



Mekong River Commission

IWRM-Based Basin Development Strategy for the Lower Mekong Basin

Incomplete Consultation Draft No. 1 – October 2009

Note to the reader

The IWRM-based Basin Development Strategy will, when completed, be a statement by the countries in the Lower Mekong Basin (LMB) of their intention to share, use, manage and protect the basin's resources in a sustainable and equitable way. It describes why a Basin Development Plan needs both boundaries as to the amount of water that can be used sustainably, and guidelines as to how and when water can be taken, and why this is best presented to decision makers as a flexible IWRM-based Basin Development Strategy.

This *incomplete consultation first draft* (October 2009) of the Strategy has been developed from a number of earlier working papers, and from national and regional discussions that debated and guided the scope, direction and content of the Strategy. It includes the results of hydrologic evaluations of various basin-wide development scenarios and of those related socio-economic and environmental impact assessments that have been completed so far. However, the key strategic information, in particular the 'development space' and the strategic guidance for the use and management of the development space is only partly covered as the economic, social and environmental assessment of the development will only be completed early 2010. This is why this document is called an incomplete first draft for consultation.

The Strategy is accompanied by supporting documents which provide the supporting data and information, including the justification of adopted approaches, methodologies and processes. The drafts of the IWRM-based Basin Development Strategy and the supporting documents will be the background information for wide ranging government and stakeholder discussions to: 1) share information, 2) identify additional work, and 3) reflect the views and perspectives of stakeholders in the drafting process.

Therefore, some sections of this draft, particularly those relating to assessments of scenario impacts, the interpretation of results, and the approach to 'balancing' benefits against adverse impacts, will change as a result of further simulations and evaluations, and the results of the stakeholder discussions at the sub-basin, national and basin levels.

TABLE OF CONTENTS

ABBREVIATIONS	I
FOREWORD.....	II
A. BACKGROUND.....	1
1. INTRODUCTION	1
1.1 Purpose of the Strategy	1
1.2 Need for an IWRM-based Basin Development Strategy	2
1.3 Approach to Develop the Strategy	3
1.4 Links to National Planning and the MRC Strategic Plan	6
2. THE MEKONG RIVER BASIN.....	7
2.1 Water and Related Resources	7
2.2 Socioeconomic Setting and Water Related Policies	8
2.3 Current Development of Water Resources	9
2.4 Impact of Current Development.....	9
2.5 Water Resources Management	10
3. EMERGING TRENDS AND PLANS.....	12
3.1 Global Developments.....	12
3.2 Basin Level Developments and National Level Developments	12
3.3 New Investments and Development Assistance	15
B. ASSESSMENT OF WATER RELATED OPPORTUNITIES AND CONSTRAINTS	16
4. MAIN TRANSBOUNDARY ISSUES FOR ASSESSMENT	16
4.1 Water Availability for Use.....	16
4.2 Fisheries Production.....	16
4.3 Floodplain Management.....	17
4.4 Navigation	18
4.5 Other issues	18
5. ASSESSMENT OF WATER AVAILABILITY AND USE	19
5.1 The Baseline Condition.....	19
5.2 The Definite Future Situation	19
5.3 The Foreseeable Future Situation.....	20
5.4 The Long Term Future Situation.....	22
5.5 Risks and Uncertainties.....	22
5.6 Water Availability for Use.....	23
6. TRANSBOUNDARY ECONOMIC, SOCIAL AND ENVIRONMENTAL ASSESSMENT	24
6.1 Hydrological Impacts	24
6.2 Results Economic Assessment.....	24
6.3 Results Environmental Assessment	24
6.4 Results Social Assessment.....	25
6.5 Evaluation of the Assessment Results	25
6.6 Use of the Assessment Results	25
C. STRATEGY FOR BASIN DEVELOPMENT	26
7. BASIN DEVELOPMENT FRAMEWORK.....	26
7.1 The 'Development Space'.....	26
7.2 Strategic Guidance for Use of the Development Space.....	27
7.3 IWRM Guidelines for Basin Development.....	28
8. BASIN MANAGEMENT PROCESSES	30
8.1 Regional Cooperation and Transboundary Governance	30

8.2	<i>Harmonization of Basin and National Planning</i>	30
8.3	<i>Enabling Tools and Procedures</i>	32
8.4	<i>State-of-Basin Monitoring</i>	33
8.5	<i>Institutional and Human Capacity Building</i>	34
8.6	<i>Managing Differences</i>	34
D.	IMPLEMENTATION OF THE STRATEGY	36
9.	IMPLEMENTATION OF THE IWRM-BASED BASIN DEVELOPMENT STRATEGY	36
9.1	<i>Road Map – the way forward</i>	36
9.2	<i>Measures to Implement the Strategy</i>	36
9.3	<i>Roles and Responsibilities</i>	38
10.	MONITORING AND UPDATING OF THE STRATEGY	40
10.1	<i>Monitoring, Evaluation and Reporting</i>	40
10.2	<i>Periodic Review and Updating</i>	40
	ANNEX 1 – SUPPORTING DOCUMENTS	41
	DEFINITION OF TERMS	43

ABBREVIATIONS

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BDP2	Basin Development Programme Phase 2
CEA	Cumulative Environment Assessment
DSF	Decision Support Framework
EIA	Environment Impact Assessment
IBFM	Integrated Basin Flow Management
IFI	International Financial Institution
IWRM	Integrated Water Resources Management
JC	Joint Committee
LMB	Lower Mekong Basin
mcm	million cubic metres
MNRE	Ministry of Natural Resources and Environment (Thailand)
MONRE	Ministry of Natural Resources and Environment (Vietnam)
MOWRAM	Ministry of Water Resources and Meteorology (Cambodia)
MRC	Mekong River Commission
MRCS	Mekong River Commission Secretariat
MW	Mega Watt
NGO	Non-Government Organization
NMCs	National Mekong Committees
NMCSs	National Mekong Committee Secretariats
PDIES	Procedures for Data and Information Exchange and Sharing
PMFM	Procedures for Maintenance of Flow on the Mainstream
PNPCA	Procedures for Notification and Prior Consultation
PWQ	Procedures for Water Quality
PWUM	Procedures for Water Use Monitoring
RBC	River Basin Committee
RBO	River Basin Organization
RTWG	Regional Technical Working Group
SEA	Strategic Environmental Assessment
WB	World Bank
WREA	Water Resources and Environmental Administration (Lao PDR)

FOREWORD

- Highlights that the four Lower Mekong Basin countries prepared the IWRM-based Basin Development Strategy through a highly participatory process and broad stakeholder consultation.
- Reconfirms the relevance of the shared vision, goals, values and strategic priorities for IWRM set out in the ‘Strategic Directions for IWRM in the Lower Mekong Basin’, approved by the MRC Council in 2005.
- Acknowledges that in the current context of accelerating water resources development, stronger collaboration and support for a basin-wide IWRM approach is needed that can link basin-wide perspectives to the national planning process.
- Stresses the relevance of the basin development strategy for the economic and social development of the four riparian countries and the coordinated management of the water and related resources in the Lower Mekong Basin.
- Confirms that the four LMB countries will collaborate to implement the basin development strategy.

The IWRM-based Basin Development Strategy – a snapshot:

- Provides an integrated basin perspective against which national plans and proposed projects can be assessed to ensure an acceptable balance between economic, environmental, and social outcomes in the Lower Mekong Basin (LMB), and mutual benefits to the riparian countries.
- Provides the ‘development space’ within which the LMB countries can plan and work: a space for development of water and related resources, shaped by sustainable boundaries and supported by strategic guidance and a package of IWRM guidelines that will assist policy makers and water managers in the use and management of the development space.
- Provides practical institutional mechanisms to adapt the strategic guidance and processes in this Strategy into the various transboundary and national planning, decision-making and governance processes, which complement activities and processes now underway.
- Provides confidence that water can be allocated and used without significant unforeseen transboundary impacts. At the national level, this will make it easier to attract funding for projects, since project developers are provided some certainty as to the water resources management processes against which proposals will be judged. At the basin level, this will provide incentives for a more strategic implementation of agreed procedures under the 1995 Mekong Agreement.
- The development space does not infringe, or impact on, the natural dry season flow regime of the Mekong mainstream (as represented by the Baseline Scenario). The present ‘dry season flow regime can be ‘protected’ and continue to meet the important and essential environmental and social needs.
- The IWRM-based Basin Development Strategy takes a twenty-year view of basin development and management. Through its periodic updates of the State-of-Basin Report, the MRC will provide guidance whether this Strategy requires adjustment. It is anticipated that the IWRM-based Basin Development Strategy will be reviewed every five years.
- Establishes ‘networks’ or ‘working groups’ to jointly work on ways to make the Strategy implementation most effective. In this way, the countries will be able to bring existing and emerging national perspectives into future updates of the Strategy. This creates a ‘loop of ownership’ between MRC and the four countries and ensures that regular updates of the Strategy will be fully informed and based on current and emerging trends and issues.
- The overall process of Strategy implementation and monitoring will be oversighted and coordinated by a four-country sub-committee that reports directly to the Joint Committee.

A. BACKGROUND

1. Introduction

1.1 Purpose of the Strategy

A key part of the 1995 Mekong Agreement is the need for the four riparian countries to cooperate in *‘the formulation of a basin development plan that would be used to identify, categorize and prioritize the projects and programs to seek assistance for and to implement at the basin level’*. Further, the countries have agreed to undertake this planning to achieve *‘the full potential of sustainable benefits to all riparian countries and the prevention of wasteful use of Mekong River Basin waters, with emphasis and preference on joint and/or basin-wide development projects and basin programs’*.

This means basin water planning that seeks to obtain a balance between water resources development and water resources protection, in a way that all the four countries agree is fair and equitable – fair from social and cultural points of view as well as economic and environmental aspects. This highlights the range of difficult debates and decisions that need to be made when considering sustainable development at a basin scale among sovereign countries.

The Mekong basin cooperation model is built on ‘cooperation, coordination and mutual respect’. So developing a common understanding of the IWRM transboundary issues, and of the importance of the environmental and social values and assets of the basin, and how these can be used and managed in the future development, is the essential supporting foundation for basin wide sustainability.

All of this becomes much more important when large development plans exist for a basin, and water and related resources development is accelerating in several economic sectors. A clear and re-confirmed commitment by the four LMB countries to a basin wide IWRM approach is now important to guide this accelerated development in a sustainable way.

This IWRM-based Basin Development Strategy provides this strengthened commitment and responds directly to the foundation provisions of the 1995 Mekong Agreement. It aims to elaborate this common understanding and be a statement by the countries in the Lower Mekong Basin (LMB) of their intention to share, use, manage and protect the basin’s resources in an equitable and sustainable way.

The Strategy describes why a Basin Development Plan needs both boundaries as to the amount of water that can be used sustainably, and guidelines as to how and when water can be taken, and why this is best presented to decision makers as a flexible IWRM-based Basin Development Strategy. It will:

- Define or reconfirm the long-term goals and current specific objectives of basin development and management.
- Define the ‘development space’ of the basin’s water and related resources and strategic guidance for the use and management of that space.
- Create IWRM guidelines and processes that will assist water managers at the national and sub-basin levels in the allocation, use and management of water resources.

1. Introduction

- Provide a relational planning framework for the basin, national and sub-basin levels, building on the existing MRC procedures and associated guidelines under the 1995 Mekong Agreement.
- Allocate responsibilities for the implementation of the Strategy to the key target groups (riparian countries, MRC, development partners and others).

Term of the Strategy

The IWRM-based Basin Development Strategy considers development scenarios over a fifty year period but concentrates on a twenty-year view of basin development and management, which is considered to be a period for which rational and informed decisions can be made.

A full review of the IWRM-based Basin Development Strategy will be conducted every five years, as account needs to be taken of new knowledge of how the Basin's water resources behave under evolving circumstances and changing social, economic and environmental conditions.

1.2 Need for an IWRM-based Basin Development Strategy

MRC has already agreed on the broad directions that IWRM should take in the Mekong Basin. The fundamental aims of the 1995 Mekong Agreement are restated in:

- The agreed vision for the Mekong Basin in the MRC Strategic Plan 2006-2010, being *'an economically prosperous, socially just and environmentally sound Mekong Basin'* and
- A set of broad goals, values and directions that IWRM should take in the Mekong basin, by the adoption, in 2005, of an *'IWRM Strategic Directions'* document for the basin.

The IWRM Strategic Directions document identified eight major areas of IWRM that are seen as of most relevance to the goals of sustainable, optimal and equitable development Mekong Basin, and specified a broad reaching 'direction' for each area with a general description as to how the various 'players' or stakeholders in the basin might address issues as a means of moving toward the objectives.

