Integrated Water Resources Management-based

Basin Development Strategy 2016-2020

For the Lower Mekong Basin

Mekong River Commission

Cambodia • Lao PDR • Thailand • Viet Nam

For sustainable development

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Preface

On behalf of the Mekong River Commission (MRC) Council, I am pleased to present this IWRM-based Basin Development Strategy for the Lower Mekong Basin (LMB), updated for 2016-2020. It has been jointly prepared by the Member Countries of the MRC (Cambodia, Lao PDR, Thailand and Viet Nam).

The Strategy replaces the first Basin Development Strategy approved in 2011 that sets out development opportunities and strategic priorities to manage the risks. Since then, a number of development opportunities have moved from the planning to the implementation stage, including on the mainstream. Simultaneously, the implementation of the strategic priorities is leading to a reduction of knowledge gaps, the harmonization of regional and national planning, and the institutional reform of the MRC.

The Basin Development Strategy 2016-2020 takes stock of the implementation experiences, lessons learned, and progress achieved under the Strategy 2011-2015, much of it through the implementation of the MRC Strategic Plan and the National Indicative Plans of the Member Countries by a broad range of regional, national and local stakeholders.

The Member Countries appreciate that the implementation of the Strategy 2011-2015 has also led to a greater awareness of the risks of development to the Mekong's rich natural resources and of the missed opportunities for more coordinated development. Furthermore, there is a wide recognition of the shortcomings of the current national plans to optimise basin-wide sustainable development, including the protection of key environmental assets, and the provision of long term water security, including the protection against extreme floods.

This updated Basin Development Strategy for 2016-2020 addresses these concerns 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, minimize adverse transboundary impacts, and provide water security. The state of the basin report – to be updated every five years – will record and evaluate the positive and negative development

impacts within the Mekong basin as a measure of the effectiveness of the implementation of the Strategy.

We are encouraged that the updated Strategy has been shaped by many riparian stakeholders at all levels, from the Second MRC Summit in Ho Chi Minh City in 2014 to national consultation meetings, regional working groups, and stakeholder forums. This bodes well for a successful implementation of the Strategy, which will require the consideration of difficult trade-offs between desired outcomes in the Mekong basin and the active involvement of all Mekong stakeholders, including the strategic engagement of the riparian governments and development partners.

H.E. Mr. Lim Kean Hor
Minister of Water Resources and Meteorology, Cambodia
Chairperson of the MRC Council for 2015-2016

Executive Summary

A Dynamic Strategy: Responding to change and uncertainty

The Basin Development Strategy for 2016-2020 (henceforth BDS 2016-2020) replaces the 2011-2015 Strategy. This updating reflects the dynamic challenges encountered in the Lower Mekong Basin (LMB).

The Mekong, one of the world's greatest rivers, is an exceptionally complex system with high intra-annual and inter-annual flow variability caused by the Southwest Monsoon, bringing both great risks and opportunities. It is also a rapidly changing river because of its contribution to the rapid economic development of the basin countries, but also as a consequence of this development on the river itself, including the impacts of increasing population, urbanisation and industrialisation.

Adding to these on-going changes are uncertain futures, particularly as a consequence of climate change. In all river basins, futures are uncertain and solutions are always provisional. This is particularly so in the Mekong basin due to the rapidity of change, within and outside the water sector.

The dynamic updating of the Strategy is an essential response to these challenges. This updating aims to engage stakeholders in a regular cycle of cooperative engagement, reflective analysis, adaptive strategy preparation and pragmatic, achievable action.

A Collective Strategy: Engaging riparian stakeholders

The BDS 2016-2020 takes as its point of departure the progress achieved under the previous Strategy, much of it through the implementation of the MRC Strategic Plan and the National Indicative Plans (NIPs) of MRC Member Countries. A broad range of regional, national and local stakeholders have engaged in the implementation process, leading to a reduction of knowledge gaps, the harmonization of regional and national planning, the leveraging of funding, and the institutional reform of the MRC.

The BDS 2016-2020 responds to the collective engagement of riparian stakeholders at all levels, starting with the Declaration of the Second MRC Summit in Ho Chi Minh City in 2014 which sets clear priorities for action. Extensive contributions from national line/implementing agencies and river basin organizations, together with other stakeholders, has resulted in a Strategy that is embedded in the basin, both within individual Member Countries and, collectively, within the community of the LMB.

A Responsive Strategy: Responding to future trends and long-term outlook

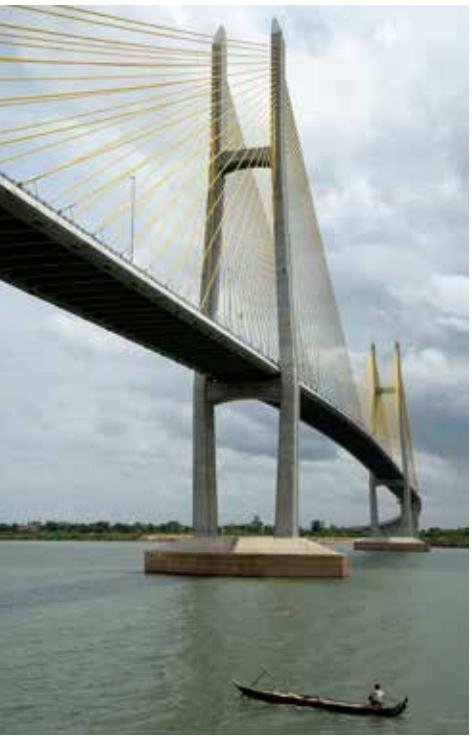
Today, the LMB is home for 65 million people, 80% of whom live in rural areas dependent on agricultural livelihoods. Many are poor. But the countries' development is reducing the contribution of agriculture to economic growth, while the contribution of the industrial and service sectors is rapidly increasing. All countries are expected to have reached middle-income status by 2030. The Mekong contributes significantly to this growth through the opportunities it provides, including water and wastewater services, energy, agriculture, fisheries, transport and trade, and ecosystems services.

But without coordinated development and effective management, the Mekong can also

threaten continued growth through the risks that it brings, including the risks of floods and droughts, the deterioration of water quality, the reduction of sediment loads, and the overall deterioration of ecosystem services and biodiversity.

The BDS 2016-2020 recognises these trends, takes a long-term outlook, and examines longer term water resources development needs. It is assessed that the current national water resources development plans are sub-optimal from a basin-wide perspective. These plans fall short in protecting key environmental assets and protecting millions of increasingly affluent people against major floods. Finally, the distribution of the benefits, impacts and risks from planned basin development may not be viewed as equitably distributed.

A Basin-Wide Development Strategy: Promoting cooperation now



Sustainable development within the LMB requires mitigating the risks and seizing the opportunities that the Mekong creates for the people of the LMB in a manner that conserves the river's functions for future generations. Achieving this goal is essential and urgent. National plans and actions cannot achieve this goal alone as they (1) cannot individually address the long-term water security and environmental needs of the Mekong basin, and (2) miss the significant opportunities for joint development that could be realised.

The BDS 2016-2020 focuses on how the sustainable development of the LMB can be achieved and national plans adapted to address longer term needs and provide a comprehensive response to climate change and other challenges. Experience from other regions indicates that joint management and development will be needed, along with cost and benefit sharing deals.

The significant and long-term investment that the MRC has made in data and knowledge will greatly facilitate the early identification of opportunities for joint development and benefit sharing. The development of such projects will lead inevitably to higher levels of transboundary cooperation, benefiting many sectors (such as food, energy, navigation, tourism, and flood protection), and thus advance ASEAN integration.

An Implementable Strategy: Establishing priorities

The BDS 2016-2020 maintains the development opportunities prioritised in the previous Strategy as follows: tributary hydropower development; expansion of irrigated agriculture; mainstream hydropower development; and other opportunities. These development opportunities will be updated in greater detail based on the results of implementation of defined actions for 2016-2020 in this Strategy.

These actions are defined under 7 basin-wide strategic priorities which address longer term risks and opportunities. These priorities are specifically aimed at identifying "optimal" and sustainable development pathways that could increase regional benefits, reduce regional costs, minimise adverse transboundary impacts, and provide water-related security in an equitable manner through cooperation. The priorities recognize that cooperative or joint investments, involving deal structures and possibly cost and benefit sharing, will lay the foundation for a long-term, sustainable and peaceful basin development. The strategic priorities are:

- Reduce remaining knowledge gaps to minimise risks;
- Optimise basin-wide sustainable development and cost and benefit sharing;
- Strengthen the protection of mutually agreed environmental assets;
- Strengthen basin-wide procedures and national implementation capacity;
- Improve national water resources development;
- Enhance information management, communication and tools; and
- Increase cooperation with partners and stakeholders.

Basin Development Strategy Implementation: Focussing on development and management

The actions presented in this Strategy for 2016-2020 focus on development opportunities, including a 'help desk' function to support the MRC Member Countries, and the promotion of 'optimal and sustainable development'. The latter includes the assessment of alternative basin-wide development scenarios, the identification of further cost and benefit sharing options, and the preparation of sector strategies that will facilitate the adaptation of national plans. Stakeholder engagement will be institutionalised to ensure wide input and commitment to the development agenda.

Other actions focus on basin management, including the strengthening of water related monitoring based on the emerging MRC Indicator Framework for monitoring, assessment, and state of the basin reporting. This monitoring paves the way towards longer term management objectives for the Mekong basin. The implementation of the MRC Procedures will increasingly be made country-driven, supported by nationally maintained databases, and more closely linked to planning and management at the national and regional levels.

Implementation of the Strategy: Providing a clear roadmap

Currently identified and agreed development opportunities will be implemented at national and sub-national levels through national and local agencies and organisations and also through the private sector, taking into account applicable MRC Procedures, assessments and best practice guidelines, supported by the aforementioned 'help desk'.

The strategic priorities and defined actions for 2016-2020 will be addressed by the MRC and other relevant actors in the basin. The MRC will prepare its Strategic Plan for 2016-2020 to implement the actions at the regional level. Each Member Country through the National Mekong Committees will update its National Indicative Plan for 2016-2020 to implement relevant priorities and actions by agencies and organisations at the national level. The NIPs will become the primary channel by which basin perspectives, development opportunities, priorities and core functions are mainstreamed into national strategies, plans, policies and systems.

The state of the basin report, updated every five years, will record and evaluate the positive and negative development impacts within the Mekong basin as a measure of the effectiveness of the implementation of the Basin Development Strategy. The state of the basin report of 2018 will be based on the MRC Indicator Framework, and will feed into the preparation of the BDS 2021-2025. A comprehensive monitoring system will be established under the MRC Strategic Plan to monitor and report on the implementation of the Strategy through the MRC Strategic Plan and the NIPs.

Basin Development Strategy: Status

The BDS 2016-2020 is a product of the MRC Member Countries of Cambodia, Lao PDR, Thailand and Viet Nam. It will be implemented by them individually and jointly with the support and facilitation of the MRC Secretariat and the financial support of their Development Partners.

Active and transparent involvement of all Mekong stakeholders is required to achieve the goals for the cooperative and sustainable management and development of the Mekong's water resources.

Abbreviations and acronyms

ADB	Asian Development Bank
AIP	Agriculture and Irrigation Programme (of the MRC)
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
BDP	Basin Development Plan (of the MRC)
BDS	(IWRM-based) Basin Development Strategy
BDS 2011-2015	BDS approved by the MRC Council in January 2011, applicable to the period 2011-2015
CCAI	Climate Change and Adaptation Initiative (of the MRC)
CRBMF	Core River Basin Management Function
DMP	Drought Management Programme (of the MRC)
EP	Environment Programme (of the MRC)
FP	Fisheries Programme (of the MRC)
GDP	Gross Domestic Product
GMS	Greater Mekong Sub-region (a programme supported by the Asian Development Bank)
GNI	Gross National Income
IKMP	Information and Knowledge Management Programme (of the MRC)
IWRM	Integrated Water Resources Management
ISH	Initiative for Sustainable Hydropower (of the MRC)
LMB	Lower Mekong Basin
LMI	Lower Mekong Initiative
M&E	Monitoring and Evaluation
MoU	Memorandum of Understanding
MRC	Mekong River Commission
MRCS	Mekong River Commission Secretariat
MW	Megawatt
NAP	Navigation Programme (of the MRC)
NIP	National Indicative Plan
NMC	National Mekong Committee
NMCS	National Mekong Committee Secretariat
NPV	Net Present Value
PNPCA	Procedures for Notification, Prior Consultation and Agreement
PMFM	Procedures for Maintenance of Flow on the Mainstream
PWUM	Procedures for Water Use Monitoring
RBC	River Basin Committee
RBO	River Basin Organization
RIF	Regional Investment Framework (of the GMS Programme)
WWF	World Wide Fund for Nature

Contents

1 Introduction

1.1 Purpose and scope of the Strategy

Purpose and scope. The IWRM-based Basin Development Strategy ('BDS' in general or 'Strategy') is a statement of the Lower Mekong Basin (LMB) countries (Cambodia, Lao PDR, Thailand and Viet Nam) setting out how they will utilise, manage and conserve the water and related resources of the Mekong in line with the *Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin* (the 1995 Mekong Agreement).

The 1995 Mekong Agreement establishes the goals, objectives and underlying principles by which the four Member Countries intend to cooperate, and to which this Strategy responds. These may be summarised as:

- To cooperate in all fields of sustainable development, utilisation, management and conservation of the water and related resources of the Mekong River Basin, in a manner to optimise multiple uses and mutual benefits in the water and related resources of the Mekong River Basin including, but not limited to irrigation, hydro-power, navigation, flood control, fisheries, timber floating, recreation and tourism (Article 1);
- To promote the development of the full potential of sustainable benefits and to prevent wasteful use with an emphasis and preference on joint and/or basin-wide development projects and basin programs through the formulation of a basin development plan (Article 2);
- To protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects (Articles 3 and 7-10); and
- To utilize the waters of the Mekong River system in a reasonable and equitable manner (Articles 4-6).

The Strategy contributes to a wider adaptive planning process linking regional and national planning to achieve the basin-wide vision of an economically prosperous, socially just and environmentally sound Mekong River Basin. The Strategy provides an integrated basin perspective for the assessment and improvement of national plans and projects to ensure an acceptable balance between economic, social and environment outcomes in the basin, and mutual benefits to the MRC Member Countries. The Strategy:

- Defines opportunities to promote sustainable development and strengthen management, and thereby increase regional and national benefits;
- Sets medium term strategic priorities for all relevant actors in the basin which will support the promotion of development opportunities and strengthen basin management;
- Prescribes strategic actions for the next five years (2016 – 2020) to address the basin-wide strategic priorities.

Prepared under the framework of MRC cooperation, and adopted by the four Member Countries, the Strategy is for the entire LMB and for implementation by all national and regional level stakeholders. The MRC, guided by National Mekong Committees (NMCs) of line/implementing agencies will identify development opportunities and management needs in partnership with other regional organisations. The MRC will also promote and coordinate the implementation of the strategic actions at the regional level and provide related technical support. Other relevant stakeholders will contribute to the implementation of the Strategy as described in Chapter 5 below.

1.2 Need for strategy update

By global standards, the Mekong River is both of great importance and also highly complex due to its highly variable inter- and intra-annual flows. This complex variability creates significant risks as well as significant opportunities. These risks are growing as populations and economies grow and climate change advances, putting more people and assets in harm's way. Assessing and mitigating these risks requires early and joint action, as solutions will become significantly more difficult and costly with time and continuing uncoordinated development.

The Basin Development Strategy adopted in 2011 sets strategic priorities to capture water resources development opportunities and managing the risks of national ongoing and planned developments. The Strategy is updated taking into account major changes in the basin. Hydropower dams constructed on the mainstream in the Upper Mekong Basin and on tributaries in the LMB are changing the natural flow regime of the river, yielding both opportunities and risks. The first dam is being constructed on the mainstream in the LMB. Floodplains are being developed and flood protection and river training are being taken up at many locations along the mainstream. Industrial activities such as sand mining in the Mekong mainstream and tributaries are increasing.

Although numerous assessments show that the national water resources development plans would create large national economic benefits, they also pose impacts and risks at the basin level, including falling short in protecting key environmental assets and millions of people against major floods and droughts. Furthermore, the distribution of the benefits, impacts and risks from basin development may not be viewed as equitably distributed. The nationally planned development may therefore be sub-optimal from a basin-wide perspective. Some of the projects in implementation stage could prevent the implementation of joint projects needed to increase water security and help achieve the basin vision.

In addition, the Mekong basin is rapidly changing due to major developments outside the mandate of the MRC but nonetheless impacting water related resources. These include the construction of roads and railways, the development of non-irrigated agriculture and mining activities, as well as deforestation and urbanization.

A sense of urgency is growing among stakeholders for the need to move basin development towards more “optimal” and sustainable outcomes that addresses long-term needs, including environmental protection as well as water, food and energy security.This requires increased levels of regional cooperation and integration. Experience from other regions indicates that joint management and development, with cost and benefit sharing deals will be necessary if the people of the Mekong region are to transition to high income status in a long-term

balance with the basin's environment/ecosystem . The significant investment in data and knowledge under the Mekong cooperation of the past fifty years makes the LMB more prepared than most basins that have already reached such deals.

