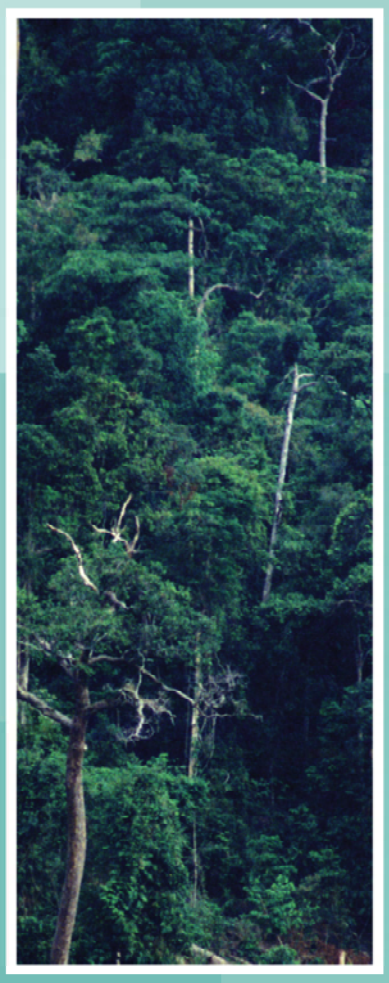

The MRC Basin Development Plan

IWRM Strategy for the Lower Mekong Basin

BDP Library Volume 10

December 2005

Mekong River Commission

BDP

The MRC Basin Development Plan

IWRM strategy for the Lower Mekong Basin

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Foreword

The BDP Library was compiled towards the end of Phase 1 of the BDP Programme. It provides an overview of the BDP formulation, together with information about the planning process and its knowledge base, tools and routines.

The library incorporates the essence of more than a hundred technical reports, working papers and other documents. It consists of 15 volumes:

1 The BDP planning process

2 Sub-area analysis and transboundary planning

3 Sub-area studies (including 13 sub – volumes)

4 Scenarios for strategic planning

5 Stakeholder participation

6 Data system and knowledge base

7 MRCS Decision Support Framework (DSF) and BDP applications

8 Economic valuation of water resources (RAM applications)

9 Social and environmental issues and assessments (SIA, SEA)

10 IWRM strategy for the Lower Mekong Basin

11 Monographs. March 2005

12 Project implementation and quality plan

13 National sector reviews

14 Regional sector overviews

15 Training

The work was carried out jointly by MRC and the NMCs with comprehensive support and active participation by all MRC programmes and more than 200 national line agencies. Financial and technical support was kindly granted by Australia, Denmark, Japan, Sweden and Switzerland.

The library has been produced for the purpose of the BDP and is intended for use within the BDP Programme. The work was done from 2002 to 2005, and some information may already have been superseded by new developments and new knowledge. The library does not reflect the opinions of MRC nor the NMCs.

It is hoped that the work will contribute to the sustainable development of water resources and water-related resources in support of the MRC vision of *'an economically prosperous, socially just and environmentally sound Mekong River Basin'.*

Contents

Acknowledgement

The *'Strategic Directions '* were developed between mid 2003 and mid 2005 in a close collaboration with other MRC programmes, the NMCs, and the many national line agencies that via the NMCs have contributed to the work. The information, guidance and support received in connection with the work have been indispensable and are gratefully appreciated.

Acronyms and abbreviations

ADB	:	Asian Development Bank
AIFP	:	Agriculture, Irrigation and Forestry Programme (of MRC)
ASEAN	:	Association of South East Asian Nations
BDP	:	Basin Development Plan (of MRC)
CNMC	:	Cambodia National Mekong Committee
DSF	:	Decision-Support Framework (of MRC)
EIA	:	environmental impact assessment
EP	:	Environment Programme (of MRC)
FMMP	:	Flood Management and Mitigation Programme (of MRC)
FP	:	Fisheries Programme (of MRC)
GMS	:	Greater Mekong Sub-Region
GMS-SEF:		GMS Strategic Environment Framework
GWP	:	Global Water Partnership
IFI	:	international financial institution
IUCN	:	International Union for the Conservation of Nature
IWQM	:	integrated water quality management
IWRM	:	integrated water resources management
IWT	:	inland waterway transport
LMB	:	Lower Mekong Basin (the Mekong Basin parts of Cambodia, Lao PDR, Thailand and Viet Nam)
LNMC	:	Laos National Mekong Committee
M&E	:	monitoring and evaluation
MCA	:	multi-criteria analysis
MDG	:	Millenium Development Goals (under the UNDP)
MRC	:	Mekong River Commission
MRCS	:	Mekong River Commission Secretariat
NA, n/a	:	not applicable
NGO	:	non-government organisation
NP, NAP:		Navigation Programme (of MRC)
NMC	:	National Mekong Committee
RAM	:	Resource Allocation Model (of BDP)
RBO/RBC:		river basin organization/committee
TNMC	:	Thailand National Mekong Committee
UNDP	:	United Nations Development Program
VNMC	:	Viet Nam National Mekong Committee
WSP	:	Water and Sanitation Program
WSSD	:	World Summit on Sustainable Development, Johannesburg,
WUP	:	Water Utilization Programme (of MRC)
WWF	:	Worldwide Fund for Nature

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Executive summary

The *'Strategic Directions for IWRM in the Lower Mekong Basin'* was approved by the MRC Council at its meeting in December 2005. The full document, as approved by the Council, is attached as Appendix 2 to the present report.

The countries of the Lower Mekong Basin, through the MRC, have enunciated a shared vision of

> *"an economically prosperous, socially just and environmentally sound Mekong River Basin"* (MRC Mar 2001).

This vision is reinforced by a shared commitment to

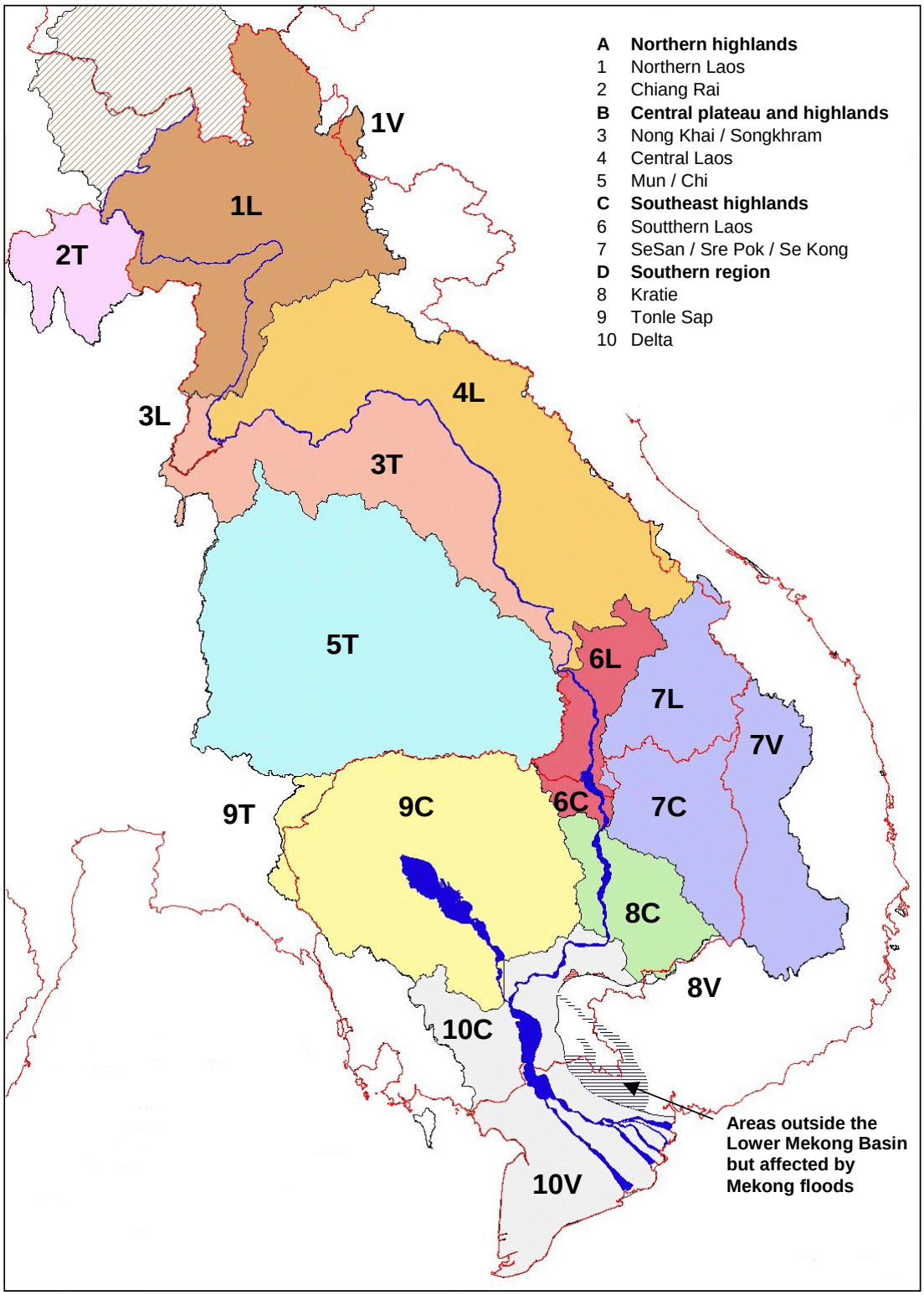
- Regional political and economic cooperation, as embodied in ASEAN (Association of South East Asian Nations) and the Asian Development Bank Greater Mekong Sub-region program (ADB-GMS)
- Millennium Development Goals (set out by the United Nations);
- Sustainable development (as defined under Agenda 21);
- Integrated Water Resource Management; and
- Poverty alleviation (as set out in national policies).

The present report describes the formulation and outcome of Strategic Directions for development of water resources in the Lower Mekong Basin for the next 20 years. The *'Strategic Directions '* document (Appendix 2) is intended to lend guidance to sustainable water resource development and management in the LMB, and is regarded as relevant to all stakeholders. It aims to synthesize directions identified in national plans and strategies and add a basin dimension, and to promote the approach of Integrated Water Resources Management (IWRM) within the Basin.

Implementation of IWRM is the responsibility of all stakeholders in the Basin, from local communities to national governments and regional organizations. The *'Strategic Directions '* document provides a context and broad framework for a coordinated approach. It will be translated into action through a range of national and regional instruments, including the MRC Strategic Plan (2006-2010), national IWRM strategies, and regional initiatives such as the World Bank Mekong Water Resource Assistance Strategy (MWRAS), ASEAN Strategic Plan of Action on Water Resources Management, ADB's Greater Mekong Subregion programme.

From the Strategic Directions identified in this document, the MRC Strategic Plan (2006-2010) will draw out goals and actions relevant to regional and trans-boundary issues that are under the mandate of MRC, to establish MRC's areas of action for the next 5 years. Within this, the MRC Basin Development Plan will provide a specific framework for identification and promotion of high priority projects; and support to national IWRM to ensure consistency between national and regional strategies.

Map of BDP sub-areas



1 Introduction

The MRC Basin Development Plan (BDP) was instituted by the April 1995 Mekong Agreement. Following a series of preparatory studies, the BDP project document was approved by the MRC Council in October 2000. The BDP formulation (Phase 1) started in October 2001 and is scheduled for completion in July 2006.

The vision of the Basin Development Plan (BDP) is to contribute to acceleration of inter-dependent sub-regional growth by establishing a process and framework conducive to investment and sustainable development. To contribute to this vision, the BDP process being undertaken by the Mekong River Commission (MRC) should establish a planning framework for development programmes, capable of balancing efficient use of resources with protection of the environment and the promotion of social justice and equity.

There are two main outputs sought from the first phase of the BDP programme. First, the establishment of a more participatory form of basin planning than has previously existed in the Lower Mekong Basin for use in subsequent planning rounds. Second, an agreed short-list of high priority development projects with basin-wide or trans-boundary significance which have benefits that transcend national borders.

This paper describes the preparation and the final formulation of Strategic Directions for IWRM in the Lower Mekong Basin.

1.1 Origin of document

Regional sector overviews were made by BDP in November 2002, and national sector reviews were completed in 2003-04. Development options and concerns were identified, evaluated and reported by the BDP Sub-Area Working Groups.

On this basis, and also drawing on proceedings of the other MRC programmes, an *'Initial outline of basinwide development objectives & elements of an LMB Strategy'* was prepared in May 2003 as a first step towards an IWRM Strategy. The paper was discussed with the various MRC programmes, and was reviewed at national consultation meetings and a subsequent regional consultation meeting in mid 2003.

A series of iterations of an IWRM Strategy was made, involving in-house meetings, national and regional consultations, and submissions to the MRC Joint Committee for review and guidance. In the process, the work was interwoven with the formulation of the new MRC Strategic Plan 2006-2010. A final draft was submitted to the JC in August 2005 and was approved by the MRC Council in December 2005.

