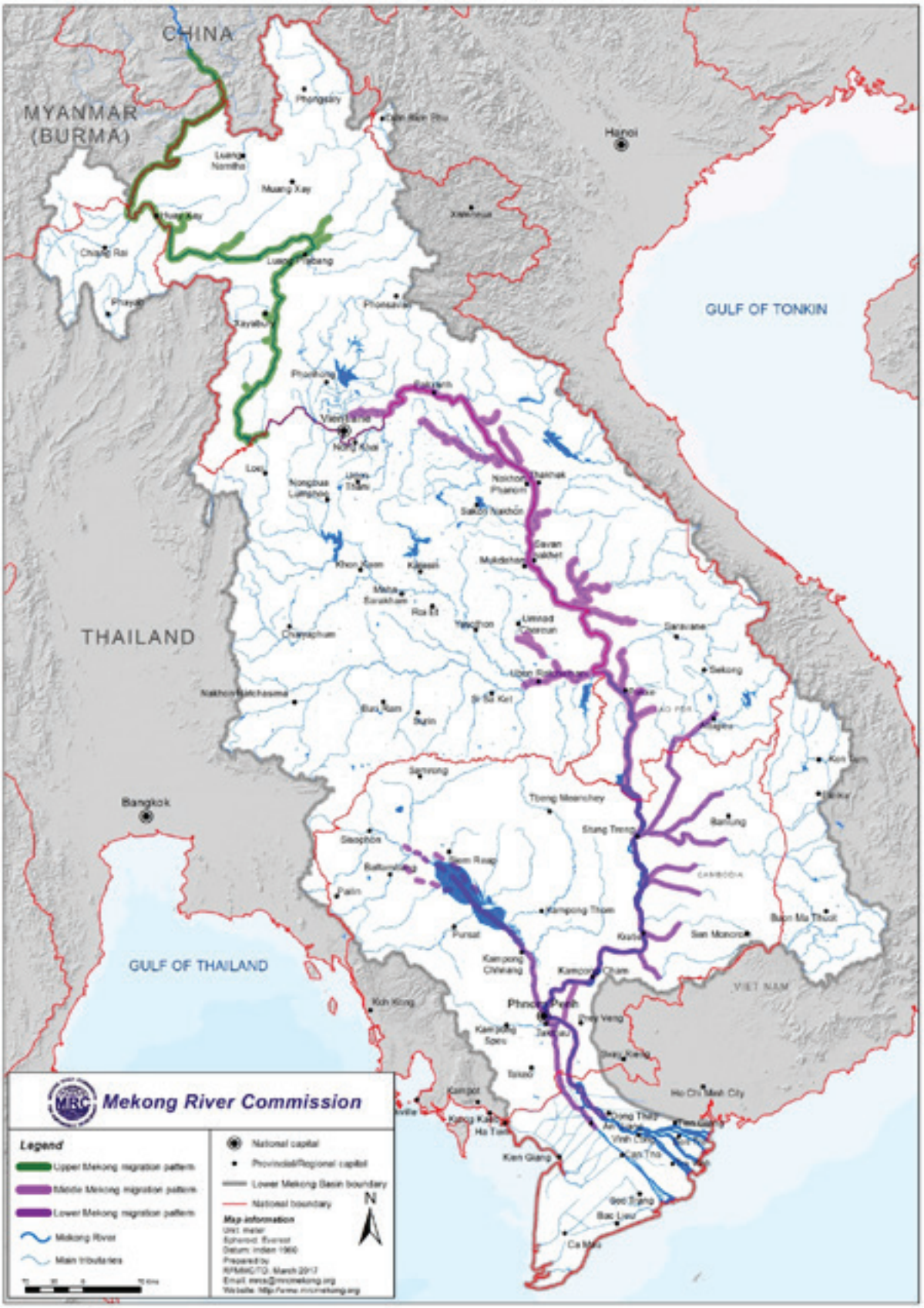
5. Priority Fish Species for Transboundary Management and Fish Monitoring Programme

There is a need to monitor transboundary fish stocks in order to gain better information and knowledge to support the formulation, implementation and update of a transboundary fisheries management plan. The current regional pressures from transboundary environmental impacts and pressures on transboundary fisheries resources due to lack of sustainable transboundary fisheries management practices, as outlined in Section 4, are having an impact on long distance migratory whitefish species that are estimated to comprise more than one third of the total fish catch in the LMB (Baran et al., 2007). With an anticipated increase in water resources development in the future, and other pressures, this impact is likely to increase. **Figure 6** shows the fish migration pattern in the LMB.