The updated Strategy for 2016-2020 addresses these pressing issues and in accordance with the Second MRC Summit (April 2014) takes regional cooperation a further step towards more optimal and sustainable development and management by:

- Enhancing basin development through the development of alternative basin-wide development scenarios with sector strategies that will provide water-related security in an equitable manner;
- Increasing regional cooperation and integration through the development of joint and basin wide development opportunities which increase regional benefits, reduce regional costs, and minimize harmful effects;
- Promoting the adoption of longer-term management measures to protect key environmental, social and economic assets; and
- Harmonizing regional and national planning through the National Indicative Plans (NIPs) to mainstream regional perspectives and decentralization in national policies, strategies and plans.

Accordingly, the implementation of this Strategy during 2016 – 2020 is intended to build further sustainable development opportunities for implementation from 2021 onwards. This Strategy will be updated in 2019 to cover the 2021-2025 period.

The new assessments and basin-wide strategies presented in this Strategy will lay out different pathways, with the most optimal and sustainable one promoted for Mekong development and management.

AGAINST THIS BACKGROUND, THIS STRATEGY IS DIRECTED AT:

" Cooperation on water development and management to further move national sector planning towards basin-wide optimal and sustainable development in the Mekong basin"

1.3 Approach to Strategy updating

The first Basin Development Strategy (BDS 2011-2015), approved by the MRC Council of Ministers on 26 January 2011, was an important milestone for the cooperation of MRC Member Countries. It demonstrated for the first time the shared understandings of the opportunities and risks inherent in the national plans for water resources development in the LMB.

These understandings aligned fully with the Declaration of the First MRC Summit of Heads of Governments held on 5 April 2010 in Hua Hin (Thailand). It acknowledged that accelerating the development of water and related resources would make a significant contribution to the socio-economic development of the region.

This updated Basin Development Strategy is further guided by the Declaration of the Second MRC Summit held on 5 April 2014 in Ho Chi Minh City (Viet Nam) in which the Heads of Governments of the Member Countries reaffirmed their commitment to implement the 1995 Mekong Agreement and consolidate the spirit of Mekong cooperation, and set a number of priority areas for action (see box on following page).

The approach to updating the Strategy builds on the experience gained during the preparation and implementation of the BDS 2011-2015, and further takes into account:

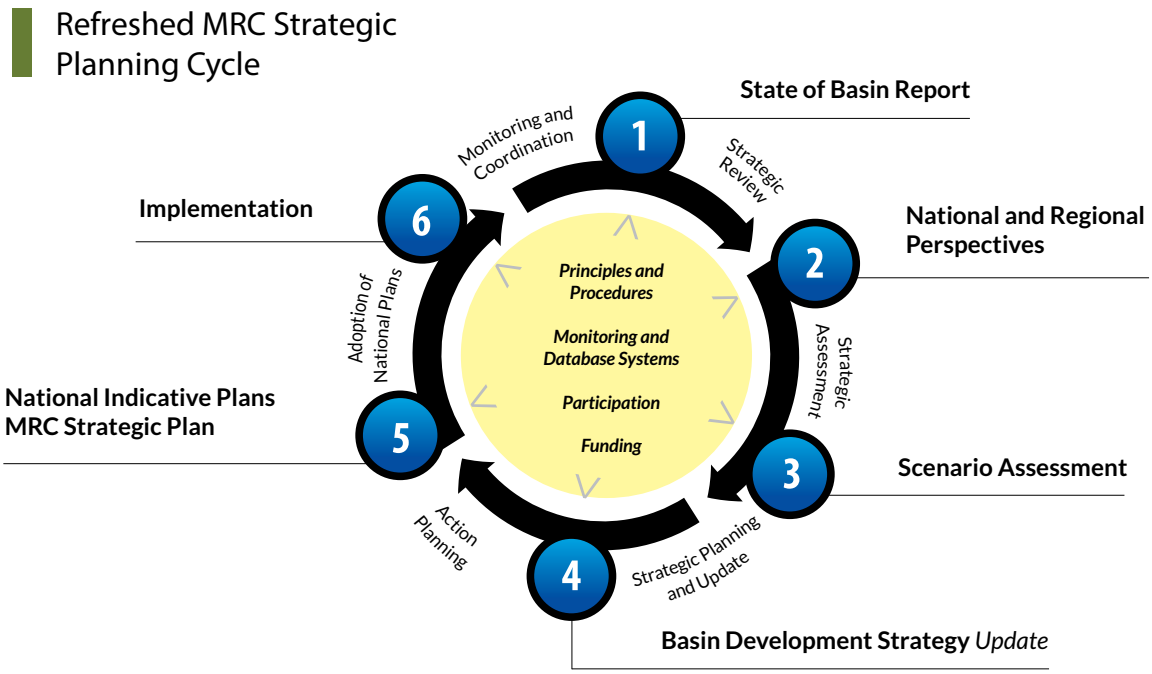
- The progress made in implementing the strategic priorities of BDS 2011-2015 and lessons learned (see Section 1.4);
- A review and assessment of the trends and future outlook in water resources and economic, environmental and social factors (see Sections 2.2 and 2.3);

- Any changes in national plans for development and management of water related resources (Section 2.2);
- A review of the previous scenario assessments underpinning the BDS 2011-2015 in light of new information and knowledge(see Section 3.2);
- The national perspectives by Member Countries and regional perspectives by MRC Programmes (see Section 3.1, 3.2, 3.3 and 3.4); and
- The streamlined approach to strategic planning adopted by MRC (see Section 5.1.2).

This Strategy has been prepared with contribution from each Member Country's NMC and national line/implementing agencies, RBOs, and broader stakeholders. The final version of the updated BDS (for 2016-2020) has been negotiated by senior government officials from the Member Countries prior to consideration and approval by the Ministers in the MRC Council on behalf of their respective Governments.

This Strategy forms a key step in the implementation of the strategic planning circle facilitated by the MRC. Figure 1 illustrates the key steps in formulating, implementing, and updating the Strategy.

FIGURE 1 REFRESHED MRC STRATEGIC PLANNING CYCLE



1.4 Implementation of the Strategy during 2011-2015

The BDS 2011-2015 comprises development opportunities, 12 strategic priorities, and 62 identified strategic actions. The development opportunities are being implemented through the national plans. Since 2011, a number of opportunities have moved from the planning to the implementation stage in many water-related sectors (see Section 2.2).

The MRC implements the strategic priorities and actions through the Basin Action Plan. This Plan comprises a Regional Action Plan (implemented primarily by MRCS in collaboration with counterparts in Member Countries through the MRC Strategic Plan), and four National Indicative Plans (NIPs) (implemented through projects undertaken by line/implementing agencies and RBCs in coordination with the respective NMCs). Review reports of Strategy implementation are available from the MRCS.

By 2015, it is estimated that over three-quarters of the strategic actions set out in BDS 2011-2015 will have been substantially completed, addressing all 12 strategic priorities of the Strategy (see Box). Strategic actions that have either not started or will remain substantially incomplete by the end of 2015 have been identified. If remaining relevant, these will be further addressed during 2016-2020.

Strategic Actions from BDS 2011-2015 with substantial completion include:

- Strengthened cooperation with China and Myanmar
- Web-based monitoring of flows on the mainstream
- Identification of ecologically sensitive sub-basins
- Exploration of benefit sharing options and mechanisms
- Climate change adaptation initiative launched and development of adaptation strategy
- Development of basin fisheries strategy
- Regional action plan for transportation of dangerous goods approved and development of Master Plan for navigation launched
- Joint Platform for the coordinated review and implementation of MRC Procedures and 1995 Agreement established
- 49 stations of near real-time river monitoring established
- Various capacity building actions
- Development of MRC Indicator Framework
- Performance monitoring system

The following summarises the experiences, outcomes and lessons learned from implementation of the BDS 2011-2015.

Reduction of knowledge gaps.

Implementation of the BDS 2011-2015 has reduced knowledge gaps in a number of areas (see box). Most progress has been made in the generation of new knowledge on sediment transport (see Section 2.3.3). In addition, the initiated Delta Study by the government of Viet Nam will provide more information on the potential impacts of upstream developments that would further build scientifically based knowledge to guide the decision making process. The new knowledge obtained will inform many of the strategic actions to be taken up in the next planning cycle.

Key knowledge gaps reduced under BDS 2011-2015

- Sediment and nutrient trapping - through MRC studies (IKMP, ISH), countries' monitoring, WWF assessments, and others
- Reduction of capture fisheries and social implications - through various studies and monitoring efforts (FP, World Fish, national fisheries departments, developers)
- Risks associated with river transport of dangerous and toxic goods – through studies and guidelines (NAP)
- Social and livelihood impacts - through studies, surveys and database efforts (EP, ISH, BDP, others) working with national agencies and statistical offices
- Risk management of existing, ongoing and planned projects - through studies (ISH, the Council study, Delta study, impact monitoring study by the Thai NMC, etc.)
- Climate change risks and adaptation needs - through many assessments and studies (CCAI, FMMP, AIP, DMP) and many other regional and national entities

Nevertheless, not all studies (including the Council Study and the ISH risk mitigation study) have been completed and there remains areas where further knowledge is needed to better understand development impacts, potential trade-offs, and adaptation and mitigation options. It is crucial that priority be given to addressing these remaining knowledge gaps, which include biodiversity and capture fisheries ecology.

Need for improved implementation of the MRC Procedures. Although there have been improvements to the implementation of the MRC Procedures, there have been also challenges. The implementation of Procedures for Data and Information Exchange can be improved with more clarity on the data needed for implementing agreed MRC activities. The implementation of the Procedures for Water Use Monitoring can be made more targeted and straightforward. The Procedures for Water Quality could be more simplified and made into a practical water quality management tool. The Procedures for Maintenance of Flows on the Mainstream, now implemented in a 'learning-by-doing' approach, can be made into 'real life' implementation, which will build trust among Member Countries.

A prominent issue in the past few years has been the implementation of the Procedures for Notification, Prior Consultation and Agreement (PNPCA). The PNPCA process on the two dams (Xayaburi and Don Sahong) has demonstrated that improvements can be made. Although the process has provided opportunity for cooperation and discussion of concerns that resulted in some improvements in project design and mitigation measures, the process also led to tensions and an administrative handling and completion of the process. Recently, the MRC established a 'Joint Platform' to discuss and agree on measures to improve the implementation of the Procedures, taking into account the current realities and trends in the Mekong basin. One improvement measure is to link the implementation of the MRC Procedures more strongly with the Basin Development Strategy.

Promoting optimal and sustainable development.

During the course of implementing the BDS 2011-2015, it has become clear that there are opportunities to enhance national plans for basin-wide benefits. An important step has been taken through the establishment of an exploratory scenario assessment process to investigate long term development choices and trade-offs, as well as opportunities for cost and benefit sharing. This process will allow Member Countries to consider whether their current national plans could be improved to increase benefits, reduce costs, minimize adverse transboundary impacts, and provide water-related security in an equitable manner through cooperation.

Cost and benefit sharing.
Options for enhancing national-to-local benefit sharing on tributary hydropower have been evaluated and promoted. The potential for increased regional cost and benefit sharing in all sectors has been identified through the promotion of both "national projects of basin-wide significance" (which expand development opportunities within the basin) and "joint projects" (projects involving two or more countries to address issues and opportunities that each country alone could less effectively do). These projects are now seen as central to building cooperation and promoting greater regional interdependence.

The NIPs already contain some of these types of projects, and joint actions between two or more Member Countries have also been initiated. The management of the Cambodia and Viet Nam Mekong delta to meet the long term needs of balancing development of floodplains to meet urbanisation and global food security, on the one hand, with preservation for flood storage and environmental protection, on the other represents such joint action. The challenge ahead is to identify and promote more projects of this nature (and related deal structures).

Practical implementation of IWRM and decentralization.
The preparation and implementation of the NIPs have been at the heart of promoting IWRM at the national level (communication and information sharing between sectors and sub-basins) and at the transboundary level (towards adaptation of national plans and processes taking into account basin perspectives). This has raised the profile of MRC's work within each country amongst line/implementing agencies, RBCs and other stakeholders. The implementation of the NIPs indicates that they can become the primary mechanism for successful decentralization of MRC core function activities to Member Countries.

Harmonization of regional and national planning.
The NIPs are contributing to further harmonisation of regional and national planning. Cambodia has synchronised the national development priorities of the National Strategic Development Plan 2014-2018 (NSDP) with MRC's development perspectives and incorporated several sectoral NIP projects into the Three-Year Rolling Public Investment Programme (PIP), a national investment tool for the NSDP. In Thailand, basin planning tools and processes have been mainstreamed into the strengthening capacity of river basin committees to implement and update sub-basin management strategies. In Lao PDR and Viet Nam, several NIP projects are incorporated in national plans, including watershed improvement projects and the Viet Nam Delta Study.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The NIPs will inform future updates of the Basin Development Strategy, thus strengthening the mutual ownership of the planning and management processes. In turn, MRC and other organizations will need to adapt its own response to country needs to ensure that these needs are fully reflected in regional level activities.

Leveraging of funding.

Alignment of the NIPs and their investment opportunities with basin-wide strategic priorities will provide greater confidence to both public and private investors alike. The current NIPs (with a total value of almost US$ 1.0 billion) have been used to attract investment from Development Partners and from private sector developers. For example, more than US$ 50 million has been provided for the development of hydrometeorology networks and associated capacity building in three countries. The leveraged support by individual countries is measured under MRC's Associated Project Budget, which becomes an important means of demonstrating the added value of cooperation fostered by the MRC.

Need to act as 'honest facilitator'.

As a technical and knowledge body, MRC can play more often the role of a honest facilitator on which people in the basin countries can rely on to provide scientific and even-handed information and advice on technical aspects, and to pro-actively facilitate solutions and agreements. Unbalanced and incorrect journalism and advocacy have on occasions contributed to different perceptions across stakeholder groups, thus feeding mistrust and affect regional relations. Such a facilitator would also be able to table deal structures for cost and benefit sharing that will represent a reasonable and fair outcome for all countries.

Emerging MRC Indicator Framework.

A unified framework of strategic and assessment indicators and monitoring parameters is being established to be used across MRC regional and national levels in terms of mutual accountability. The strategic indicators will provide information to policy makers on the overall status and conditions of the basin. The assessment indicators will be used to assess the value of the strategic indicators as well as to assess scenarios and large infrastructure projects. Monitoring parameters will provide the basin with relevant quality assured data sets from which indicators can be quantified and other MRC technical studies and assessments supported. In short, the MRC Indicator Framework provides a common state of basin monitoring, assessment and reporting framework.

Reduction of fragmentation and moving towards one MRC.

The implementation of the Basin Action Plan has been challenging since the BDS 2011-2015 and the MRC Strategic Plan 2011-2015, and the 5-year programme documents of the MRC Programmes were prepared in parallel and were not fully aligned with each other. As a result, MRC Programmes had to work on too many activities, some of which are not a priority according to the BDS 2011-2015. This experience has accelerated the planning and institutional reform of the MRC.

A streamlined approach to MRC strategic planning has already consolidated the current multiple processes into a single process. This new approach, elaborated in Chapter 5, brings many advantages, including moving towards "one MRC" with a greater focus on core river basin management functions instead of separate programmatic activities. It will mainstream the decentralization of core function activities at the national levels, increased harmonisation of regional and national planning, and simpler and more transparent monitoring and evaluation across the MRC.

2 Development trends and long-term outlook

Current trends and the longer term outlook for the Mekong basin provide a basis for the identification of the long-term water related needs, trade-offs and risks in Chapter 3.

The following sections are based on an assessment of current trends and a long-term outlook for some key indicators of the MRC Indicator Framework for monitoring, assessment and state of the basin reporting. The next edition of the BDS will need to be based on a comprehensive state of the basin report, as described in Section 5.5.

2.1 The Mekong River Basin

The Mekong River is the 12th longest river in the world. The river flows for almost 4,800 km from its source in Tibet through China, Myanmar, Lao PDR, Thailand, Cambodia and Viet Nam via a large delta into the East Sea, draining a basin area of 795,000 km2. The River has a mean annual discharge of approximately 475 km3, the 10th largest in the world.

The contribution of the basin countries to the annual discharge is: China 17%, Myanmar <1%, Lao PDR 41%, Thailand 15%, Cambodia 19% and Viet Nam 8%. The flow from the Lancang-Upper Mekong basin contributes 18% of the average annual flow in the LMB, but up to 40% of dry season flow.

There is a very large difference in wet and dry season flow, caused by the Southwest Monsoon generating wet and dry seasons of about equal length. Inter-annual variability is also large in terms of river discharges, flooded areas, and the start and end of the wet and dry seasons. The seasonal cycling of water levels at Phnom Penh causes the large water flow reversal to and from the Tonle Sap Lake, with the associated flooding and drying creating a rich ecology.

2.2 Water resources development and management

2.2.1 WATER RESOURCES DEVELOPMENT

In terms of water resources development, the LMB is not a blank sheet. In some countries, most water resources development has already taken place; in other countries, water resources development is accelerating.