'IWRM Strategic Directions' (2005) - Eight priority IWRM key result areas:

- Economic development and poverty alleviation
- Environmental protection
- Social development and equity
- Dealing with climate variability
- Information based planning and management
- Regional cooperation
- Governance
- Integration through basin planning

guidelines in future water resources development and protection. Whilst this document provided useful 'high level' guidance on the broad IWRM needs at the basin scale, it was limited in how it considered possible links to the national planning processes.

1. Introduction

Since 2005, there has been increasing demand from both riparian countries and project developers for the provision of an integrated basin perspective against which ambitious national plans and proposed projects can be assessed to ensure acceptable balance between economic, environmental and social outcomes, and mutual benefits to the countries. *This is an IWRM perspective that is beyond the scope of the IWRM Strategic Directions from 2005.*

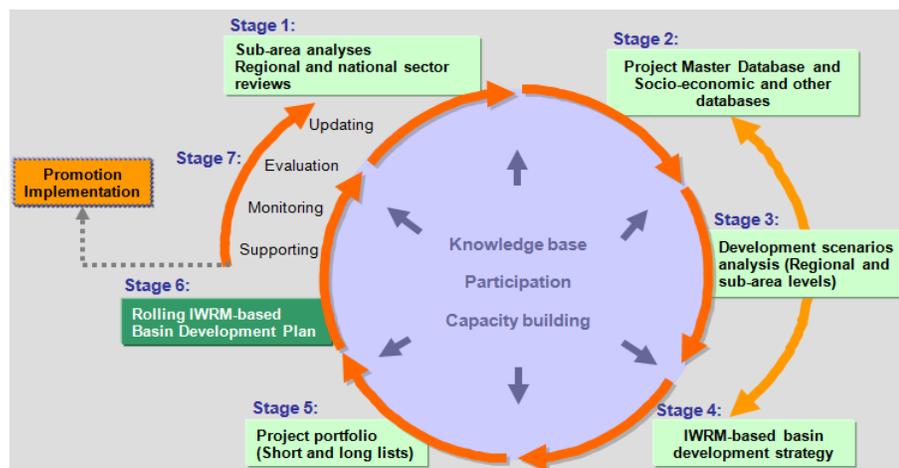
It is also beyond the responsibility of any individual country or project developer. Yet without such a perspective, private project developers can be discouraged as they cannot place their proposals within an overall framework that gives them some certainty as to the water resources management processes and practices against which proposals will be judged, and within which they will operate. This will make it more difficult to attract funding for projects.

All of this has confirmed the importance to the four countries of a strengthened commitment to IWRM principles and intentions for the basin, in a way that will strategically support the accelerated development now planned. It has led to the preparation of this more expansive and comprehensive IWRM-based Basin Development Strategy.

1.3 Approach to Develop the Strategy

The earlier stages of the MRC's basin planning activities formulated a rolling' basin development planning process that followed seven stages as shown in Figure 1. The key feature of the process is the necessary inter-play between national and sub-national plans with the opportunities at basin-level that are made possible through effective transboundary cooperation. The IWRM-based Basin Development Strategy is shown at Stage 4.

Figure 1 – The BDP planning process



In a large and complex basin as the Mekong basin, with six sovereign countries, it is not feasible to 'force' a rigid and constraining basin development plan, based on basin optimization techniques. Nor is it feasible to prepare an 'IWRM Strategy for the Lower Mekong Basin', which would look at the 'integration' of water related national policies, strategies and procedures of the sovereign riparian countries. *But it is feasible to prepare an IWRM-based Basin Development Strategy, which focuses on how development can proceed in a way that meets proper IWRM guidelines and concepts.*

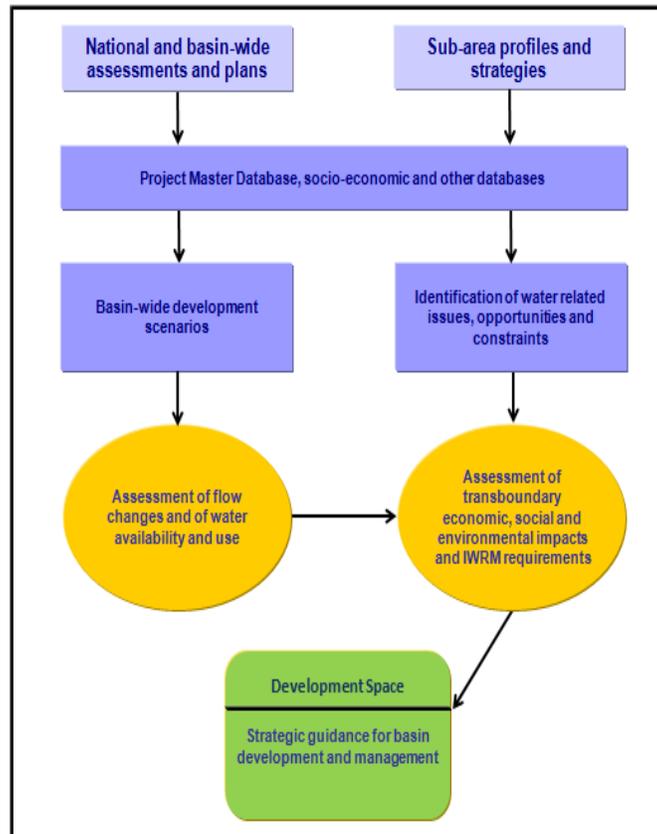
1. Introduction

The most sensible option to develop guidance on how water related development can proceed in way that is sustainable from a basin perspective and mutually beneficial to the LMB countries, is through a basin-wide dialogue of the results of a comprehensive assessment of basin-wide development scenarios. The scenarios represent different levels of water resources development in the Mekong basin. Each scenario would be formulated to represent different combinations of sectoral development, recognizing the synergies and trade-offs between sectors.

Figure 2 – Towards Strategic Guidance for Basin Development

The approach is shown in Figure 2. The whole process is a ‘step by step’ process and the development of the Strategy depends first on the collection, analysis and assessment of water and related issues at the national and sub-area levels, and also on the information within the water related sectors. The identified strategic issues, opportunities and constraints have helped to scope the scenarios and agree on the assessment approach methodology, including the assessment criteria.

The LMB countries have formulated and agreed on 9 scenarios, some of which comprise sub-scenarios. The scenarios can be categorized in four situations, as shown in Figure 3. First the scenarios will be assessed on a range of hydrological impact indicators to evaluate future water availability and use, and of the flow changes caused by different levels of water use, including those in the Upper Mekong Basin. The results are then fed into the ‘assessment of the transboundary economic, social and environmental impacts and IWRM requirements’.



In these assessments, the scenarios will be evaluated against 13 main indicators that can measure how well each scenario achieves the countries’ objectives of economic development, social development and environmental protection. As well, a basin wide ‘equity’ indicator is included that is to measure the degree of ‘equitable development’ between each country that each scenario produces, taking into account benefits from existing water use and further planned investments in each country.

Technical capacity will be build to support national discussion and consensus building on the results of the scenario assessment; the possible trade-offs between sectors, areas, and population groups; and the selection of the preferred scenario. Subsequently, consolidated national positions will be discussed at the basin level. Based on the results of these consultations, senior Government officials will indicate which scenario would provide the

1. Introduction

most acceptable balance between economic, environmental, and social outcomes in the LMB, and would bring mutual benefits to the LMB countries.

Subsequently, the chosen scenario will lead to the identification of the ‘development space’ for water and related resources in the LMB and the development of strategic guidance for the use and management of that space, or ‘statements or guidelines’ that will guide and influence national planning and management of water and related resources development.

The ‘development space’

The development space is not just a ‘volume of water’ that can be ‘safely’ used or consumed by future development. Such a definition would be a narrow interpretation of the ‘sustainable space’ for new development. It must be a development space that is supported by good ‘foundation’ policies and strategies, and either constrained, shaped or supported by a range of basin-wide strategic guidance, procedures, and a package of IWRM ‘best practice’ concepts that water managers need to use and manage the ‘development space’.

Within the ‘development space’ (shaded ‘blue’ in Figure 4), there will be a combination of projects and activities that fall within three categories:

- **Major infrastructure developments** that use or control the available water (based on the hydrologic modelling of the scenarios).
- **Water related projects**, such as socio-economic activities involving fisheries, navigation, watershed management, other non-structural and stakeholder driven projects, and IWRM ‘enabling’ developments.
- **Water opportunities, constraints and ‘enabling’ activities** such as institutional issues, capacity building, strengthened national IWRM capabilities, mainstream minimum flow procedures, etc.

The ‘blue’ space is supported and shaped by a range of strategic guidance and procedures and associated guidelines that represent the ‘sustainable boundaries or limits’ for development.

Figure 3 - The basin development scenarios

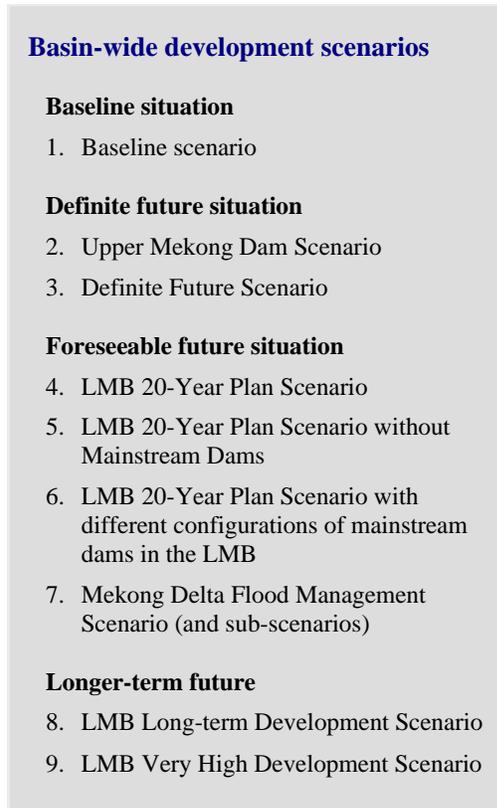
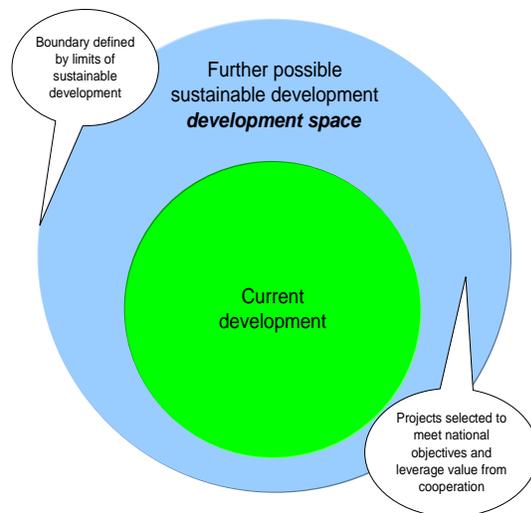


Figure 4 – Concept of development space



1. Introduction

The assessments (see Chapter 6) provide the ‘boundaries’ for the ‘development space’. If the assessed ‘adverse impacts’ are small then the boundaries around the development space are wider apart, or the ‘development space’ is larger, but if the adverse impacts are large then the constraining boundaries around the space will be closer.

The 1995 Mekong Agreement is implicitly framed in this way, with its emphasis on maintenance of agreed flows in the mainstream; reasonable and equitable utilization; and recognition of sovereign equality and territorial integrity in the utilization and protection of the water resources.

It is noted that in choosing a development scenario or identifying a development space, the LMB countries are not committing to a particular set of projects (which are in any case subject to feasibility studies, EIAs etc.), but are identifying a development space within which they can plan and work. Conflicts and trade-offs may occur, but within an agreed vision of an overall outcome, which will be described in the IWRM-based Basin Development Strategy.

1.4 Links to National Planning and the MRC Strategic Plan

National planning processes

Each country has its own system and procedures for water related planning. Usually there are five-year socio-economic and sector plans that seek to address the particular national long term objectives, including poverty reduction, infrastructure projects and improved environmental management. But there is no basin-wide overview that allows each country to take account of synergies that could occur from multi-country planning, or from shaping national sector plans and projects to achieve broader basin wide benefits.

Previously, the various MRC programmes have provided guidance to the four countries on particular sector issues – navigation, agriculture and irrigation, environment, flood management and recently hydropower – but this has been largely ‘one off’ and not an integrated basin-wide response across all relevant sectors and levels (sub-basin, national and basin) in the LMB.

This IWRM-based Basin Development Strategy will, for the first time, provide this basin-wide strategic overview across all aspects of IWRM. The Strategy also provides the practical linkages that need to be established to adapt the strategic guidance and processes in the Strategy into various transboundary and national planning decision-making and governance processes.

The MRC Strategic Plan

The IWRM-based Basin Development Strategy, as the overarching water-related development policy for the LMB, will guide and influence not only the national planning but also the planning of other stakeholders in the water sector, including the MRC.