5.1 Priority Fish Species for Transboundary Management

A process for identifying the priority fish species for transboundary management was therefore undertaken between Cambodia and Lao PDR at the Joint Workshop for the Mekong-Sekong Fisheries Management transboundary project, held on 4-5 May, 2016, in Pakse, Lao PDR. The process was based on the main transboundary fish species (long distance migratory whitefish) which occur within both the Mekong and Sekong Rivers of the project area, and an assessment and subsequent ranking made up of: their commercial importance, importance for food security, long distance migration, occurrence in the Mekong and Sekong Rivers within the project area, and whether they were listed as threatened on the IUCN Red List. Five priority species were identified: *Pangasius larnaudeii, Pangasius conchophilus,*

Figure 6: Fish Migration Patterns in the Lower Mekong Basin

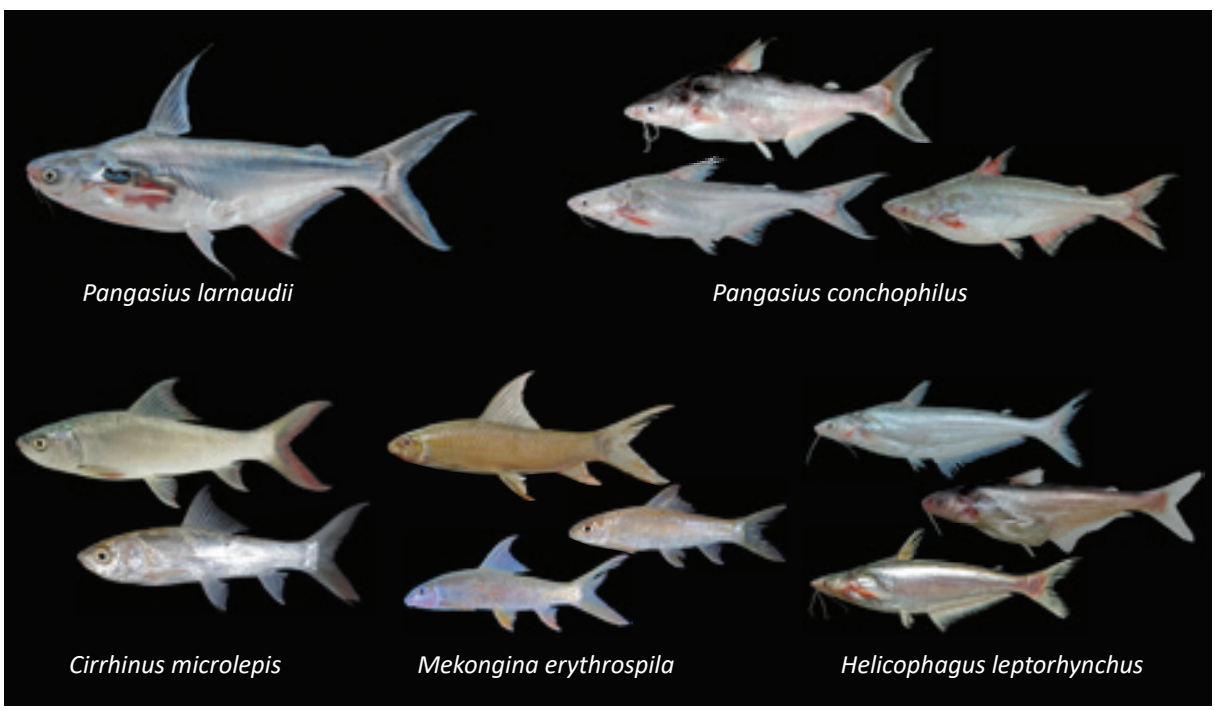


Cirrihinus microlepsis, Mekongina erythrospila, and Helicophagus leptorhynchus. **Table 3** shows the overall results and ranking of the five priority fish species for transboundary management, as agreed at the Joint Workshop.

Table 3: Priority Fish Species for Transboundary Management

Fish Species	Abundant Rank	Commercially important (price per kilo) for Cambodia	Commercially important (price per kilo) for Lao PDR	Valuable for Food Security	Long Distance Migration	Located in Mekong	Located in Sekong	Threatened	Overall Rank
Pangasius larnaudeii	0.375	2	2	1	1	1	1	0	8.4
Pangasius conchophilus	0.875	1	2	1	1	1	1	0	7.9
Cirrhinus microlepis	0.5	1	1	1	1	1	1	1	7.5
Mekongina erythrospila	0.125	2	1	1	1	1	1	0	7.1
Helicophagus leptorhynchus	0.625	1	1	1	1	1	1	0	6.6

Note: The highest-ranking fish species best meets the criteria, thus is the most important for transboundary management.