Viet Nam began investing a century ago in improvements to navigation and drainage in the fertile areas of the Mekong delta. Since the 1960s, significant national and local benefits have been created when large areas were brought under irrigation through the development of intensive canal systems and farmer-owned low-lift pumps, while managing acid-sulphate soils and "living with floods". The Viet Nam delta is critical to the livelihoods and food security of millions of people. Hydropower development has also occurred in this period in Viet Nam's Central Highlands, upstream of Cambodia.
In Thailand, the flows of the Mekong's tributaries are highly seasonal. For many years, it has been a priority of the government of Thailand to improve water security in the north east, particularly given the less developed economic conditions in this area. Development took off in the 1960s with many small and large dams constructed to capture the highly seasonal flows for irrigation and hydropower. Even so today, only a comparatively small part of the Thai agricultural land in the Mekong basin is irrigated in the wet season and much less in the dry season.

More recently, large-scale water resources development has commenced in Lao PDR and Cambodia. Lao PDR is now developing its vast hydropower potential for national economic growth and poverty reduction, and contributing to regional energy demand, benefitting from the regional transmission grid that is being developed under the GMS. Lao PDR has also plans to expand irrigated agriculture and address its declining forest area.

Cambodia has started developing the Cambodian portion of the Mekong delta and the Tonle Sap basin, the largest remaining irrigated agricultural potential in the region. These developments are linked to investments in flood management and drainage. The rapid growth of the Cambodian economy, including its manufacturing industry, also highlights the need for greater national energy security. Hydropower produced both within Cambodia and imported

from neighbouring countries is an important renewable source to help meet this escalating energy demand.

Figure 2 below shows the development of irrigated agriculture and hydropower in the LMB. It demonstrates that Viet Nam has largely completed the development of water resources in these sectors, whilst development in Lao PDR and Cambodia are accelerating. Existing reservoir storage is still less than 10% of the mean annual flow of the Mekong. Water use for public and industrial water supply and aquaculture are relatively small but increasing in most countries. Navigation is important but, outside the Mekong delta, largely undeveloped as an integrated transport sector. The dry season flows reaching the delta are fully used for economic, environmental and social purposes, including combating seawater intrusion.

Changes during the last five years

Since 2010, approximately 20 tributary hydropower projects and the Xayaburi mainstream hydropower project have moved from the planning stage to the implementation stage. Flood protection and river training are being taken up at many locations along the mainstream.

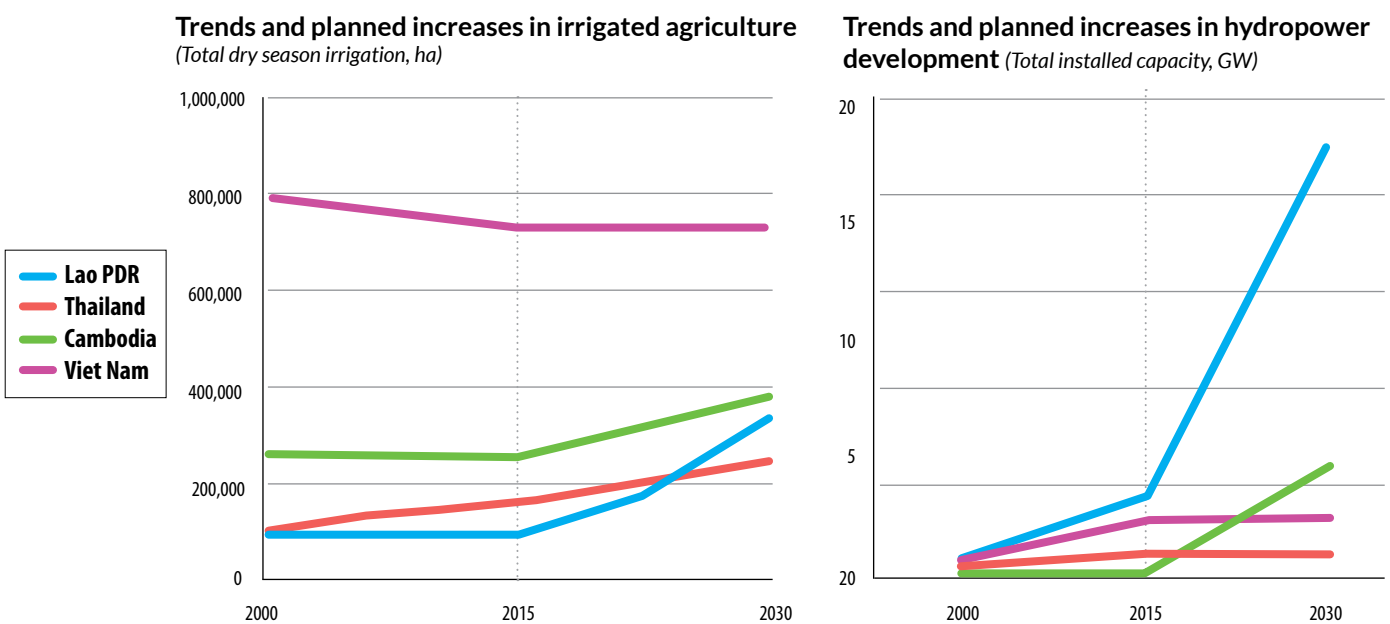


FIGURE 2 TRENDS AND PLANNED INCREASES IN IRRIGATED AGRICULTURE AND HYDROPOWER DEVELOPMENT IN THE LMB

The trends have been reviewed in 2014-2015 and are in line with recent data and assessment from the Member Countries. The planned increases are based on the 2009-2010 cumulative assessment of national water resources development plans and more recent data submitted by Member Countries.

However, the expansion of the irrigated area has been limited. These development projects have followed national preparation and approval processes and, in several instances, have been subject also to regional assessment and the MRC procedures, such as the PNPCA.

The continuous monitoring of river flows showed that from 2012-2014, dry season flows upstream of the Mekong delta have been close to or above the historically observed maximum levels. At the beginning of the wet season, flows were significantly lower than average . These observations are in line with MRC's prediction in 2009 for the Definite Future Scenario. The main reason is the redistribution of water from the wet to the dry season by the storage dams on the recently completed Lancang hydropower cascade in China, and the filling of the reservoirs in the beginning of the wet season to maximize annual energy production. This needs to be confirmed by the exchange of dam operating data.

The 4,200 MW Xiaowan and the 5,850 MW Nuozhadu hydropower projects on the Lancang cascade (with 9,800 and 12,400 million m3 of active storage) and the increasing number of storages in Lao PDR could provide additional water in the dry season on average, but also cause flow fluctuations. Proper operation of the dams might create opportunities for riparian countries to implement plans, such as a diversion into Thailand, irrigated agricultural expansion in Cambodia and Lao PDR, increase of reservoir fisheries, and combatting seawater intrusion in the Viet Nam delta. On the other hand, dam operations could result in lower water discharges than the historical averages in the beginning of the wet season due to reservoir filling and water shortage in the dry season due to emergency situations and operational mismanagement. Dam development could also have significant adverse transboundary impacts on sediment transport, aggravating erosion in the delta, and on agricultural production, capture fisheries and biodiversity.

Groundwater

Groundwater use has been modest in the Mekong basin. Most wells are located in northeast Thailand and the Mekong delta where fresh water is scarce during the dry season. There are few extensive transboundary aquifers in the basin and transboundary issues over groundwater have been absent so far. There is scope for increasing groundwater use for water supply and small scale irrigation in Lao PDR and Cambodia where groundwater quality is found to be adequate. More recently, the potential of the basin's groundwater resources is

being investigated in relation to drought management and storing excess water from floods, which then can be used for irrigation in dry spells.

2.2.2 WATER RESOURCES MANAGEMENT

Water resources management in the LMB is a mix of a 'cooperative and coordinating model' at the basin-scale, facilitated through the MRC, and four national models, where individual sovereignty, customs and administrative systems dominate. MRC, through the 1995 Mekong Agreement, acts as a focal point for the cooperation and assists the Member Countries in achieving their basin-scale aims through provision of shared information, technical guidance and mediation (see Section 2.4.1).

Each country is embracing IWRM adapted to its needs, with clear statements of national water policy and strategy supported by strengthened institutional and regulatory frameworks, and clearer definitions of responsibilities for water resources management. All LMB countries now have a dedicated agency responsible for water resources management. River basin organizations/committees are being established for participatory water management at the sub-basin level.

Development pressures and increasing private sector engagement in the water resources sector are creating new challenges for the LMB countries in sustainably managing the basin's abundant resources. Water resources management will need to be further strengthened, not only between countries, but also within countries. The challenges at the national level include: (i) the further improvement and implementation and enforcement of policies, laws, regulations and procedures (including relevant MRC procedures), (ii) the improvement of water related monitoring networks and databases, and (iii) the establishment of appropriate levels of coordination and data and information exchange between vertical and horizontal levels of government. These and other challenges are being addressed, often with bilateral support from Development Partners.

2.3 Economic, social, and environmental trends and outlook

2.3.1 ECONOMIC TRENDS AND OUTLOOK

Economy – trends

The economies of LMB countries have expanded at an average growth rate of between 4.3% and 7% per annum since 1990 . Over this period, a major structural change in the economies of Viet Nam, Cambodia and Lao PDR occurred, with the percentage contribution of agriculture to GDP rapidly declining. Thailand is already a middle income country with a Gross National Income (GNI) per capita in 2013 of US$13,430, although the GNI per capita in the northeast of Thailand within the LMB is less than half of this amount. The GNI per capita of the basin within the other three countries (Cambodia US$2,890, Lao PDR US$4,550, Viet Nam delta US$5,070) is much closer to national averages.

Economy – outlook

The economies of LMB countries are expected to continue to grow at approximately 4% to 5% per annum, with all reaching middle income status by 2030, and high income status by no later than 2060. This forecast assumes the absence of major shocks and disasters, such as a regional economic crisis or the occasional major floods aggravated by climate variability and change. The need for flood protection will increase with the rising value of the infrastructure and assets on the floodplains and increasing living standards. Competition for the use of the floodplains will rise significantly.

Agriculture – trends

In 2013, agriculture, fisheries and forestry represented 20% (northeast Thailand) to 34% (Cambodia) of the basin's economy, with industry (26% to 33%), which includes hydropower, and services (34% to 50%) making up the balance . Although agriculture's contribution to GNI is gradually falling, agriculture and fisheries continue to be the most significant employer within the rural areas of the basin. The basin's production contributes to the substantial agricultural exports and agricultural trade surpluses of Thailand and Viet Nam in particular. In 2011, national agriculture exports in Thailand were US$ 37 billion with a trade surplus of US$ 27 billion. In Viet Nam in 2011, these were US$ 14 billion and US$ 2 billion respectively.


GINTO

Agriculture – outlook

Agriculture and aquaculture will continue to be a major export earner and supplier of domestic food needs across the region. Its contribution to the basin's economy will, however, continue to decline in percentage terms. The LMB's comparative advantage in food production will provide growing opportunity for commercial agricultural enterprises to benefit from rapidly rising global demand for food. Rice production is expected to rise over the long term at 1.5% per year, driven mainly by export markets. Aquaculture production is expected to continue its rapid increase in response to growing domestic and export demands, as will livestock and other crops. Agricultural processing can be expected to continue to expand.

Energy – trends

Gas and coal are the main sources of energy within the LMB, with hydropower's share of energy demand at 8% . Existing hydropower capacity (within the LMB) has increased from 282 MW to 6,422 MW between 1990 and 2014 . During 2009-2014, hydropower development in Lao PDR has proceeded at a significantly slower pace than envisioned in 2009. However, the updated national plans show an acceleration in development leading to the same installed capacity and live storage in 2030 as modelled in the 2009 scenarios.

Energy – outlook

The total energy demand in the LMB countries will increase to 815,000 gigawatt hours (GWh) by 2025. Hydropower will remain an important, albeit small, component of the regional energy mix. Demand for financially viable projects is expected to continue, facilitated by the development of regional energy grids and associated markets . Hydropower development is expected to be a highly significant contributor to economic development of the basin's least developed countries, particularly for Lao PDR and to some extent Cambodia, and for meeting some energy demands in Thailand and Viet Nam.

Trade – trends

A notable expansion of inland waterway transport cargo underscores navigation as an important link in the region's transport network. Increased trade between the basin'scountries is encouraged by ASEAN, as is sub-regional economic integration under the GMS programme. Substantial increases have occurred also in tourism, mining, manufacturing and processing over the past two decades, making significant contributions to economic growth and employment.

Trade – outlook

Regional trade opportunities are projected to increase with the establishment of the ASEAN Economic Community in 2015. River related infrastructure and transport networks, including navigation infrastructure, bridges, and rail and road in floodplain areas, and an increased productivity of irrigated agriculture will contribute to trade opportunities and regional economic growth. The 2010 navigation agreement between Cambodia and Viet Nam highlights the need to expand river transport and regional trade.

2.3.2 SOCIAL TRENDS AND OUTLOOK

Population – trends

The current LMB population of 65 million is growing on average at around 1.2% per annum, but with significant variation across the basin, including negative growth in northeast Thailand. Fertility rates have declined sharply, but over 60% of the population is younger than 30 years of age. About 80% of the basin's population still lives in rural areas.

Population – outlook

The sharp decline in fertility rates will slow LMB population growth. By 2060, the total population is projected to reach approximately 83 million, 20% higher than the current population. By 2060 between 50% and 70% of the people in Thailand, Vietnam and Lao PDR, and 35% in Cambodia, are expected to live in cities. Urbanisation creates opportunities for better services. However, urbanisation is achieved at a loss of productive land from urban sprawl and adverse impacts on the environment and water resources.

Employment – trends

Across the four countries, typically between 50-70% of the population is engaged in activities or employment in sectors related to the MRC (being mainly agriculture, inland fisheries, aquaculture). Agriculture remains the main source of employment and income, but is slowly declining. Between 2.8 and 3.2 million households are engaged in inland capture fisheries . A large proportion of these are poor people who depend upon capture fisheries for food security and income.

Employment – outlook

The changing socio-economic status of the countries as they move towards middle and high-income status will significantly change employment patterns. Increasingly, people will work in the industrial and services sector. By 2060, relatively few people will work in agriculture and much less poor people will depend upon capture fisheries for food security and income. However, there is a clear need to minimise adverse social impacts from basin development on poor resource users in the short to medium term.

Poverty – trends

The incidence of poverty has been greatly reduced in the last 15 years. According to the most recent data from 2008-2012, the incidence of poverty is highest in Lao PDR (28% of the population), Cambodia (21%), northeast Thailand (18%), and in the Viet Nam delta and Central Highlands (16%). There are significant variations between provinces, but these percentages are generally greater in rural areas compared to urban areas. Household food security and malnutrition have also both improved, with the incidence of malnutrition within the basin being at about 16% in 2010. Access to safe drinking water supply has increased and stood in 2012 at 71% in Cambodia, 72% in Lao PDR, 96% in Thailand, and 95% in Viet Nam .

Poverty – outlook

The focus on pro-poor economic growth and accelerated rural development could reduce the population below the poverty line to 8% of the population by 2030. Food security nationally is unlikely to be a problem. Continued focus will still be needed, well into the future, on the food security of vulnerable households and on reducing malnutrition, especially in Lao PDR and Cambodia. Small scale agriculture, agricultural labour, low skilled manufacturing, and capture fisheries are expected to remain important sources of food and income for vulnerable households. Urbanisation and industrialisation will reduce labour availability in rural areas in most LMB countries, exacerbating vulnerabilities particularly for the increasing number of female headed households.

Gender equality – trends

In the rural areas of the LMB, women assume major water related responsibilities. The reduced availability of rice and fish due to water and related developments often has more negative impacts on women as they are responsible for growing and preparing most of the food and carry out most home food processing. During flood and drought, women are more vulnerable than men due to their higher dependence on natural resources and social barriers that limit their adaptive capacity. In policy making, the specific roles of women and men have not been fully taken into consideration and women experience challenges to assume leadership roles in the public and private sectors.

Gender equality – outlook

Government policies, public action, and continuing high levels of economic growth and poverty reduction will all contribute to narrowing gender gaps in several areas, such as access to education, health, and water supply and sanitation services. Continued focus will be essential to address the most challenging gender gaps in economic opportunity and influence in society. Within the sphere of MRC cooperation, this could lead to a more equal representation of both sexes in decision making processes and leadership roles of water resources development and management. Promoting gender responsive planning of water and related resources as well as disaster risk reduction is a priority in the upcoming years since the growing LMB populations and economies are globally among the most vulnerable, especially women, to extreme floods. Therefore, integrating gender perspectives into the planning and implementation of climate change adaptation responses at all scales and across sectors remains crucial.

2.3.3 ENVIRONMENTAL TRENDS AND OUTLOOK

Wetlands and forests – trends

Land and water resources development during the last 125 years has put increasing pressure on natural resources in the Mekong basin. The loss of natural wetlands has been enormous. According to estimates made in 2003, nationally Viet Nam has lost 99% of its original, natural wetland area, Thailand 96%, Cambodia 45% and Lao PDR 30% . Ongoing developments, such as the expansion of agricultural and urban/industrial areas and flood protection, put pressure on the remaining wetlands. Between one third and half of the original forest area in the LMB has been lost, although in Viet Nam the trend has been recently reversed and forest area is growing at 2% per year. In 2010, the forest area amounted to 55 million hectares or 45% of the LMB area.