The present document is based on reports and working papers prepared between October 2003 and June 2005, notably (in chronological order):

> Wallace, Malcolm (Jun 03): Defining a basin development strategy. Mekong River Commission, Basin Development Plan

MRC-BDP (Feb 04): Initial outline of basinwide development objectives & elements of an LMB Strategy. May 2003, revised 6 February 2004

Halcrow Group (Mar 04): Strategic framework for BDP. Mekong River Commission, Basin Development Plan

Geerinck, Lieven (Jan 05): Incorporation of navigation into the integrated water resources management and development strategy. Mekong River Commission, Basin Development Plan

MRC-BDP (Dec 05): Strategic Directions for IWRM in the LMB. Final version, as approved by the Council in December 2005

These documents, in turn, draw on other working papers and drafts prepared in connection with the formulation process.

1.2 Basis and context

1.2.1 Link/relationship of subject to IWRM

The MRC member countries are committed to implement IWRM principles in managing the water resources of the LMB. IWRM is not an end in itself but a means of achieving three key strategic objectives (GWP 2003):

- Efficiency in water resource development and use: Maximising the economic and social welfare derived both from the water resources base and from investments in water services;
- Equity in the allocation of water resources and services across different economic and social groups, to reduce conflict and promote socially sustainable development;
- Environmental protection, as ultimately all attempts at water management reform will fail if the water resources base and associated ecosystems are compromised.

The following benchmarks of *'good IWRM'* can be defined (Millington 2004):

- Institutional and regulatory frameworks with clear pathways of accountability – establishing the ethic and performance of good governance
- Knowledge-driven planning and management, with open sharing of information
- Community and stakeholder participation – partnerships between government and community for demand-responsive approaches to development
- Integration and coordination of policies and programs across sectors, countries, competing stakeholder interests and levels of government.

All activities, programs and projects relating to water resources should be guided by IWRM concepts and contribute to sustainable development.

These principles have been observed during the preparation and are reflected by the final *'Strategic Directions for IWRM in the Lower Mekong Basin'.*

1.2.2 Link/relationship of subject to BDP Inception Report

The Inception Report retains the stage-wise approach to BDP formulation that had been identified during the programme formulation:

Stage 1 - analysis of the LMB and of sub-areas

Stage 2 - analysis of development scenarios

Stage 3 - strategy formulation

Stage 4 - compilation of long-list of programmes and projects

Stage 5 - compilation of short-list of programmes and projects

The present report addresses stage 3 in the formulation process, forming an important part of the basis for stages 4 and 5.

1.2.3 Link/relationship of subject to other BDP reports / activities

The strategy formulation draws on most of the preceding work done under BDP Phase 1: The national and regional sector and policy reviews, the sub-area studies, and the scenario analyses.

In turn, the *'Strategic Directions '* are guiding the identification, formulation and further development of supporting development initiatives under the BDP.

1.2.4 Link/relationship of subject to BDP's Logical Framework Matrix

In the BDP Logical Framework, the strategy formulation is included explicitly as

Output 2.1: Basin-wide strategies

Activity 2.1.1: Scenario review

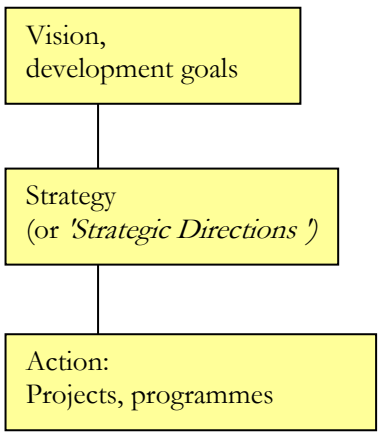
Activity 2.1.2: Strategy components

Activity 2.1.3: Formulation of strategies

1.3 Significance

1.3.1 Significance of subject for strategic planning

In strategic planning, the *'strategy'* provides the link between (i) a governing vision with a related set of development objectives, and (ii) supporting intervention (priority development initiatives in support of the vision and the development initiatives):



In other words, the *'strategy'* seeks to operationalize the vision and the development goals, and to provide practical guidance on how to pursue these goals.

1.3.2 Significance of subject for Mekong Basin

The *'Strategic Directions '* is a key tool in connection with IWRM in the Lower Mekong Basin.

First, the document reflects development goals and priorities that are shared between the member countries and agreed among them. Hereby, it provides a basinwide perspective for the national and de-central development.

Second, because the document reflects shared values, it provides a powerful platform for identification and promotion of a broad range of water-related development initiatives to the benefit of the LMB, the MRC member countries, and the people living in the basin.

Hereby, the *'Strategic Directions '* can contribute to basinwide IWRM, within and outside the MRC and the MRC programmes, while at the same time adding value to the many development programmes at the national and de-central levels.

1.3.3 Significance of subject for MRCS / BDP 1

Important lessons were learnt during the strategy formulation in BDP Phase 1. In the process, the perspective was highly expanded, from initially being strictly confined to the purpose of BDP long-listing and shortlisting, to eventually aiming at serving as the over-all reference for the upcoming MRC Strategic Plan 2006-2010.

The interfaces with other (existing and new) MRC programmes have remained a priority, with the *'Strategic Directions '* providing a framework and a promotion platform for the broad range of water-related studies and development initiatives proceeding under the MRC.

2 Summary of approach

2.1 The Strategic Directions

Due to the complexity of water resource development and management in the Lower Mekong Basin a joint approach to water resource planning is essential. The complexity of the system and its stakeholders means that it is not realistic to frame a single, all-encompassing plan for water resources in the LMB. However, based on national water policies and plans and on international agreements, the countries of the LMB share a set of goals, issues and concerns regarding water resources and from these it is possible to identify agreed priority areas for action in water-related sectors.

The *'Strategic Directions '* document draws together information from a wide range of sources, including

- the extensive process of national consultation under BDP regarding regional, national and sub-area development plans, policies, strategies and options (coordinated by the National Mekong Committees)
- information and analyses from the BDP's planning process (for example, sub-area analyses and development scenarios)
- consultation, information and Strategic Directions identified under MRC programs
- enhanced understanding of LMB hydrology resulting from the Basin Models and DSF developed under MRC's Water Utilization Program

- consultation with donors and investment banks (including World Bank, ADB, Danida, SIDA, AusAID).

The document spells out the concepts, principles, practices and guidelines that constitute 'good' IWRM, and why it is important such concepts and guidelines drive the next phase of Mekong basin water resources development. It identifies eight major areas of IWRM that are seen as of most relevance to the Mekong basin at this stage, and specifies a broad reaching objective for each category with a general description as to how the various 'players' in the basin might address issues as a means of moving toward the objectives.

2.2 Approach to formulation

During its preparation, consideration was given to basic questions such as

- Whether the BDP should consider only such projects that were either notifiable, or required prior consultation or agreement according to the 1995 Mekong Agreement[1]. It was established, however, that the BDP can cover any water resources development and any water-related development in the Lower Mekong Basin, whether notifiable or not.

- Whether the BDP should confine itself strictly to development initiatives that are transboundary or basinwide - i.e. relating to more than one country. It has been realized that this distinction is not very important - and even unsupportive at the basic sub-area level. In some cases, the transboundary or basinwide implications emerge at a rather late stage of the project identification, for example if corresponding (and otherwise purely local) project ideas are raised in different sub-areas in parallel, whereby a basinwide collaboration can add value to the individual development efforts.

- To which extent the BDP should address the various impacts of potential development initiatives: Economic, social, and environmental, including cumulative impacts. The BDP process, as it appears a the end of BDP Phase 1, undertakes a screening of possible impacts (individual as well as strategic), and evaluates the need of more detailed impact assessments, but does not engage in undertaking the actual assessments, except at the over-all conceptual level. Impact regulation and impact monitoring are managed by other MRC programmes (like WUP and the Environment Programme) and not by BDP, but can be supported by the BDP in connection with identification of new needs and new initiatives.

- Whether the BDP process should emerge as a traditional master planning exercise (as suggested at a certain stage by consultants and during in-house meetings), or should appear as a more open strategic process. In this connection, experience was drawn from the national 5-years development plans, and from the Indicative Basin Plan (1970) and the revised Indicative Basin Plan (1987)[2] (prepared by the

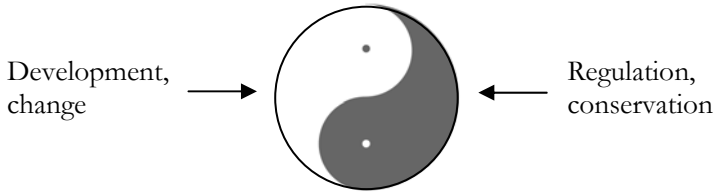
[1] (as suggested in Halcrow (Mar 03) p. 28)

[2] The 1st indicative plan aimed at a cascade of large mainstream reservoirs. The 2nd indicative plan comprised national projects with a mainstream cascade as a long-term objective. In the late 90-ies, when the detailed scope of the BDP was specified by the governing bodies of MRC, these goals were not regarded as viable

predecessors of today's MRC[3]), which indicated that a traditional master plan approach was risky, for several reasons: First, the required political support and external funding were not available for the indicative master plans and could not be relied upon for a new basinwide master plan; and second, there are large - possibly prohibitive - technical and institutional challenges related to a master plan that would cover 4 countries and all water-related sectors. The successful Mekong Delta Master Plan prepared by Viet Nam in the 1990-ies might serve as a model, but was much more focused in its basis, scope and implementation modalities than the BDP. An open, strategic process was regarded as more robust and less likely to fail, because part of the identified development initiatives can proceed, even if other parts are delayed for financial or other reasons.

- The interfaces between BDP and the MRC Water Utilization Programme (WUP), which have been prepared in parallel. From the start, it was realized that there were close interfaces and even overlaps (for example regarding institutional issues and frameworks). At an early stage, it was expected that the BDP would provide knowledge about water uses and water demands, while the WUP would provide information about the water availability. A lack of synchronization (for various practical reasons) implied that this task division did not fully materialize. The important assumption remains that water-sharing (including basinwide water allocation, cumulative impacts of water utilization, and rules for water-sharing) is basically under the WUP and not a task for the BDP.

In this connection, the BDP is seen as the pro-active development instrument of MRC, interacting with regulatory and conservation-oriented instruments outside the BDP:



On the bottom line, at the end of BDP Phase 1, the BDP has taken a role that is close to what was anticipated in the 1995 Mekong Agreement (Article 2), where the parties agree *'...To promote, support, cooperate and coordinate in the development of the full potential of sustainable benefits to all riparian States 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 through 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.'*

At the same time, however, it is hoped that the *'Strategic Directions ',* with its delineation of shared values and formulation of agreed recommendations, can provide a useful perspective for any water-related development in the Lower Mekong Basin.

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[3] The Committee for Coordination of Investigations of the Lower Mekong Basin (31 October 1957) and the Interim Committee for Coordination of Investigations of the Lower Mekong Basin (5 January 1978)

Terminology

Basin development potential: The maximum level of socio-economic development that can be obtained within the basin with a defined set of infrastructure and management practices, within the limits imposed by the prevailing flow management rules and without contravening any other requirements of the 1995 Agreement

Basinwide: Same as transboundary, but affecting the entire Lower Mekong Basin

BDP's portfolio of programmes and projects: Programmes and projects identified and shortlisted under the BDP process

Cumulative impacts: The joint impacts of many small and otherwise insignificant interventions, such as a large number of small irrigation withdrawals

Development strategy: A broad statement of how it is intended to manage the basin in the long-term in order to fulfil a defined set of mutually shared development objectives

Enabling developments: Improvements to resource management practices and regulatory and trading conditions and the like

Infrastructure developments: Civil, mechanical or electrical engineering-based developments

Non-structural developments: Investments in developments other than infrastructure, such as extension programmes, flood preparedness, etc

Projects or programmes of basin-wide significance: Projects or programmes that contribute to raising the development potential of the basin, whether notifiable or not

Rolling plan: A management document that sets out, in both a short and medium term horizon and consistent with the long-term directions in the Development Strategy, the specific actions agreed by the MRC to develop and manage the basin's resources and the means for effective monitoring of these

Short, medium and long term: Respectively, the next 5 years, the following 15 years and 20-50 years from now

Transboundary projects or programmes: Projects or programmes that create significant impacts (positive or negative) in more than country and/or require the participation of more than country

Transboundary: Affecting more than one country, in terms of intervention-impact (or cause-effect) relationships, or in terms a scope for added value by coordination or active collaboration

3 Background and context

3.1 Planning context of the BDP

This Chapter presents some suggestions towards establishing a comprehensive understanding of the basin management issues and establishing a framework for cooperation between the Member States so as to realize the goals of the 1995 Agreement.