Photos: ffish.asia/Nagao Natural Environment Foundation

The five priority transboundary fish species that were identified for management will form the basis of the Joint Transboundary Fisheries Management Plan (Joint Action Plan for the project (Outcome 3). The Transboundary Fisheries Management Plan (TBFMP) will assemble data and information on the five species and develop management goals, objectives, indicators and targets and then management measures to manage the five species at the transboundary level. In developing the TBFMP for the five priority transboundary fish species, the key issues and constraints that are detailed in this Joint Issues Paper will be considered and addressed through the development of the management plan and respective management measures, and will also provide the opportunity for consideration of an appropriate joint coordination mechanism for joint transboundary fisheries management in the project area.

An outcome of the TBFMP could be the development of simple guidelines for the conservation and management of the five priority fish species and this could be disseminated to community fisheries within the project area for implementation and monitoring. Implementation of the Joint Action Plan, whilst not in the current project cycle, could therefore utilise the existing structures enabled through the current Cambodian and Lao fisheries law, and the formally registered fishing communities (FMCs in Lao and CFis in Cambodia) to implement the management measures and include management measures through the FMC's and CFi's existing management plans. This would avoid the need to amend existing national fisheries law, unless deemed necessary by the national governments of Cambodia and Lao PDR. Capacity building of local community institutions in fisheries management, community-based resource management, and co-management approaches is therefore important.

5.2 Transboundary Fisheries Monitoring Programme

As detailed in Section 4 of this paper, regional fisheries resources are increasingly under pressure from transboundary environmental impacts and accompanied by a lack of sustainable transboundary fisheries management, due to wider economic development in the area - such as better access to markets and growth in tourism - which triggers an increase in fish demand and prices. In addition, in Lao PDR this is caused by the installation of excessive passive fishing gear in the Khone Falls area (Phouthavong & Soukhaseum, 2007). In Cambodia, the exploitation of fish in sensitive areas (deep pools refugees, spawning grounds and migratory routes) and the use of explosives and other illegal fishing gear are becoming critical issues (Bush, 2004).

In view of these multiple pressures on transboundary fisheries resources, and the long distance migratory whitefish species, which are estimated to be more than one-third of total fish catch in the LMB (Baran et al., 2007), and the potential of further water resources development; transboundary cooperation in fisheries management is urgently needed through a process of formulation and implementation of a transboundary fisheries management plan (Outcome 3) and the development of an agreed joint coordination mechanism (Outcome 2), including an agreed transboundary monitoring programme.

Both Cambodia and Lao PDR currently undertake national fish monitoring to understand better their fisheries. In Cambodia there are four monitoring activities: i) Dai Bag Net in the Tonle Sap River, ii) Larvae in the Mekong River, and iii) fish abundance and iv) ecological health, both of which are countrywide. In Lao PDR there are two activities: i) fish abundance monitoring and ii) lee-trap monitoring. Although, currently there is no transboundary fisheries monitoring programme between the two countries.

The MRC has a regional fish monitoring programme (led by the MRCS Environmental Management Division) which supports field fisheries monitoring on fish abundance and diversity monitoring in the LMB (MRC, 2016), which has been adopted within the national fisheries monitoring programme for Cambodia and Lao PDR. Currently, the MRC is leading the collaboration with the four member countries of MRC (2016-2020). This activity will be fully financed by all Member Countries after year 2020 which is under the MRC decentralisation plan (MRC, 2017).

The overall objective of the MRC fish monitoring activity is to measure fisheries indicators in the LMB to provide an understanding of the status and trends of basin-wide capture fisheries, as well as providing more effective means of monitoring and assessing the effects of water management and basin development activities (MRC, 2016). The indicators use total catch and include the composition of fish species (number and biomass), abundance (number and biomass), and diversity (MRC, 2016). The methods of the Fish Abundance and Diversity Monitoring (FADM) activity comprises: sampling locations, selection of fishers, monitoring habitats, gear types for monitoring, confounding factors, field sampling procedures, procedure for completing FADM logbook, and procedure for identifying and processing fish (MRC, 2016).