Wetlands and forests – outlook

Without effective environmental management, the area of pristine natural wetlands could be reduced further with perhaps only small areas left by 2060, mainly because of expansion of agriculture, urbanization and industrialization. In the short term, the forest area in Viet Nam and Thailand is likely to increase, but in Cambodia and Lao PDR forest loss and catchment degradation may continue for some decades. However, by 2060, reforestation and soil conservation projects within the LMB catchments could result in a substantial increase in the areas benefiting from improved watershed management practices.

Biodiversity – trends

Notwithstanding the considerable loss of natural areas, the remaining river and associated natural wetlands cover about 1.5 million ha and support a high biodiversity. Over 200 riparian bird species have been identified. Fish species diversity is also high, with many species being migratory. The Mekong basin is also home to spectacular mammals, amphibians and reptiles. However, the continued loss of wetland area combined with habitat degradation and introduction of exotic species, hunting and illegal wildlife trade, has resulted in considerable loss of species and an increase in the number of threatened species from 327 in 1996 to 1,525 in 2014.

Biodiversity – outlook

Given the increasing pressure on the natural system, resulting in a loss of natural areas, a loss of connectivity and a decrease in water quality, the trend in species diversity loss is expected to continue in the future. Without effective environmental management, by 2060, a high percentage of the present species may be in serious decline, endangered or already lost. Three of the four Mekong flagship species are expected to be extinct (Giant Catfish, Irrawaddy Dolphin and the Eastern Sarus Crane), while the Siamese Crocodile may still be kept in captivity.

Fisheries – trends

Estimates made of capture fisheries production in the LMB range from 0.9 to 2.1 million tons per year . This valuable resource is threatened by overfishing, the use of destructive fishing gear, agricultural and industrial water use, habitat fragmentation and loss of riverine connectivity from dams, roads, drains, canals, and barrages. Although catches are still high, the quality of the catch is decreasing. Small fish are increasing as a percentage of the catch, both in weight and numbers. Infrastructure development, such as dams, that alters the natural flow of the river and blocks migration routes, may further affect this valuable resource. However, aquaculture production in the LMB, estimated at 2.6 million tons per year, has been growing steadily and is now larger than capture fisheries in three of the four LMB countries (Lao PDR, Thailand and Viet Nam).

Fisheries – outlook

In the long term, the development of dams and other infrastructure on floodplains will continue to threaten capture fisheries. The management and conservation of wild fish stocks will be critical to sustaining a stable supply for capture fisheries to maintain the current levels of production. Without fish friendly policies and active fisheries management, including the engagement of fisheries line/implementing agencies in basin development planning, capture fisheries production levels will decline by 2060 to much lower levels than today. In the

medium to long term, it is likely that aquaculture will further expand in Thailand, Cambodia and Lao PDR in response to growing domestic and export demand. In Viet Nam, the dramatic rate of increase in aquaculture production in recent years will begin to slow down and stabilize.

Water flows – trends

The 2012-2014 flow monitoring records suggest that there is a clear indication of increased average dry season flows emanating from the upper basin as a consequence of the recently completed new storage dams in China. However, in the mainstream below the confluence with the Tonle Sap River at Phnom Penh, such changes are not yet as evident, possibly as a consequence of the annual variability of outflows from the Tonle Sap Lake. Further monitoring is required to confirm the expected impacts of flow augmentation as a result of the new reservoirs in the basin.

Water flows – outlook

The 2009-2010 scenario assessment, validated by recent review and monitoring data, suggests that the redistribution of seasonal flows from the wet season to the dry season by the existing and planned hydropower developments in China and the LMB (in particularly Lao PDR) could provide additional dry season flow volumes to meet some planned consumptive water demands of the LMB countries in the foreseeable future. But at the same time, the uncoordinated operation of storage dams would cause negative impacts such as delay of the flood onset due to dam filling and unexpected flow changes in the dry season, which would impact the Tonle Sap and the delta.

Water quality – trends

Monitoring data collected by the MRC since 1985 show that water quality in the mainstream is relatively stable and still meets the agreed minimum standards in all but a few locations around urban centres, including the densely populated Mekong delta. Growing population, increasing industrial activity, and the potential increase of the use of agro-chemicals in agriculture may result in increased pollutant loads in the Mekong basin.

Water quality – outlook

If not regulated and managed, mainstream water quality will gradually deteriorate below agreed minimum standards downstream of the current urban centres. Water quality will

potentially be at greater risk due to increased pollution loads from expanded urban and industrial areas without proper treatment and by intensified agriculture. In the Mekong delta and Tonle Sap River, the transport of petroleum and other dangerous goods by inland barges is increasing. MRC technical guidelines exist for management of river pollution from shipping accidents, but risks will increase if no regional standards and regulations for river transportation of dangerous goods are implemented.

Sediment – trends

Sediment trapping and sand mining throughout the Mekong basin have resulted in a major reduction in sediment loads. At Pakse, total sediment loads have fallen by more than a half from an historic 147MT/year to around 66MT/year, mainly due to sediment trapping by mainstream dams in China and tributary reservoirs. A valuable resource for the construction sector, the incidence of gravel and sand mining from the mainstream has also greatly increased in most parts of the LMB, particularly downstream of Kratie through to the Mekong delta in Viet Nam. The major resulting changes in sediment loads are expected to impact on the morphology of the river and the delta's coast line.

Sediment – outlook

Without mitigating measures and effective management, the combined trapping efficiency of the mainstream dams (including in the upper basin) could be as high as 80%, which will greatly reduce the sediment loads in the mainstream. The increasing number of tributary dams will trap sediments and reduce the amount of sediment reaching the mainstream. On the other hand, catchment degradation and soil erosion are expected to increase in the short to medium term. This may result in higher sediment fluxes from the tributaries to the mainstream. In the longer term, it is likely that watershed management measures and soil conservation practices will be implemented on steep slopes and on erosion sensitive soils, reducing sediment discharge to the rivers. The combined effect of dam construction and watershed management is likely to further decrease sediment loads. This disturbance in the sediment balance will further increase coastal erosion.

Protected areas - trends

Recognizing the importance of maintaining the balance between rapid development and environmental protection, the basin countries have taken up various initiatives to conserve the biodiversity of the Mekong basin and secure the natural resource base. At present, 15% of the

Mekong basin has a protected status and the number and size of protected areas are both increasing.

Protected areas – outlook

With increasing economic development and welfare, attention for the natural environment and the wish to protect the remaining natural areas, as well as to stop further loss of biodiversity, is expected to become more manifest. It is therefore likely that the total number and size of protected areas will further increase in the near future. However, it is also expected that, in the longer term, growing population and the related increasing pressure on the resources, combined with weak law enforcement, may lead to further loss of the quality and biodiversity of the existing protected areas.

2.3.4 CLIMATE CHANGE

The Mekong basin is expected to be significantly affected by climate change. Results of long-term climate model projections under various emission scenarios indicate that temperatures will increase and sea level rise, while changes in rainfall and run-off may increase or decrease, depending on location within the basin.

The predicted changes in rainfall and temperature could cause greater variability in the hydrological regime of the Mekong. In the short-term, the climate variability change adds more uncertainty to the changes caused by the development activities. An increase in the risk of both floods and droughts is expected. Low-lying areas downstream of Kratie and in the Mekong delta would be particularly at risk.

In the Mekong delta, the most important factor related to flooding is expected to be sea level rise. Estimates indicate that approximately 30% of the delta would be inundated with a one metre sea level rise. .The recently prepared Mekong Delta Plan of Viet Nam provides a long-term vision and strategy for the development and management of the delta in the face of climate change.

Based on further assessments of the range of potential impacts that climate change may have on the Mekong basin, the MRC is leading the formulation of a regional adaptation strategy.

2.4 Regional cooperation and integration

2.4.1 THE MRC'S ROLE IN FOSTERING COOPERATION

The Mekong basin lies within a dynamic region of fast growing economies. South East Asia as a whole is taking its rightful place on the global stage in terms of manufacturing, trade, food exports and tourism. Throughout this region, regional cooperation and integration trends are manifesting themselves as the countries are seeking increased cooperation to strengthen their positions to take advantage of the vast opportunities that lie ahead and to take responsibility for jointly managing the basin they share.

For basin wide-water resources development and management, the MRC acts as the primary forum for cooperation and the only one established by treaty (the 1995 Mekong Agreement) of four sovereign states. While the responsibility for planning, design and implementation of development projects and water resources management lies with each Member Country, the MRC is mandated to promote sustainable development and coordinate management from a basin-wide perspective.

In seeking to fulfil its mandate to foster cooperation and contribute to regional integration in its mandated water and related sectors, the MRC and its Member Countries have sought to build cooperation with strategically important partners.

2.4.2 COOPERATION WITH REGIONAL ORGANISATIONS AND INIATIVES

Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam are all cooperating and striving for regional integration as members of ASEAN, a cause which is fully consistent with MRC's aim of promoting greater regional inter-dependence. In addition, the LMB countries are also cooperating through other bilateral and multilateral mechanisms, including Asia-Europe Meeting (ASEM), Asia Pacific Economic Cooperation (APEC), Lower Mekong Initiative (LMI), Mekong-Japan Cooperation, Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS), the Triangle Development Cooperation, and others.

All Mekong basin countries are also making advances in regional economic and physical connection under the Greater Mekong Sub-region (GMS) cooperation supported by ADB. MRC and ADB continue to work together, building on their Partnership Agreement, with a view to greater sharing of knowledge and information and in promoting strategically important development opportunities. Alignment of development strategies developed under GMS and MRC cooperation frameworks will support each to succeed in their respective aims in synergetic ways. With the MRC transitioning to core river basin management functions, cooperation from GMS offers the opportunity to the MRC to rationalise and phase out its programmatic work in water-related sectors. For the GMS, the Basin Development Strategy provides a basin-wide water resources management perspective against which possible water related Regional Investment Framework (RIF) projects can be screened. This can facilitate funding of RIF projects as project developers are provided with some certainty as to the regional water resources management processes against which RIF projects will be judged.

MRC and ASEAN are also continuing discussion to cement areas of cooperation identified in the signed Memorandum of Understanding between the two organizations. MRC can support ASEAN integration by promoting optimal and sustainable water resource development projects to reduce the development gap between countries. MRC can further engage in ASEAN water related working groups. Strategic directions and cooperation agreements facilitated under ASEAN in the water and related sectors (including energy, transport, environment, and disaster management) could provide an added impetus for MRC cooperation. In this respect, ASEAN can help promote and facilitate the making of broader multi-sectoral deals to secure specific cost and benefit sharing arrangements (including benefits beyond the water sector).

2.4.3 COOPERATION WITH DIALOGUE PARTNERS

The MRC began working with China and Myanmar when in 1996 these two countries agreed to become Dialogue Partners of the MRC. From the MRC's perspective, fostering close cooperation with these countries is essential to capturing downstream opportunities arising from increased regulation of flows by the two large storage dams constructed in the Lancang, and minimising the attendant risks associated with these projects.

In 2002, MRC's cooperation with China under this relationship was further strengthened with the signing of a Memorandum of Understanding on the provision of daily river flow and rainfall data from two monitoring stations in Yunnan Province during the wet season to facilitate improved flood forecasting. More recently, MRC is cooperating with China in a number of areas, such as the exchange of relevant monitoring and water-quality data and sharing technical expertise and exchanges in flood prevention and management, hydropower development, and environmental management. Further collaboration in these and other areas are being explored.

Cooperation with the Dialogue Partners continues to increase through yearly dialogue meetings (and high-level participation from China and Myanmar in MRC summits and Council meetings), technical exchanges of knowledge and expertise through visits and workshops, comparison of modelling and study results, and the Junior Riparian Professional Programme (where China nominates and supports young professionals to work at the MRC).

2.4.4 COOPERATION WITH DEVELOPMENT PARTNERS

A wide range of Development Partners have supported the Mekong cooperation since the 1950s. This support continued with the establishment of the MRC in 1995 and peaked during the past five years, especially in terms of financial contribution. With increased development in the riparian economies, 2015 will be a turning point in a gradual transition towards a MRC that is fully funded by its Member Countries in 2030.

During the transition process, MRC activities will be increasingly embedded in the national systems. In many cases, Development Partners have strengthened the planning and management of water and related resources at the national levels. Therefore, opportunities may exist in the transition process for Development Partners to create synergies between their regional support to the MRC and their national support to line/Implementing agencies, RBOs, and others, with benefits for all levels of water resources planning and management.

3 Development needs, trade-offs and challenges

As described in Chapter 2, water resources development and management in the LMB is shaped by rapid economic and social changes across the region as the riparian countries move towards middle and high-income status. Furthermore, lead times required for water resources development are often lengthy and the potential impacts of development felt well into the future. Therefore, an understanding of the long term development needs, trade-offs, challenges and risks are an essential part of strategic planning. Development opportunities and strategic priorities and actions can then be appropriately framed within this longer term perspective (see Chapter 4).

The current and successive national plans will necessarily have to address the required development needs and trade-offs, and provide a comprehensive response to the risks in all water and related sectors. The national plans will also have to leverage the benefits to be gained from regional cooperation that will be guided by the Basin Development Strategy and the basin-wide cross cutting and sector strategies to be prepared under this Strategy.

3.1 Development needs related to water resources

The following long-term needs related to water resources development and management follow from the assessment of trends and outlook in Chapter 2, and analysis of regional and national perspectives of stakeholders.

3.1.1 FOOD AND LIVELIHOOD SECURITY AND ACCESS TO SAFE WATER SUPPLY AND SANITATION

The basic needs of food and livelihood security can be met through a combination of income generating employment and access to affordable food. All LMB countries have adopted poverty alleviation strategies which seek to address these issues. In these strategies, each country focuses on development in specific water sectors in which it has a comparative advantage.

Within the sphere of MRC's influence, agriculture, capture fisheries and aquaculture contribute to local food and income security. Sustainable hydropower development contributes to employment, as well as national revenues to achieve poverty reduction and economic growth.

t is important that development within these and other water-related sectors avoids or minimises harm to those whose livelihoods depend upon natural resources, particularly those engaged in capture fisheries. Whilst long-term changes in the rural socio-economy will reduce the number of vulnerable resource users in the future, there is a clear need to minimise adverse social impacts in the short to medium term until such changes have fully come into effect.

Access to safe water supply and sanitation is a fundamental human right. Most drinking water supplies are from groundwater, with only significant urban areas making use of surface water from the mainstream and major perennial tributaries. The quality of surface water resources is threatened by increases in agricultural pollutant runoff, industrial waste discharges and accidental spills. The need for pollution control and management measures to safeguard water quality will become increasingly important.

3.1.2 RESILIENCE AGAINST SEVERE FLOODS AND DROUGHTS

The long term outlook points towards a wealthier society within the basin, underpinned by growth in industry, urban centres, transport and more export-oriented agriculture and fisheries sectors. Greater resilience against severe floods will be needed, as richer societies will demand higher levels of flood protection to secure infrastructure, assets and lives.

Development pressure on land use will lead to encroachment on the floodplains, particularly those of Cambodia and Viet Nam. The potential reduction of floodplain storage, combined with the anticipated increase in the number and/or intensity of extreme events caused by climate change and sea level rise, will increase the severity of both mainstream floods and tributary flash floods. Current plans for reservoir development have insufficient storage to offset losses in floodplain storage. There is an urgent need to establish a long-term and basin-wide strategy for flood protection of the expanding urban, commercial and industrial assets before encroachment extends too far.

At the same time, climate change may increase the risk of droughts, affecting farmers throughout the basin. A regional response is needed to mitigate these impacts, involving improved warning systems and greater awareness of adaptation measures. In some places, groundwater may be used to overcome dry spells.

3.1.3 PROTECTION OF KEY ENVIRONMENTAL ASSETS AND ECOSYSTEM SERVICES

Article 3 of the 1995 Mekong Agreement, Protection of the Environment and Ecological Balance, emphasises the need to protect the environment and ecological assets of the basin. Nevertheless, the environment, in particular biodiversity and ecosystem services, is still considered one of the areas with insufficient knowledge at the basin-wide level.

It is known that biodiversity and valuable ecosystems have degraded considerably since large scale basin development began more than 100 years ago. MRC scenario and other assessments show that environmental assets will be further eroded by developments not only within but also beyond the water sector. So far, joint efforts by the riparian countries to preserve those prioritised valuable assets from a basin-wide economic, social and environment point of view have been limited.

Notwithstanding the considerable environmental losses already occurred, there remains opportunities to sustainably manage the remaining naturally functioning ecosystems. This requires a common understanding of the functions and services of environmental assets within the basin, followed by appropriate actions to protect selected assets. It will inevitably involve a discussion of trade-offs between development and protection, with potential impacts in all water and related sectors.

3.1.4 ENERGY SECURITY

The long-term outlook confirms that regional energy demands will continue to grow and that national energy security will remain an issue for Member Countries to address. Hydropower is expected to continue to be high in demand as a cost-effective source of renewable energy.

Further development of hydropower is central to the economic development policy for Lao PDR and is also planned in Cambodia. The regional challenge is to build consensus on how tributary and mainstream hydropower can be sustainably developed within the basin in a

manner that contributes to energy security requirements, satisfies country ambitions to develop their hydropower potential, and minimises adverse transboundary impacts.

3.1.5 IMPROVED NAVIGATION

For centuries the Mekong river system has been used for connecting communities. Many areas in the Mekong basin are remote and can currently be reached only by boat. The rapidly developing economies require a significant increase in effective transportation systems. Navigation already plays an important part downstream of Phnom Penh and upstream of Chiang Saen, but it must compete with the growth of other transport modes within the region, including road and rail transport.