3.1.1 The 1995 Agreement

The 1995 Agreement provides a coherent statement of intent of the four riparian countries that they wish to cooperate in managing the water and related natural resources of the basin to mutual advantage and within sustainable limits. The Agreement provides a clear framework for the MRC to work within, key elements of which are:

Policy: The Agreement sets high-level goals that are to be achieved through implementation of the Agreement, viz.: social and economic development, environmental protection and inter-dependent sub-regional growth and cooperation.

Key instruments: The Agreement provides for a set of rules of procedure (Art. 5) by which to utilize the Mekong's waters in a reasonable and equitable manner in each country, the basis for determining an acceptable set of flow conditions in the shared mainstream (Art. 6), a set of rules for monitoring water utilization (Art. 26) and a rolling planning process (the BDP) to determine a programme of joint actions by which to fulfil the goals of the Agreement and associated investment opportunities (Art. 24B).

Principles: The Agreement provides a wide range of guidance on how the MRC will act in implementing the Agreement. The Agreement commits the four countries inter alia to active consultation and/or prior agreement before engaging in certain types of development. Conversely, other development activities within each country, as defined by Article 5 as being subject to notification, remain solely within the remit of that country, providing of course that these activities do not cause harm to others (Art. 7 et al).

Areas of Cooperation: The Agreement defines also the areas of cooperation covered by the Agreement in Article 1, being (but not limited to) irrigation, hydropower, navigation, flood control, fisheries, timber floating, recreation and tourism.

The Agreement specifically defines the Basin Development Plan as *"the general planning tool and process that the Joint Committee would use as a blueprint to identify, categorize and prioritize the projects and programs to seek assistance for and to implement the plan at the basin level".* In other words, the Basin Development Plan should provide the road map by which to realize the added value that cooperation of the four countries makes possible over and above that which they could achieve individually.

3.1.2 Subsequent decisions by the MRC Council and Joint Committee

The 1995 Agreement sets out a broad statement of intent and includes an institutional mechanism by which to translate this statement into specific and mutually agreed actions. In the course of the last nine years, the MRC Council has met 10 times during which many

decisions have been made. The following are of direct relevance to the preparation of the BDP:

(i) Policy and Strategic Aims

- Strategic Plan of the MRC, October 1998
- MRC Environmental Policy and EIA Methodology, October 1998
- MRC Gender Policy, October 2000

(ii) Key instruments

- Procedures for Data and Information Exchange and Sharing, November 2001
- Preliminary Procedures for Prior Consultation, Notification and Agreement, November 2002
- Procedures for Prior Consultation, Notification and Agreement, November 2003
- Procedures for Water Use Monitoring, November 2003

(iii) MRC programme activities

- Agriculture and Irrigation Programme, October 1998
- Hydropower Strategy and Programme, October 1998
- Water Utilization Programme, October 1999
- Basin Development Plan programme, October 2000
- Environment Programme, October 2000
- Agriculture, Irrigation and Forestry Programme, October 2000
- Flood Management Strategy and Programme, November 2001
- Fisheries Programme, November 2002
- Navigation Strategy and Programme, November 2003
- Environment Programme Revision, November 2003

The main implications of these decisions as directly affect BDP are discussed below.

3.1.3 MRC policy and strategic aims

The MRC adopted a Strategic Plan in June 1998[4]. This Strategic Plan makes clear:

- The Vision for the Mekong River Basin is to see the Basin as "an economically prosperous, socially just and environmentally sound Mekong River Basin"
- The Mission of the MRC is "to promote and coordinate sustainable management and development of water and related resources for the countries' mutual benefit and the people's well-being by implementing strategic programmes and activities and providing scientific information and policy advice".

[4] This plan is presently being comprehensively revised (late 2005)

- The Goals of the MRC in the short- to medium-term (1999-2004), were to (i) establish and implement rules for water utilization and inter-basin diversions, (ii) formulate the Basin Development plan as an effective general planning tool and process for sustainable management and development, (iii) establish and implement MRC environmental management policies and guidelines and integrate socio-economic considerations into all MRC development activities, (iv) complete and evaluate on-going programmes and projects, and progressively initiate new development activities in accordance with the Strategic Plan, and (v) improve the capacity of MRC to implement its Mission, to play a leading role in coordinating the Basin's water-related activities, and to meet stakeholder expectations

These three elements, the vision, mission and goals, together with various activity programmes made up the 1998 MRC Strategic Plan.

The vision and mission are as relevant today as they were in 1998, but new goals must be set with time moving on.

3.1.4 Key instruments already adopted

The "key instruments" are the procedures that provide governance for the way in which the four countries cooperate together. They provide necessary and agreed interpretation of the Articles in the 1995 Agreement relating to managing the basin's water and related resources. The full suite of procedures is not yet in place, but substantial progress has been made in establishing the principle frameworks for application of the procedures.

The objectives of the Procedures for Data and Information Exchange and Sharing (November 2001) are to:

- Operationalize the data and information exchange among the four member countries
- Make available, upon request, basic data and information for public access as determined by the NMCs concerned, and
- Promote understanding and cooperation among the MRC member countries in a constructive and mutually beneficial manner to ensure the sustainable development of the basin.

The procedure commits each country to making available information (in some cases at cost) on issues relevant to the MRC (subject to laws and regulations), and to standardization and quality assurance.

Following preliminary agreement in 2002, the objectives of the Procedures for Prior Consultation, Notification and Agreement (November 2003) are to:

- Provide steps for the MRC member States to support the establishment of the Rules for Water Utilization and Inter-Basin Development
- Promote better understanding and cooperation among the MRC member countries in a constructive and mutually beneficial manner to ensure the sustainable development, management and conservation of the water and related resources of the Mekong River Basin.

The procedure is founded on the guiding principles of sovereign equality and territorial integrity, equitable and reasonable utilization, respect for rights and legitimate interests, good

faith and transparency. It provides the basis for communication between member states on matters as required under Articles 5 and 26 of the 1995 Agreement.

Of particular relevance to BDP formulation is that this Procedure defines the terms "wet and dry seasons", "mainstream", "Mekong tributary", "water use/utilization" and "inter-basin water diversion", albeit that in the case of the wet and dry seasons precise dates are left for JC to decide.

These terms together with the Agreement itself require and enable categorization of all interventions within the basin into those that are subject to notification , and those which require consultation and/or prior agreement. Each country is required to provide timely information on developments subject to notification.

Thus all projects, programmes and activities subject to notification are ones that each country is free to take up unilaterally, always with the understanding that they would not cause a breach to the Rules established under Articles 6 and 26 and would not cause harm under Articles 7 and 9.

The objectives of the Procedures for Water Use Monitoring (November 2003) are to:

- Provide a comprehensive and adaptive framework and process to support effective implementation of the intra-basin water use monitoring and the monitoring of inter-basin diversions
- Promote better understanding and cooperation among the member States through transparency and confidence in the water use monitoring system

The procedure is founded on the guiding principles of efficiency, coordination, transparency, cost effective, dynamism, adjustability and mutual benefit. The procedure establishes important definitions for BDP, viz.:

- Water use/utilization: any use of water which may have a significant impact to the water quality or flow regime of the mainstream of the Mekong River System by any member State, and
- Inter-basin diversion: The diversion of water from the mainstream or a tributary of the Mekong river system into another basin

The monitoring system under these Procedures is to comprise physical equipment and structures normally owned and operated by respective member States, various technical procedures and related personnel, institutions and organizations. Details of the system are to be developed by a technical support team and approved by the Joint Committee as needed from time to time. In other words, the agreed Procedure provides a framework within which the technical experts can develop and implement the nuts and bolts of the monitoring system and allows that the system may be adapted from time to time to suit particular needs as they arise.

Viewed overall, the Procedures agreed to date make a substantial contribution to the framework within which the countries will cooperate in managing the basin's resources, and hence the framework to the BDP itself. In summary, these Procedures have defined inter alia:

(i) The categorization of all water-related projects into those which are subject only to notification and those which require consultation and/or prior agreement from other member States

(ii) The obligation of each member State to inform the MRC of all significant uses of water, and the mechanisms by which to do this

(iii) The concept that water use relates to any use which may have a significant impact to the water quality or flow regime of the mainstream

3.1.5 Key instruments in preparation

The remaining procedures or "key instruments" that the MRC Council has directed should be prepared are in various stages of preparation. These are briefly summarized below.

Rules for the Maintenance of Flows (due in late 2004): These will serve to enumerate the requirements under Article 6 with regard to low and peak flows in the mainstream and flow reversal in Tonle Sap River. This work is supported by the Interim Basin Flow Management programme (WUP/EP), for which the plans (by early 2004 [5]) were that:

- By late 2004, rules will be set on the basis of an assessment of hydrological parameters
- By late 2005, the rules will be modified as necessary taking into account expert review on environmental considerations (environmental flow analysis)
- By perhaps 2008, the rules will be reassessed on the basis of the outcome directed research undertaken from 2004 with the support of IUCN

Rules for Water Quality (due in late 2005): These will establish a mutually acceptable range of water quality parameters for the mainstream. The work is being supported by the French-funded water quality project under WUP in collaboration with EP. Again a phased approach is planned: [6]

- By late 2005, rules will be set on the basis of consideration of anthropogenic toxicants
- By perhaps late 2006, the rules will be revised taking into account an integrated water quality management (IWQM) approach, with field research commencing in 2004.

Transboundary Environmental Impact Assessment Procedure: This procedure, which is being developed through EP, will govern the way in which impacts of specific projects in one country on another country are assessed for the purposes of implementing Articles 7 and 8 of the 1995 Agreement. Most probably constructed using the European model for the Rhine, the procedure will provide the basis for harmonizing the different environmental impact assessment required under the laws of each member State. Currently it is planned that:

- By late 2005, the principles underscoring the procedure will have been established
- Followed by preparation of detailed bilateral "connection" agreements between countries

In addition, a number of other initiatives are in process or consideration, which will have bearing on the BDP formulation process. These include:

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5 The rules are still being negotiated (by late 2005)

6 (same)

- A guideline on Strategic Environmental Assessment, which is aimed at establishing a process for assessing potential basin-wide development scenarios under the BDP. Supported by EP, this work has been initiated through a process of in-country consultation.
- A protocol on Freedom of Navigation to promote common understanding amongst member States and practical implementation of Article 9 of the 1995 Agreement

These remaining procedures and guidelines clearly have direct bearing on what may or may not be incorporated within a Basin Development Plan from the perspectives of acceptable limits of sustainability and environmental impacts:

- Preliminary basis for interpreting Article 6, Maintenance of Mainstream Flows, based on hydrological considerations only
- Interim basis for interpreting Article 6, Maintenance of Mainstream Flows, based on environmental flow analysis
- Preliminary basis for acceptable water quality standards based on the basis of consideration of anthropogenic toxicants
- Principles established for the Transboundary Environmental Impact Assessment Procedure
- Interim basis for acceptable water quality standards based on the based on an IWQM approach
- Revised basis for interpreting Article 6, Maintenance of Mainstream Flows on the basis of the outcome of directed research

These procedures and guidelines are in preparation (by late 2005).

3.1.6 MRC programme activities

MRC programme activities are made up of four core programmes (BDP, WUP, EP and FMMP) and four sector programmes (AIFP, WRP, FP and NP)[7]. The content and phasing of each programme is briefly reviewed below.

Water Utilisation Programme

Mandated in 1999 and commencing in 2001, the aim of the Water Utilization Programme (WUP) is to assist the MRC over a period of six years to promote and improve the coordinated and sustainable water resources management in the Mekong Basin. The specific objective of WUP is to establish an effective mechanism to improve water resources management for the economic and social development of the basin in an environmentally sustainable manner. The WUP has three main components:

A Basin modelling and knowledge base

B Rules for water utilization

C Institutional strengthening

The Decision Support Framework (DSF) under Component A (basin modelling and knowledge base) has been established and is ready for use. This provides a comprehensive

[7] The distinction between core and sector programmes is expected to be cancelled by the upcoming 2006-2010 MRC Strategic Plan

and transparent basis for assessing the impacts of interventions within the basin on flow regime and consequently upon socio-economic and environment indicators (as and when the indicators are selected and necessary data are assembled). The DSF will provide the analytical basis for assessing the acceptability of different rules and of BDP planning scenarios. It may also, if approved, provide a common basis for assessing the impacts of transboundary projects.

As indicated above, WUP support for the development of "rules" continues through to 2006, with associated institutional strengthening activities. Parallel Finnish, Japanese and French funded projects provide technical support to the development of rules through various activities.

The Basin Development Plan

The original programme document for BDP was amended in July 2002 in the BDP Inception Report.

The vision of the Basin Development Plan (BDP) is to contribute to acceleration of inter-dependent sub-regional growth by establishing a process and a framework conducive to investment and sustainable development. The BDP objectives comprise two main parts:

- A basin planning process, including a regional development strategy, indicators, selection criteria, decision making and public consultation guidelines, a knowledge base and a data system.
- A short-list of high priority projects with regional significance or transboundary benefits and impacts agreed by the four LMB riparian governments.