Within the LMB the total number of sampling locations is 38; with 15 in Lao PDR, 11 in Cambodia, 5 in Thailand, and 7 in Vietnam. These sampling locations are from Bokeo in Lao PDR through Thailand and Cambodia to the Mekong Delta in Viet Nam and categorised into habitats namely the Mekong mainstream, tributaries, floodplain/swamps and lake, reservoir and canal (applied for Viet Nam only). In addition, there are three experienced fishers of each sampling location selected. The basic qualification of selected fishers is that they must be medium-scale full-time fishers at that location. They usually operate most days of most weeks (<200 days per year) and fishing is their primary occupation for income generation. Each fisher is assumed to operate for 20 days per month; this would generate 60 samples of catch per unit of effort (CPUE) per month, which is sufficient to detect a significant difference. Within the project area there is a total of seven MRC sampling locations for fish monitoring, four in Champassak province, Lao PDR, and three in Stung Treng and Kratie provinces, Cambodia (MRC, 2016).

In acknowledgement of the value of understanding information on the fish species within the transboundary project area, the Joint Working Group for the Mekong and Sekong Rivers Fisheries Management Project proposed that a transboundary fisheries monitoring programme be established to understand the current fisheries situation in the first instance, so that impacts in the future can be measured, and as a consequence management actions developed and implemented through the TBFMP (Outcome 3) to mitigate such impacts.

The Joint Working Group for the Mekong and Sekong Rivers Fisheries Management Project therefore met on 26 May 2016 to:

- Review and discuss the existing MRC approach and methods for fish monitoring,
- To agree on objectives, approach and methods for establishing a Joint Fisheries Monitoring Programme for the transboundary project area, and
- Discuss the next steps for implementation of the Joint Fisheries Monitoring Programme.

The Joint Working Group agreed to adopt the MRC Standard sampling procedures under the MRC fish

abundance and diversity monitoring program in the Lower Mekong Basin in order to monitor fish species in the transboundary project area, including the agreed five priority fish species. The monitoring programme will collect information using: a standard panel gillnet (60 metres in length with three different mesh sizes each 20 m long), the length-weight form, and temperature and dissolved oxygen kits. The countries will each select six new fishers for the Mekong River and six new fishers for the Sekong River.

The Joint Monitoring Programme will be overseen monthly by the Member Countries to monitor fishers, fish data sampling data collection, document fisher and their fishing gear profiles, verify data collection sheets, and help fishers to accurately find, collect and enter the data provided into the logbooks and forms. The MRC will provide technical support and advice for the implementation of the Joint Monitoring Programme including training methods, updating and use of the fisheries database, data analysis and joint reporting. The Joint Monitoring Programme will commence implementation shortly.

6. Conclusion and Recommendations

In conclusion, the Mekong and Sekong Rivers Fisheries Management Project between Cambodia and Lao PDR has provided an opportunity to collect information from the community, and district and provincial fisheries, to understand the main issues, challenges and constraints for fisheries management in the project area (Outcome 1). In doing so, seven priority transboundary issues were identified including; increasing fishing effort; illegal fishing gear use; habitat degradation; decreasing fish catch and changing species catch composition; joint transboundary fisheries management mechanisms; limited fisheries data and information; and limited capacity and resources for fisheries management. This paper has explored in detail the transboundary issue and why they are a concern for management.

In considering actions to address the priority transboundary issues, the Joint Working Group agreed it was important to identify priority fish species for transboundary management, that occur in the border area of the project site. Five long-distance migratory Whitefish were identified, and will form the basis of the Transboundary Fisheries Management Plan (Outcome 3).

Furthermore, the Joint Working Group agreed with the importance of enhancing and establishing a Joint Coordination Mechanism between Cambodia and Lao PDR in the transboundary project area and to implement a Joint Monitoring Programme, as a first step. Further consideration will be given to a joint coordination mechanism in the next phase (Outcome 2) of this project and the need for a Transboundary Fisheries Management Body to ensure the sustainability of the Mekong and Sekong Rivers Fisheries Management Project beyond the life of the MRC M-IWRM Phase 1.