Furthermore, increased regional trade and the demand of regional integration will require better multi-modal transportation networks. Maintaining freedom of navigation and enhancing river-borne transport networks, including on the mainstream, are needed to support remote communities, ship bulk goods, build regional interconnectivity and foster socio-economic development. As a first step, MRC is preparing a Regional Master Plan for Waterborne Transportation that links into ASEAN's work on multi-modal transport.

3.2 Basin-wide assessment of national plans

The current national plans focus on leveraging the comparative advantage each possesses in terms of their natural resources and human capital. The socio-economic and environmental impacts of these development plans have been cumulatively assessed in 2009-2010 as part of the preparation for formulating the BDS 2011-2015. The results have been largely validated during the 2014 review. They indicate that the national plans can capture the considerable scope for further water resources development in the basin that can address some national needs and regional demands. However, the 2014 review reaffirms that the plans are sub-optimal from a basin-wide perspective as they do not address the above long-term water security needs, and therefore miss the joint development opportunities that could be realised.

The review shows that sediment loads are decreasing more rapidly and that water quality appears to be deteriorating somewhat faster than expected earlier (see Section 2.3). This means that impacts on the river bed and coastal and river bank stability in the delta are larger

than predicted in the 2009-2010 scenario assessment. One reason for the under-assessment of the sediment reduction is the recent assessment of the magnitude of sand mining (11 MT/ years upstream and 45 MT downstream of Kratie), which was not known at the time of the scenario assessment .

In all other respects, including the economic and social assessment, the 2009-2010 assessment results appear to remain largely valid. The overall incremental economic benefits of all ongoing (since 2000) and planned water resources developments of the MRC Member Countries are very large (with an estimated net present value of US$ 33,386 million) . Hydropower development will contribute most with further significant benefits in irrigated agriculture, reservoir and rice field fisheries, and some in navigation.

The ongoing development may also lead to very large environmental and social transboundary impacts and risks (valued at US$ 3,041 million in present value terms), including a loss of 25% of the basin-wide capture fisheries production, and considerable losses to wetland area production, biodiversity, and recession rice.

Approximately 1.7 million people in Viet Nam, 1.2 million people in Cambodia, 0.9 million people in Lao PDR and 0.5 million people in Thailand will be exposed to some degree of livelihood risk. It is estimated that approximately half of these impacts and risks are 'inevitable' as they occur as a result of ongoing (since 2000) and already committed water resources development.

The 2009-2010 assessment acknowledges a number of limitations including:

- The assessed plans pertain solely to the water and related sectors. The findings point to the need to consider also future plans for other sectors in order to establish a comprehensive and integrated approach to basin planning; and

- The assessments were conducted against economic, social and environmental baseline conditions in 2008, while a considerable part of the impacts of planned development would become only visible sometime after 2030. Since the impacts of developments outside the water sector were not considered, the findings may also be skewed.

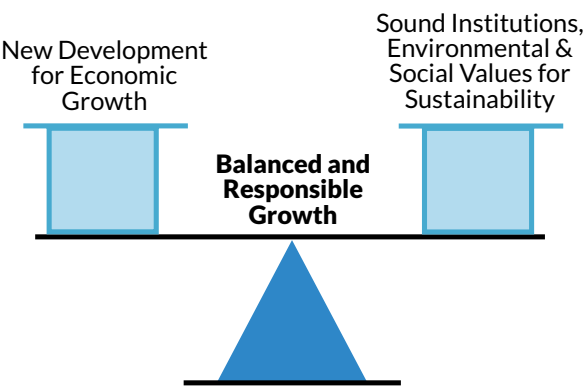
The sub-optimal nature of national plans and the limitations above both point to the need to broaden and deepen the basin planning and assessment approach.

Assessment of alternative development scenarios. MRC has already initiated the formulation of alternative basin-wide development scenarios to examine how the above long-term needs can be met in the light of demographic changes, rising social demands, climate change among other factors. The aim of the assessment is to show where development and management opportunities lie in the future to optimize basin development to increase national benefits, minimize negative transboundary impacts, and provide water-related security in an equitable manner through cooperation.

3.3 Key trade-offs to be considered

The results of assessment of the alternative development scenarios will demonstrate both 'synergies', or complementary effects between water resources developments, and 'trade-offs', where benefits for one area or activity create dis-benefits in another area. Trade-offs in particular require much analytical work and negotiation between countries, or between sectors, to find the 'middle ground' or 'balancing point' which all key players and stakeholders are prepared to agree. The right development pathway balances a range of desired outcomes and can be sustained for the long term.

All of this requires strong IWRM understanding and water-food-energy nexus thinking, and capabilities across the basin and institutions, and time for consultation to develop preferred negotiating positions. It will also require close consideration of a range of complementary measures that may be needed to offset or mitigate the impacts of agreed development. The key considerations in this regard are highlighted below.



3.3.1 BALANCING ECONOMIC BENEFITS WITH SOCIAL AND ENVIRONMENTAL PROTECTION

The economic benefits of the planned national developments, especially in hydropower and irrigation, are very large and transformative. However, the combined impacts on the environment (especially fisheries) and exposure of vulnerable people are significant. The transboundary assessments illustrate the scale of adverse impacts of the different development scenarios.

Whilst loss of environmental assets is generally irreversible, levels of vulnerability in the rural population are expected to fall over time, implying that some forms of development may be more acceptable if they are not taken up in the short to medium terms. Balancing development and protection requires a thorough examination of the trade-offs involved.

3.3.2 BALANCING OF MAINSTREAM AND TRIBUTARY HYDROPOWER DEVELOPMENT

Energy from hydropower projects has a part to play in each country's energy supply mix and can also contribute to growing regional inter-dependence from cross-border energy trading. Similarly, the reservoir storage provided by these projects helps to regulate mainstream flows from the wet to the dry season, opening up opportunities if properly operated for increased dry season abstractions and potentially for flood control as well.

However, depending on the location, size and manner of operation, hydropower developments on the mainstream and tributaries have different transboundary impacts on capture fish migration, on rural livelihoods, on sediment trapping, and on the extent of flow regulation. The scenario assessments show that groups of mainstream dams in the upper part of the LMB have less potential transboundary impacts than others further downstream. The economic value and environmental impacts of different hydropower projects on the tributaries vary considerably.

Given this situation, the appropriate selection and sequencing over time of mainstream and tributary hydropower projects can help achieve a balance between hydropower development (including dam design and operation) and transboundary environment protection requirements.

3.3.3 BALANCING THE INCREASE OF RESERVOIR AND NATURAL STORAGE

Considering the large variation in mainstream water flows, the current and planned water storage capacity is small in the Mekong basin compared to other river basins. More extreme events associated with climate change and the continued reduction of the basin's wetlands are predicted to worsen flood damage in densely populated parts of the basin. Experiences worldwide suggest that as societies become more affluent, the traditional approach of living with floods is no longer adequate. Spatial planning, flood proofing and flood forecasting will increasingly become important resilience measures, but so will the increase of water storage capacity in the Mekong basin. If properly planned, the balanced increase of reservoir and natural storage throughout the Mekong basin are "no-regret" measures which may have multiple benefits.

Likewise, it will be critical to balance the development of the Mekong delta and the preservation of wetlands, which are critical assets for flood storage, fisheries, agriculture and ecosystems. Given the rising expectations for flood protection and the impacts of climate change, a multi-sectoral assessment of options is needed to determine how best the Mekong delta should be managed and developed in the medium to longer term. Considerations should include the protection of certain wetland areas against encroachment, the use of certain zones of the floodplain and wetland for flood conveyance, the potential benefits to be gained from alternative infrastructural solutions and the impacts of future flow regimes on the Mekong delta's aquatic ecosystems, channel and coastal stability.

3.4 Strategic challenges and risks

Based on the identified long-term water related needs and anticipated trade-offs, the Member Countries and MRCS have identified the following challenges and some risks that could diminish the effectiveness of the implementation of the Basin Development Strategy.

3.4.1 HARMONIZATION OF REGIONAL AND NATIONAL PLANNING

The implementation of the NIPs has begun to contribute to the harmonisation of regional and national planning. The challenge is now to further build the "circle of ownership" between the MRC and its Member Countries so that national developments are compatible with basin-wide needs, including awareness and implementation of MRC Procedures and best practice guidelines. Joint planning, management and development provide the potential to mitigate risks and develop opportunities in a way that increases benefits for all parties. Taking steps along this pathway will provide positive feedback in terms of building trust and creating new opportunities.

The NIPs can be updated to further engage national agencies in MRC's work. The NIPs could provide the information that needs to be integrated or taken up in the national socio-economic and sector plans (when they are updated) and/or annual work planning of relevant national agencies. The NIPs will also influence future updates of the BDS and MRCs response to country needs.

3.4.2 JOINT DEVELOPMENT AND COST AND BENEFIT SHARING

Most of the identified development risks (including those posed by changes in sediments, fish and floods) are growing as populations and economies grow and climate change advances. Assessing and mitigating these risks requires early cooperative action, with all relevant parties.

Experience from other regions indicates that sooner or later joint management and development, with cost and benefit sharing deals, will be necessary. This will require a shared vision planning that addresses the longer term needs to identify acceptable development outcomes across the basin. In this process, the MRC needs to allow and promote broad-based as well as targeted stakeholder engagement to examine development options, costs, benefits and trade-offs which may need to be considered by riparian governments, individually and collectively.

3.4.3 ASSESSING AND MITIGATING WATER RELATED POVERTY

If economic growth and structural changes of the economy may reduce the numbers of vulnerable resource users in the future, poverty reduction in the Mekong region remains a major challenge in the medium term and an indispensable requirement of sustainable development. There is a clear need for the MRC in the short to medium term to promote food security and pro-poor development in its basin-wide sector strategies for water resources development.

Experiences with scenario studies and the PNPCA process show that it remains a challenge to assess water related poverty in relation to developments in and outside the water sector. The scope and spatial density of national statistical data collection does not allow for an assessment of how people might have been positively or negatively impacted by water resources development. The emerging MRC Indicator Framework provides useful socio-economic monitoring parameters that could close this gap in the national statistical data. In the meantime, periodic socio-economic studies and periodical surveys (such as SIMVA) are needed to complement national socio-economic data collection.

3.4.4 UNCERTAINTIES ASSOCIATED WITH CLIMATE CHANGE AND THE IMPACTS ARISING FROM DEVELOPMENTS OUTSIDE THE WATER SECTOR

Uncertainties exist in all planning exercises. They may arise from insufficient knowledge of how a system responds to change, of what stimulates change, or from unforeseen external shocks such as natural catastrophes and conflicts. A good plan anticipates where these risks lie, takes action to minimise their impacts, and increase resilience to external shocks. In the Mekong context, this requires a greater knowledge of how economic, social and environmental impacts relate to shocks, and the subsequent development of robust "no regret" plans with adequate provision for adaptation to changing circumstances and with measures to deal with emergency situations.

The MRC has already built a substantial body of knowledge and has plans in place to address identified gaps. A climate change adaptation strategy is currently being formulated, which will increase understanding of the possible impacts of climate change and how these may be managed. MRC is also exploring the positive and negative impacts of alternative long-term scenarios that will draw upon the long-term trends in developments outside the water sector. Insights gained will be used to promote adaptation of national plans.

3.4.5 WILLINGNESS TO IMPLEMENT BASIN-WIDE COOPERATION MECHANISMS

The 1995 Mekong Agreement is an agreement to cooperate in joint basin development planning and management of the river through procedures. Much effort has been given to defining and elaborating the MRC Procedures and related technical guidelines. The fact that the MRC cooperation is underpinned by five agreed procedures is an achievement compared to other basins in developing countries.

However, the development and effective implementation of the MRC Procedures have been a challenge. The Procedures and associated guidelines have been in place for several years, and it is appropriate that they now be reviewed to establish whether they are aligned with the current realities and trends in the basin. The review, including through the recently established Joint Platform, will be implemented in the context of decentralization and the 5-yearly Basin Development Strategy. The review could lead to a more practical and country-driven implementation of the procedures with stronger links to planning and management at the national and regional levels.

3.4.6 LIMITATIONS IN HUMAN RESOURCE AND INSTITUTIONAL CAPACITY AND ENFORCEMENT CAPABILITY

The Member Countries are at different levels of economic development and, as a consequence, their national interests and institutional capacities are not the same. The

implementation of basin development at national level requires a suitable and high level of interest, human resource and institutional capacity by which to integrate basin perspectives into national and sub-national planning in a coordinated manner that addresses both local issues and engagement with the private sector.

Development Partners are supporting institutional strengthening programmes in each country in support of integrated water resources management. In addition, the MRCS has been providing capacity building at the regional level. Given the perceived risks to the Strategy implementation, it is evident that MRC needs to continue its support to the countries, but with a sharp focus on capacity building in areas related to core river basin management functions and in support of decentralisation of these.

3.4.7 LIMITED COORDINATION ACROSS GOVERNMENT AGENCIES AT NATIONAL AND SUB-NATIONAL LEVELS

The Basin Development Strategy is founded on the principles of IWRM. These principles require a coordinated response to the Strategy across all water and related sectors. The role of coordination at national level lies primarily with the National Mekong Committees (NMC). The constitution of each NMC is determined according to national preference, but generally includes members drawn from a range of ministries reflecting the breadth of water and related sectors. Each NMC is supported by a NMC Secretariat, which is normally attached to the lead ministry for water resources management.

Although national perspectives differ across countries, some view that coordination within and/or between countries is not as effective as it needs to be. The root causes may lie in legal and regulatory powers, in the practices and procedures for horizontal and vertical inter-agency coordination, or in the perceived view of the MRC importance for national development. Whilst this is primarily a national issue, the MRC through NMCS should assess how its coordination with the various national and sub-national agencies can be strengthened in each country to minimize risks to the effective implementation of the Strategy.

3.4.8 INSUFFICIENT KNOWLEDGE AND INFORMATION MANAGEMENT AND COMMUNICATION

Although MRC has a significant amount of information and knowledge accumulated through decades of monitoring and research, there still are gaps related to climate change,

biodiversity, capture fisheries, rural livelihoods, flood management and others that need to be filled. Most of these gaps are being addressed by ongoing studies and will continue to be implemented during the 2016-2020 planning cycle. The newly generated information is needed for the examination of key trade-offs and preparing alternative strategies for an optimal and sustainable development. In the process, further priority knowledge gaps may be identified.

Even though Mekong knowledge creation has been considerable, broad-based consensus and common understanding on key information is often lacking. This results in different perceptions across stakeholder groups, which can feed mistrust and affect regional relations. The MRC is mandated to promote common knowledge and understanding among all stakeholders, through providing scientific evidence and raising awareness related to the river and to management and development benefits, impacts and risks. The transition of the MRC to core functions and the further strengthening of national water resources management (supported by Development Partners) may offer opportunities to improve data and information management and timely communication to stakeholders.

3.4.9 GENDER MAINSTREAMING IN MEKONG BASIN DEVELOPMENT

Gender awareness and equity are critically important for sustainable development in the Mekong basin. Gender-inclusive development strategies contribute significantly to economic growth and poverty reduction, as well as to equity objectives by ensuring that all groups of beneficiaries share development benefits. Women and men contribute to water resources development and are impacted differently by it.

Given this situation, most water related organizations promote gender equity and many have gender policies in place. At the regional level, the MRC has a gender policy and strategy and "Tool Kits for Gender Responsive Mekong River Basin Development" to help capture gender benefits and identify new opportunities for achieving gender equity. However, resource limitations challenge the translation of these strategies into realistic and practical guidelines that are endorsed and implemented by the countries.

This Strategy directs that all assessments, strategies, guidelines, projects and related work must be gender-sensitive. Furthermore, together with partner organizations, actionable guidelines will be developed to reduce existing inequalities and promote gender-responsive and effective water governance systems including monitoring and evaluation. One example

4 Basin Development Strategy

In the context of addressing the long term development needs, trade-offs, challenges and risks in Chapter 3, the Basin Development Strategy sets out the development opportunities for basin-wide and national implementation and medium term strategic priorities and actions for all relevant actors. The MRC will implement strategic priorities and actions through its 5-yearly MRC Strategic Plan and the National Indicative Plans (NIPs) in according with its core functions. Others have important roles to play as stipulated in Chapter 5.

4.1 Development opportunities

Based on the 2009-2010 basin-wide cumulative impact assessment of national plans, which remains essentially relevant (Section 3.2), development opportunities were negotiated by the Member Countries in the BDS 2011-2015. These development opportunities are confirmed again for the updated BDS for 2016-2020 in the four areas described below (Sections 4.1.1 to 4.1.4). The development opportunities will be updated in greater detail based on the results of the initiated new assessments, including the Council Study and assessment of alternative development scenarios taking into account the balancing of trade-offs and the nexus of water, food and energy security (see Section 3.3).

4.1.1 TRIBUTARY HYDROPOWER DEVELOPMENT

There is considerable potential for further development of tributary hydropower in the LMB, especially in Lao PDR and Cambodia, as well as for improvement in operation of existing hydropower projects in the LMB.