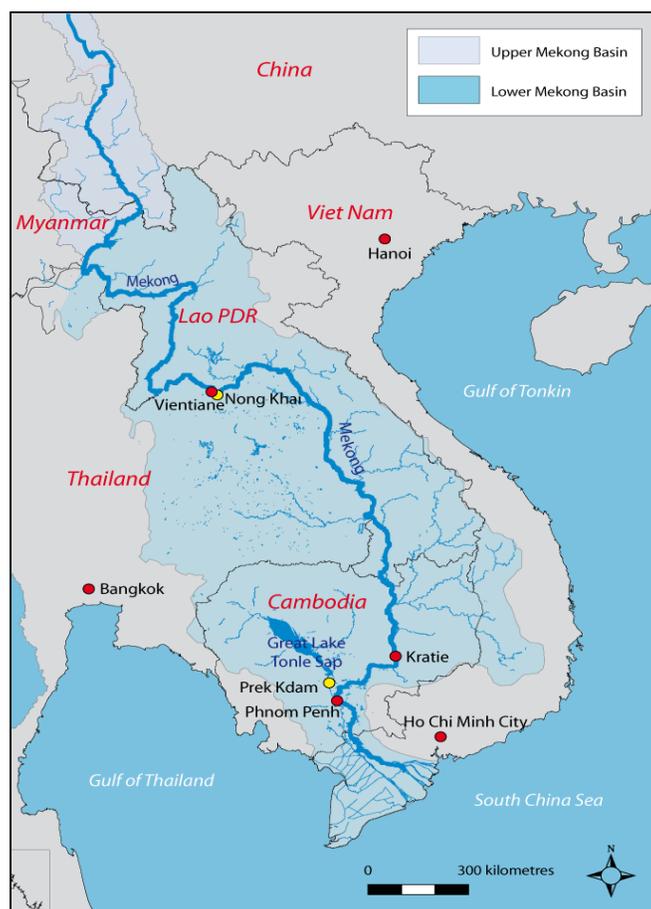
By providing strategic guidance and a framework of actions for coordinated basin development, this Strategy and its underpinning processes and assumptions, will guide the strategic planning process of the MRC, and influence the direction and content of the MRC Strategic Plan 2011-2015 and follow-on five-year plans.

2. The Mekong River Basin

2.1 Water and Related Resources

The Mekong flows for almost 4,700 km from its source in Tibet through China, Myanmar, Lao PDR, Thailand, and Cambodia before entering the South China Sea via a complex delta system in Vietnam. The area of almost 800,000 km² that drains into the Mekong is called the Mekong Basin (Figure 5). The mean annual discharge of the Mekong is approximately 475 km³. Per capita resources amounts to 8,500 m³/person/year, which is ‘plentiful’ compared with most other international river basins.

Figure 5 – The Mekong River Basin



One of the important features of the Mekong is the very large difference in wet and dry season flow, caused by the Southwest Monsoon, which generates wet and dry seasons of more or less equal length (Figure 6). In most parts of the Basin, flows in the driest three months constitute less than 10% of total annual flows, while flows in the wettest three months make up over 50% of total annual flows. The seasonal cycle of changing water levels at Phnom Penh results in the unique ‘flow reversal’ of water into and out of the Great Lake via the Tonle Sap river.

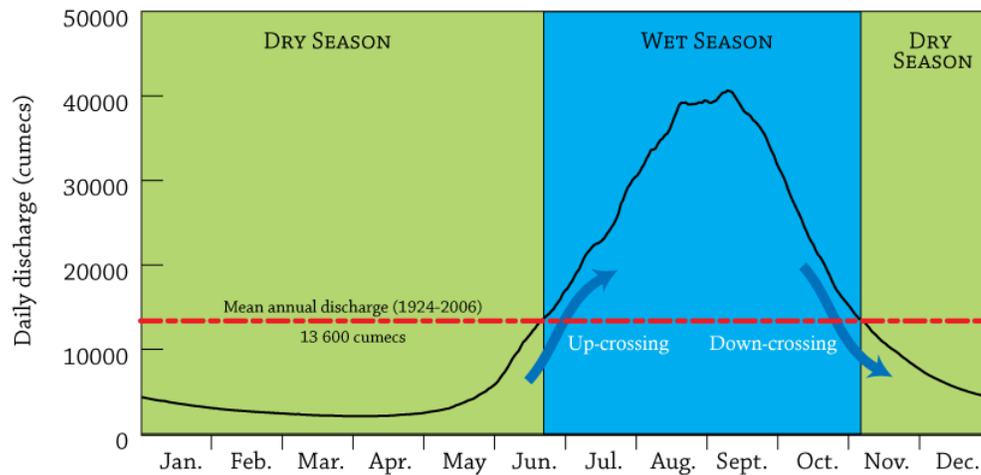
Also the historically observed natural year-to-year variability is very significant in terms of river discharges, flooded areas, and the beginning and end of the wet and dry seasons. For example, depending on the year, between 1 and 4 million hectares of floodplain are submerged during the wet season, including the

Tonle Sap Great Lake. The timing of the beginning and end of the flood season shows a range of about 4 weeks.

Another important feature is the Mekong Basin’s rich riverine ecology, fueled by the annual ‘flood pulse’ in and out the Great lake and the associated flooding and drying of major parts of the floodplain. The Mekong is the second most biodiverse in the world after the Amazon, and supports the world’s largest fresh water fishery of about 2.5 million tons per year.

2. The Mekong River Basin

Figure 6 – Monthly distribution of flow in the Mekong mainstream at Kratie



2.2 Socioeconomic Setting and Water Related Policies

Despite impressive economic growth over the past decade within the basin countries, much of the Mekong Basin itself remains among the world's poorest areas. In 2009, the total population living in the Lower Mekong Basin was estimated at 65.7 million, the majority living in rural areas. Many of these people are farmers, who supplement what they grow with the fish they catch and the food and other materials they gather from forests and wetlands. This makes the rich ecology of the lower basin unique in terms of its contribution to livelihoods, particularly of the poor.

The majority of Cambodia's and Lao PDR's land area and population lie within the basin. About 40 percent of the people in Cambodia and Lao PDR living in the basin have incomes below the poverty line. Comparatively, the Thai portion in the basin holds only about 40 percent of the national population, while in Viet Nam, 20 percent of the country's population lives in the Mekong Delta or the Central Highlands.

The countries' socio-economic and sector policies demonstrate that governments increasingly recognize that developing some of the economic potential of the water resources in the Mekong Basin can contribute to increased economic growth, poverty alleviation, improve livelihoods, and work towards meeting the UN Millennium Development Goals. All four countries plan to:

- Considerably increase irrigated agricultural production, for food security, safe food production, the growth of high value crops, and to create high employment.
- Significantly increase hydropower production to meet increasing demand for affordable electricity and/or generate foreign exchange with minimal adverse effects, thereby promoting economic growth.
- Improve navigation to increase international trade opportunities and river-based tourism, and to develop effective and safe waterborne transport.
- Considerably decrease the damages of floods to prevent or minimize people's suffering and economic losses due to floods, while preserving the environmental benefits of floods.

2. The Mekong River Basin

- Improve water supply and wastewater management to make sufficient water of adequate quality available to people and industries.
- Further develop aquaculture and maintain capture fisheries for food security.
- Alleviate poverty by creating job opportunities through the continued development of some of the basin's water resources for beneficial use.
- Maintain vital ecology and cultural heritages and minimize adverse effects on natural resources from economic development.

The national plans and policies show that the LMB countries are all following 'common and consistent' principles in the development and management of national water resources, in their efforts to reduce poverty and boost economic growth. It highlights the importance and value of an IWRM-based Basin Development Strategy that can capture these similarities and guide a common set of shared goals and values at the basin scale.

2.3 Current Development of Water Resources

Average annual withdrawals for agricultural, industrial and other consumptive uses in the LMB are estimated at around 60,000 mcm, or 12% of average annual discharge of the Mekong. The most downstream end of the Mekong Basin, the Vietnamese Delta, is by far the largest water using area in the Basin. Diversions from the mainstream upstream the Vietnamese Delta are so far negligible. Lao PDR, Cambodia use about 1% of their annual renewable water resources. Consumptive uses of water resources in the Upper Mekong Basin are insignificant. Existing storage of water resources behind dams corresponds to less than 5% of the average annual flow, and does not significantly redistribute water between seasons.

Agriculture is the most dominant water-related sector, particularly in Thailand and Vietnam. In the dry season, the irrigated area is less than 10% of the agricultural area (1.3 million hectares). Expansion of the present levels of irrigation is limited by the availability of dry season flows. The water flows that reach the Vietnam Delta in the dry season are fully used for economic, environmental and social purposes, including combating seawater intrusion.

The hydropower potential of the Mekong Basin is estimated at over 60,000 MW and about 10% of this potential has been developed to date. Navigation is an important sector but is largely undeveloped in the sense that it is occurring naturally and, so far, not as an integrated transport sector. To reduce damage by major floods, the emphasis so far has been on the reduction of vulnerability to floods by flood proofing and non-structural measures. Water resources have been developed on a small scale for the improvement of wetlands and aquaculture.

While millions of poor people use the natural resources of the Mekong River Basin for their food security and livelihoods, the Mekong's water and related resources are largely undeveloped.

2.4 Impact of Current Development

The areas with the highest levels of water resources development - Northeast Thailand and particularly the Vietnam Delta - have witnessed strong economic growth during the 1990s. The Vietnam Delta is now one of the world's most productive agricultural areas. Some

2. The Mekong River Basin

biodiversity has been lost but thanks to thriving rice field fisheries, the annual fish yields in Thailand and Vietnam are among the highest in the Mekong Basin.

Current water resources developments have had various localized adverse impacts in the Mekong's sub-basins. On some of the tributaries, inadequately designed hydropower projects have created wide and sudden variations in the daily downstream flows, often to the distress of people living downstream. Uncontrolled deforestation in many of the tributary basins has led to increased erosion and flood risks. Significant water quality problems have developed in the Vietnam Delta and some tributary basins with a high population density and intensive agriculture. Throughout the LMB, there are localised impacts from some industries, such as mining.

While the developments so far on the tributaries have had some localized impacts, the impacts on the flow regime and water quality of the mainstream are insignificant. The impacts of water resources development in the sub-basins tend to become 'drowned out' in a large international river basin such as the Mekong by the overall magnitude of the basin's total flows. The impacts of land use change on mainstream water flows also become undetectable as geographic scale of the basin increases, despite the fact that regional deforestation has been very significant since 1960's.

Overall, the status of the water and related resources in the Mekong Basin is still good.

2.5 Water Resources Management

At the Mekong Basin scale

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 dominates. MRC, through the 1995 Mekong Agreement, acts as a focal point for the cooperation, and to assist the member countries in achieving their basin scale aims through provision of shared information, technical guidance, and mediation. The Agreement establishes a forward-looking framework and mechanisms for pursuing the concept of IWRM at the basin.

Since 1995, the Mekong River Commission has made slow but sure progress, with member country agreement to a procedural framework for cooperation and the development of a regionally recognized knowledge base. It also established a participatory process for basin planning. Most of MRC's activities are now implemented through sector or thematic programmes. In 2009 a start has been made with the definition of core functions, which would be fully financed by the member countries after a transition period.

At the national level

Each country is implementing IWRM in a way that suits its particular circumstances. There have been large changes in all countries, particularly relating to developing clear statements of national water related policy and strategy. An improving institutional and regulatory framework increasingly supports these policies, that removes uncertainty as to which agency has the role of the 'water resources manager', and gives it strong legal backing through modern water resources legislation. These are foundation issues for 'good' national IWRM governance. In Thailand, River Basin Committees are becoming the main bodies for participatory water management at the river basin and local level.

2. The Mekong River Basin

All countries are further developing the overall water policy, legal and institutional framework, and have plans for implementing and strengthening the new approaches and systems. The most important recent initiatives have been:

- All countries now have specified agencies with the responsibility for IWRM – a specified '*national water resources management agency*' (MOWRAM in Cambodia, WREA in Lao PDR, MNRE in Thailand, and MONRE in Vietnam).
- All countries have at least a 'framework' national 'water policy and strategy' based on IWRM principles.
- All countries are strengthening participative approaches to river basin, and sub-basin, planning and management.
- Improved farmer input to management of irrigation schemes.
- New decentralization policies that will enable water related decisions to be taken at the provincial levels, where the problems exist.
- All countries are modernizing water resources legislation.
- All countries are supporting capacity building programs for IWRM and introducing new technical, modelling and analytical systems and approaches to support water planning and management.

Changes are occurring in the processes for regulating and supplying water services for both urban and rural water demands. For the major towns and cities there is a range of government owned water supply corporations or businesses. They are regulated by water departments and agencies, through various operating authorities and agreements. These corporations are being required to operate to high levels of water service, environmental and management efficiency.

In the irrigation sector, water users associations are being formed, which places greater accountabilities on the farmers. There are also new approaches to private-public sector partnerships, and to private sector-community farmer partnerships, which can lead to large scale irrigation farming and vertical integration into processing and product marketing.