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Annex A - Plans and Policies Reviewed

Plans and policies reviewed in developing this Joint Transboundary Issues Paper include:

Lao PDR

MRC: M-IWRM P project document

MRC: MRC Strategy plan 2016-2020

MRC: Basin Development Strategy 2016-2020

MRC: MRC agreement (1995)

MAF: Agricultural Development Strategy to 2025 and Vision to 2030

NAFRI: Agriculture and Forestry Research Strategy 2025 and 'Vision up to 2030'

DLF: Fisheries development strategy to 2025

DLF: Fisheries implementation plan to 2020

DLF: Lao Fisheries Law

FAO: Fisheries and Aquaculture in the Lao PDR-a legislative review

MAF and STEA: Biodiversity Country Report and National Biodiversity Strategy Action Plan

FAO: FAO Code of Conduct for Responsible Fisheries

WWF: Guidelines for fisheries co-management

PAFO: Champassak province livestock and fisheries management and development annual report

PAFO: Attapeu province livestock and fisheries management and development annual report

DAFO: Soukhouma district socio-economic development plan 2016-2020

DAFO: Xaysettha district socio-economic development plan 2016-2020

LARReC: Fish abundance and Diversity Monitoring 2013-14

LARReC: Lee trap Monitoring 2012-2013

LARReC Fisheries co-management in Khong district Champassak province.

Convention on International Trade in Endangered Species (1973)

Convention on Migratory Species (1979)

Convention on Biological Diversity (1992)

Cambodia

MRC: M-IWRM project document

MRC: MRC agreement 1995

MRC: Consumption and the yield of fish and other aquatic animals from the Lower Mekong Basin. MRC Technical Paper No. 16. Mekong River Commission, Vientiane.

FiA: Cambodia Law on Fisheries

FiA: The Strategic Planning Framework for Fisheries: 2010-2019

FiA: Prakas on Guidelines for Community Fisheries

FiA: Sub-Decree on Community Fisheries Management

FiA: Community Fisheries Management Plan

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Annex B – Questionnaire Survey and Checklist for Interviews

Lao PDR

M-IWRM Fisheries Survey and Checkllist

Village name:……GPS location N……E…….

District……Province……

Date: ……

1. Fisher information

no	Name of fisher	Mobile number	Fishing experiences (year)
1			
2			
3			
4			
5			
6			

2. Could you please list the common fish species exited in your areas:

   - Dry season: .....

   - Wet season: .....

3. Using fish photo flipchart to check other species and provide with species code ……
   ……
   ……
   ……

4. Could you identify fish species that occur only in the Mekong and the Xekong River
   ……
   ……
   .....

5. Could you list exotic species existed in your areas:
   ……
   ……
   .....

6. Could you provide the list of species that migration to your areas
   ……
   ……

7. Fish migration in different season

Species name	Month												Remark
	1	2	3	4	5	6	7	8	9	10	11	12	
Dry season													
Cyprinid (scale fish)													
Catch fish (Pangasius)													
Wet season													
Cyprinid (scale fish)													
Catch fish (Pangasius)													
Common species													
Dry season													
1													
2													
3													
4													
5													
Wet Season													
1													
2													
3													
4													
5													

8. Fisheries trend compare to last five years: ☐ ncrease, ☐ decrease, ☐ no change Reasons for increase or decrease: .....
.....
.....
Species difficult to catch: species difficult to catch .....
.....
.....
Species abundance in the past but very rare now .....
.....
.....

9. Fishing gear use

- Wet season:.....

- Dry season:.....

10. Fish catch

- Wet season: Max.:.....kg, Min.....kg

- Dry season: Max.:.....kg, Min.....kg

- Total catch per year.....kg

11. Disposal of catch: Consumed……. kg or percent, sold……..kg, processing……..kg, Given to relative…… kg, other…… kg

    - Most recent catch: Consumed……. kg or percent, sold……..kg, processin

12. Do you know any fish breeding ground in your areas:

    - Name: do you know any fish breeding ground in your area: eg school of fish in

      this area: ……

13. Are there any deep pools in your areas:
    ……
    ……

14. Illegal fishing activities: Illegal fishing activities: Illegal fish ……

15. Does your village have FCZ: Name: ……

16. Local rule and regulation:

……
…… gen and……
……

Cambodia

Questionnaire for Survey and Checklist

1. Interviewer:…….
2. Address: House#/Village:……; Commune:……..

   District:……; Province:…….
3. Phone number:……..
4. Fisher's name:……..
5. Fisher's age:……..
6. Fisher's number: CF…… Province……
7. Fishing experience:…….. year
8. Full time/ Part-time livelihood:

   □ Full time;
   □ Part-time……..%, what is other's occupation? ……..