The overall planning approach focuses on basin-wide development potentials, opportunities and constraints that arise through sharing the resources of the LMB, based on consideration of regional issues, current national programmes and plans and the specific needs at sub-area and catchment levels.

The planning process comprises five stages that will be continuously revised and improved during the current project, based on the integration of knowledge and capacity building and dialogue with the public and key stakeholders as parallel processes. The Inception Report acknowledges also the need for coordination with other MRC programmes, which are in a continuous state of development. It has also been foreseen that some pilot (or spearhead) projects will be identified that are relatively easy to implement, have no significant negative impact. And which will add momentum, visibility and justification to the planning process.

Environment Programme

The Environment Programme, as the third core programme within MRC, has two key roles in support of establishing the key instruments associated with managing the basin's water and related resources:

- The development of tools by which to assess the physical, biological and social conditions within the basin (relevant to MRC), and
- The development of evaluation tools by which to evaluate interventions within the basin in terms of transboundary impacts

Under the revised Environment Programme document (November 2003), EP is involved in wide-ranging activities, including support to other MRC programmes:

- Development of Transboundary Impact Assessment Procedures

- Development of Strategic Environmental Assessment guidelines
- Collaboration with WUP on Water Quality Procedures
- Collaboration with WUP on Interim Basin Flow Management activities

Flood Management and Mitigation Programme

The Flood Management and Mitigation Programme, elevated in 2003 to be a core programme of MRC, has as its key strategic objective *"people's suffering and economic losses due to floods are prevented, minimized, or mitigated, while preserving the environmental benefits of floods".* The FMMP in its current form has five main components associated with three strategic aims of promoting technical products and services, addressing differences and facilitation and capacity building:

(i) Establishment of a Regional Flood Management Centre

(ii) Structural measures and flood proofing

(iii) Mediation

(iv) Flood emergency management

(v) Land use management

The design of Component (ii), Structural Measures and Flood Proofing, is being revised and will include inter alia a holistic review of the issues surrounding flood plain management within the basin. FMMP will also be developing risk and vulnerability assessment tools.

Agriculture, Irrigation and Forestry Programme

The Agriculture, Irrigation and Forestry Programme was reformulated and approved in November 2000 with a principal objective of *"cooperative sustainable development and utilization of land and water resources to the benefit of the Basin community, and to contribute to poverty alleviation and food security".* The AIFP, which extends from 2001 – 05, has three main components:

- Water use efficiency, with four sub-components of (i) water use efficiency in paddy irrigation, (ii) water use efficiency in upland agriculture, (iii) land and water resources inventory (building on earlier AIFP work), and (iv) modelling the multi-functionality of rice farming.
- Catchment management, which is being implemented through GTZ with a focus on basin-wide land use planning and associated issues of governance
- Capacity building, as a cross-cutting component of both the above

Sub-components (i) – (iii) of water use efficiency are not funded yet and the Government of Japan is funding Sub-component (iv).

Hydropower strategy and the Water Resources Programme

The MRC Hydropower Development Strategy (under the Water Resources Programme) was adopted in 2001 with the vision of *"the efficient and socio-economically and environmentally appropriate generation and distribution of hydropower in the riparian countries, in a cooperative and well coordinated way, is provided".*

This vision is supplemented by an immediate objective that *"hydropower resources of the Mekong mainstream and its tributaries are developed according to true least-cost planning, fully considering environmental and social impacts",* and a development objective described

as *"the increasing demand for affordable electric energy in the MRC member countries is met with minimal negative impacts on the environment and local people, thereby promoting economic growth for the countries' mutual benefit".*

The programme has three strategic areas with associated potential actions:

(i) Consideration of integrated water use, environment and socio-economic factors:

- Sector EIA for hydropower development, assist countries in developing their own EIA systems considering planning processes proposed by World Commission on Dams
- Study of cumulative effects of reservoirs and inter-basin diversions on downstream conditions
- Clarification of potential negative side effects on fisheries and the environment and possible mitigation measures

(ii) Efficient hydropower generation and distribution mechanisms:

- Study of potential improved efficiency, reduced power demand and investment savings in power sector through Demand Side Management etc
- Study of private sector participation and develop efficient and fair principles for private participation

(iii) Information system and capacity building:

- Review and disseminate best practices, eg for planning and public participation
- Evaluate existing data holdings and data collection and storage programmes for planning and assessment purposes
- Review and update existing studies and establish tentative ranking of hydropower projects

It is understood that none of the above activities have attracted funding thus far, although it is evident that EP, BDP and FP are addressing some aspects of the above through their own programmes.

Fisheries Programme

The Fisheries Programme was approved in 2002 and is proceeding with three broad thrusts:

- Fisheries ecology and impact assessment and mitigation
- Co-management of fisheries
- Aquaculture of indigenous Mekong species

The first includes management implications such as marketing, evaluation of fish production and trade, guidelines for management (including regulatory aspects) and promotion of impact assessment and mitigation procedures. Some modelling work is being done with the World Fish Centre to try and relate fisheries productivity to water management.

The second focuses on community involvement in fisheries and is to provide guidance from policy to community level actions. The third deals with promotion of reintroduction of indigenous species and replacement of exotic ones.

Navigation Strategy and Programme

The MRC Navigation Strategy responds to Article 9 of the 1995 Agreement, which provides MRC with the mandate to promote and coordinate water transportation (of all sizes) and to encourage freedom of navigation in the Lower Mekong region. The development objectives are (i) to promote freedom of navigation in the Lower Mekong River system, (ii) to assist in coordination and cooperation in developing effective and safe waterborne transport in a sustainable and protective manner for the waterway environment, and (iii) to increase international trade opportunities for the mutual benefit of the Member Countries of the MRC.

Five main areas are targeted by the Strategy on strength of the extensive consultations taken up with stakeholders. These are:

- A legal and operational framework for cross-border navigation
- Reducing bottlenecks through common standards for port procedures, training, rules of navigation and more efficient customs and immigration procedures, as well as integration with multi-modal transport networks
- Identifying specific locations where targeted interventions would promote safer waterways to attract greater investment by both private and public sectors
- Promoting measures to curb transboundary pollution, including accident prevention and preparedness
- Promoting measures with a user-focus that will bring direct benefits to communities dependent upon river transport for access to public services and markets

The MRC Council approved the Navigation Programme in November 2003. The programme is divided into two main sub-components, being a Regional Master Plan for Navigation and, secondly, Supporting Projects.

3.1.7 Overview of MRC programmes

There are a number of common themes to the MRC Programmes, which are made clear by the discussions above. These themes are highlighted below.

The three original core programmes (WUP, BDP and EP) are primarily concerned with establishing the procedures, plans and protocols necessary to implement the 1995 Agreement with the stated objectives of the Agreement. Ultimately these will lead to a comprehensive institutional and procedural framework for management of the basin's water and related natural resources. There are strong inter-linkages between all three, such that the progress of each has bearing on the other.

The sector programmes, together with the newly defined Flood Management and Mitigation Core Programme, generally are targeted at filling apparent knowledge gaps in order to provide guidance to the Member States on best practice and to build capacity in the many aspects of modern integrated water resource management. In some cases, the programmes include specific services, such as with the FMMP's Flood Management and Mitigation Centre, but in general the end products are in the form of "strategic guidance". This "guidance" will ultimately enrich the overall appreciation of how best to manage the basin, and there needs to be an established linkage that enables this to be incorporated into the BDP.

In broad terms, the production of strategic guidance from the Sector Programmes may be summarized as follows:

Flood Management Programme	Overview of flood plain management
	Risk and vulnerability assessment tools
	Guidance on appropriate flood management
	Guidance on appropriate land use and flood emergency management
Agriculture, Irrigation and Forestry Programme	Guidance on improving water use efficiencies
	Guidance on catchment management
Hydropower (Water Resources) Programme	No funding committed, unclear when strategic guidance will emerge
Fisheries Programme	Guidance on appropriate measures to promote fisheries production
Navigation Programme	Guidance on measures to promote navigation within the basin

It is clear that in many cases, the sector programmes will not be in a position to input specific technical guidance into a basin development strategy during BDP Phase 1, notwithstanding that the preparatory work for each brings into focus key issues that the BDP will need to address within an integrated basin-wide framework. This underscores the need for the BDP to be seen as an ongoing process with regular updates as new information becomes available.

The genesis of the Sector Programmes (AIFP, WRP, FP and NP) lies in extensive sector-focused consultations with stakeholders, each set in the context of the 1995 Agreement. Legitimate as this approach to programme formulation is, in the absence of a coherent and comprehensive basin-wide strategy, it is not clear whether all relevant issues have been identified and are being addressed (with associate prioritization). It is evident that this is a gap that only the BDP can fill.

3.2 BDP plan documentation

This section discusses first the role of the BDP as a planning tool within an overall framework for integrated water management established under MRC. Suggestions are then as to what types of development should be considered as legitimate and necessary components of the Plan in both sectoral terms and in relation to the categorization implicit in Article 5 of the Agreement. A proposed structure of the BDP documentation is then described, demonstrating how it responds to both the functional requirements of the BDP and the wide range of components to be included. Finally, the impacts of other MRC Programmes on formulation of BDP are considered.

3.2.1 Role of the Basin Development Plan

As stated earlier, the nature of the 1995 Agreement is that four member States have agreed to cooperate in the management and development of the water and related resources of the basin in order that not only will each country gain benefit through cooperation, but also that these resources will be managed in a sustainable manner.

In order to fulfil the spirit and intent of this Agreement, the member States have agreed in principle to establish an appropriate and forward-looking management framework, the principal components of which are:

- Establishment of an institutional framework (the MRC) to act as a focal point for the cooperation and to assist the member States in achieving their aims through provision of shared information, technical guidance and mediation
- Establishment of procedures and rules that both facilitate interaction between the member States consistent with their stated aims, as well as provide a mutually agreed basis for defining the sustainable limits for basin development at any one time
- Establishment of a monitoring system and procedures that both ensure that the sustainable limits are not being exceeded and also to provide information that will help guide future development of the Basin
- Establishment of a basin-wide planning process (the BDP) by which the member States can identify, categorize and prioritize the actions necessary to fulfil the central aims of the Agreement, and through which assistance with appropriate investments at basin-level may be sought.

The Agreement underscores in Article 4 that sovereign equality and territorial integrity in the utilization and protection of the water resources of the Mekong River Basin is axiomatic to all actions undertaken through the MRC. This is further underlined in Article 5, which ensures the right of each country to develop a certain category of projects (those under notification) without the need for consent from the other countries (providing these are within the agreed limits of basin-level sustainability and do not cause harm to others), whilst recognizing that other types of development are of basin-level significance and require prior consultation and/or agreement.

Further, it is clear that important drivers for basin development are the individual national policies and plans as determined from time to time by each Government.

Viewed in this context, the role of the Basin Development Plan is seen principally to be:

- To contribute to acceleration of inter-dependent sub-regional growth by establishing a process and a framework conducive to investment and sustainable development (the agreed vision for the BDP)
- To be a mutually agreed expression at any one time of the actions deemed desirable by the member States individually and/or collectively to realize the development aims of the 1995 Agreement and the vision for the BDP, in accordance with the agreed procedures and limits of sustainability
- To provide assurance to investors that those actions are consistent with developing an economically prosperous, socially just and environmentally sound Mekong River Basin (the agreed vision for the MRC), and
- To provide an agreed prioritization of those actions that are of basin-level relevance, in the form of a shortlist of programmes and projects to attract investment

3.2.2 Possible planning components

Basis to the Plan

To fulfil the aims of the 1995 Agreement requires a holistic approach founded on the principles of integrated water management. Necessarily, the BDP must consider and address

all issues relevant to these aims, consistent with the primary purpose of guiding wise use of the water and its related resources within the basin and creating added value through cooperation. Thus the BDP must be based on:

- An assessment of the overall water and related resources within the basin
- An assessment of the future demands upon this resource base (both consumptive and instream), taking into account demographic trends, market demands and opportunities, and exogenous factors such as globalization, climate change and new technologies
- An appreciation of the individual development policies and plans of each member State, how these will impact upon the demands upon the resource base, and how they translate into future interventions (both structural and non-structural)
- An appreciation of the extent to which other regional initiatives (eg GMS) may influence future demands within the basin
- An appreciation of how non-member States within the Basin may cause changes to the resource basin within the Lower Basin, to the extent that this may impact upon the development plans of the latter
- An understanding of the sociological and environmental factors that are key to the sustainability of the basin, an appreciation of how interventions within resource system will impact upon these and an assessment of the limits within which the water and related resources need to be managed

Leading to:

- An overall appreciation of the development issues and constraints, and the need for a basin-level plan to enhance the opportunities of the countries to realize their individual and collective development aims through cooperation (the added value that can be created through implementation of the 1995 Agreement).