New approaches to *stakeholder participation and consultation* are being developed in all four countries. Such processes are a central part of the modern IWRM practices. Each country has its own systems, approaches and cultures relating to community or mass participation. These must be respected as a well structured stakeholder participation policy and set of processes are developed for future basin wide IWRM implementation.

3. Emerging Trends and Plans

3.1 Global Developments

Global developments once would have had only a small impact on developing countries. In the last decade this has changed dramatically and now the effect of market changes and global economic downturns and peaks are registered in all countries. ***Fluctuating oil and natural gas prices*** are making hydropower development financially more attractive to private investors, which have led to an accelerating hydropower development.

Global food shortages and rising prices can make irrigation more profitable in the LMB. Emerging industrial nations such as China and India now seek more diversified food types. Together with potential large investments from Middle Eastern countries in the LMB, this opens up new market opportunities and new public-private business relationships for irrigation development.

Global climate change must be considered in the context of its possible impacts on water related sectors and future water availability. Initial assessments suggest that in the Mekong basin, the wet season may become wetter but the dry season will be largely unaffected.

All of these emerging trends provide additional incentives for the development of significant water infrastructure, including storage projects. The challenge is to develop these projects within an IWRM context, and with an emphasis on developing multi-purpose projects within a basin perspective.

3.2 Basin Level Developments and National Level Developments

Whilst global developments offer both opportunities and threats, there are many priority issues within the Mekong Basin itself, and within each country, that influence how and when land and water resources could be developed.

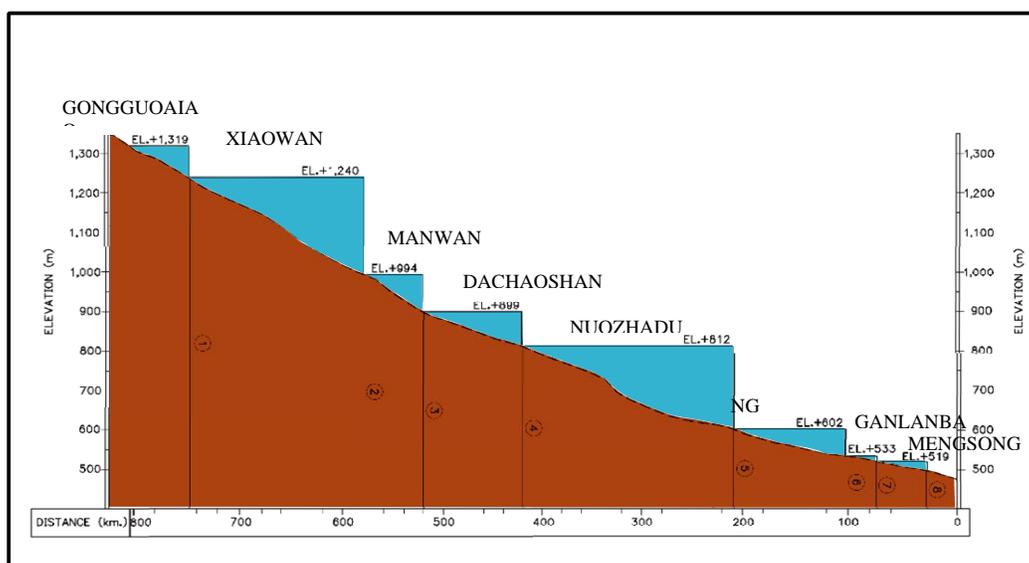
Upper Mekong Basin

In the Upper Mekong Basin, China is completing its ***hydropower cascade on the Lancang***. In particular the Xiaowan and the Nuozhadu hydropower projects, with 9,800 and 12,400 million m³ of active storage, will cause a very significant seasonal redistribution of flow from the wet season to the dry season. The significantly increased dry season water availability makes run-of-the-river hydropower schemes in the LMB financially more attractive and opens up the possibility for major expansion of irrigation.

The Manwan, Dachaoshan and Jinghong Dams are currently operational. The completion of the Xiaowan Dam in 2009 and Nuozhadu in 2014 may significantly reduce sediment transport in the Mekong mainstream and increase river bank erosion in the northern part of Thailand and Lao PDR. China has no plans at present to use any of the water resources in the Upper Mekong Basin for consumptive purposes.

3. Emerging Trends and Plans

Figure 7- Profile of the hydropower cascade on the Lancang in China



Source: *Cumulative Impact Analysis of Nam Theun 2 Contributions, Government of Lao PDR and ADB, 2004*)

Lower Mekong Basin

In the Lower Mekong Basin, all four countries have targeted ‘poverty reduction strategies’ within the national socio-economic and sector plans, and these all include the development of water resources for irrigation, flood management, hydropower, domestic water supply, and other uses. *In particular the countries’ hydropower and irrigation development plans will significantly impact on how the basin’s resources are used and consumed.*

Currently, ten large (> 10 MW) **hydropower projects** are under construction on tributaries and many more are planned in the LMB, including 11 projects on the mainstream. Many of the hydropower projects on tributaries include significant reservoirs which will further increase dry season flows, making more water available for irrigation development. Table 1 below shows the dams in China and the dams under construction in the LMB will create 34,325 mcm of additional active storage in The Mekong Basin. An additional fifty dams are being planned to be constructed during the next 20 years, mostly in Lao PDR. These dams would add another 28,213 mcm of storage to the Mekong system.

Table 1 - Dam storage capacity in the Mekong Basin

Situation	Active Storage (mcm)	Total Active Storage (mcm)	Comments
Baseline	9,628	9,628	
Upper Mekong Dams	23,193	32,821	
Definite Future	11,132	43,953	Mainly because of Lao dams that are under construction
LMB 20-Year Plan	28,213	72,166	Mainly because of planned Lao dams
LMB 20-Year without mainstream dams	23,307	67,260	

Source: *MRC BDP Hydropower sector review, draft final report, March 2009*

3. Emerging Trends and Plans

Most of the LMB countries have ambitious plans for *irrigation development*. For example, Lao PDR plans to increase dry season irrigation from less than 100,000 ha at present to more than 300,000 ha in twenty years from now (see Table 2 below). Also in Cambodia, large irrigation expansions are being studied, in particular in the undeveloped Cambodian delta, linked to major investments in flood control, and elsewhere, linked to hydropower development. Water transfers from the Mekong mainstream have long been considered by Thailand to complement national approaches to alleviate droughts.

Table 2 - Planned increases in irrigated agriculture

Country	Increases in Irrigation in the Dry Season (hectares)		
	Current Situation	20- Year Plan Scenario	Increase in %
Lao PDR	99,319	332,646	235
Thailand	171,768	279,831	63
Cambodia	260,815	378,012	45
Vietnam	740,304	740,304	0
LMB total	1,272,206	1,730,793	36

Source: MRC BDP irrigation sector review, draft final report, March 2009

Development plans of this size and scope bring with them both ‘synergies’, or complementary effects between projects, and ‘trade-offs’, where benefits for one area or activity create dis-benefits for another. For example there can be synergies between hydropower, irrigation and upland watershed management - with some benefits occurring for all. Trade-offs at the transboundary level will largely be about hydropower benefits from mainstream dams, on the one hand, and the dis-benefits caused by the blockage of fish migration routes by this infrastructure.

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. This requires strong IWRM understanding and capabilities across the basin, and across institutions, and time for consultation and to develop preferred negotiating positions.

Projected population growth suggests that by 2020 the basin’s population will reach 77.8 million (Table 3). These conditions along with increased longevity mean that overall population growth will remain significant. The increasing population growth requiring accelerating electricity demand and increasing food requirements, continue to increase pressures on the basin’s water resources within the dry season.

Table 3 - Projected population growth of the Lower Mekong Basin

Portion within Mekong Basin	Current Basin Population (million)	Annual Growth Rate (%)	Basin Population Projected in 2020 (million)	Source
Cambodia	14.6 (2007)	2.5	20.1	www.unescap.org
Lao PDR	6.2 (2007)	2.9	7.7	www.unfpa.org
Thailand	22.7 (2009)	0.9	24.4	www.nso.go.th
Vietnam	22.2 (2006)	1.3	25.6	www.geohive.com
Total	65.7	2.0	77.8	

3. Emerging Trends and Plans

Also, increasing living standards means changes in attitudes to flooding and food shortages, which require different approaches and policies to both flood protection and irrigation expansion on the delta flood plains in Cambodia and Vietnam.

3.3 New Investments and Development Assistance

As the four LMB countries reform and develop government investment policies and clarify the rules for resource utilization, there will be increasing opportunities for the private sector (and foreign ‘state-owned companies’) in the development of water and related resources, such as hydropower, navigation, large-scale irrigation, and industry (mining, forestry, and tourism). In many of these areas, investment from the private sector now outweighs public sector investments.

In comparison with conventional public sector driven developments, the emerging private sector developments in the LMB are more opportunity-driven with relatively short planning cycles and assessment processes that meet minimum requirements. As well, private project developers are not obliged to develop projects through processes open to public scrutiny, and are less sensitive to arguments and advocacy promoted by civil society and NGOs. Moreover, private project developers do not have to comply with more stringent safeguard policies of the multilateral banks (WB, ADB), which previously dominated the hydropower and irrigation sectors.

When private sector projects begin to dominate, the government requires strong government regulatory systems and enforcement capacity. This means greater skills and capacities for the central regulating and resource management agencies and stronger supporting laws and regulations.

4. Main Transboundary Issues for Assessment

B. ASSESSMENT OF WATER RELATED OPPORTUNITIES AND CONSTRAINTS

4. Main Transboundary Issues for Assessment

In the basin planning process, the water-related issues have been collated from the national and sub-area data collection and analyses process. In addition, assessments by MRC programmes have added sector and thematic issues. Strategic assessments of this large amount of information have identified over fifty main IWRM issues that must be addressed when future water related development is being considered.

Many of these issues do not have transboundary implications, while others are more related to opportunities for transboundary cooperation, which are described in Chapter 8. The transboundary issues that have been initially assessed from this extensive list as being of the highest priority for a basin-wide, scenario-based economic, environmental, social assessment are described in this chapter.

Strategic guidance and IWRM guidelines will be prepared for those issues that are clearly of transboundary significance in the foreseeable future.

4.1 Water Availability for Use

The current dry season flows are used to maintain a wide range of economic, social and environmental values in the LMB. The water of the Mekong mainstream that reaches the most downstream parts of the Vietnam Delta is fully used for combating salinity intrusion. The earlier basin planning activities and the related 'Integrated Basin Flow Management' studies (2000-2006), which assumed that the ambitious irrigation plans of most of the LMB countries would need to be 'sourced' from within the natural dry season flows, have highlighted the difficult questions related to what level of environmental and social decline this might cause, and what could be the acceptable limits, if any, of such a decline.

The future increases in dry season flow, caused by hydropower developments now under construction and planned (Chapter 3) will make it easier to agree on acceptable and sustainable outcomes. The reason is that there will now be much more water available in the dry season than under present conditions. Once there is agreement on what might be the acceptable level of development that will use or consume new dry season water - the 'middle ground' or 'balancing point' between more water for irrigation, and consequential social and environmental impact - it would then be possible to incorporate this information into the technical guidelines that are to support the 'Procedures for the Maintenance of Flows in the Mainstream' (PMFM).

4.2 Fisheries Production

The productive fisheries of the basin are under pressure from exploitation, flow modification, and habitat fragmentation and degradation. Recent studies estimate that between 0.7 and 1.6 million tonnes of fish are at risk from the proposed 11 mainstream hydropower dams, depending on the estimation methodology employed. Reductions in yield of this magnitude could have profound socio-economic implications for the inhabitants of the basin that depend on fisheries resources for their livelihoods.

4. Main Transboundary Issues for Assessment

Since successful mitigation of the barrier effects of mainstream dams with fish passes appears doubtful, other strategic measures would need to be implemented to compensate for the loss of yield from capture fisheries. In particular, measures to improve the management of capture fisheries and develop aquaculture (reservoir fisheries and rice field fisheries) seem to have considerable potential, as demonstrated in the Vietnam Delta and Northeast Thailand. In these parts of the Mekong Basin, water resources development and fishery yields are among the highest in the Mekong Basin.

Measures to improve capture fisheries management include the control of fishing through closed seasons and areas, by gear controls, and by improving the access of fish to critical habitats, such as floodplains and deep pools. It is noted that the benefits from improved capture fisheries management can be captured by poor people with limited investment. By contrast, successful aquaculture requires access to land, water and capital, as well as significant education and technical training.

Rice field fisheries would benefit from controls on the use of pesticides and surface water for irrigation to maintain sufficient water in dry season refuge habitats on the floodplains. Other measures include improved management of reservoir habitats by means of stocking programmes, the protection of spawning streams, and catchment management to reduce sedimentation. Adverse transboundary impacts could concern water pollution, the spread of diseases, parasites and noxious species, and competition with capture fisheries.