Further utilising this opportunity requires a focus on sustainability both at project and transboundary levels, and that any potential transboundary impacts are collaboratively identified and mitigated through national regulatory frameworks and guidelines as well as applicable MRC Procedures and guidelines.

4.1.2 EXPANSION OF IRRIGATED AGRICULTURE

Subject to coordinated operation of the hydropower dams in the Lancang-Upper Mekong Basin and in LMB, there is an opportunity for increased dry season flows to be used, without

affecting the baseline flow, to expand irrigation, including in Cambodia, Lao PDR and a possible diversion from the mainstream into Northeast Thailand, and to combat saline intrusion in the Mekong Delta. At the same time, there is the need to mitigate the potential risks relating to decreased sediment transport and unexpected flow changes.

To further capitalize on this opportunity and mitigate the risks, effective cooperation with China and rigorous implementation of agreed MRC Procedures to share data and information (PDIES), monitor water use (PWUM), maintain baseline flows (PMFM), maintain water quality standards (PWQ), and ensure transboundary assessment of certain uses (through PNPCA as applicable) are required.

4.1.3 MAINSTREAM HYDROPOWER DEVELOPMENT

There is an opportunity to consider mainstream hydropower proposed by Member Countries, provided the major uncertainties and risks associated with mainstream dams are fully addressed and that the Member Countries consider and address jointly the transboundary impacts of any proposed project (through the PNPCA).

4.1.4 OTHER OPPORTUNITIES

Water-related opportunities, such as fisheries, navigation, flood and drought management, watershed management, tourism and environment including ecosystem management, as well as opportunities beyond the water sector (e.g. alternative power generation options) have considerable potential. This potential will be identified, facilitating the move towards sustainable basin development.

The BDS 2011-2015 emphasises the need for water-related sectors to prepare basin-wide strategies and for further identification of alternative opportunities beyond the water sector.

4.2 Strategic priorities for basin development and management

Seven basin-wide strategic priorities are identified as a framework to address the longer term water-related needs, trade-offs, challenges, and risks for basin development and management (Chapter 3). They also contribute to ensuring that identified development

7 basin-wide strategic priorities for basin development and management

1. Reduce remaining knowledge gaps to minimise risks;
2. Optimise basin-wide sustainable development and cost and benefit sharing;
3. Strengthen the protection of mutually agreed environmental assets;
4. Strengthen basin-wide procedures and national implementation capacity;
5. Improve national water resources development and management;
6. Enhance information management, communication and tools; and
7. Increase cooperation with partners and stakeholders.

opportunities are effectively realised and sustainable. Their identification has taken into account also the goals, objectives and principles of the 1995 Mekong Agreement and the directions provided by the Heads of Governments at the 1st and 2nd MRC Summits (see Section 1.3).

Under each strategic priority, actions have specifically taken into account:

- The two major roles of the MRC mandated by the 1995 Mekong Agreement: to promote sustainable development of the Mekong water and related resources and to coordinate the management of the river;
- The core functions of the MRC, including core river basin management functions at the regional and national levels (s described in the roadmap for decentralization); and
- The relevant actions from the BDS 2011-2015 that are of an ongoing nature, or expected to remain incomplete by the end of 2015 and need to be carried forward to 2016-2020.

Overall, thestrategic priorities and actions are directed at putting the missing pieces in place during 2016-2020 to move towards more optimal and sustainable development in the Mekong basin. Strategic assessments and studies will enhance the already considerable knowledge of the basin, laying a solid foundation to develop and finalize basin wide cross-cutting and sector strategies.

A range of cost and benefit sharing and deal structures will ensue, also facilitated by the improved implementation of MRC Procedures, processes and tools and their link to basin

planning. National projects and programmes of transboundary significance will be further supported by best practice guidelines. Underpinning all strategic priorities is not only the increase in cooperation between Member Countries, but also with Dialogue Partners, relevant regional and international organizations and broader stakeholders in the basin.

4.2.1 REDUCE REMAINING KNOWLEDGE GAPS TO MINIMISE RISKS

The trade-offs, uncertainties and risks associated with basin development opportunities (including uncertainties of climate change and developments outside the water sector), continue to require studies of strategic importance to close the remaining knowledge gaps and develop accompanying measures. This will build on the Council Study which is examining benefits, impacts and risks of all water related development including intensive irrigated agriculture, aquaculture, hydropower, flood control measures, navigation dredging and other sand mining activities. The management of risks also requires strengthened water-related monitoring (addressed below in Section 4.2.6).

The actions under this strategic priority build on the wealth of knowledge already held within MRC and regional and international institutes and organizations, and are aimed collectively at ensuing that knowledge is sufficient to support strategic and project planning and implementation.

The strategic actions to be implemented during 2016 – 2020 for the purpose of reducing knowledge gaps are:

- Study of capture fish ecology with a view to mitigating impacts from development;
- Study of rural livelihoods and measures to cope with transboundary changes and by which sector development plans and projects can adopt a pro-poor agenda;
- Study of biodiversity to establish baseline environmental conditions and trends;
- Study of options to increase storage within LMB for flood and drought management purposes;
- Study of transboundary impacts of climate change on water and related resources of LMB in medium to long term and potential adaptation options; and
- Study of the use of surface and groundwater and the potential for increasing the use and conjunctive use of groundwater.

4.2.2 OPTIMISE BASIN-WIDE SUSTAINABLE DEVELOPMENT AND COST AND BENEFIT SHARING

Article 2 of the 1995 Mekong Agreement calls for promotion and cooperation in the development of the full potential of sustainable benefits from the Mekong river basin, while Article 1 specifically identifies the water and related sectors (irrigation, hydropower, navigation, flood control, fisheries, etc.) to "optimise multiple-use and mutual benefits to all riparians and to minimise harmful effects".

This priority responds to the identified need to address insecurities related to water, food, energy, floods and navigation, and the opportunity to move towards optimal and sustainable development from a basin perspective in these water related sectors. The cumulative assessment of national plans shows that they are sub-optional from a basin perspective in responding to key needs relating to floods, environment, and distribution of benefits, impacts and risks. Addressing this priority involves a discussion of key trade-offs within the basin in the context of future needs and opportunities.

Actions include the assessment of alternative basin-wide development scenarios to examine the above trade-offs and more optimal development pathways. The assessment will use all new information as well as the latest IWRM and water-food-energy nexus thinking. The boundaries of the currently identified development opportunities will be defined, taking into account any emerging criteria for the protection of key environmental hotspots under the strategic priority on protecting environmental assets. The results will inform the development and implementation of sector and cross-cutting strategies that are relevant to the major trade-offs.

Basin-level strategies will promote improvements in national sector planning. They will identify the ways that benefits of cooperation can be leveraged through, for instance promoting coordinated and/or joint development and cost and benefit sharing in the form of basin-wide and joint projects and the strengthened partnerships stipulated in Section 4.2.7. A range of cost and benefit sharing opportunities will be identified and a concept on cost and benefit sharing for any mainstream projects will be prepared.

The strategic actions to be implemented during 2016 – 2020 to optimise basin-wide development are:

- Assessment of alternative medium-term development scenarios;
- Implement and update the basin-wide fisheries management and development strategy;
- Finalise and implement the Regional Master Plan for Waterborne Transportation;
- Prepare and promote a basin-wide strategy for sustainable hydropower development;
- Prepare and promote a regional strategy for flood management, especially for the Cambodia - Viet Nam floodplains;
- Implement and update the Mekong climate change adaptation strategy and action plan; and
- Promote, further identify, and implement cost and benefit sharing opportunities and deal structures emphasising national projects of basin-wide significance and joint projects.

4.2.3 STRENGTHEN THE PROTECTION OF MUTUALLY AGREED ENVIRONMENTAL ASSETS

According to Article 3 of the 1995 Mekong Agreement, the Member Countries are required to "protect the environment, natural resources, aquatic life and conditions, and the ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin". The need to protect or mitigate adverse impacts on the river ecology, food security, livelihoods and water quality is also prioritised in the HCMC Declaration (see Section 1.3).

These environmental protection requirements must be integrated into relevant strategic priorities and actions, including the new scenario assessments and the implementation of guidelines and sector strategies to improve basin-wide and national water and related development. Protecting the environment needs also to be prioritised in MRC Procedures, including those for water quality, water use monitoring and project notification. Several actors in the basin are already actively engaged in this area and are collaborating with MRC at the regional and national levels to address these actions.

This strategic priority relates specifically to strengthening the protection of mutually agreed environmental assets of high economic, social or ecological value. This is because all of the existing basin-wide scenarios (which are based on the national development plans) dis-benefit the environment. Along with implementing the MRC Procedures, this priority is seen as central to the way in which the Member Countries cooperate in managing the basin.

The strategic actions to be implemented during 2016 – 2020 to strengthen the protection of mutually agreed environmental assets are:

- Analyse the functioning and services of environmental assets and establish and agree on criteria for the selection and protection of these assets, including biodiversity sites, in the LMB; and
- Prepare and promote a basin-wide strategy for the protection, development and management of the selected environmental assets.

4.2.4 STRENGTHEN BASIN-WIDE PROCEDURES AND NATIONAL IMPLEMENTATION CAPACITY

This priority responds to the two identified challenges: willingness to implement basin-wide cooperation mechanisms and limited coordination across government agencies at national and sub-national levels. Rapidly growing private investments in water-related sectors underscore the important roles of both regional and national water resources management agencies in coordinating an integrated approach to sector planning and implementation, both within and between national and regional levels.

At the regional level, this coordination depends on strengthening basin-wide management procedures, mechanisms and the needed capacity in each country to implement them, based on tools developed or strengthened under the strategic priorities 4.2.5-4.2.7. At a minimum, strategic actions for this priority are those that will strengthen the implementation of the MRC Procedures, improve the linkages with basin planning and between regional, national and local level actors, and build greater capacity to implement the BDS following decentralisation of core river basin management functions.

The recently constituted Joint Platform to review the implementation of the MRC Procedures needs to take into account the role of the procedures in defining the development opportunities, and whether, in the light of experience gained, the application of the procedures is in practice fit for purpose and contributing to sustainable development of the basin.

The strategic actions to be implemented during 2016 – 2020 to strengthen basin-wide procedures and national implementation capacity are:

- Review of the MRC Procedures and associated technical guidelines and implement agreed improvement measures;
- Review institutional structure and capacity of the National Mekong Committees and implement support measures tailored to each country's needs; and
- Strengthen capacity in decentralised core river basin management functions.

4.2.5 IMPROVE NATIONAL WATER RESOURCES DEVELOPMENT AND MANAGEMENT

The planning and implementation of national projects and programmes resides with the planning, water and related sector agencies in each country. This priority complements the priority on optimisation of national development and sector plans and responds to the need to address insecurities related to transboundary impacts from water, energy, flood management, and navigation projects, activities and events.

Exchanging experiences and joint learning on technical innovation and the application of guidelines for the development and operation of water and related projects should be promoted among the riparian countries. In this context, national efforts will be supported by the preparation and promotion of best practice guidelines designed to promote better design and operation of individual national water related projects and programmes to reduce transboundary impacts, while securing and increasing national benefits. The package of guidelines will assist project planners and water managers in the use and management of the development opportunities.

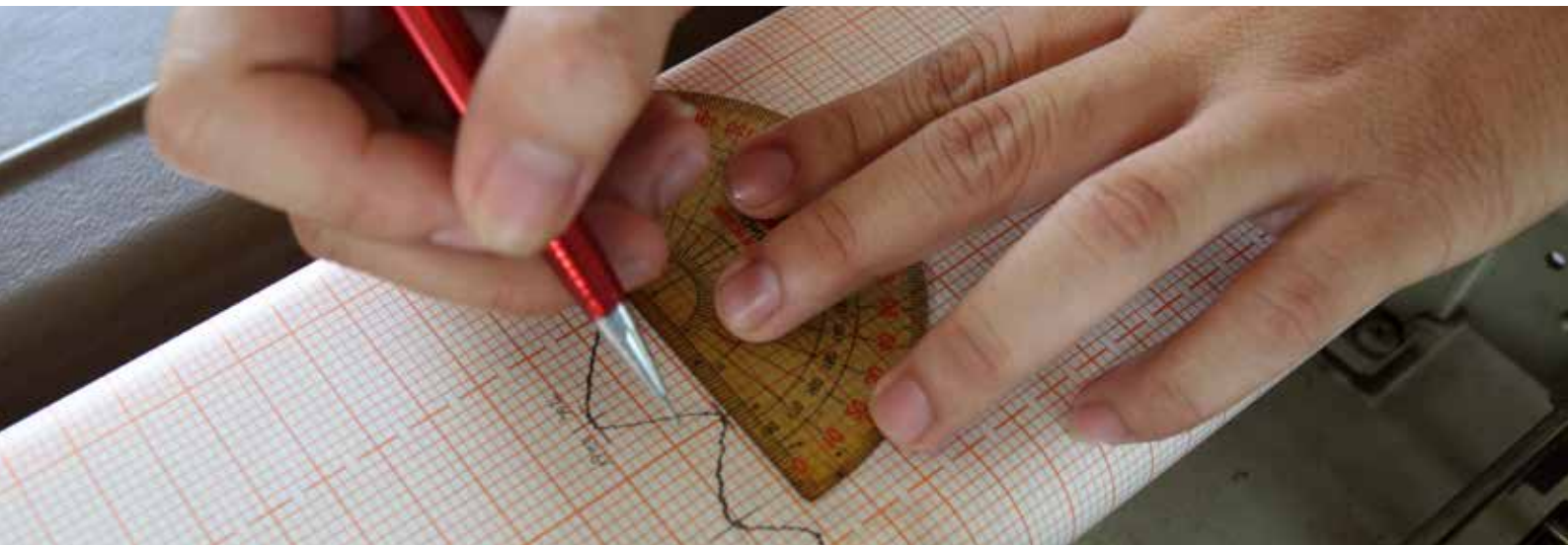
The strategic actions to be implemented during 2016 – 2020 to improve national water resources development and management are:

- Review, update and implement design guidance for mainstream dams;
- Share experiences and jointly learn about the application of guidelines for the development and operation of water and related projects, including dams for irrigation, hydropower and flood management on the tributaries;
- Consolidate and implement guidelines for management of capture fisheries and develop guidelines for fisheries monitoring, and fisheries impact assessment and impact mitigation;
- Consolidate and implement guidelines for design and operation of irrigation systems, including fish friendly irrigation schemes;
- Adopt and implement the Integrated Flood Risk Management Guidelines;
- Implement the Regional Action Plan for Transportation of Dangerous Goods and the set of guidelines and frameworks on waterborne transportation management;
- Consolidate and support the implementation of guidelines for improvement of watershed management practices; and
- Prepare and implement guidelines for addressing climate change risks and opportunities in water and related sector projects, including guidelines to adapt to water shortage and drought impacts.

4.2.6 ENHANCE INFORMATION MANAGEMENT, COMMUNICATIONS AND TOOLS

This priority responds to the challenge of knowledge and information management, monitoring and timely communication to stakeholders. It is intended to ensure that the basin-wide and national tools and systems developed reflect user needs, promote harmonisation in data collected for regional purposes and take advantage of technology advances. The scope of activities will include systems and tools within MRCS, within and with NMCs, and between MRC and key external stakeholders. For the MRC, full account will be taken in improving systems and processes of core river basin management and decentralisation requirements.
Strategic actions for this priority build on existing flood forecasting capacity within MRC and aim to broaden it out to include flash floods in addition to the existing coverage for mainstream floods. A communication network will be established by which to relay emergency warnings covering floods, drought and pollution accidents. These actions are designed to result in timely and accurate flood and drought information, that are valued and being made use of within each country.

Establishing comprehensive monitoring systems for basin management at the regional and national levels is also a priority and will be based on the finalization and implementation of the MRC Indicator Framework. This includes implementing a comprehensive rationalisation and upgrade of MRC's approach to monitoring and evaluation, which goes beyond project or programme levels and covers state of basin monitoring and reporting, assessment and monitoring of development impacts, and the monitoring of a wide range of parameters in the environmental, social, economic, climate change and the cooperation dimensions. Monitoring and other data collection and assembly will be conducted increasingly at the national level, reflecting that most of the information required at the regional level will already be needed also at national level for water resources management. This will include MRC's periodic social impact monitoring and vulnerability assessments (SIMVA).



The rapid advances in information technology, combined with a clearer understanding of what data and information needs to be collected and shared, should enable the MRC to bring greater focus on the way it supports and promotes knowledge management in an efficient, effective and inclusive manner in line with its decentralisation policies.

The strategic actions to be implemented during 2016 – 2020 to enhance information management, communications and tools are:

- Improve data, information and knowledge management and its access and communication for stakeholders;
- Improve regional flood forecasting system and establish flash flood forecasting system;
- Establish regional emergency communication network for flood and drought;
- Develop and maintain harmonised methods, models, tools and databases for monitoring and assessment purposes ;
- Establish and implement monitoring systems required by MRC Procedures and the MRC indicator Framework; and
- Implement state of basin reporting based on the MRC Indicator Framework

4.2.7 INCREASE COOPERATION WITH PARTNERS AND STAKEHOLDERS

The BDS is a Mekong basin-wide strategy for sustainable water resources development prepared under the MRC cooperation framework by four Member Countries and to be implemented primarily by them. However, the Mekong has multiple actors engaged in the development of the whole basin. This strategic priority underscores not only the need for stronger cooperation between Member Countries in implementing all priorities but also between them and Dialogue Partners(especially China), related regional cooperation frameworks and programmes (primarily GMS and ASEAN), and broader stakeholders ranging from other international RBOs and research institutes to civil society, Development Partners, and the private sector.