Whilst the BDP must be able to make the foregoing overall assessments, it is also clear that the level of detail required need be sufficient only to establish the transboundary impacts as represented by the current and future conditions of the mainstream. This is consistent both with the ongoing work of EP and WUP in establishing the rules for water utilization and with BDP's own approach of sub-area assessment, directed at establishing the overall resources and demand projections of each sub-area, as well as the development opportunities and national plans for each. The Decision Support Framework developed by WUP is also established at a level of representation somewhat more detailed than provincial level (as with BDP sub-areas, the DSF is primarily based on hydrological boundaries), which permits meaningful assessment at sub-area level.

Potential development components

Article 1 of the 1995 Agreement defines the areas of cooperation as being: *"all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River Basin including, but not limited to irrigation, hydro-power, navigation, flood control, fisheries, timber floating, recreation and tourism, in a manner to optimize the multiple-use and mutual benefits of all riparians and to minimize the harmful effects that might result from natural occurrences and man-made activities."*

The governing bodies of MRC have specified eight sectoral components and four cross-cutting issues to be covered by the BDP, as follows:

Sectors:

- Irrigated agriculture
- Watershed management
- Fisheries
- Hydropower
- Navigation, transport, river works
- Tourism and recreation (water related)
- Water supplies (domestic and industrial uses)
- Flood control and management

Cross-cutting themes:

- Environment (including ecosystems and their water demand)
- Human resources development
- Socio-economics (including poverty reduction and gender aspects)
- Public participation

The current MRC sector programmes cover all of the sectoral components (with a caveat on timing of outputs), except tourism and recreation and domestic and industrial water supplies.

Collaboration with non-member States and human resources development comes under the Office of the CEO (although each MRC Programme has a HRD component). Promotion of poverty reduction and gender aspects and public participation are part of BDP's mandate (again, these also are included within other MRC Programmes as well).

Categorisation of components

It is clear that, in accordance with the 1995 Agreement, the vast majority of development work within the basin falls into the category of that which is subject to notification. From the discussions above, it is equally clear that a basin plan has to take into account what these developments are expected to be, and the extent to which individual country plans in the short, medium and long term are consistent with the sustainable limits set by the rules for water utilization and the requirements for avoiding environmental harm to others.

Country plans are of course a sovereign right of each country, and are the principal driver behind the long-term development of the basin. Even so-called transboundary projects, which may be defined as those requiring the participation of more than one country, will have to be absorbed into individual country plans before they can be implemented.

Thus, a list of potential notifiable developments should be viewed as a fundamental input (and not a product) of the BDP.

Given the limits imposed by the 1995 Agreement, not all projects that would become subject to notification will be feasible to take up at any one time. Countries have the right to make their own choices on which projects to take up under prevailing circumstances. Whilst the MRC (through its various Programmes) may offer guidance to the countries, the decision lies firmly with the individual country, and is not a collective decision of the member States.

The limits that constrain the extent of notifiable development in each country can themselves be relaxed by taking up different forms of development. For instance, an obvious

example is where irrigation development in one sub-area is constrained by dry season flows. In such a case, the constraint can be relaxed by construction of a dam in the sub-area concerned, by construction of a dam elsewhere that produces surplus flows, or by reduction of demands in the sub-area concerned or elsewhere (for instance by changing cropping patterns or improving technologies).

Such projects that directly contribute to expanding the development potential of the basin are of particular importance to achieving the aims of the 1995 Agreement for optimal use of resources. For the purposes of the BDP, they may be termed as projects of basin-wide significance, in so far as their benefits can be realized in more than one country. Some of these projects nevertheless will fall into the category of being subject to notification, and some will require prior consultation and/or agreement. Where they are taken up in a manner that is intended to bring benefits in another country, they can also be termed as transboundary projects.

As in the irrigation example above, there are different ways by which the same outcome can be achieved. The aims of the 1995 Agreement will inevitably be addressed through a mix of projects and programmes aimed at achieving the best possible mix of economic, social and environmental development. The components of these will include improvements to resource management practices and regulatory and trading conditions (the enabling environment), as well as structural interventions.

Thus to summarize the different categories of projects and programmes that need to be considered under the BDP in line with its intended role:

(i) All projects and programmes will fall into one of the following three categories of:

- Enabling developments – being improvements to resource management practices and regulatory and trading conditions and the like
- Infrastructure developments – being civil, mechanical or electrical engineering-based developments, or
- Non-structural developments – being investments in developments other than infrastructure, such as extension programmes, flood preparedness and the like

(ii) In addition:

- Some of the above projects and programmes will be of basin-wide significance (ie they contribute to raising the development potential of the basin), and
- Some of the above will be by nature transboundary projects or programmes (ie they require the participation of or impact upon more than one country)

Framework for the Plan

The role of the BDP is perceived as multi-faceted as:

- A process and a framework conducive to investment and sustainable development
- A mutually agreed expression at any one time of the desirable actions deemed desirable to realize the development aims of the 1995 Agreement
- An assurance to investors that those actions are consistent with the developing aims, and
- An agreed prioritization of actions with basin-level relevance

In order to fulfil this role, the BDP has to be based on a comprehensive understanding of the resource setting and how this may change in the future as a result of exogenous factors, the development requirements of each country, the development opportunities (including those that are categorized as notifiable) and constraints and how these influence the socio-economic and environmental well-being of the basin.

Further, the BDP must provide a mutually agreed road map towards optimal management and development of the basin's water and related resources with respect to resource limitations, evolving demands upon the resource base and the collective development aims of the member States.

Finally the BDP, on a rolling basis taking into account current conditions within the basin and the state of prevailing knowledge, set out actions that the member States agree would advance them along the road map in an optimal, equitable and sustainable manner.

3.2.3 Structure of BDP documentation

Given that one of the primary aims of the BDP is to provide confidence amongst potential investors, it is clearly necessary that the BDP is supported by sufficient and appropriate detail. The "devil is always in the detail", and it should be recognized from the outset that (i) all data and analyses are not without error and at one level or another are disputable, and (ii) that planning decisions are always political by nature.

Accordingly, it is recommended that the BDP documentation be relatively concise (in a form digestible by decision-takers and sufficient to guide programme implementers, whilst devolving detail design considerations), supported by, but separate from, the wealth of technical documentation that inevitably is needed to develop and justify the final plan.

It is further recommended that the BDP contain three main components:

- The Plan Setting: An appreciation of the resource setting, the development trends and constraints, exogenous factors, and national and other regional development policies, leading to an appreciation of the need for a basin-level plan
- The Development Strategy: A long-term view (30-50 year horizon) of the manner in which it is intended to achieve the aims of the 1995 Agreement, together with the principles which will be applied in determining the components of the Rolling Plan
- The Rolling Plan: A statement of assumed developments over 20 years accompanied by a short-term (5 years) statement of firm actions, programmes and projects to be undertaken of basin-wide significance and/or of a transboundary nature, together with a medium term (years 5-20) perspective of further similar actions, programmes and projects, accompanied by an investment portfolio setting out the principal aims and objectives, broad description and justification for each basin-wide or transboundary investment component, an action plan and a monitoring and evaluation plan.

It is envisaged, once the BDP process is fully established, that the Rolling Plan would be reviewed and updated every 5 years and the other two elements every 10 years.

The first part, the Basin setting, can take advantage of the wide-ranging MRCS State of the Basin Report published in 2003, together with the extensive preparatory studies undertaken by BDP, the sub-area assessments also undertaken by BDP and the many insights and information available in the MRC Programmes. The other two parts are elaborated below.

The Basin Development Strategy [8]

The word strategy means different things to different people. In the context of the BDP as set out above, it is suggested that the Development Strategy should be confined to a broad statement of how it is intended to manage the basin in order to fulfil the (clarified) development objectives. The utility of a statement of Strategy is fourfold:

- It provides the necessary linkage between the high-level development goals and objectives and the selection of specific projects and management actions;
- It is the principal means of demonstrating a coherent and holistic approach to basin management that draws together all relevant sectoral activities into a single integrated plan of action within a consistent and sustainable framework;
- It is an opportunity to provide a long-term view of how the river should be managed that takes into account development trends that will extend beyond the immediate 20-year planning horizon, recognizing that some goals may take more time to fully achieve; and
- It provides a clear framework for the subsequent selection and prioritization of specific projects and programmes.

The Strategy must be broad and all encompassing, since it will provide the framework within which the BDP team is to develop the rolling plan. Thus it has to elaborate the sectoral goals and objectives as well as the main thrust of activities within each sector. The Strategy must be demonstrably internally consistent and integrated between sectors and regions as well as conforming to sustainable limits. The Strategy may set specific interim goals to achieve certain objectives within certain periods, though this is not always considered necessary, depending on the general level of detail desired and/or is technically possible.

The Development Strategy has to be built upon a clear understanding of the basin's dynamics as encapsulated in the Plan Setting. This understanding will lead to identification of a wide range of development opportunities that may be appropriate to take up in the short, medium or long-term to help overcome current and possible future development constraints. These are the development scenarios for which the WUP-A DSF has been commissioned to help compare and assess.

However, there has to be an agreed basis for choosing to take up one set of actions over others. An Assessment Framework is required that enables these decisions to be taken in a manner that demonstrably reflects national and regional policy aims.

The precise form of the Strategy document cannot be fully pre-determined, because its very nature is one that should be developed through a participatory process, such that by the time it reaches the Joint Committee it is one that fundamentally has widespread backing.

Nevertheless, it is possible to anticipate a broad scope of the Strategy document that would cover the context, objectives, strategy itself and principles to guide implementation (see box), in probably not more than 10 pages total.

The extent to which numbers are included in the Strategy document will depend largely on whether these can be agreed. Some enumeration may be desirable, but full enumeration is probably not given the state of knowledge at any one time.

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8 Presently referred to as *'Strategic Directions for IWRM in the Lower Mekong Basin'* and attached as Appendix 2 to the present document

The Rolling Plan

The Rolling Plan may be viewed essentially as a management document that sets out, in both a short and medium term horizon and consistent with the long-term directions in the Development Strategy, the specific actions agreed by the MRC to develop and manage the basin's resources and the means for effective monitoring of these.

The main components of the Rolling Plan document are suggested in the box overleaf. Again, these components need to be discussed and developed further through a participatory process involving relevant stakeholders.

(a) Currently agreed limits of mainstream sustainability

The currently agreed limits of mainstream sustainability will reflect the prevailing rules for water utilization (which may change from time to time as understanding of the mutually accepted environmental requirements change and/or different priorities are set).

These limits will constrain the overall future developments included with any one edition of the rolling plan, and it is essential that the plan provides the necessary assurance that this has been checked and found compliant with the rules.

(b) National development requirements

An understanding of national development requirements has to be set out. Knowledge of these is fundamental to justifying the basin-wide and transboundary investments included within the portfolio that comes later in the plan document.

The expected levels of notifiable development will reflect both the requirements of the requirements of individual national policies, strategies and plans, together with the product of the sub-area assessments. Where national plans are insufficiently forward-looking to quantify at least the 20-year development requirement (as for instance is sometimes the case with 5-year national plans), it will be necessary to take account of development potential as determined through the sub-area assessments and estimate a 20-year development requirement (implicit in the BDP's adoption is that the concerned country will have agreed with such an estimate). Notifiable developments will necessarily have to be categorized into those that are of basin-wide significance and those that are not, in order for an assessment to be made at basin-level of the overall resource development potential.

It is also necessary to preface the rolling plan with a statement of understanding of what each country may implement in terms of non-structural developments of basin-wide significance, again because these will impact on the overall resource development potential.

It is envisaged that the notifiable developments generally would be couched in terms of expected total levels of development (or total demands) in each BDP sub-area, or for instance in terms of percentages of floodplains retained, volumes of storage provided and the like. Where projects or programmes are notifiable and of basin-wide significance, specific details of location would be needed to aid assessment of basin-level impacts.

(c) Portfolio of programmes and projects

The benefits derived from the portfolio of programmes and projects of basin-wide significance represents the added value of the BDP that is derived through transboundary cooperation. The portfolio is made up of those projects/programmes that contribute to raising the development potential of the basin and/or safeguarding the environment. The projects/programmes are those have a direct effect on more than one country (ie are transboundary), and are those for which the MRC may seek development assistance for on behalf of the member States (an explicit part of the definition of the BDP as set out in the 1995 Agreement).

The portfolio comprises three main categories of development: enabling developments, infrastructure developments and non-structural developments. Each would be accompanied by a proforma description setting out the main details of the project or programme, its anticipated cost, impacts, risks and implementation arrangements, as well as the justification for its inclusion in portfolio.