All of these areas offer opportunities for transboundary coordination of management policies, standardization of monitoring methods, and exchange of knowledge, data and information.

4.3 Floodplain Management

If the current plans of the LMB countries would be implemented, significant parts of the current floodplains would be protected from flooding and developed for irrigated agriculture and other land uses. With increasing levels of floodplain development in the longer term, significant transboundary impacts may occur in terms of loss of biodiversity, reduction of fish production, and increased flood heights and velocities, due to the diversionary effect of flood banks and roads. Also the impact of climate change on the frequency of large floods needs to be considered.

In particular the protection of the deep flooded areas beyond the early July-August floods in the Mekong Delta, could considerably increase river water levels and flood risks across the Vietnam/Cambodia border, and adversely affect capture fisheries and important wetlands in the Delta. These impacts result essentially from the loss of storage capacity during the different stages of the floods. Options to divert the flood waters towards the Gulf of Thailand or the Vai Co River are costly and their discharge capacity is limited.

Recent flood risk reduction studies suggests that there is sufficient scope in the foreseeable future for improvement of the 'living with floods' concept in the Delta by infrastructural and non-structural measures to reduce flood damage and increase economic activities. New concepts are needed in the longer term, with increased levels of flood plain development in Cambodia and possibly higher flood risks due to climate change.

4. Main Transboundary Issues for Assessment

4.4 Navigation

River navigation improvements reduce transaction costs of trade in the Mekong region and can serve as one critical element in improving the livelihoods of the basin's people and alleviating poverty through employment and trade opportunities. The impact of mainstream barriers and dams on the integrated development and implementation of ports, river works, locks and regional waterways need to be assessed and prevented or mitigated where necessary and appropriate.

The navigation sector also offers tremendous opportunities in transboundary cooperation in terms of the regional harmonization of navigation processes and schemes (border regulation, navigation aids, navigation rules, pollution control, certification, monitoring, and statistics), and morphological management, including bank protection and dredging. Also, the integration of navigation with regional initiatives to improve road and rail transportation would be important.

4.5 Other issues

Other priority issues for the transboundary economic, environmental and social assessment concern: 1) the impact of the Upper Mekong dams on river bank erosion and sediment movement downstream, 2) dam safety of the Upper Mekong dams, in particular the two large storage dams Xiaowan and the Nuozhadu, 3) the impact of the mainstream dams in the LMB on sediment entrapment and flushing downstream, and the related impacts on the riverine ecology (filling of deep holes etc.), 4) transboundary water inundation issues from the storage backwaters, and the passage of flood flows of any mainstream dams, and 5) the deterioration of water quality due to proposed large increases in irrigated agriculture.

5. Assessment of Water Availability and Use

Note to the reader: This chapter will be revised upon completion in October 2009 of the ongoing hydrological assessment of the formulated basin-wide development scenarios

Part of the ‘development space’ relates to future water use – those future projects or activities that ‘*use and consume water*’ such as major irrigation developments, and those that ‘*utilize or control water*’ without actually ‘diverting or consuming it’, such as run-of-the-river hydropower projects. All of these possible water use and utilization activities can have significant transboundary impacts and these need to be assessed to provide a strategic picture of just how much water can be used over what time periods, where in the system it can be used safely and by what types of activities.

This chapter focuses on the question how much water is available for use from a single perspective of water quantity. This is a pertinent question, since the dry season flows that reach the Vietnam Delta are fully used while upstream countries are planning large increases in consumptive uses (Section 3.2). This question is answered by modeling the flow changes of the defined basin-wide development scenarios that represent four situations: the baseline situation, the definite future situation, the foreseeable future situation, and the long-term situation (see Section 1.3).

5.1 The Baseline Condition

The baseline condition is explored by the Baseline Scenario, which represents the development conditions (physical and management characteristics) that existed in the basin in the year 2000. Physical conditions include climate; land use; public and industrial water demand; irrigated areas, cropping patterns, and delivery infrastructure; storage characteristics (location, size, shape and outlet structures); and hydraulic conveyance and flood storage. Management conditions include operating rule curves for storages; water allocation policies; and operating rules for salinity barriers.

It has been assessed through the MRC’s modeling package that *at the basin scale* there is as yet no statistical evidence that man-induced developments have caused any significant change to the hydrological regime of the Mekong mainstream downstream as far as the Cambodia-Vietnam border in the delta. Of course there are land management and development issues (deforestation, irrigation development) at the smaller sub-basin and watershed scales that will impact on catchment water yields and condition. However, when this is aggregated up to the basin scale these impacts make no significant changes to the flow regimes of the mainstream. That is, any impacts are not transboundary.

Therefore the mainstream can be considered to be in, or very close to, its natural state. This is particularly significant for the dry season as this is an important part of the river flow hydrograph in maintaining a wide range of environmental and ecological values.

5.2 The Definite Future Situation

The definite future situation is explored through two scenarios:

- 1) The Upper Mekong Dam Scenario, which comprises the Baseline Scenario, plus the hydropower cascade that is being developed on the Lancang.

5. Assessment of Water Availability and Use

- 2) The Definite Future Scenario, which comprises this Upper Mekong Dam Scenario plus the significant water resources developments on the LMB tributaries that have been constructed since 2000, or are under construction or committed and therefore, will become fixed parts of the Mekong system in several years from now.

The Upper Mekong Dam Scenario, in particular through the Xiaowan and the Nuozhadu hydropower projects, with 9,800 and 12,400 million m³ of active storage, will store substantial wet season flows and re-regulate these to enhance dry season flows, and increase power generation during this dry season over what would be possible from the normal flow levels.

Table 4 shows that the resulting dry season flow increases in the LMB are very significant. At the Vientiane monitoring station, average monthly flows would increase with about 40% in February and March. Much further downstream, at the Kratie station, the average monthly flow in these months would increase by about 18%. The fractional reduction of the flows in the wet season is small. The dams in Lao PDR that are certain to be completed – that is the Definite Future Scenario – will further increase dry season flows.

Table 4 - Difference of average monthly flow (in mcm) between the Upper Mekong Dam Scenario and the Baseline Scenario

Month	Vientiane			Kratie		
	Baseline	Upper Mekong Dam	% Difference	Baseline	Upper Mekong Dam	% Difference
Jan	4,506	6,044	34	10,310	11,680	13
Feb	3,346	4,700	40	7,338	8,629	18
Mar	2,946	4,096	39	5,886	6,979	19
Apr	3,297	4,121	25	5,979	6,810	14
May	5,399	5,505	2	11,017	11,228	2
Jun	9,834	8,962	-9	31,227	30,630	-2
Jul	19,543	16,253	-17	58,328	55,257	-5
Aug	26,469	24,440	-8	84,786	82,471	-3
Sep	26,547	26,238	-1	88,001	87,513	-1
Oct	18,026	18,169	1	59,229	59,386	0
Nov	11,012	11,088	1	32,098	31,845	-1
Dec	6,642	7,842	18	17,465	18,314	5

5.3 The Foreseeable Future Situation

The definite future situation is explored through the LMB 20-Year Plan Scenario, which includes the planned water resources developments in the LMB, including the 11 mainstream dams, and a few alternative scenarios to study the impact of different configurations of mainstream dams. However, the alternative scenarios would cause similar flow changes as the LMB 20-Year Plan Scenario since the proposed LMB mainstream dams will not cause flow changes beyond a daily time frame.

The modeling results indicate that *the water quantity demands of all of the development ‘packages’ within the LMB 20-Year Plan Scenario (large irrigation increases, mainstream hydropower dams, tributary dams and irrigation etc. see Section 3.2) can be met, and in the dry season there will still be more water in the mainstream than at present.* This is shown in Table 5.

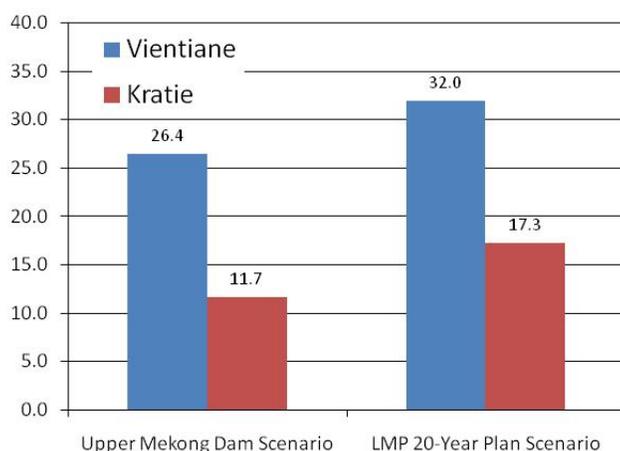
5. Assessment of Water Availability and Use

Table 5 - Difference of average monthly flow (in mcm) between the LMB 20-Year Plan Scenario and the Baseline Scenario

Month	Vientiane			Kratie		
	Baseline	LMB 20-Year Plan	% Difference	Baseline	LMB 20-Year Plan	% Difference
Jan	4,506	6,419	42	10,310	11,898	15
Feb	3,346	5,015	50	7,338	9,036	23
Mar	2,946	4,485	52	5,886	7,686	31
Apr	3,297	4,410	34	5,979	7,820	31
May	5,399	5,517	2	11,017	11,294	3
Jun	9,834	8,073	-18	31,227	26,786	-14
Jul	19,543	14,258	-27	58,328	49,135	-16
Aug	26,469	22,558	-15	84,786	77,919	-8
Sep	26,547	24,623	-7	88,001	84,597	-4
Oct	18,026	17,775	-1	59,229	57,745	-3
Nov	11,012	11,061	0	32,098	31,947	0
Dec	6,642	7,402	11	17,465	17,679	1

This favorable water quantity situation is because the upper Mekong dams, the Lao PDR dams in the Definite Future Scenario, and the further Lao PDR tributary dams in the LMB 20-Year Plan Scenario will re-regulate amounts of water to the dry season that are greater than all the demands of the planned new consumptive development. *That is, there will still be surplus water in the mainstream above the present dry season flow after the 20 year development has occurred.* This remarkable finding is visualized in Figure 8.

Figure 8 – Changes in flows (%) in the dry season (December-May) compared to the Baseline Scenario



The LMB 20-Year Plan Scenario, therefore, represents a major hydrologic change over the Baseline Scenario which approximates natural conditions. However, most of that change is caused by ongoing developments that will be ‘fixed parts’ of the Mekong system in a few years from now - such as the two large storage dams in the Upper Mekong Basin and the under-construction dams in the LMB, such as Nam Theun 2 and Nam Ngum 2. Thus these

developments are seen as existing and are not part of a ‘planning scenario’ covered by this Strategy.

The LMB 20-Year Plan Scenario causes relatively small flow changes in the mainstream over and above the Definite Future Scenario, which will be a reality in a few years from now. The calculated changes in flows, flooding and salinity intrusion constitute a small fraction of the historically observed natural year-to-year variability. The main reason for this result is that there are considerable synergies between the hydropower and irrigation sectors: the increases in dry season flows caused by the many new dams in the LMB 20-Year Plan Scenario will be reduced by the large increases in irrigated agriculture.

5. Assessment of Water Availability and Use

5.4 The Long Term Future Situation

The long-term scenarios, and in particular the ‘LMB Very High Development Scenario’, will likely cause large man and climate induced changes of the flow and levels in the mainstream, as well as changes in sediment transport, water quality, the regulation of the working of the Tonle Sap and Great Lake, and impact on flooding and salinity intrusion in the delta. The flows in the mainstream within Lao PDR and Thailand would still be at, or perhaps slightly above, the natural dry season flow regime, but would be below the dry season regime in the lower parts, as the large irrigation developments in Cambodia planned for this long time horizon came on-line.

Fifty-year planning horizons are only ‘indicative’ in the sense that they provide early ‘warning’ or ‘opportunities’ that can be investigated in later years – they are not a sensible option upon which to base detailed short, immediate or mid-term term planning.

5.5 Risks and Uncertainties

If this re-regulated flow is to be the basis of the water that supports new development, then the countries need to have some assurance that this water will, in fact, be available. This means understanding the anticipated flow regime that will seasonally come from the dam cascade on the Lancang in the Upper Mekong Basin, and the likelihood that there could be changes, or reductions, due to a change in water-related development and operational policies in China.

To the knowledge of the LMB countries, China has no plans at present to use any of this upper basin water for consumptive purposes. If it chose to do so, this would be for irrigation development downstream (but there is very limited suitable land) or possibly by diversion into an adjoining basin such as the Yangste. This would be a very large undertaking and may not yield an acceptable amount of water, and would also take water away from its primary purpose of power generation at the dam cascade on the Lancang.

Assessments are undertaken to show the amount of dry season water passing downstream from upper Mekong dams for various degrees of probability, based on historical flow data and alternative operating regimes of the hydropower cascade on the Lancang. A similar assessment is being made for the proposed new tributary dams in Lao PDR, based, amongst others, on the ability to raise and manage the large investments that will be required during the coming 20 years.