9. Other fisher's occupations:……
10. How much do fisher learn:

    □ Per day in average?.....
    □ Per Month in average?.....

11. If compare with other occupation, how many percent of income from fishing? ……
    ……
    ……
12. Any Challenges/problems face with their livelihood?..... .....
    .....
13. List your fishing gears used:

#	Gear type	Length (m)	Height (m)	Mesh-size	Catch at age	Habitat*	Species	Operating in which month?	Fishing day/ month
1									
2									
3									
4									

**1: Mainstream; 2: Tributary; 3: Flooded rice field; 4: Flooded fore; 6: Lake.*

14. Are there any illegal fishing gears in your area? What? ....
    .....
    Is it increasing number/activity? .....

15. Based your experiences, how many species are there in Mekong and Sekong River? …… And how many species for trade? ……

16. List the most important 10 fish species caught in last 12 months?

#	Code	Local name	Which months do you catch the species?	Trend?	Reason?
1				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
2				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
3				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
4				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
5				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
6				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
7				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
8				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
9				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	
10				☐ Increasing……% ☐ Decreasing……% ☐ Stableness	

17. What species have been conserved? ....
..... Reason? .....
.....
.....

18. Did your locality have conservation areas such deep pole or ramsar area or protected area?

☐ Yes ☐ No

If yes, please descript? .....
....
.....

19. List the most important aquatic species caught in last 12 months?

#	Code	Local name	Which months do you catch the species?	Trend?	Reason?
1				☐ Increasing.....% ☐ Decreasing.....% ☐ Stableness	
2				☐ Increasing.....% ☐ Decreasing.....% ☐ Stableness	
3				☐ Increasing.....% ☐ Decreasing.....% ☐ Stableness	
4				☐ Increasing.....% ☐ Decreasing.....% ☐ Stableness	
5				☐ Increasing.....% ☐ Decreasing.....% ☐ Stableness	

20. Which species are rare in catches? Why?

Species name: .....

☐ Illegal gears
☐ Too many people participating in fishing
☐ Dam/dyke construction
Others:.....

.....

Comment: .....
.....

21. Which species are no longer caught? Why?

Species name: .....

□ Illegal gears
□ Too many people participating in fishing
□ Dam/dyke construction
Others: ……
……

Comment: ……
……
……

22. Do destructive fishing practices occur in your area? ☐ Yes ☐ No.

If yes, please list? ……
……

23. Based on your experiences, do you think the fish population is overexploited in your area?
…… ……
…… ……
……

24. Most recent catch:……kg

Species name	Code	Species name	Code	Species name	Code

25. Disposal of catch caught in last 12 months:

#	Disposal of catch	Wet season		Dry season	
		kg	or %	kg	or %
1	Consumed				
2	Sold				
3	Processing				
4	given to relative				
5	other: ……				

26. Please list the most import species that migrate?

No	Species' name	Specific place	Which month?	What reason?
	To upstream			
	To downstream			

27. Which species do they not migrate to others habitat? Why? ……
……
……

28. Does natural habitat degrade compare with last 5 years? Why? …… ……
…… ……
……

29. Fisheries trend compare to last five years:

☐ Increase; ☐ Decrease; ☐ No change (in terms of abundance and biomass)

☐ Increase; ☐ Decrease; ☐ No change (in terms of fish length)

Reaons: ……
……

30. What kind of fisheries information, M&E, regulations and laws do you know in last 12 months?

No	Information, M&E, regulations and laws	How do you know?	By whom?	Others

31. Beside the information above, what kind of fisheries information do you want to know? .....
.....
.....
.....

32. What are your problems/challenges in getting information of fisheries? (transboundary)
.....
.....
.....

33. Who are involved in fisheries sector? (Government, Development partner (INGO&LNGO), Farmer, Private sector (trader, middleman, seller))

No	Stakeholder's name	Purpose/aim	Main activity	Others

(Note: international, National level, Local level)

34. List top challenges/problems in fisheries management?

No	Challenges/problems	Why it occurs?	When it occurs?	Solution?

35. List recently topics of training that attend in last 12 months?

No	Topic of training	Organised by whom?	When it occurs?

36. List topics of training that you want to train?

No	Topic of training	For what?	To whom?

Mekong River Commission Secretariat

184 Fa Ngoum Road,
P.O.Box 6101, Vientiane, Lao PDR
Tel: (856-21) 263 263
Fax: (856-21) 263 264
e-mail: mrcs@mrcmekong.org
www.mrcmekong.org