It is envisaged that the Enabling Developments will include projects and programmes to address, inter alia:

- Research programmes and studies to fill identified knowledge gaps relevant to basin-level planning
- Strategic sectoral studies to identify and provide guidance on "best practice" of management of water and related resources within the basin
- Development of assessment tools, monitoring systems and knowledge and information sharing technologies that would enhance the effectiveness of the MRC and its associated agencies
- Reviews and preparation of guidance on improvements to and harmonization between countries of transboundary regulations, trade and tariffs that would directly contribute to enhanced utilization of the basin's water and related resources
- Human resource development and institutional capacity building that would also directly contribute to enhanced management and utilization of the basin's water and related resources
- Promotion, facilitation and coordination of implementation of any of the above activities

It is anticipated that implementation of the Enabling Developments would be undertaken either by the MRC Secretariat or by appropriate regional entities. It is further envisaged that progressively, the Rolling Plan would take charge of establishing the agenda for the MRC Programmes, consistent with the Development Strategy and the evolving needs of the MRC.

The Infrastructure Development project and programmes would necessarily encompass the needs of all MRC areas of cooperation.

It is envisaged that infrastructure development programmes and projects would include projects that directly improve water quality and flow conditions and/or raise the productivity of the use of the water with basin-wide significance.

The third category of projects and programmes in the investment portfolio are non-structural developments, which may be categorized as follows:

- Those are implemented within one country and are of basin-wide significance and transboundary in nature
- Those that are implemented necessarily in more than one country at the same time

It is envisaged that non-structural developments development programmes and projects may include developments within all BDP sectors (see box above) and would include:

- Investment in multi-national facilities that contribute directly to improved management of water and its related resources, eg flood warning systems, navigation equipment, water use monitoring equipment or stations, training centres, etc
- Investment in multi-national capacity building programmes, such as field, extension programmes, scholarship programmes, awareness raising, etc

(d) Action plan

A time-lined and costed action plan with assigned responsibilities will be included in the plan that:

- Indicates appropriate phasing of the programmes and projects within the investment portfolio, based on considerations of development priorities, logical sequencing, implementation capacity and, as appropriate, smoothing of investment requirements. The phasing is expected to be firm for the first 5 years (short term) and indicative for the next 15 years (medium term).
- A broad estimate will be given of the investment requirements and consequential recurrent costs on an annual basis for the first 5 years and for each of the four 5-year intervals thereafter.
- An indication of responsibilities for each action will be set out. It is envisaged that, whilst many of the enabling developments (but most probably not all) will be incorporated within MRC programmes, implementation of infrastructure and non-structural developments would be assigned to national line agencies of the country in which the programme or project takes place, with coordination provided by MRC Programmes if deemed necessary.

(e) Targets and monitoring procedures

It is essential with a rolling plan that a check is kept not only of the progress in implementing the actions set out in each plan, but also that the impacts arising from those actions are closely monitored. In this way, each successive rolling plan can be updated in an informed way, adjusting as necessary the plan design to ensure that the MRC stays on track towards achieving its long term aims.

Time-bound, quantified targets and procedures for monitoring these and plan implementation will be set out under the plan. Indicators will be monitored that indicate physical and (where appropriate) financial progress, progress with notifiable development, water use monitoring records and national statistics as defined by the overall strategic assessment framework.

3.2.4 Evolution of the development strategy and rolling plan

It should be evident from the preceding discussions that there are strong linkages between the formulation of the BDP and the ongoing MRC Programmes. In particular, it should be recalled that:

- The rules and procedures for water utilization describe the limits on sustainable development and effectively constrain the limits of development under the BDP at any one time. The plan serves the twin purposes of determining what is best to do within these limits, and the extent to which the limits can be relaxed through interventions in either the demand or supply side. If the limits are un-stated, then the plan is unconstrained and has little meaning.
- Secondly, the MRC Programmes have been targeted at establishing a range of "best practices" that will contribute to the overall basin Development Strategy. At issue is the extent to which BDP can formulate a meaningful basin-level strategy in the absence of this guidance. A ready example is what would BDP be able to say about flood management until FMMP has completed its initial study of the functions of the flood plains?
- The Sector Programmes will not be in a position to input specific technical guidance into a basin development strategy until 2005-06, although much of the preparatory work provides already valuable insights.

Thus it makes good sense to progressively upgrade the Development Strategy and the Rolling Plan throughout this period in order to maximize the benefits to be gained from the current studies and research ongoing within the other MRC Programmes.

3.3 Basis for component selection

This section makes suggestions on possible modalities by which the components of the plan will be selected. These projects and programmes are those that will be included in the investment portfolio within the rolling plan. The primary objectives against which selection should be made are described first, followed by the approach to assessing different combinations of developments to best meet these objectives within the various constraints that apply to the range of choices that can be made.

On this basis, an outline is made of the processes of firstly long listing potential developments, secondly short-listing these for inclusion in the 20-year investment portfolio and thirdly prioritizing those selected for inclusion in short-term first 5-year programme.

3.3.1 Primary objectives

The fundamental aims of the 1995 Agreement are restated in the agreed vision for the Mekong River Basin, being *'an economically prosperous, socially just and environmentally sound Mekong River Basin'.*

The Agreement also makes clear (in Article 1) that the purpose of the cooperation embodied in the Agreement is to do so in a manner to optimize the multiple use and mutual benefits of all riparians and to minimize the harmful effects that might result from natural occurrences and man-made activities. Furthermore, Article 5 expounds the intention *'to utilize the waters of the Mekong River System in a reasonable and equitable manner …'*

Thus the aims of the 1995 Agreement may be summarized as being that management and development of the water and related resources should be:

- *Optimal* with respect to being economically beneficial , socially just and environmentally sound
- *Equitable,* being a mutually acceptable distribution of the benefits arising from cooperation, and
- *Sustainable* with respect to current and future resource limitations and sound environmental management

Assessment framework

The selection of projects and programmes to put in the investment portfolio should be based on a consideration of the combination that best meets the principle aims above.

There are a number of techniques that can be used to help decision takers determine the "best" mix, of which Multi-Criteria Assessment (MCA) is the most simple and easily understood. Essentially, MCA requires the impacts of each programme are evaluated against a common set of indicators that relate directly or contribute towards achievement of the overall development aims.

One approach for MCA is to use nested objectives and indicators that create a "tree" that depicts how individual projects and programmes contribute to sectoral, BDP and ultimately to the overall Agreement objectives.

Other similar approaches of varying complexity may be used and are to a large extent driven by the extent to which basic data are available and impacts can be evaluated with adequate confidence. The techniques can also involve non-numeric evaluations in the form of expert assessment of the degree of positive or negative impacts.

The process of developing an assessment framework in the light of information availability . should proceed in a manner that reflects and relates to the overall aims above. The principles arising from the assessment framework should be fully reflected in the Development Strategy in so far that these will provide guidance for immediate and future short-listing of programmes and projects that will be entered into the BDP portfolio.

'Optimal' development

'Optimal' development in the context of the BDP is taken to mean the combination of feasible developments throughout the basin that creates the best development potential within the limits of resource availability and the acceptable limits of sustainability. This does not necessarily mean the optimal solution is equitable - rather it characterizes that which overall would best meet the aims of being economically beneficial, socially just and environmentally sound .

BDP is developing a Resource Allocation Model (RAM) that will help determine broad indications of where optimal use of the basins water and related resources lies, principally with respect to primary indicators such as areas irrigated, hydro-electric power generated, areas flooded and areas affected by saline intrusion. The RAM also can take into consideration broad indications of fisheries potential and preservation of instream flows. To some extent, these primary indicators can also be related to a sub-set of general socio-economic indicators.

The RAM will help the BDP team explore alternative resource allocations between sub-areas and thereby to identify specific development scenarios to investigate more thoroughly with the DSF. The two modelling systems are compatible in terms of schematization (although

the DSF operates at much higher level of spatial disaggregation), and data for the RAM is drawn from the Knowledge Base in the DSF.

'Equitable' development

The concept of *'equitable use of water'* is one that is addressed in the 1997 UN Convention on the Law of the Non-navigational Uses of International Watercourses, the early drafts of which clearly strongly contributed to the 1995 Mekong Agreement.

Articles 5 and 6 of the Convention (see box below) set out statements on equitable use and it clearly makes good sense for MRC to define equity from this starting point.

Extract from the
1997 UN Convention on the Law of the Non-navigational Uses of International Watercourses

PART II - GENERAL PRINCIPLES

Article 5 - Equitable and reasonable utilization and participation

1. Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.
2. Watercourse States shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.

Article 6 - Factors relevant to equitable and reasonable utilization

1. Utilization of an international watercourse in an equitable and reasonable manner within the meaning of article 5 requires taking into account all relevant factors and circumstances, including:
   (a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
   (b) The social and economic needs of the watercourse States concerned;
   (c) The population dependent on the watercourse in each watercourse State;
   (d) The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
   (e) Existing and potential uses of the watercourse;
   (f) Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;
   (g) The availability of alternatives, of comparable value, to a particular planned or existing use.
2. In the application of article 5 or paragraph 1 of this article, watercourse States concerned shall, when the need arises, enter into consultations in a spirit of cooperation.
3. The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.

As may be seen, Article 6 suggests that seven sets of factors should be taken into consideration when determining whether the Basin is being developed in an equitable manner, but leaves it to watercourse (member) States to determine the importance that should be attached to each set of factors.

In so far as considerations of optimal development and sustainable development are being considered as well, it is reasonable to confine discussion of equity to a sub-set of the seven sets of factors above, namely to three:

(b) The social and economic needs of the member States concerned;

(c) The population dependent on the watercourse in each member State;

(g) The availability of alternatives, of comparable value, to a particular planned or existing use.

There are still evidently many ways even these three sets of factors could be interpreted and it is vital that the BDP team facilitate a debate on this important subject in order to establish a mutually acceptable set of guidelines as to what would be an equitable division of benefits to be gained from the developments included within successive rolling plans.

It may also be noted that this could provide a rational basis as to how to allocate surplus water as referred to in Article 26 of the 1995 Agreement. It is evident however that BDP will need to define also a working definition of surplus water in the event that a formal procedure has not been promulgated.

Sustainable development

At basin-level, it is taken that the water utilization rules will define the minimum requirements for sustainable use of the basin's water resources. These rules are being formulated on a basis of informed debate and mutual agreement of acceptable conditions. Continuing research and evaluation will contribute to updating these rules, as knowledge grows of the environmental processes involved.

Thus a basin plan that indicates compliance with the prevailing rules will be judged as being a sustainable development programme .

3.3.2 Identification of long-list projects and programmes

The potential components of the investment portfolio in the BDP rolling plan will each fall into one or more of the nine sectoral components and four cross-cutting issues and will be categorized as either:

- Enabling developments
- Infrastructure developments, or
- Non-structural developments

The sources of these potential developments will be the current national and sub-regional development plans, feedback on the development opportunities identified through the sub-area assessment programmes, the "guidance" provided as a result of the studies made by the MRC Programmes, and inputs from the BDP team's own strategic studies.

A long list of these potential projects and programmes will be compiled and held on a BDP database. Inclusion on the long-list will not signify inclusion in the plan . Nevertheless, all stakeholders should be encouraged to promote their ideas of developments worthy of

consideration. The longer the list is, the greater the choice will be, and the more likely that an "optimal" solution will be found.

The BDP has developed a proforma for recording the details of long-listed projects and programmes, within the framework of the DSF Knowledge Base, and efforts should continue to encourage throughout MRC and its stakeholders to propose relevant project and programme ideas. That said, experience suggests that BDP will need to continue to take a proactive stance on assembling the initial long-lists.

3.3.3 Short listing of projects and programmes

Short-listing of projects and programmes will be undertaken in a manner that provides the best possible mix of developments to attain as far as possible the MRC development objectives within the 20-year time frame.

The approach and methodology for short-listing will be consistent with the agreed assessment approach.

Prioritization of projects will be undertaken on the basis of realizing the greatest equitable benefit within the short term, moderated by political preference, and constrained by resource limitations, implementation capacity and compliance with the water utilization rules.

Short-term projects and programmes, viewed as priority ones, will need to be adequately defined so that (potential) investors may readily appreciate the objectives and nature of the project or programme, its likely cost and impacts and the associated risks and means of mitigating these. In conventional terms, this would fall short of a pre-feasibility standard of presentation (although in every likelihood, an infrastructure project that makes the shortlist will already have been subjected to earlier study, to which reference may be made).

BDP has developed a proforma description of short-listed projects and programmes, within the framework of the DSF Knowledge Base.

3.4 BDP interfaces with other MRC programmes

This section reviews firstly the important issues related to the confidence in the available information by which to draw up a Basin Development Strategy and later a rolling plan, and the impacts this will have on plan formulation. The importance of close cooperation between the BDP and the other MRC is then highlighted and areas of specific cooperation during the current plan formulation process are then identified.

3.4.1 Availability and confidence in planning information

Not only do the other MRC programmes have much to contribute to the understandings necessary to formulate the BDP, but also that these programmes are established with specific time frames that, at first sight, are not really consistent with the time frame set for BDP's plan formulation.