The results will allow decision makers to judge how much development in the LMB could occur over the next twenty years or so, depending on the degree of certainty that can be assigned to various levels of dry season flow.

Climate change impacts on river hydrology

Existing expert assessments suggest that dry season flows could increase marginally by some 2 to 3 %. ***By adopting a five-year review period for this Strategy document, there are sufficient checks and balances to incorporate climate change impacts in future planning reviews if this proves necessary.*** Also, over the next 20 years, if world-wide trends are an indication, irrigation efficiency will improve significantly throughout the region. A 10% efficiency gain is not unreasonable and this will provide ‘saved’ water that can offset any unforeseen issues that reduce the water available for consumptive use.

5. Assessment of Water Availability and Use

In the longer term, climate change may cause significant changes in water demand and the hydrological regime of the Mekong. The predicted rises in sea level will increase salinity intrusion in the Vietnam Delta, which would require additional dry season flows to combat.

5.6 Water Availability for Use

Subject to the assessment of risks and uncertainties, and from the single perspective of water availability, the four countries can now agree that the LMB 20-Year Plan Scenario reflects the quantity of water that could be ‘consumed’ by proposed developments in this scenario, without impacting on the present dry season flow.

This is an important consideration as prior to the confirmation of the ‘new’ or surplus water in the system, it had been assumed that any new consumptive development would need to compete with social and environmental claims for use of the present dry season flow. ***This is now not the case – the present dry season flow can be ‘protected’ and continue to meet the important and essential environmental and social needs.***

This does not necessarily mean that all of this development can proceed: the economic, social and environmental impacts must be determined and this will guide how much of this development will be ‘acceptable’. For example, there may be a need for some limitations to exist on the amount of ‘protected’ flood plain irrigation development at some locations – to maintain acceptable flood plain ecological functions - but not on the amount of water that this development needs for ‘consumption’. As well, there are non-consumptive uses of water may cause unacceptable transboundary impacts, such as dams. All this will be addressed in the Chapter 6.

6. Transboundary Economic, Social and Environmental Assessment

6. Transboundary Economic, Social and Environmental Assessment

Note to the reader: This chapter will be written upon completion of the comprehensive economic, social and environmental assessment of the formulated basin-wide development scenarios, and the outcomes of the continuing government and stakeholder consultations

This chapter first summarizes the hydrological impacts of the considered scenarios, including the predicted changes in sediment transport and water quality. Then these changes, and the changes that are not driven by hydrology (such as the barrier effect of dams on migratory fish), are fed into a comprehensive assessment of transboundary economic, social and environmental impacts and IWRM requirements of the considered scenarios.

This assessment uses all data and information collected from sector reviews and sub-area analysis. Also, the strategic assessment of IWRM issues and the resulting priority issues, opportunities and constraints will enrich the assessment.

The assessment results are the foundation of the Strategy and allow stakeholders in the four countries to debate what could be an agreed level of acceptable future development (and future water use), and what should be the '*development space*' for water and related resources development in the LMB, and the '*IWRM strategic guidance*' that will guide and influence how this level of future water use can be utilized or consumed.

6.1 Hydrological Impacts

Note to the reader: This section will summarize and evaluate the predicted hydrological impact of the considered scenarios that are covered in the previous chapter, such as changes in flooded area, salinity intrusion, water quality and sediment transport

6.2 Results Economic Assessment

Note to the reader: This section will present the key findings of the transboundary economic, environmental and social assessment from an economic perspective

6.3 Results Environmental Assessment

Note to the reader: This section will present the key findings of the transboundary economic, environmental and social assessment from an environmental perspective

6. Transboundary Economic, Social and Environmental Assessment

6.4 Results Social Assessment

Note to the reader: This section will present the key findings of the transboundary economic, environmental and social assessment from a social perspective

6.5 Evaluation of the Assessment Results

Note to the reader: This section will summarize the results of the transboundary economic, social and environmental assessment in user-friendly diagrams, tables and figures, which compare how each scenario scores on the agreed assessment criteria, i.e. how well the specific development objectives of the MRC member countries are met by each scenario. The risks and uncertainties the assessment of the scenarios will be provided, with a view to making decisions on the degree of reliability of the benefits and costs or gains and losses. Possible trade-offs between water-related sectors and between member countries will be described. Also the results of the transboundary assessment of major water-related transboundary issues, which are not captured in the water resources development scenarios, will be described.

6.6 Use of the Assessment Results

Note to the reader: This section will describe how the results of the comprehensive transboundary economic, social and environmental assessment will be used to firstly facilitate basin wide stakeholder discussions, government consultations and the detailed evaluations that each country must undertake to define the range of ‘acceptable trade-offs’, and ultimately in the preparation of the Basin Development Strategy, in particular the definition of the ‘development space’ and the strategic guidance for the integrated development and management of the various water-related sectors.

7. Basin Development Framework

C. STRATEGY FOR BASIN DEVELOPMENT

The results of the assessments in the previous chapters reconfirm the relevance and importance of the provisions of the 1995 Mekong Agreement and MRC's shared vision, goals and values for the sustainable development of the Mekong Basin.

However, in the current context of accelerating water resources development, a strengthened commitment to IWRM principles and intentions for the Basin is needed to strategically support the developments now planned and ensure an acceptable balance between economic, environmental and social outcomes, and mutual benefits to all riparian countries.

The strategy for basin development described in the following two chapters provide this strengthened commitment. The strategic guidance for basin-wide water related planning and management responds directly to the foundation provisions of the 1995 Mekong Agreement and supports its implementation within the scope and intent of the MRC's shared vision, goals and values.

7. Basin Development Framework

7.1 The 'Development Space'

Note to the reader: Section 7.1 will be written upon completion of the comprehensive economic, social and environmental assessment of the formulated basin-wide development scenarios, and the outcomes of the continuing government and stakeholder consultations.

The analysis in Chapter 5 has shown that *from a water availability point of view*, the four countries can now agree that the '*development space*' comprises the volume of water that can be consumed by the proposed developments in the LMB 20-Year Plan Scenario. The water that is re-regulated to the dry season from new dams in the upper and lower parts of the Mekong basin will provide plenty of water to meet the consumptive needs of the LMB 20-Year Plan Scenario in LMB.

The present dry season flows in the mainstream (which still resembles the natural flow regime) can remain untouched by new development and can be protected for essential environmental and social uses. After the 20 year development is completed there will be still be 'surplus' dry season water over and above the existing dry season flow regime.

So, for the first time the four LMB countries can have the confidence that water is available to proceed with those water related developments within this scenario. This scenario can therefore become the water quantity component of the 'development space' for the present time.

However, as explained in Section 1.3, the 'development space' is not just a 'volume of water' that can be 'safely' used or consumed by new development. *It must be a 'space' that is:*

- 1) '*Shaped*' by sustainable boundaries defined by acceptable socio-economic and environmental transboundary impacts and basin-wide procedures, such as the *Procedures for the Maintenance of Flows in the Mainstream (PMFM)*; and

7. Basin Development Framework

- 2) *Supported by strategic guidance and a package of IWRM guidelines that will assist policy makers and managers of water and related resources to use, manage, and enhance the 'development space'.*

Stakeholder discussions of the results of the comprehensive economic, environmental and social assessment of the defined development scenarios will help 'shape' the sustainable boundaries of the development space and define the strategic guidance for the use and management of that space.

There must then be the final negotiations between the countries as to what level of development, and associated impact, will constitute the 'agreed development space' and how this will be 'consumed and managed'. This cannot occur until all assessments and stakeholder consultations are completed and national discussions held to determine what will be the 'negotiating positions' of each country.

Whilst many projects will consume resources, others will expand the development space through regulating river flows from wet to dry season (e.g. storage reservoirs), improving efficiency of resource use (e.g. promotion of best practice), and removing knowledge gaps (e.g. research). Thus, depending on what developments are taken up, or on what changes there may be in water management policies and strategies, the size of development space will vary periodically. The overall objective must be to continue to maximise its size through wise and efficient use of the basin's resources and active cooperation and participation between the riparian countries and the basin stakeholders.

By adopting a five- year review period for this Strategy document, there are sufficient checks and balances to adjust the development space and the associated strategic guidance if needed.

7.2 Strategic Guidance for Use of the Development Space

Note to the reader: This section will be a key part of the IWRM-based Basin Development Strategy. Understandably, 'hard' strategic guidance for water-related sectors and transboundary issues can only be provided upon the availability of the results of national and regional discussions on the results of the transboundary economic, environment and social assessment and related activities, such as the SEA of the proposed mainstream dams.

The results of the transboundary economic, environment and social assessment will identify the priority areas which must have '**strategic guidance**', so that the development space can be utilized by member countries in a sustainable manner. It can be expected that the priority areas will include the main transboundary issues described in Chapter 4. The BDP programme and its scenario assessment team will draft the initial strategic guidance, based on the outcomes of national and regional stakeholder discussions on the results of the scenario assessments.

As well, strategic guidance is needed for the identification of the different categories of projects that contribute to the development of the basin. The strategic guidance should enable the countries to agree on: 1) the categorization of ***national projects without transboundary implications***, which fall within the development space, 2) the categorization, screening and selection of projects of the ***Project Portfolio of the IWRM-based Basin Development Plan*** that would comprise of national projects with acceptable transboundary implications and joint and transboundary projects, which can enhance the value of the Basin's water resources

7. Basin Development Framework

and/or capture the benefits of transboundary cooperation, 3) the categorization of *controversial projects* that do not fall within the agreed development space.

An indication of the key issues that require ‘strategic guidance’ that will be provided within this Strategy for the management and use of the developments space is:

- Protecting Valuable Wetlands.
- The Mainstream Barrier Effects on Fish.
- Preventing or Mitigating Transboundary Impacts of Flood Plain Development.
- Improving Irrigation Management.
- Improving navigation.
- Engaging People and Communities.
- Developing Institutional and People Capacity.
- Guidance for projects and the Project Portfolio of the Basin Development Plan

7.3 IWRM Guidelines for Basin Development

Whilst the *high priority strategic issues* in the preceding Section 7.2 must receive immediate attention to guide new development and new resource management, the Strategy should also either identify or provide guidelines, or ‘helping hands’, across the whole spectrum of IWRM so that planning, management and operational decisions that can have transboundary impacts, are made in accordance with *‘best practice’ processes and experiences*.

A package of *‘Basin-wide IWRM Guidelines’* will be progressively prepared and included within a *‘Manual of IWRM Practices at the Basin Scale’* and, in conjunction with the priority strategic guidance given in Section 7.2, can be used by sector agencies and private developers to guide how development can proceed in a suitable and sustainable way.

The supporting information provides a preliminary list of 28 IWRM guidelines that will be progressively developed as part of this Strategy. These include not only sector and project related issues, but also water resources management tools and techniques, and guidelines as to promoting cooperation and interaction between national resource management agencies and between RBOs and other organizations with natural resource management responsibilities at the sub-basin level. A few examples are listed in Table 6.

The ‘Manual of IWRM Practices at the Basin Scale’ must cover the more than 50 identified IWRM issues that must be addressed when future water related development is being considered (see the introduction to Chapter 4). In the supporting documentation, the full range of IWRM issues were analyzed under the sub-headings of environment, socio-economic and people, institutional and capacity, and water use and impact.

The Manual of IWRM Practices will be gradually developed through the normal consultative work by the MRC programmes in conjunction with working groups from the national line agencies and other organizations in all LMB countries.

7. Basin Development Framework

Table 6 - Examples of basin-level IWRM Guidelines

No.	Guideline	Status
	Multi-sector guidelines	
8	Guidelines for multi-purpose development and operation of water resources development projects	
10	Guidelines for consultation with, and participation by, the broader basin community in the planning of water and related resources at the basin, national, sub-basin and project levels	
	Guidelines for the facilitation of networks	
11	Guidelines for the facilitation of a Mekong network of national resource management agencies	
12	Guidelines for the facilitation of a Mekong network of RBCs/RBOs with linkages to wider networks	
	Fisheries Sector	
13	Guidelines for assessing fish migration and yield impacts due to mainstream infrastructure, and possible mitigating measures	In preparation
	Environment Sector	
15	Environmental considerations for sustainable hydropower development	In preparation
16	Guidelines for river bank erosion risk management	
	Hydropower Sector	
	Preliminary design guidance for proposed mainstream dams	Completed
21	Guidelines for benefit sharing	
	Flood Management Sector	
24	Best practice guidelines for integrated flood risk management planning and impact evaluation	In preparation
25	Best practice guidelines for the development and design of structural and flood proofing measures	In preparation

8. Basin Management Processes

8.1 Regional Cooperation and Transboundary Governance

The IWRM-based Basin Development Strategy, which is ‘owned’ by the four riparian countries. Its success depends on how each country will be able to adapt the strategic guidance and processes in the Strategy into various transboundary and national planning decision-making and governance processes.