The intention is that this will lead to increased effectiveness in implementing the Basin Development Strategy in terms of enhancing national development plans to further develop

basin-wide and joint projects, promoting development funding and cost and benefit sharing deals, closing development gaps between countries, reducing development risks, and overall leading to greater interdependent development and regional integration.

The strategic actions to be implemented during 2016 – 2020 to increase cooperation with partners and stakeholders are:

- Strengthen cooperation with ASEAN in disaster and environmental management, and facilitation of sustainable water and related resources development to close the development gap between Mekong countries and other areas in contributing to regional integration;
- Strengthen strategic alignment and collaboration with the Greater Mekong Sub-region Programme: (i) coordinate implementation of the Basin Development Strategy and the GMS Regional Investment Framework and (ii) strengthen collaboration including agreeing on a cooperation mechanism and clarify areas of comparative advantages with GMS on water and related sectors work in light of the MRC transitioning to core river basin management functions;
- Strengthen cooperation with China on technical exchanges, information sharing and operation of Lancang hydropower dams to capture potential benefits and minimise adverse impacts;
- Strengthen cooperation with Myanmar on technical exchanges and future membership in MRC; and
- Establish and implement a regional stakeholder platform with targeted engagements of various stakeholder groups in MRC strategic activities.

5 Implementation of the Strategy

5.1 Roles and responsibilities

5.1.1 IMPLEMENTING DEVELOPMENT OPPORTUNITIES

Currently identified and agreed development opportunities will be implemented at national and sub-national levels through national and local agencies and organisations, and also through the private sector, taking into account applicable MRC Procedures, assessments and best practice guidelines.

In this context, the MRCS will perform a help-desk function for technical queries from national agencies and RBCs related to implementation of the BDS and the use of best practice guidelines. This corresponds to the advisory services core function of the MRC, which is to make available its technical expertise, databases, modelling capacities, and MRC expert networks to support studies and assessments commissioned by others, both at the project, basin wide and cumulative levels.

At the same time, MRC will further identify optimal and sustainable development through the assessment of alternative development scenarios, building on the earlier scenario assessment and other assessments of national water resources development and plans. This consists of:

- **Transboundary assessment of alternative basin-wide development scenarios** to examine and identify development opportunities, trade-offs, risks and challenges for achieving greater overall basin benefits through coordinating and/or modifying nationally planned development ('making the pie larger');
- **Distribution analysis of costs and benefits** that will accrue across countries and sectors under the alternative basin-scale development scenarios (taking into account all past development). Various options for sharing the costs and benefits of cooperation more equitably will be explored, such as joint projects and basin-wide projects, as envisioned in the 1995 Mekong Agreement (equitable distribution of the 'larger pie'); and
- **An institutional analysis of the possible levels and modes of cooperation** necessary to generate the greatest net benefits, taking into account the costs of cooperation.

The assessment process is to be used to build further trust and confidence among the MRC Member Countries. This will set the stage for a common point of departure to discuss the assessment results, make initial decisions on trade-offs, and develop a shared understanding

of the path to meeting the longer term needs and move towards more optimal and sustainable development.

International experience suggests that with such information at hand, the riparian countries will start discussing deal structures, which could be well beyond the infrastructure considered in the assessed scenarios (for example - navigation, trade, and interconnected power grids among others).

The development and management opportunities and risks identified in these regional discussions are to be reflected in basin-wide sector strategies (hydropower, irrigated, agriculture, fisheries, navigation etc.) and cross-cutting strategies (climate change, environment). These strategies will demonstrate how increased cooperation can leverage additional gains over and above what the Member Countries could achieve individually, which will facilitate the adaptation of national plans. The agreed development opportunities will be summarized in the Basin Development Strategy for 2021-2025.

The Assessment indicators

The approach must be mindful of ongoing activities by many organizations to address knowledge gaps (which will serve to enrich the assessment process). For the transboundary assessment and distribution analysis, the emerging MRC Indicator Framework will be used. The Framework sets out the strategic and assessment indicators as well as the monitoring parameters, covering the five dimension of sustainability (see Box).

Project approval

The above scenario-based planning approach prioritises national projects of basin wide significance and joint projects, and flags national projects that are sub-optimal from a basin-wide perspective. For an identified opportunity to become project it will pass through national planning and approval processes and the MRC Procedures, in particular the Procedures for Notification, Prior Consultation and Agreement

Five dimensions of the new MRC indicator framework

Economic dimension	Performance of water and related sectors and contribution to riparian economies
Social dimension	Conditions of livelihoods and employment
Environment dimension	Status of water flows, quality and environmental assets
Climate change dimension	Climate change trends, vulnerability and adaption
Cooperation dimension	Benefits derived from the Mekong river basin and from cooperation in its development and management

(PNPCA), which aims at ensuring the best possible preparation, design, construction, and operation of notified projects.

A four-country agreement on the development opportunities in the 5-yearly Basin Development Strategy should create incentives for notification of projects much earlier in the project preparation process. Early notification under the terms of the PNPCA will offer the opportunity for the countries to share draft project preparation documents with the MRC to support project development. Strategic guidance, best practice sector guidelines and other knowledge can then be used to add value to the various TORs and feasibility studies, EIAs and other processes in close consultation with the national line/implementing agencies and relevant parties. The process will include an assessment of project specific avoidance, mitigation and enhancement options.

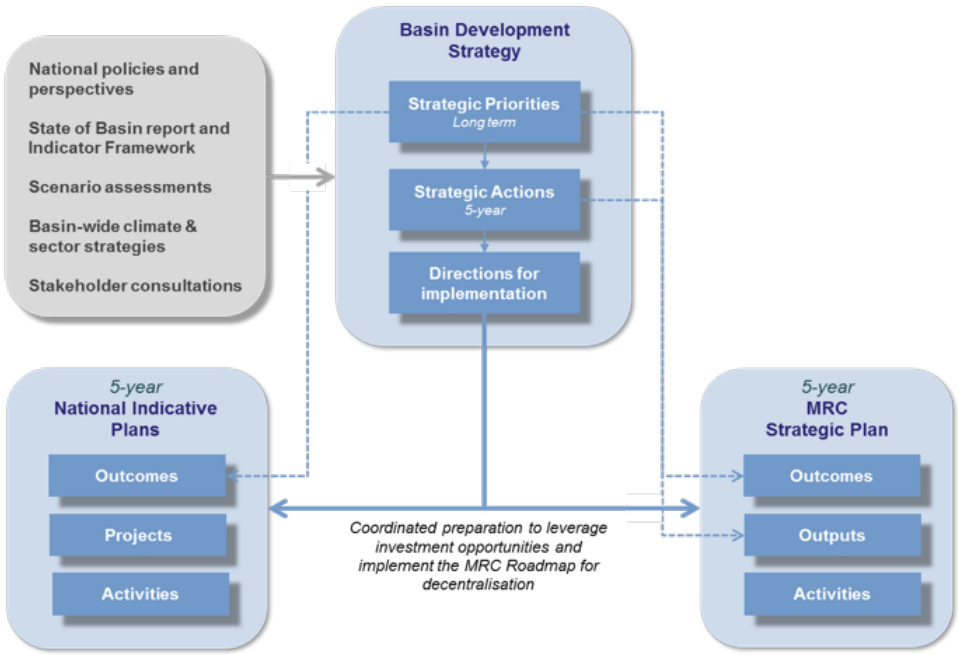
5.1.2 IMPLEMENTING STRATEGIC PRIORITIES AND STRATEGIC ACTIONS

Strategic priorities and actions will be addressed by the MRC and other relevant actors in the basin. In accordance with the streamlined planning approach (see Figure 3) and its mandated core functions, the MRC will prepare its Strategic Plan for 2016-2020 to address the priorities and actions at the regional level. Each Member Country through the National Mekong Committees will also update its National Indicative Plan for 2016-2020 to address relevant strategic priorities and actions by agencies and organisations at the national level.

The distribution of strategic actions and activities will be in line with the MRC Roadmap that provides guidance for the transition of the MRC to full Member Country financing by 2030. Elements of the roadmap include the transition to core functions (and stopping work on non-core functions), the progressive decentralisation of some core functional activities to Member Countries in accordance with the subsidiary principle, and the transition to a leaner organization built around core functions. These directions establish an extensive reform agenda for the MRC with considerable implications for 2016-2020, which are described in the MRC Strategic Plan.

Where appropriate, arrangements will be identified in the MRC Strategic Plan or National Indicative Plans for the implementation of strategic priorities and actions through collaborative partnerships between regional and national organisations, including Development Partners, Dialogue Partners, research and academic institutions, and non-governmental organisations.

FIGURE 3 STREAMLINED APPROACH TO MRC STRATEGIC PLANNING



Overall coordination of implementation of the updated Strategy will be undertaken by the MRC Joint Committee with support of the MRCS at the regional level and NMC Secretariats at the national levels. Monitoring and evaluation of Strategy implementation at the regional and national level will be coordinated by MRCS.

5.2 The MRC Strategic Plan

The MRC Strategic Plan will contain:

- Goals for MRC in terms of (i) promoting and coordinating basin development and management and in this context (ii) strengthening its institutional structure and operations;

- Five year outcomes for the MRC to achieve based on the medium-term strategic priorities of the BDS;
- Five year outputs for the MRCS to deliver, based on the strategic actions of the BDS; and
- Main activities and budget under each output.

The MRC Strategic Plan will allocate responsibilities to the operational units within MRCS, and set out time lines, resourcing and funding requirements. For yearly implementation, the MRCS will prepare annual work plans.

5.3 National Indicative Plans (NIPs)

The NIP is the plan to implement the BDS at the national level in each country. It is the primary channel by which basin perspectives, development opportunities, priorities and core functions are gradually mainstreamed into national strategies, plans, policies and systems. To that end, the NIPs perform two roles.

First, through joint projects with other countries and national projects of basin-wide significance, the NIPs promote among national planning and sector agencies the uptake of development opportunities set out in the BDS (Section 4.1) in the national socio-economic and sector plans. These agencies will also take up relevant strategic actions set in the BDS for national implementation.
Second, the NIPs will set out a plan for implementation by relevant agencies of the national and decentralized activities under the MRC's core river basin management functions, in accordance with the MRC's decentralisation process. These activities are linked to regional level implementation and contribute to MRC outcomes.

The NIP is not a 'new plan' for the country. Rather, the NIP provides an opportunity for each country to demonstrate how it will respond to the development opportunities and strategic priorities in the BDS. By doing so, the NIP supplements the national plans with joint projects and national projects and activities that are of basin-wide significance and will increase regional benefits, reduce regional costs, and increase water-related security.

The NIP will be prepared by the relevant line/Implementing agencies and RBOs, under the coordination of the NMC Secretariat, and be approved by the Chair of that NMC. Funding

for the NIPs will be mobilised by Member Countries from national budgets and bilateral support from Development Partners. The NMCS and planning department of the national line/Implementing agencies will promote the NIP activities among Development Partners for co-financing, with appropriate support from MRCS. In addition, the NIPs can be used as a tool for leveraging and promoting investments for joint and basin-wide projects.

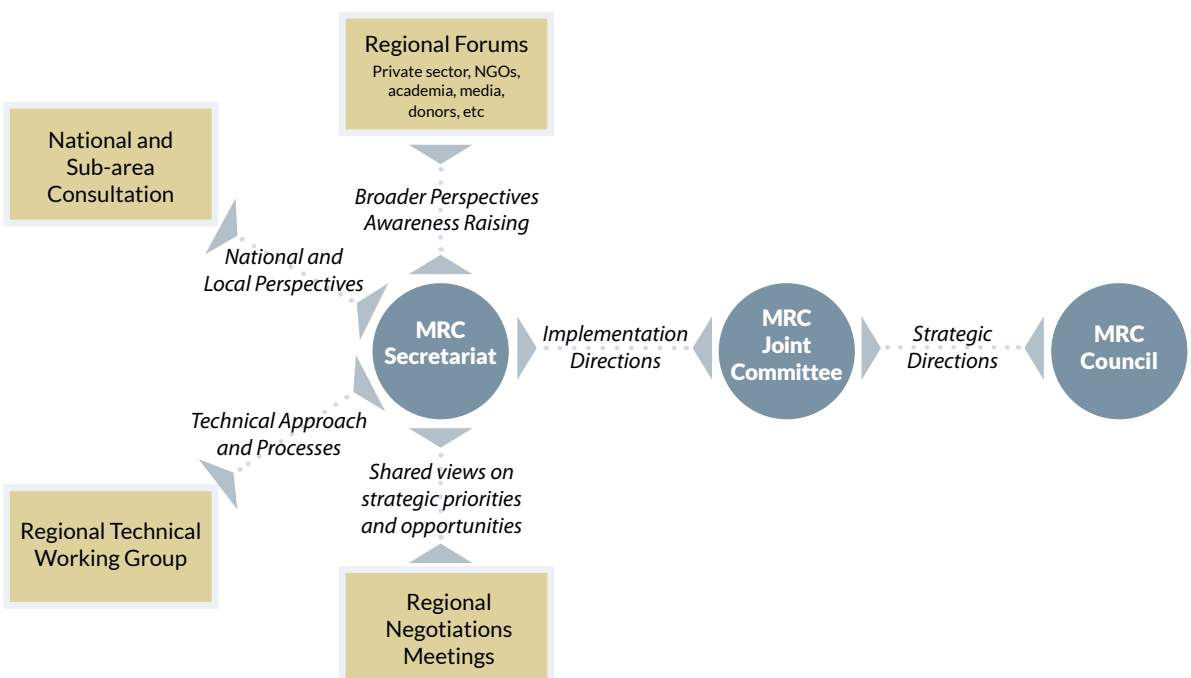
5.4 Engagement of broader stakeholders

Engagement of broader stakeholders takes place particularly during strategic planning and in support of both regional and national strategy implementation.

5.4.1 ENGAGEMENT DURING STRATEGIC PLANNING

A comprehensive approach to stakeholder engagement has been developed for strategic planning under the MRC cooperation framework, which is illustrated in Figure 4. This approach will continue to be refined and improved based on experience.

FIGURE 4 STAKEHOLDER ENGAGEMENT FOR STRATEGY FORMULATION AND UPDATING



Key relationships have been identified and purpose of engagement made clear. A distinction between technical, consultative/advisory and decision-making bodies is fundamental, as is also ensuring that participants fully understand their roles as well as that of the MRC.

Under current arrangements, the MRCS planning unit works internally with other units for sectoral and technical inputs. Perspectives are prepared and consultations held at the national levels. Basin-wide technical discussion, data sharing, and validation of approaches and information are done through the Regional Technical Working Group (RTWG) composing of senior technical staff from planning and water related line/Implementing agencies. National, sub-area and regional stakeholder forums and meetings are important in raising awareness, promoting shared understandings and providing broader feedback from civil society, private sector, and other regional organizations and institutes. Eventually, the Strategy is negotiated by senior government officials of four Member Countries for Joint Committee endorsement and Council approval.

5.4.2 ENGAGEMENT DURING REGIONAL IMPLEMENTATION

The MRCS will promote a more systematic, institutionalized and targeted approach to engaging with broader stakeholders, including academic organisations, private sector, civil society and other regional organizations in implementing its regional-level operations.

This could take the form of strengthened stakeholder participation in MRC Governance Meetings and/or a Regional Stakeholder Platform to engage regularly in the preparation and implementation of the MRC strategic plans. Also, specific approaches and mechanisms under the platform tailored to each group of stakeholders will be considered, such as the setting up of a stakeholder working group specifically for the private sector (since investment from the private sector now outweighs those of the public sector in all MRC sectors), for civil society or for research institutes.

A more institutionalized and systematic stakeholder engagement will also require further improvement of MRC's knowledge management and communications. The MRCS will also maintain transparency through the publication and dissemination of MRC reports in line with the MRC Communication Strategy.

5.4.3 ENGAGEMENT DURING NATIONAL IMPLEMENTATION

Engagement at national and sub-national level is arranged by the NMC with the coordination of its Secretariat. Stakeholders include national agencies, academic organisations, RBOs, private sector and national civil society organizations. National engagement with those agencies will be elaborated in the updated National Indicative Plans.

5.4.4 SUMMARY OF STAKEHOLDER ROLES

The table below summarizes the role and engagement of various stakeholders in basin planning and the implementation of the Strategy.