In general most of the programmes will not be in a position to have fully developed their "guidance" on best practice within BDP Phase 1, notwithstanding that a significant amount of consultation has already taken place during the design of the current programmes. Furthermore, whilst the process of formulating WUP rules has already produced many fundamental interpretations, full enunciation of the rules has not yet evolved.

On the other hand, it is true to say that whenever a Plan is formulated there will always be unknowns and it is the role of the planner to cope with this. Thus successive editions of the rolling plan must be formulated on the basis of the best evidence available.

However, due recognition must be given to the uncertainties associated with that evidence, and decisions implicit in the agreed plan may not be as robust as would be preferred. Preliminary analyses generally do make clear where the risks of decisions being wrong is high, and it is both important and prudent that these be properly identified.

In some cases, it will be important to acknowledge that more information must be collected in order to reach a firm decision. The job of the planner will include identifying these important knowledge gaps and ensuring that they are addressed through study and research programmes included within the Plan.

3.4.2 Relationship between BDP and the MRC programmes

In an ideal world, the current MRC programmes would have been formulated within the context of an holistic development strategy for the basin a whole. In this way, the areas of study and research would have been prioritized to meet overall development needs.

The review of the programmes indicates nevertheless that in fact a reasonably comprehensive set of studies has been embarked upon (recognizing that, in particular, little is being done in the energy sector at present). This should not come as a surprise, given the extensive tapping of knowledge of the basin through the individual and extensive consultation programmes undertaken in programme development, together with the considerable professional expertise and experience available with the MRC programme teams.

Thus, whilst the BDP looks on the one hand to national development plans and sub-area assessments to identify development requirements and opportunities, it should also look to the acquired knowledge within the other MRC programmes from which to build an overall perspective of what development strategies to follow. Such considerations, embodied within an integrated planning environment, will lead to identification of pertinent knowledge gaps, which in turn should set the ongoing agenda of the MRC Programmes.

A strong sense of partnership between BDP and the other MRC programmes is essential therefore. The medium of the BDP will assist the programmes by ensuring that their own work is fully integrated and consistent with an overall approach to basin management and development. In turn, the knowledge and perspectives within the programmes will enrich the BDP.

3.4.3 Specific areas of cooperation

To best fulfil its own mandate, the BDP must call upon the other programmes to directly contribute to the initial Plan formulation. Given below are examples of cooperation with a particular value:

Water Utilization Programme

- Establishment of a common baseline for both rules and planning purposes
- Shared approach to trade-offs between levels of sustainability (flow management requirements) and development opportunities
- Tailoring of the DSF to meet evolving BDP requirements

Technical Support Division

- Support with scenario assessment through DSF
- Cooperation in building up additional datasets in the DSF Knowledge Base
- Development of databases for long- and short-list projects and programmes
- Scoping and initial design of the M&E database

Environment Programme

- Further development and adoption of the Strategic Environmental Assessment guidelines
- Establishment of preliminary environment component to the Development Strategy
- Identification of specific projects and programmes to safeguard environmental needs

Flood Management Programme

- Preliminary overview of flood plain management issues and requirements
- Establishment of a preliminary component to the Development Strategy covering appropriate flood management, flood plain land use and flood emergency management
- Identification of specific projects and programmes related to flood plain management

Agriculture, Irrigation and Forestry Programme

- Establishment of a preliminary component to the Development Strategy covering irrigated agriculture development and catchment management
- Identification of specific projects and programmes related to irrigated agriculture development, including improving water use efficiencies
- Identification of specific projects and programmes related to catchment management and land use planning generally

Hydropower (Water Resources) Programme

- Perspective on hydroelectric development potential within the basin, identified developments and details of these

Fisheries Programme

- Establishment of a preliminary component to the Development Strategy covering fresh and brackish water open fisheries and aquaculture
- Identification of specific projects and programmes related to promotion of fisheries production

Navigation Programme

- Establishment of a preliminary component to the Development Strategy covering navigation within the basin
- Identification of specific projects and programmes related to promote fisheries production
- Guidance on measures to promotion of navigation within the basin

4 Issues and priorities

The work with the BDP began shortly after the 1995 Mekong Agreement, under the auspices of a sub-committee established by the purpose by the MRC Joint Committee. The sub-committee held two meetings in 1995 and continued until Terms of Reference for the BDP formulation were approved in mid 1996. In the following years, however, progress was slow due to lack of funds, and the BDP was overtaken by several other MRC programmes.

Hereby, the BDP temporarily lost some of its significance as a framework for identification of MRC projects and programmes, as assumed with reference to Article 2 of the Mekong Agreement. There was, in some cases, no need for this framework, since several MRC programmes were in a healthy state of progress at the time of the BDP Inception Report (July 2002). On the contrary, the formulation of an over-all strategic framework was looked upon with some concern, because it - in case of any inconsistencies - could raise uncertainty about for example the strategy formulations that had taken place already, or took place took place in parallel under the MRC sector programmes. Also, there was some fear of duplication of efforts in relation to the knowledge base, public participation modalities, the MRC Information System, and the various decision-support tools under the MRC Decision-Support Framework (DSF).

During BDP Phase 1, this uncertainty was eliminated, as the strategy formulation and related analyses proceeded in a smooth and fruitful dialogue among the MRC programmes. Still, by the end of BDP Phase 1, its value to the other programmes remains to be demonstrated by tangible outputs in the form of actual development initiatives.

From the beginning, the BDP was designed to distance itself visibly from the indicative plans - although this intent was never fully agreed among the institutional stakeholders, some of which preferred a BDP along the lines of these plans (and with the same purpose). This was clearly exemplified during one workshop in 1999, where an opinion was offered that *'the BDP would be useless if it could not promote hydropower development on the mainstream'.*

It has been duly considered to shape the BDP as a traditional *'rational'* water management plan (with a consistent set of components and outputs that, between them, could assure the achievement of some agreed immediate goals) [9]. The arguments against this approach were (1) that MRC and its BDP do not have the power (including funds) required to implement such a plan, and no mandate at all for the required control of national water-related development; (2) the required knowledge is not yet in place - for example about a basic thing like the water availability in the LMB; and (3) a management plan covering 4 countries and many sectors and themes would be almost certain to fail.

5 Solutions

The role of the BDP has been developed in many analyses of strategic interfaces, inputs and outputs, flows of knowledge, and development and application of the MRC Decision-Support Framework (DSF), the Resource Allocation Model (RAM), the entire MRC Information System, and other important tools.

[9] As for example assumed in Halcrow (March 2004)

The role has been clarified in connection with the formulation of the MRC Strategic Plan 2006-2010 and is much more visible towards the end of BDP Phase 1. In the process, the strategic focus has been sharpened, while the role has become more comprehensive than anticipated at the initial stages of formulation.

Towards the end of BDP Phase 1 it is hoped that a planning process has been designed that can accommodate a broad range of relevant development initiatives, ranging from very *'soft'* capacity-building to very *'hard'* infrastructural intervention; and that can, at the same time, adjust flexibly to new knowledge and new challenges.

During the formulation of the Strategic Directions , it was noted [10] that neither the WUP not the BDP would produce any more water (although comprehensive re-distributions in time and place are in the pipeline). In consequence, the BDP will promote water-related development in terms of quality as much as quantity; improved economic efficiency of water allocation and utilization (value generated by m3 of water); and a development from *'water for food'* via '*water for production'* towards *'water for employment'.* In the Lower Mekong Basin, in the long term, there is no reason why development should be constrained in any way by a finite (dry season) water availability - but a comprehensive and time-consuming adaptation is required, including a basinwide IWRM with a clear strategic focus.

6 Findings and recommendations/ lessons learnt

The strategy formulation during BDP Phase 1 took place as an explorative process with numerous iterations and a comprehensive dialogue. In this connection, an active collaboration was maintained among the MRC programmes, the NMCs, and the national line agencies. The work took its starting point in the national development plans, and incorporated results from the BDP sector reviews, sub-area studies, and scenario analyses, as well as many indispensable contributions from other MRC programmes and external sources.

Some of the lessons learnt are summarized below.

- An important feature of the Strategic Directions is that the values expressed must be shared by the member countries, and that the development goals must be accordingly agreed between them. Although the formulation took 2 years, the part of the work that related to these key features was not complicated, and no significant divergences or other obstacles occurred during the establishment of what can be regarded as the *'core'* of the Strategic Directions . This is regarded as a strong demonstration of the commitment of the member countries, given the particularly broad scope of the Strategic Directions .

- The interaction between the development of BDP and WUP did not reach its full potential, since both programmes, for a variety of reasons, failed to meet their milestones. It is believed that the BDP has been sufficiently robust to proceed in a

[10] (by George Radosevich)

useful way even if some initial assumptions about its context and basis were changed during the preparation process.

- While the Strategic Directions have been formulated in a smooth dialogue among the MRC programmes and the NMCs, there is a scope for expanding the external dialogue in connection with its initial implementation and further development. This need was emphasized by the Joint Committee (in March 2004), but was not fully pursued during BDP Phase 1. While the BDP process has been entirely open, only a few initiatives were taken to activate a dialogue with external stakeholders and development partners.

- A scope is seen for continued dialogue with the upstream riparians, also in connection with the BDP process, for example during the initial implementation and subsequent adjustments of the Strategic Directions .

7 Relevance

7.1 Relevance for NMCs and/or line agencies

Clear and functional Strategic Directions for IWRM are highly relevant to the NMCs and line agencies, in support of the shared aim of the MRC collaboration.

The Strategic Directions are based on consensus and appear as a joint expression by the NMCs and the line agencies with regard to priorities and concerns in relation to basin-level IWRM. These preferences and concerns can be applied or considered also in connection with national and de-central (sub-basin) IWRM.

Hereby, the Strategic Directions can facilitate a gradual convergence between the BDP with its basinwide perspective and the sub-area level IWRM that is presently in an early stage of implementation under the new or planned river basin committees/river basin organizations. This may, in the course of time, lead to a particularly fruitful synergy between the over-all basin planning under the BDP, the national planning processes, and the de-central planning at sub-basin level.

7.2 Relevance for MRCS and/or BDP Phase 2

The relevance of the agreed Strategic Directions to MRCS is two-fold:

- First, the placement of the MRCS activities within a context of an agreed IWRM strategy for the LMB will support the documentation of their relevance, and add to their quality, transparency and credibility; and

- second, the BDP process will provide a shared platform for promotion and funding of agreed priority development initiatives.

The Strategic Directions developed during Phase 1 will be a natural starting point for its enhancement, streamlining and consolidation during Phase 2, in a continued and expanded collaboration, building on the good experience gained.

8 Concluding general outlook

The shared goals and priorities which the countries have identified and which are reflected in the Strategic Directions provide a solid basis for cooperation and a platform for coordinated action to facilitate IWRM in the Lower Mekong Basin. At the national level, each country has outlined a commitment to sustainable water resources management and development, through their national policies and strategies. At the regional level, the involvement of all countries in regional and international agreements, conventions and programs demonstrates a willingness to work together towards mutually beneficial development.

It is hoped that the Strategic Directions and IWRM approach that was developed during BDP Phase 1 will provide a sound basis for sustainable water resource development in the LMB.