At the transboundary level, this relates to how each country is able to work through the MRC cooperation process and interact with each other to use and manage the development space. Of primary importance will be the formulation of effective measures to incorporate and use the strategic guidance and the IWRM guidelines in the national planning and management processes (Section 8.2); the further development and improvement of enabling tools and the improved implementation of agreed procedures (Section 8.3); the joint monitoring of the health of the Basin (Section 8.4); and capacity building in the implementation of IWRM (Section 8.5).

A priority for the MRC for the next few years is the consultation with, and participation by the broader basin community to improve processes for transparent basin wide dialogue, and encouraging the development of national approaches to consultation that relate well to the basin perspective. However, all MRC processes must be governed by the views and processes of its “owners” – the four LMB countries – and each country has its own systems, approaches and cultures relating to community or mass participation. All of these views need to be blended into a coherent and well structured stakeholder participation policy and set of processes.

8.2 Harmonization of Basin and National Planning

The policy, strategy, institutional and regulatory advancements in all four LMB countries provide an excellent platform to maximize cooperation at the basin level through MRC activities. Each of the countries now have specified agencies with the responsibility for the management of water resources in their country, backed by improving water legislation and a water resources policy and implementation strategy (Section 2.4).

These national water resource management agencies should become the primary authority for water resources management. The aim is to further strengthen their coordination, steering, monitoring role for IWRM, while the long established water-related sector agencies (agriculture, energy etc.) do most of the on-the-ground planning, but in a way that maintains the most acceptable balance between resource development and resource protection. Moreover, the NMCs are housed in these agencies, which will increasingly facilitate the linkage to basin-wide perspectives (see Table 7).

Table 7 - Indicative management arrangements for IWRM

Management Level and Strategy	Purpose of Strategy or Plan	Coordination or Management Body	Partner, Supporting or Implementing Bodies.
<i>Basin Scale:</i> IWRM-based Basin	Guides the water related development and	MRC	National water resources management

8. Basin Management Processes

Management Level and Strategy	Purpose of Strategy or Plan	Coordination or Management Body	Partner, Supporting or Implementing Bodies.
Development Strategy	management in the LMB.		agencies
National: National IWRM Strategy (linked to basin scale strategy)	Plans the actions to achieve national objectives, follows an IWRM approach. Takes account of the basin scale strategy.	<ul style="list-style-type: none"> • MOWRAM • WREA • MNRE • MONRE 	National planning and sector agencies, private and non-government stakeholders
Sub-basin: Sub-basin IWRM Strategy	Plans the actions for local level socio-economic development and resource protection, in accordance with the national IWRM strategy.	<ul style="list-style-type: none"> • River Basin Organizations • Province level coordinating mechanism 	National sector agencies (province level)
Watershed: Watershed Plan of Action	Provides information into sub-basin level plans	Watershed Committees	Districts and Commune Agencies, local communities.

Thus, the national water resources management agencies are, or soon will be, in an excellent position to bring basin perspectives into the national planning, in particular through:

- Merging of basin-wide issues and strategies into national water policies and strategies.
- Reviewing, steering and approving the periodically updated national socio-economic plans and sector plans.
- Supporting the development of sub-basin IWRM strategies and plans.

In addition, through the NMCs, the national water resources management agencies will be able to bring existing or emerging national perspectives into future updates of the Strategy. This creates a ‘loop of ownership’ between MRC and the four countries and ensured that regular updates of the strategy will be fully informed and based on current and emerging trends and issues. ***This whole process can be strengthened by the proposed networks between resource management agencies and between sub-basin organizations, facilitated by the MRC*** (Section 8.5).

The national water resources management agency will develop its own implementation principles for the harmonization of the outcomes of basin and national planning processes, which will both meet the needs of national plans and processes and also closely parallel the timing and approaches of the other riparian countries. The implementation of the principles would be annually reported to the MRC governance bodies, together with related progress reporting, such as the reporting on the implementation of the water utilization procedures (Section 8.3). The MRCS will undertake, on behalf of the countries, five-yearly reviews of the impact of the Strategy and advise the MRC governance bodies on any emerging issues and the need for change.

All countries are now developing approaches to sub-basin level water resources planning and management. To achieve the full benefits of an integrated basin wide approach, these more local level approaches should incorporate linkages upwards first to the national level policies and then, where appropriate, to the basin-wide strategy. This IWRM-based Basin Development Strategy is a key part of this process - for example:

8. Basin Management Processes

- ***The IWRM-based Basin Development Strategy*** (this document), which provides the framework within which the LMB countries can plan and work, and optimize the multiple use and mutual benefits of all riparians, as envisioned in the 1995 Mekong Agreement.
- ***IWRM national perspectives*** - each riparian country is developing, or has developed its approaches to IWRM at the national level and how these approaches link into a basin wide framework. This basin-wide strategy will assist by providing a large variety of technical and institutional activities and support to complement the activities now underway to improve water and related resources management. This strategy can be used as a check list or guide as to how national water resources policies and strategies could reflect ‘best practice’ in basin wide water resources management.
- ***The sub-basin IWRM perspectives*** – most of the actual implementation of projects and IWRM issues will be at the sub-basin level within the four countries. This basin-wide strategy provides guidance that will assist in developing appropriate sub-basin planning frameworks that will in turn, help the long established sector agencies (agriculture, navigation, hydropower, etc.) to do the on-the-ground planning and project development, but in a way that is sensitive to the environmental and other sub-basin needs.

8.3 Enabling Tools and Procedures

The success of an IWRM-based Basin Development Strategy depends on the ability of the four national approaches to water resources management to ‘harmonise’ and effectively interact. If there are large differences in the systems, methods, procedures, standards and tools for data collection and information generation, monitoring, planning, transboundary impact assessment, and development and management of water resources at the basin, national and sub-basin levels, then it becomes very difficult to generate joint discussion and agreements.

Of particular importance will be the development of a suite of modern management tools, particularly hydrologic and socio-economic modelling packages – at the sub-basin and basin levels - that countries can use to assess new policies and development proposals and ensure sustainable use of the basin’s resources. A sound and modern modelling package is the “engine room” of IWRM; without these tools and the skills to use the models and interpret results, it becomes very difficult to assess new developments in a balanced way.

This Strategy will develop tools and processes to harmonise these issues and to better inform the riparian countries on existing basin wide procedures, processes and guidelines and thus establish additional building blocks for transboundary water management and the goodwill among the member countries and basin stakeholders.

A key set of procedures and implementing guidelines are the ***water utilization procedures and associated guidelines*** that have been progressively developed over the last decade (Table 8). The countries use these guidelines to share data and information (but at the same time protect national sovereignty issues), to monitor water use, and to keep each other advised of new projects and proposals that could be of transboundary significance. The implementation of the guidelines is essential for a shared basin wide perspective for water resources development and management.

8. Basin Management Processes

The IWRM-based Basin Development Strategy will further develop capacities within MRC and the countries to utilise the water utilization procedures and associated guidelines in a pro-active and value-added way.

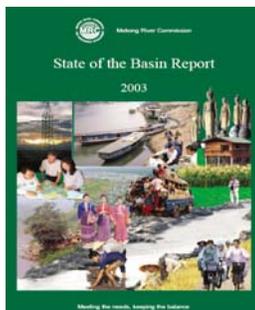
Table 8 – MRC Procedures

Procedures/Technical Guidelines	Status
Procedures for Data and Information Exchange and Sharing (PDIES)	Approved by MRC Council on 1 November 2001
Guidelines for the implementation of the procedures for data and information exchange and sharing (PDIES)	Adopted by MRC Joint Committee on July 2002
Procedures for Notification, Prior Consultation and Agreement (PNPCA)	Approved by Council on 13 November 2003
Guidelines for the implementation of the procedures for notification, prior consultation and agreement (PNPCA)	Adopted by Joint Committee on 31 August 2005
Procedures for Water Use Monitoring (PWUM)	Approved by Council on 13 November 2003
Guidelines for the implementation of procedures for water use monitoring (PWUM)	Adopted by Joint Committee on 5 April 2006
Procedures for the Maintenance of Flows on the Mainstream (PMFM)	Approved by Council on 22 June 2006
Guidelines for the implementation of the procedures for maintenance of flows on the mainstream (PMFM)	In preparation
Procedures for Water Quality (PWQ)	Adopted by Joint Committee in December 2006
Guidelines for the implementation of the procedures for water quality (PWQ)	In preparation

The four country agreement to a ‘development space’ in which country proposals can now be considered, now creates confidence that water can be allocated and used without unforeseen impacts. *This should lead to proposals being notified under the terms of the Procedures for Notification, Prior Consultation and Agreement (PNPCA) much earlier in the process.* This will then need evaluations to be timely and comprehensive, and will require the effective use of notification procedures and a commitment by MRCS to process these notifications in a timely and transparent way.

With the confirmation of the additional dry season flow by the new hydropower developments in Upper Mekong Basin and Lao PDR, the present difficulties regarding agreement for the technical guidelines to support the Procedures for Maintenance of Flows on the Mainstream (PMFM) could be largely overcome by incorporating the natural dry season regime (represented by the Baseline Scenario of the year 2000 and to be updated to 2006) as a fundamental part of these guidelines.

8.4 State-of-Basin Monitoring



MRC has a role of monitoring water and related resources and publicly reporting through ‘State-of-Basin’ reports and other mechanisms, and this should include progress on how this IWRM based Basin Development Strategy is being implemented.

MRC’s transboundary monitoring programs includes water quantity, water quality, aquatic ecosystem health, socio-economic impacts and vulnerability to aquatic ecosystem change, and wetland distribution,

8. Basin Management Processes

function and values. The resulting monitoring information and the information obtained through the implementation of the water utilization procedures can be used to continually check on the condition of the basin's transboundary water resources.

The reporting process includes periodic updates of the State-of-Basin Report, which provides an overall assessment of the basin's status and trends, including evidence whether or not there is a need to update the basin-wide development scenarios and the IWRM-based Basin Development Strategy. *The State of the Basin report should be one of the prime sources of information that informs how well the Strategy is implemented and guides whether it requires adjustment.*

8.5 Institutional and Human Capacity Building

The policy, strategy, institutional and regulatory advances in the water related sectors described in Section 2.4 are quite new. Successful implementation will depend to a large degree on building human resource capacities, improving the range and extent of data and information that is collected and processed, and developing new water resource technological and analytical systems and tools, such as hydrologic and socio-economic modeling capabilities. This needs to occur at all levels of government to ensure effective implementation of IWRM at national and basin scales, and proper compliance by all water sector agencies.

At the same time, the increasing pressures on the basin's resources (Chapter 3) call for those aspects of IWRM that aim at increasing synergies, or greater common features, between the policies and practices of the four governments, as well as greater integration/coordination between the national line agency policies and processes. This requires strong IWRM understanding and capabilities across the basin, and across institutions, and time for consultation and exchange of experiences.

The chance of success for effective coordination will be greatly improved if the national resource management agencies regularly interact between themselves and with MRCS (*a network of resource management agencies*). Similarly, sub-basin IWRM, which has only commenced during the last 5 years, will become more effective if there is interaction between these emerging organisations (*a network of sub-basin organisations or coordinating committees*).

Developing networks of national resource management agencies, of river basin organisations and of lower level/watershed groups are very effective ways of practical capacity building in IWRM issues and it is a legitimate part of the MRC's 'cooperation and coordination' role to facilitate these networks.

8.6 Managing Differences

The MRC Agreement already has provisions to cover dispute resolution but there may be particular issues relating to basin development, such as accelerating hydropower development that may lead to disputes and possibly conflicts between sectors or countries. Whilst it would be appropriate for any unresolved disputes to follow the specific procedures in the agreement, it should be seen as a 'process of last resort'.

A mechanism will be developed as part of the IWRM Guidelines for Basin Development that will provide for country discussions (either four country or less as required), and for

8. Basin Management Processes

negotiations at various technical levels, and ultimately for discussions at the higher policy levels. Lessons learned from relevant case studies in the Mekong region and elsewhere where successful basin organisations operate, will be used to prepare the guidelines.

9. Implementation of the IWRM-based Basin Development Strategy

D. IMPLEMENTATION OF THE STRATEGY

9. Implementation of the IWRM-based Basin Development Strategy

9.1 Road Map – the way forward

The Strategy provides vision for basin development for 20 years with review and adjustment every five years. A matrix will be developed that details the *main actions to implement the strategic guidance* provided in this document with an indicative timeframe. It will summaries the key parts of the national processes that will need to be followed for the Strategy to be adopted and implemented and list major policy and strategy areas at the national level that could impact on this Strategy. It will also set out the process to prepare and/or finalize the basin-wide IWRM Guidelines and prioritize further research to address the key transboundary issues. Roles and responsibilities for the four member countries and their agencies, the MRC and all the other key ‘players’ for these main actions will be identified, as well as the specific needs for capacity building to enable effective implementation of the Strategy.