TABLE 1 IMPLEMENTATION ROLES AND ENGAGEMENT OF BROADER STAKEHOLDERS

Actors	Roles
Mekong River Commission Council	Provide strategic guidance to Strategy implementation and promote the Strategy at a high-level to all relevant national and regional development initiatives
Mekong River Commission Joint Committee	Provide direct implementation guidance to Strategy implementation and promote the Strategy at senior-level to all relevant national and regional development initiatives
Mekong River Commission Secretariat	Facilitate, support and monitor the implementation of the Strategy through the MRC Strategic Plan and regularly report to the Joint Committee and Council
National Mekong Committees (of line/ implementing agencies)	Prepare and implement the National Indicative Plans (NIPs) to capture development opportunities and implement relevant strategic actions and CRBMF activities at the national levels
National Mekong Committee Secretariats	Facilitate and coordinate Strategy implementation at the national levels by national line/ implementing agencies, RBOs and others in accordance with arrangements in the NIPs
Dialogue Partners	Take account of basin perspectives and priorities and continue exchanging and sharing of information and technical expertise

Development Partners	Promote basin perspectives and priorities and continue financial and technical support in addressing them both at regional and national bilateral levels
Greater Mekong Sub-region Programme (GMS)	Use the Strategy to screen and promote RIF projects and collaborate in mutual areas to build synergies and avoid duplications
ASEAN	Support the promotion the water-related development opportunities to close the development gap and the facilitation of broader cost and benefit sharing deals for regional integration
Private Developers	Consider and address basin perspectives, procedures and best practice guidance when implementing development opportunities
Scientific and advisory institutes	Consider and promote basin perspectives and priorities and contribute to the generation and dissemination of information and knowledge
Consulting firms	Promote basin perspectives and priorities and contribute to information generation and stakeholder communication and outreach
Other non-governmental organizations	Promote basin perspectives and priorities and contribute to information generation and stakeholder communication and outreach

5.5 Monitoring, evaluation and reporting

The state of the basin report will record and evaluate the development impacts, positive and negative, within the Mekong basin as a measure of the effectiveness of the implementation of the Basin Development Strategy. State of the basin monitoring will be reported once every five years, normally at least 24 months prior to the end of the 5-year planning cycle to feed into the strategic review for the next cycle. The report will be compiled by the MRCS with support from each NMC Secretariat and be submitted to the MRC Joint Committee for endorsement.

The 5-yearly state of the basin report will track and analyse the trends in the values of the strategic and assessment indicators and monitoring parameters of the MRC Indicator Framework (Section 5.1).The indicators will be based as much as possible on quantifiable monitoring parameters to provide an evidence-based approach to the reporting, including answers to a number of strategic questions (see box below). Monitoring and other data collection and assembly will be progressively increased at the national level to cover all monitoring parameters of the MRC Indicator Framework (which are also essential for water resources management at the national and local levels).

Basin Development Strategy impact monitoring through 5-yearly state of the basin reporting	
Economic	What economic value does each Member Country derive from the use of the Mekong river system within the water-related sectors?
Social	What social benefits, direct and indirect, are being derived from water resource developments in the Mekong basin? How are the river-related livelihoods in each country being affected by land and water management decisions?

Environment	Are the conditions of water flow and water quality in the Mekong mainstream acceptable? Are key environmental assets in the Mekong basin being adequately preserved and protected?
Climate change	How resilient are the current water infrastructure and plans to climate change?
Cooperation	What is the added value of cooperation under the 1995 Mekong Agreement facilitated by MRC? How well is Mekong basin development moving towards optimal and sustainable development?

The response to these and other questions will provide valuable information for evaluating the achievement of the strategic priorities and the adjustments that need to be made in the next update of the Basin Development Strategy. The establishment of a set of key indicators within the MRC Indicator Framework is the first step towards defining longer term basin management objectives and targets and the means to achieve through the 5-yearly updates of the Basin Development Strategy.

A comprehensive **M&E system** will be established to monitor and report on the implementation of the BDS 2016-2020 through the MRC SP and the NIPs. The M&E system will be set up in the MRC SP. Thus monitoring and evaluation of NIP implementation will be undertaken within the common monitoring and reporting system that is able to track MRC implementation progress and provide output and outcome information to MRC's governance bodies and stakeholders.

Notes

i "Optimal" development is used to mean "full potential of sustainable benefits" from a basin wide perspective.

ii In line with further recognition of the importance of ecosystem services for the health of the basin and the livelihoods that depend on these services.

iii Final WUP report (2007)

iv MRC annual PMFM and hydrological reports

v MRC Hydropower Database

vi World Development Indicators, World Bank, 2013

vii World Development Indicators, World Bank, 2013.

viii National energy sector plans

ix MRC Hydropower Database

x MRC/BDP trends and outlook report (2015)

xi National energy sector plans. MRC/BDP trends and outlook report (2015)

xii CAMInfo, data from MAFF Agricultural Statistics; MoP, NIS Cambodia Socio-economic Surveys (CSES); Lao PDR Agricultural Census 2010/11; FAO, A review and synthesis of capture fisheries data in Thailand. From FAO website; MRC Socio-economic Database; Vietnam Agriculture, Forestry and Fishery Census 2011

xiii Source: http://data.worldbank.org/indicator/SH.H2O.SAFE.ZS

xiv ICEM, 2003, Regional report on protected areas and development

xv FAO Global Forestry Resources Assessment Database

xvi The low figure (0.9 MT/year) is based on government data compiled by FAO and the high figure (2.1 MT/year) is based on some MRC documents

xvii Koehnken, L . , 2012, MRC/ IKMP Discharge and sediment monitoring program review, recommendations and data review; Bravard, J-P, and Goichot, M., 2014, Transboundary integrated management of sediment related resources in the Lower Mekong. Results of WWF/MRCS project presented at the 2nd MRC Pre-Summit International Conference in HCMC.

xviii Bravard, J-P., Goichot, M., and Gaillot S., 2013, Geography of Sand and Gravel Mining in the Lower Mekong River.

xix Adamson, 2009. An exploratory assessment of the potential rates of reservoir sedimentation in five Mekong mainstream reservoirs in Lao PDR.

xx MRC/BDP, 2015. Review of 2010 scenario assessment findings. New data in: Bravard, J-P., Goichot, M., and Gaillot S., 2013, Geography of Sand and Gravel Mining in the Lower Mekong River. First Survey and Impact Assessment.EchoGéo [En ligne], 26 | 2013, mis en ligne le 19 décembre 2013, consulté le 20 juillet 2014.URL : http://echogeo.revues.org/13659.

xxi MRC (April 2011). Assessment of Basin-wide Development Scenarios and the BDS 2011-2015.

Appendix A
Timeframe of Strategic Priorities and Strategic Actions

Timeframe

Priority action	Targets
MRC SP and NIPs to support Strategy implementation	
Preparation MRC SP 2016-2020	Approved by the MRC Council in 2015
Updating NIPs	Approved by Member Countries in 2016
Strategic priorities for Basin development and management	
1) Reduce remaining knowledge gaps to minimise risks • Study of capture fish ecology with a view to mitigating impacts from development • Study of rural livelihoods and measures to cope with transboundary changes and by which sector development plans and projects can adopt a pro-poor agenda • Study of biodiversity to establish baseline environmental conditions and trends • Study of options to increase storage within LMB for flood and drought management purposes • Study of transboundary impacts of climate change on water and related resources of LMB in medium to long term and potential adaptation options • Study of the use surface and groundwater and the potential for increasing the use and conjunctive use of groundwater	Most urgent information available and used by 2017. All studies finalized in 2018, in advance of the completion of the updating of the State of the Basin Report and the updating of the Basin Development Strategy for 2021-2025

2) Optimise basin-wide sustainable development and cost and benefit sharing	
• Assessment of alternative medium term development scenarios	Scenarios assessed by 2017
• Implement and update basin-wide fisheries management and development strategy	Fisheries strategy operational by 2017
• Finalise and implement Regional Master Plan for Waterborne Transportation	Navigation master plan operational by 2016
• Prepare and promote basin-wide strategy for sustainable hydropower development	Hydropower sector strategy prepared by 2019
• Prepare and promote regional strategy for flood management, especially for the Cambodia - Viet Nam floodplains	Floodplain strategy prepared by 2017
• Implement and update Mekong climate change adaptation strategy and action plan	Climate change adaptation strategy updated as needed
• Promote, further identify, and implement cost and benefit sharing opportunities and deal structures emphasising national projects of basin-wide significance and joint projects	Cost and benefit sharing opportunities are continuously promoted and joint projects further identified by 2017
3) Strengthen the protection mutually agreed environmental assets	
• Analyse the functioning and services of environmental assets and establish and agree on criteria for the selection and protection of these assets, including biodiversity sites, in the LMB	Assets selected and protection criteria agreed by 2017
• Prepare and promote a basin-wide strategy for the protection, development and management of the selected environmental assets	Environmental management Strategy prepared by 2019

4) Strengthen basin-wide procedures and national implementation capacity	
• Review of the MRC Procedures and associated technical guidelines and implement agreed improvement measures	Review by 2017 and improvements agreed by 2018
• Review institutional structure and capacity of the National Mekong Committees and implement support measures tailored to each country's needs	Review by 2017 and support measures operational by 2018
• Strengthen capacity in decentralised core river basin management functions	As needed
5) Improve national water resources developmentand management	
• Review, update and implement design guidance for mainstream dams	Mainstream dams by 2017
• Share experiences and jointly learn on the application of guidelines for the development and operation of water and related projects, including dams for irrigation, hydropower and flood management, on the tributaries	Continuous
• Consolidate and implement guidelines for management of capture fisheries and develop guidelines for fisheries monitoring, and fisheries impact assessment and impact mitigation	By 2017
• Consolidate and implement guidelines for design and operation of irrigation systems, including fish friendly irrigation schemes	By 2017
• Adopt and implement the Integrated Flood Risk Management Guidelines	Continuous
• Implement Regional Action Plan for Transportation of Dangerous Goods and a set of guidelines and frameworks on waterborne transportation management	Guidelines by 2017
• Consolidate and support the implementation of guidelines for improvement of watershed management practices	By 2017
• Prepare and implement guidelines for addressing climate change risks and opportunities in water and related sector projects, including guidelines to adapt to water shortage and drought impacts	By 2018

6) Enhance information management, communications and tools	
• Improve data, information and knowledge management and its access and communication for stakeholders	Needs assessment by 2016, plan by 2017 and implemented continuously
• Improve regional flood forecasting system and establish flash flood forecasting system	By 2017
• Establish regional emergency communication network for flood and drought	By 2017
• Develop and maintain harmonised methods, models, tools and databases for monitoring and assessment purposes	Needs assessment by 2016, plan by 2017 and implemented continuously
• Establish and implement monitoring systems required by MRC Procedures and the MRC indicator Framework	Continuously
• Implement State of Basin reporting based on MRC Indicator Framework	Full SoB prepared by 2018
7) Increase cooperation with partners and stakeholders	
• Strengthen cooperation with ASEAN in contributing to regional integration	MOU extended and operational by 2017
• Strengthen strategic alignment and collaboration with the Greater Mekong Sub-region Programme	Partnership Agreement updated and operational by 2017
• Strengthen cooperation with China on technical exchanges, information sharing and operation of Lancang hydropower dams to capture potential benefits and minimise adverse impacts	Cooperation developed on SoB reporting by 2017 and operation of Lancang cascade by 2020
• Strengthen cooperation with Myanmar on technical exchanges and future membership in MRC	MOU on information sharing and technical cooperation operational by 2018

Appendix B
Glossary

1995 Mekong Agreement
Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin entered into by the MRC Member Countries on 5 April 1995. The Agreement sets out the goals, objectives and principles as well as the scope of this cooperation. It establishes the Mekong River Commission as the inter-governmental organization with the mandate to implement the Agreement and the projects, programmes and activities taken there under in cooperation and coordination with each member and the international community, and to address and solve related issues and problems.

Basin Development Plan
In accordance with the 1995 Mekong Agreement, it is the general planning tool and process that the Joint Committee would use as a blueprint to identify, categorize and prioritize the projects and programs to seek assistance for and to implement at the basin level.

Basin Development Strategy
The Mekong basin-wide IWRM-based strategy setting out shared understanding of development opportunities and risks for national implementation, medium term strategic priorities for basin development and management, and strategic actions required to be undertaken in the ensuing 5-year plan period.

Council Study
MRC's Study on the sustainable management and development of the Mekong River, including impacts of mainstream hydropower projects. The Council Study examines the past, present and future development impacts (positive and negative) focusing on six main themes – irrigation, agriculture and land use, hydropower, public and industrial water supply, navigation and flood protection – on the Mekong basin.

Core functions
Functions that the MRC performs on a routine basis to serve the organisation's purpose of transboundary river basin management. MRC's core functions include (i) corporate services, (ii) core river basin management (CRBMFs), and (iii) advisory services. CRBMFs are data acquisition, exchange and monitoring, analysis, modelling and assessment, planning support, forecasting, warning and emergency response and implementing MRC Procedures. Activities under the functions (centralized and decentralised) are defined and reviewed as part of five-yearly strategic planning cycle.

Dangerous goods
Goods identified in MRC's risk analysis of the carriage, handling and storage of dangerous goods along the Mekong River (April 2012) as "dangerous cargoes", such as specific oils, gases, and chemicals, and related packaging.

Deal structures Deal structures are supplementary understandings or agreements for cooperation over and above that set out in the 1995 Mekong Agreement and related Procedures. They can be: (i) strategic level understandings on the trade-offs necessary to promote interdependent sub-regional growth among the riparian countries; and (ii) joint projects that optimise development opportunities from a basin-wide point of view in the water and related or non-related sectors.
Development needs Basic societal requirements such as food, energy and livelihood security, access to safe water supply and sanitation, transport and protection against severe floods and drought etc., representing the most important demands that the Basin Development Strategy should address.
Development opportunities Actions or projects that could be taken up either to address "needs" or to go beyond these basic requirements, taking development towards the optimal and sustainable condition envisaged in the objectives of the 1995 Mekong Agreement.
Development Partners Multi-lateral and bilateral funding organisations providing financial support to the MRC.
Dialogue Partners Other riparian states within the Mekong Basin, being the People's Republic of China and the Union of Myanmar, with whom the MRC has a special relationship.
Environmental asset Naturally occurring areas that provides environmental "functions" or services.
Gross National Income (GNI) A condition related to the ongoing availability of and accessibility to food, energy, water etc. to consumers, measured in aggregate at national level.Gross Domestic Product (GDP), Gross National Product (GNP) and GNI reflect the national output and income of an economy. The main difference with GDP is that GNP takes into account net income receipts from abroad. GNI is equal to GNP less the consumption of fixed capital (i.e., depreciation). The World Bank defines GNI as the sum of value added by all resident producers plus any product taxes (fewer subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. The World Bank now uses GNI rather than GNP.

IWRM Integrated Water Resources Management (IWRM) is a process that promotes the coordinated development and management of water, land and related resources, in order to maximize economic and social welfare in a balanced way without compromising the sustainability of the ecosystems. IWRM is not an end in itself but a means of achieving three key strategic objectives of: Efficiency (attempt to maximize the economic and social welfare derived not only from the water resources base but also from investments in water service provision), Equity (in the allocation of scarce water resources and services across different economic and social groups) and Sustainability (as the water resources base and associated ecosystems are finite).
Joint project Joint management and/or development project, with cost and benefit sharing deals, undertaken jointly by two or more countries to address issues and opportunities to mutual overall benefit.
Mekong delta The low lying area downstream of Phnom Penh where the Mekong River empties into the sea through various river arms. The Mekong delta is shared by Cambodia (upstream) and Viet Nam (downstream).
Mekong River Commission Secretariat (MRCS) The MRC Secretariat that provides technical and administrative services to the MRC Council and Joint Committee, whose functions are stipulated in the Mekong Agreement.
Mekong River Commission (MRC) The inter-governmental organisation established by the 1995 Mekong Agreement, comprising the MRC Council, the MRC Joint Committee and the Mekong River Commission Secretariat.
Member Country(ies) The signatory riparian countries to the 1995 Mekong Agreement, being the Kingdom of Cambodia, the Lao People's Democratic Republic, the Kingdom of Thailand and the Socialist Republic of Viet Nam.
National Mekong Committees (NMC) Multi-agency Committees established in each MRC Member Country to provide an interface between the MRC and national agencies and other relevant national organisations.
National Mekong Committee Secretariats (NMCS) Secretariats to the NMC's, providing day to day administrative and coordination support.

National project of basin-wide significance National management and/or development project that creates development opportunities and/or reduce adverse impact elsewhere within the basin.
Optimal development The word optimal is used to paraphrase Article 1 and part of Article 2 of the 1995 Agreement: 'the development of the full potential of sustainable benefits to all riparian States and the prevention of wasteful use of Mekong River Basin waters'. Optimal development emphasizes basin-wide optimization of, according to Article 1, "the multiple-use and mutual benefits of all riparians and to minimise the harmful effects". Optimal development is undertaken within the broader principle of sustainable development and equitable and reasonable use. An optimal solution cannot be achieved by resource optimization only. A 'best' direction of joint development can be agreed upon, as a result of a negotiation process.
Strategic priority A priority area mutually agreed by the MRC Member Countries to be addressed by all relevant actors in the Mekong basin, which would contribute to achieving the goals and objectives set out in the 1995 Mekong Agreement.
Strategic action A priority deliverable, product or service mutually agreed by the MRC Member Countries to be undertaken in the ensuing 5-year plan period which would contribute to addressing a strategic priority.
Security (as in food, energy and water) A condition related to the ongoing availability of and accessibility to food, energy, water etc. to consumers, measured in aggregate at national level or related to individuals at household level.
Wetlands According to the Ramsar Convention on Wetlands: "Wetlands are areas of marsh, fen, peat-land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres." In the BDS, loss of natural wetlands is referring to their conversion into paddy fields, farms, residential areas etc.

Mekong River Commission
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