An important activity will be in assessing how the Strategy is being implemented and whether it needs adjustment. The monitoring and updating aspect is covered in Chapter 10. Each year, MRCS will report to the Joint Committee on the progress of the Strategy and if possible a major assessment of the Strategy should occur at the time when a new Strategic Plan is being developed.

9.2 Measures to Implement the Strategy

Note to the reader: this section will be further developed when the Strategy and roadmap are finalized)

Over the next few years, each country will develop measures to bring the basin perspectives within the Strategy into the national planning, decision making and governance processes, in a way that suits national policies and processes. *It will lead to the four countries creating and supporting a wide range of ‘networks’ or ‘working groups’ to jointly work on ways to make the Strategy implementation most effective. And in this way, the countries will be able to bring existing and emerging national perspectives into future updates of the Strategy.* This creates a ‘loop of ownership’ between MRC and the four countries and ensures that regular updates of the strategy will be fully informed and based on current and emerging trends and issues.

The measures to implement the strategy are being guided by the strategic guidance in this Strategy (see Section 7.2) and could include the following:

- *A categorization procedure that identifies national projects without transboundary implications* - these projects can be designed and implemented by the member countries and their development partners with the confidence that they have been screened from a basin perspective i.e. through this Strategy process, and have been

9. Implementation of the IWRM-based Basin Development Strategy

found to not have transboundary impacts. The Portfolio should also provide clear guidance for studies and research of significant issues affecting IWRM at the basin scale.

- ***An agreed approach to developing and implementing the Project Portfolio of the BDP*** - the Project Portfolio should contain sufficient information to enable national and local planners to proceed with water-related developments. This could be in the form of data on the development potential within each sector by BDP sub-area (and/or sub-basin) within which individual countries can choose which projects to take up during the 20-year plan, based on their own development needs.
- ***A process for cooperation on controversial projects that will be 'outside' the 'development space'***. There needs to be close and continuing cooperation between the national agencies and the MRC programmes, but particularly the Planning Division, to ensure these controversial projects are kept under continual review. The aim of the Strategy is not just to define what the sustainable development space is and what lays within it, but to assist the four countries in bringing into the 'space', if at all possible, the full range of development plans and wishes.
- ***An agreed program to develop a full suite of basin-wide IWRM Guidelines***. MRC programmes will take the lead in facilitating working groups to firstly, develop a priority listing of issues that could benefit from 'best practice' guidelines, and then implement a process that develops these guidelines over the five- year time span of the present Strategy. These guidelines will be incorporated within a 'Manual of IWRM Practices at the Basin Scale' that will be maintained by the MRCS Planning Division, and can be used by sector agencies and private developers to guide how development can proceed in a suitable and sustainable way.
- ***An agreed program to develop and implement national approaches to IWRM policy, strategy and institutional reforms***. Each country is following its own program and agenda for improving its approach and capacity for IWRM. To ensure that each country captures the basin-wide elements of IWRM as described in this strategy document, it will be important for there to be an agreed program of IWRM capacity development, linked to initiatives within MRCS, and for the four countries to establish on-going consultation and liaison mechanisms, particularly between the resource management agencies in each country, that will allow exchange of experiences, techniques and achievements.
- ***Incorporation of the strategic guidance from this Strategy into the MRC 2011 – 2015 Strategic Plan***. MRC programmes should now work with national counterparts to review work plans to ensure all the high priority 'strategic issues' guided by the Strategy will be considered in the preparation of the MRC Strategic Plan for 2011-2015.
- ***An on-going, transparent process for engaging with development partners***. Donors and international financial agencies need to be fully briefed on the components of the Strategy and existing and proposed donor support programs cross-checked against the key elements of the Strategy. If needed, donors should be encouraged to adjust support programs and modalities to best suit the needs of the national governments and agencies in implementing the overall Strategy. This applies particularly to institutional strengthening and capacity building elements of the Strategy.
- ***An on-going, transparent process for engaging with civil society***. An effective consultative/participative mechanism needs to be established that will allow the broader basin community (civil society, NGO's etc.) to both input to the Strategy and

9. Implementation of the IWRM-based Basin Development Strategy

be kept informed of activities and developments flowing from the Strategy. This may be through an extension of the MRC's stakeholder consultation process now under development, or through a more specific BDP process that would be driven by the MRC Planning Division.

9.3 Roles and Responsibilities

This Strategy is 'owned' by the four countries and administered or managed by MRCS, but it will require the input and direct involvement of many players and stakeholders throughout the basin, as well as international financial institutions and donor agencies. It will need 'partnerships' to be developed, networks to be created and a genuine desire for transparent and 'real' consultation and participation. Private developers and investors will benefit by following the guidelines and practices in the Strategy; civil society and NGO's will be able to work closer with the MRC and national agencies as the Strategy encourages all players to be positive and participative.

Establishing networks between the resource management agencies in the four countries, and the various sub-basin organisations within the countries, will be very effective ways of achieving practical capacity building not only for this Strategy but for IWRM generally.

National Governments

The primary role in water resource management will always rest with ***national governments***, which have responsibility for all aspects of policy, strategy, planning and legislative and institutional reform. Some of the national responsibility may be devolved to provincial or local levels, in line with policies on decentralization.

National Water Resources Management Agencies

The main national agencies involved will be the ***water resources management agencies*** – MOWRAM (Cambodia), WREA (Lao PDR), MNRE (Thailand), and MONRE (Vietnam). These agencies will have the responsibility to merge the basin wide issues and strategies into the national policy and strategy framework that guides socio-economic and sector planning. Developing strong regional networks between these agencies will help strengthen these basin wide and national connections. The ***National Mekong Committee Secretariats***, in whatever form each country decides to provide this mechanism, will continue to be the link between MRCS and the countries, and maintain liaison with the various national bodies and agencies that are involved in water-related development.

River Basin Organisations

River basin organizations are being organized within key catchments in the LMB. These bodies have the important role of translating national policy and strategy into sustainable development and management at the sub-basin level, with a large amount of stakeholder and community involvement, in a form that suits each country.

The ***Mekong River Commission*** has clear responsibility for regional coordination within the water sector in the LMB. This includes all aspects of negotiation between the countries relating to water resources, including the formulation of procedures and guidelines for the countries' use of the shared resource. It has a mandate to monitor water use to ensure compliance with agreed procedures, and provides shared technical information for monitoring

9. Implementation of the IWRM-based Basin Development Strategy

and as the basis for planning and research. It has the principal role of monitoring how the Strategy is implemented and whether new information such as from the periodic ‘State of the Basin’ reports, and other water use information, is indicating that adjustments need to be made.

Civil Society and NGO’s

Basin wide stakeholders (Civil society and NGO’s) must continue to have close involvement in how this Strategy is finally structured and endorsed, and how it is implemented and monitored. MRC has emerging processes that seek to provide a meaningful and transparent consultation and participation role for these basin wide groups.

Donors and Financial Institutions

A substantial proportion of water resource development at the national to local level will still be financed through international financial institutions (IFIs) and donor organisations. Country investment and assistance strategies should take account of regional as well as national concerns and priorities, and be formulated in the context of this overall regional Strategy.

Private Developers

Private investors are increasingly becoming ‘players’ in the development of the Mekong basin. The most visible presence is in the development of both mainstream and tributary hydropower schemes but also within the agriculture sector with private-public sector partnerships. Private investors will need to comply with reasonable safeguard policies that the resource management agencies should develop to comply with the strategic guidance detailed in the Strategy.

Regional Development Programs

Regional development programs, whether coordinated multilaterally (such as the development triangle initiatives) or by international organizations (such as those under ADB-GMS and ASEAN) have the responsibility to ensure that their programs fit within the overall sustainability of the basin, as well as meeting national priorities.

10. Monitoring and Updating of the Strategy

10. Monitoring and Updating of the Strategy

10.1 Monitoring, Evaluation and Reporting

MRC has a role of monitoring water and related resources and publicly reporting through 'State of the Basin' reports and other mechanisms, and this should include progress on how this IWRM based Basin Development Strategy is being implemented. The State of the Basin report will be one of the prime sources of information that informs how well the Strategy is implemented and guides whether it requires adjustment.

In view of the high importance for MRC of successful implementation of the Strategy, *the overall process of Strategy implementation and monitoring will be oversighted and coordinated by a four-country working group or sub-committee that reports directly to the Joint Committee.*

Once a five-year work plan has been developed to cover all elements of the Strategy, this Sub-Committee, or some agreed alternative, would monitor progress and report annually to the JC together with suggestions for any work plan changes to reflect emerging priorities and trends.

10.2 Periodic Review and Updating

It is anticipated that the scenarios and the IWRM-based Basin Development Strategy will need to be reviewed in detail every five years, as new data and information becomes available that may necessitate a review of the basin dynamics, basin needs and potential, and the national development needs. In this way, each successive Basin Development Strategy can be updated in an informed way, adjusting as necessary the Strategy design to ensure that projects, cumulatively, stay within the agreed development space and are on track towards achieving the Strategy's long term policy objectives.

It is logical to assess progress on the implementation of the Strategy, and of its appropriateness for the next future period, as part of the regular MRC strategic planning process which occurs every 5 years. This present Strategy should be completed and endorsed by the Joint Committee during 2010 during which time the deliberations as to the content and structure of the next MRC Strategic Plan (2011 to 2015) will be underway. So the present Strategy will guide the next Strategic Plan.

The next formal update would then be considered during year 2014 and this is an appropriate timeframe for issues, such as climate change, advances on poverty reduction, strengthening of multi-stakeholder basin management processes etc., to be evaluated. At that time, the acceptable developments within the LMB 20-Year Plan Scenario will only have just commenced and any adjustments to the 'development space' can then be made, well in advance of any unforeseen circumstances.

Annex 1 – Supporting Documents

The supporting documents comprise available reports and documents still to be prepared, as described below. They provide additional information that will lead to the findings, views and recommendations expressed in the IWRM-based Basin Development Strategy

Chapter	Nature of document	Document title	Location	Remarks
Supporting information to the chapters with 'background' information				
1	Agreement	1995 Mekong Agreement and Procedures and Rules	http://www.mrcmekong.org/download/agreement95/agreement_procedure.pdf	
1	Existing report	Strategic Directions for IWRM in the Lower Mekong Basin	http://www.mrcmekong.org/download/programmes/bdp/BDP-0512-IWRMstrategy.pdf	
2	Existing report	Overview of the hydrology of the Mekong Basin (2005)	http://www.mrcmekong.org/download/free_download/Hydrology_report_05.pdf	Report is being updated
2 and 4	Existing report	State of the Basin Report (2003)	http://www.mrcmekong.org/download/free_download/state_basin_executive_summary.pdf	Report is being updated
2 and 4	Existing report	An assessment of water quality in the Lower Mekong Basin (2008)	http://www.mrcmekong.org/publications/pubByCategory.asp?intCatalogID=7&strCatalog_NAME=Environment	
3 and 4	Existing report	Hydropower sector review for the joint basin planning process (2009)	Will be published soon	
3 and 4	Existing report	National sector reviews (2005)	http://www.mrcmekong.org/download/programmes/bdp/13-Natl_sector_reviews.pdf	
3 and 4	Existing reports	Sub-area reports (2005)	http://www.mrcmekong.org/programmes/bdp/BDP-core-library.htm	Reports are being updated
Supporting information to the chapters on the assessment of water related opportunities and constraints				
4	Companion paper 1	Compilation of supporting analysis annexes (2009): development sector reviews, sub-area overviews, water use and impact considerations, and water related opportunities and constraints	Will be published soon	
5	Companion paper 2	Scoping and planning of the assessment of basin-wide development scenarios (2009)	http://www.mrcmekong.org/programmes/bdp/bdp-publication.htm	
5 and 6	Companion paper 3	Methodology for the assessment of basin-wide development scenarios (2009)	http://www.mrcmekong.org/programmes/bdp/bdp-publication.htm	
5 and 6	Companion paper 4	Results of the hydrological assessment of basin-wide development scenarios		Draft available in Nov 2009
6	Companion paper 5	Results of the environmental assessment of the basin-wide development scenarios		Draft available in Dec 2009

Annex

6	Companion paper 6	Results of the social assessment of the basin-wide development scenarios		Draft available in Jan 2010
6	Companion paper 7	Results of the economic assessment of the basin-wide development scenarios		Draft available in Dec 2009
6	Companion paper 8	Evaluation of the assessment of basin-wide development scenarios		Draft available in Feb 2010
Supporting information to the chapters on the strategy for basin development and the implementation of the strategy				
7	Companion paper 9	Strategic guidance and basin-wide IWRM guidelines for Basin development		Draft available in May 2010
9	Companion paper 10	Measures to implement the IWRM-based Basin Development Strategy and distribution of responsibilities		Draft available in May 2010

DEFINITION OF TERMS

Will be added later