References

Geerinck, Lieven (Jan 05): Incorporation of navigation into the integrated water resources management and development strategy. Mekong River Commission, Basin Development Plan

Halcrow Group (Mar 04): Strategic framework for BDP. Mekong River Commision, Basin Development Plan

MRC-BDP (Jul 2002): Basin Development Plan. Inception Report

MRC-BDP (Feb 04): Initial outline of basinwide development objectives & elements of an LMB Strategy. May 2003, revised 6 February 2004

MRC-BDP (Dec 05): Strategic Directions for IWRM in the LMB. Final version, as approved by the Council in December 2005

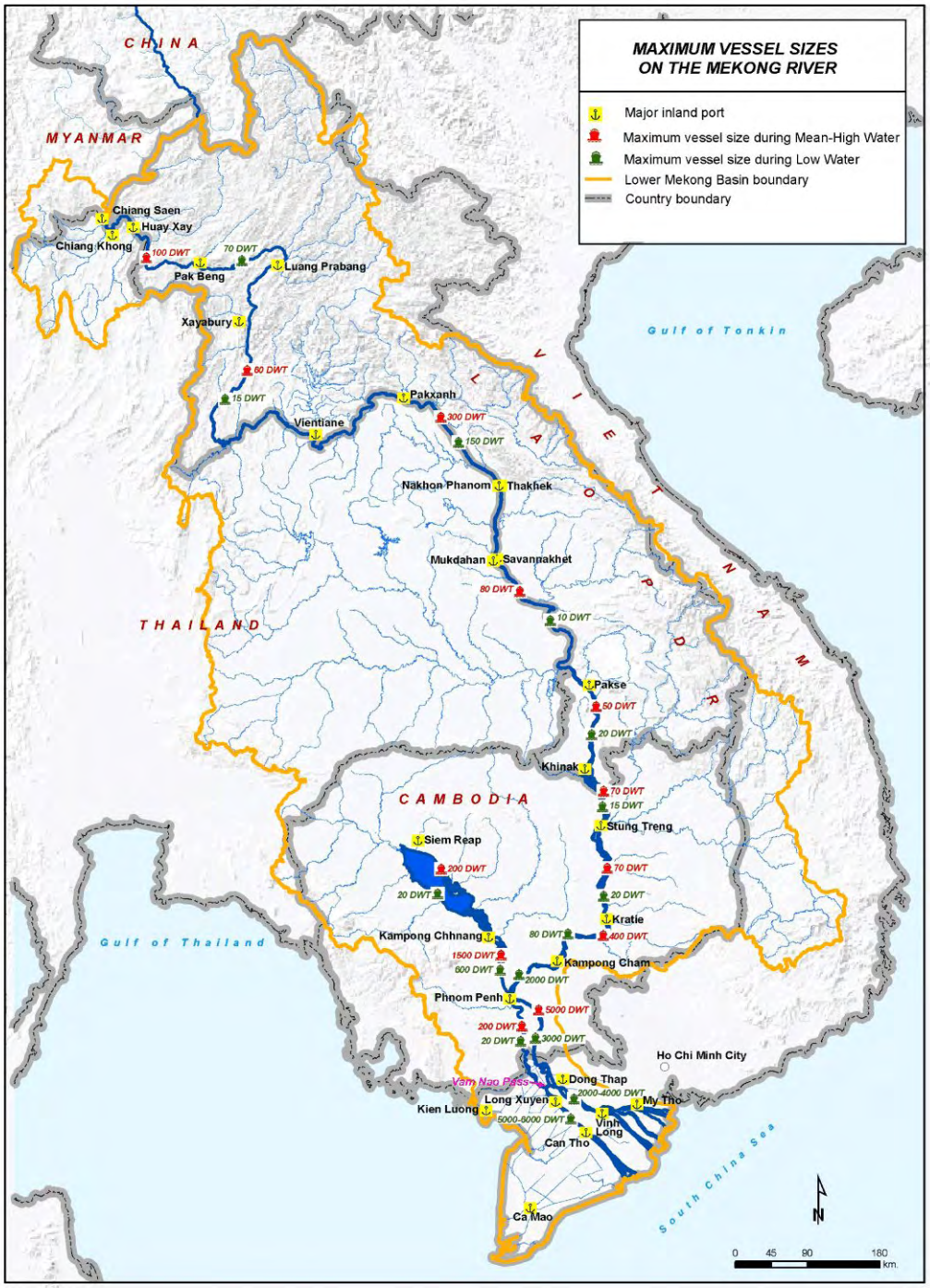
Wallace, Malcolm (Jun 03): Defining a basin development strategy. Mekong River Commision, Basin Development Plan

(Please also refer to the separate reference list in Apprndix 2).

Appendix 1: Navigational aspects

Contents

Maximum vessel sizes on the Mekong



1 Introduction

1.1 Origin of this document

This document is presented as an example of the inter-programme and inter-sector character of the BDP. It is a short extract of the report

> *Geerinck, Lieven (Jan 05): Incorporation of navigation into the integrated water resources management and development strategy. Mekong River Commission, Basin Development Plan*

Reference is made to this report for in-depth information.

1.2 Purpose of this document

The main objective of this document is to guide the BDP team members how to integrate waterborne transportation as a sector into the IWRD Strategy. It will also serve other MRC programmes with a methodology on how to coordinate and cooperate with the NAP. These interactions will be vital for the BDP team as the process of integrating all sectors into the IWRD will have to consider the overlaps, links and possible areas of conflict. Readers without specific background on transport subjects may find this report useful as it includes information on existing navigation conditions on the Mekong River System, and includes plans for further development and coordination.

The document provides an overview of the MRC Navigation Strategy and the MRC Navigation Programme (NAP).

Further, a preliminary analysis is made of the impacts on navigation by the BDP scenarios.

1.3 Context

The Integrated Water Resources Management Strategy will be the basis for regional development planning, coordination and project implementation. Strategies for the water related sectors are therefore to be comprehensive and detailed enough for (a) implementation by the countries themselves and through bilateral donor partners and development banks, and (b) for implementation by the MRC. These sector strategies will therefore consist of a regional master plan and investment priorities (for a). They will also include a detailed action plan for what MRC needs to do regarding this sector (for b).

With regards to the waterborne transport sector it is important to know that MRC has already prepared an extensive Navigation Strategy and Programme (NAP) with action plan for what MRC is to do regarding development and coordination of navigation in the region. It is focussed on what the organisation can provide in terms of added value towards coordinating and developing cross-border waterborne transport. This NAP is ready for implementation.

The Regional Navigation Master Plan on the other hand will be formulated during and by Component 1 of the MRC Navigation Programme. During formulation, regional conclusions will need to be reached on where and how to improve stretches of the Mekong River that have great potential to attract more trade and traffic. The design phase of the Master Plan will identify an optimal fit of the waterborne transport sector with other transport modes and links to achieve the most cost-effective regional transport system. In

addition to regional commercial trade, the prospects for developing waterborne transport to rural and remote areas will be examined, assessed and improved.

The Master Plan will come up with investment priorities such as physical infrastructural works (dredging, river training works, construction of ports and landing facilities, modernization of ports, multimodal requirements, surveys, mapping, removal of wrecks, fleet modernization, cargo handling, dock yards and ship building, night navigation, etc.), institutional infrastructure (organization of waterway departments, port management, classification of waterways and fleet, inter-modal links, etc.), research (morphological changes, new vessel design, bank erosion and protection, etc.) and capacity building (training of waterway users, transport operators, freight forwarders, pilots, etc.). A description of the activities for the design of the Master Plan is given in 4.5.2 Component 1 of the MRC Navigation Programme. Final discussions with ADB are now being held to jointly implement C1 and thus jointly design the Regional Master Plan, expected to be carried out between September 2005 and August 2006.

It is to be pointed out however that the MRC Navigation Strategy and Programme have already elaborated extensively on the Strengths, Opportunities, Weaknesses and Opportunities of navigation in the region. Important regional strategic directions have been concluded and an action plan established regarding transport planning, legal frameworks and navigation agreements, standardisation and harmonisation of rules and regulations, improvement of safety and efficiency, environmental protection, set-up of river information services and capacity building.

2 MRC navigation strategy and programme

2.1 Navigation strategy for MRC

A comprehensive MRC Navigation Strategy was agreed by the member countries in August 2003. The strategy contains a detailed SWOT analysis, and principles and objectives for the involvement of MRC in development of navigation in the LMB.

Significance

1 Article 9 of the 1995 Mekong Agreement addresses freedom of navigation: 'On the basis of equality and right, freedom of navigation shall be accorded throughout the mainstream of the Mekong River without regard to the territorial boundaries, for transportation and communication to promote regional cooperation and to satisfactorily implement projects under this Agreement. The Mekong River shall be kept free from obstructions, measures, conduct and actions that might directly or indirectly impair navigability, interfere with this right or permanently make it more difficult. Navigational uses are not assured any priority over other uses, but will be incorporated into any mainstream project. Riparians may issue regulations for the portions of the Mekong River within their territories, particularly in sanitary, customs and immigration matters, police and general security'.

2 Inland waterway transport is a historical feature in the Lower Mekong Basin, with proven diverse and far-reaching social and economic benefits

3 There is a clear and imminent scope for cost-effective development in many ways, structural as well as non-structural

Long-term development objective and goals

1 The Development Objective for the Strategy, indicating the benefit for the riparian countries that is expected to emanate from an MRC involvement in this field, is therefore proposed as follows:

To increase the international trade opportunities for the MRC member countries' mutual benefit, and to assist in co-ordination and co-operation in developing effective and safe waterborne transport in a sustainable and protective manner for the waterway environment.

2 The NAP legal objective is: To establish an appropriate legal foundation and navigation regime for International Mekong Navigation, and to ensure its implementation and sustainability

3 The NAP trade, transport and safety objectives are: (i) To develop and improve navigation conditions to increase international trade opportunities for the countries' mutual benefit; (ii) to provide better facilities and capacity to increase safe and efficient Mekong navigation as a separate transport mode and as part of the regional multimodal transport network; (iii) a feasible and environmentally sound removal of relevant physical and non-physical barriers to cross-border navigation; (iv) to provide the knowledge base and services to support planning and operations; (v) to reduce the accidents in ports, on the vessels, and on the waterways.

4 The NAP environmental objectives are: (i) To balance the environmental consequences of projects against their economic and social significance; (ii) to promote sustainable, sound and equitable use of all water and water related resources in the LMB; and (iii) to promote the concept of 'clean' river transportation, focusing on strategic prevention of environmental damage from waterway infrastructures/works or from shipping or port accidents rather than remedying or combating the impacts

5 The NAP social objectives are: (i) To improve access to markets, schools, hospitals through water transportation in remote areas; (ii) to improve water transportation during floods; (iii) to increase river-based employment; and (iv) to reduce negative social effects of cross-border navigation

Short-term development goals

1 Regional inland waterway transport developed in terms of capacity, efficiency, safety, and public service

2 Convenient cross-border passage of water-borne goods and passengers (including tourists)

3 Harmonised regulation and navigation aids

4 All major navigation routes maintained and mapped

5 Navigation managed with due consideration to the risk of accidents and spills

6 Deepening of waterways, sand extraction, and other river works being designed and implemented with due consideration to flood risk, the risk of bank erosion, and the effect on river habitats and on the fish and dolphin populations. The risk of pollution caused by antifouling ship paint considered as relevant

Examples of development initiatives

1 Design, feasibility and impact studies related to ports, river works and regional waterways development

2 Implementation of ports, river works and regional waterways development

3 Morphological studies and bank protection schemes

4 Basinwide institutional capacity-building; development and implementation of education programmes for pilots, skippers, and administrative officers

5 Regional standardisation schemes (navigation aids, navigation rules, certification, pilotage, monitoring, statistics)

6 Streamlining of border regulation in general and transit regulation in particular

7 Related capacity-building and awareness-building

8 Regional research programmes and knowledge-sharing

Observations, practicalities

1 There is a scope for collaboration within the entire Mekong Basin and within the GMS

2 The benefits of participatory project formulation and implementation have been clearly demonstrated during the preparation of the MRC Navigation Programme

3 Navigation development and tourism development can interact positively

Guidance on intervention

1 A large suite of specific supportive priority intervention has been identified and is being promoted under the MRC Navigation Programme

2.2 The MRC Navigation Programme

2.3.1 Component 1: Socio-economic analysis and regional transport planning

Objectives

1 Assess the socio-economic outcome of enhancing navigation on the Mekong River

2 Examine and propose cost-effective and practical ways in which cargo and passenger transport on the Mekong waterway network can be increased as a separate transport mode and as a part of the regional multimodal transport network

3 Provide a feasible and competitive scheme for Regional Navigation Development to target investments

4 Assist in developing rural waterborne transportation to improve access to markets, schools, hospitals transport in remote areas and to improve navigation during floods

5 Protect and promote the interest of the people that live directly with the river (e.g. bank erosion)

Relationship to the MRC Navigation Strategy

The Navigation Strategy holds clear indications that the member countries wish to see the MRC as a visible partner in the regional transport planning and assist them in realising the navigation potential. The countries are aware of the potentials and of the impediments but it is difficult for them to meet the challenges on their own due to lack of capacities, financial means and reliable data. The scenarios and studies from this component will be valuable tools from the countries to also address navigation impediments nationally and will give them an opportunity to be better prepared for regional and international trade integration.

Expected outputs

Sub-Component 1: Regional master plan for navigation

1 Traffic and trade scenarios

2 Master plan for regional transport

3 Assessment of socio-economic outcomes of improved navigation

4 Prioritized investment opportunities

5 Identified finance sources

Sub-Component 2: Supporting projects

1 Master plan for Mekong Navigation in Cambodia

2 Improvement of navigation on the Mekong River in Vietnam

3 Pilot project in the Lao PDR: Morphological study, including bank erosion

4 Pilot projects on tourism and navigation

5 Institutional strengthening, capacity building and training

2.3.2 Component 2: Legal framework for cross-border navigation

Objective

To develop and strengthen Article 9 of the MRC Agreement on freedom of navigation through the establishment of an appropriate legal regime ensuring effective freedom of regional and international cross-border navigation on the Mekong and to ensure its implementation and sustainability.

Relationship to the MRC Navigation Strategy

By developing Article 9 of the 1995 agreement, this component will assist the MRC countries in establishing a legal and operational navigation framework, to increase trade and mitigate the risk for regional discords. The work will be founded on a comprehensive legal study of the Mekong navigational regime as suggested in the MRC Navigation Strategy and will include preparation of draft framework agreements for maritime and inland navigation, facilitation of negotiations and mediation between member states, and supervise harmonisation and enforcement of common rules.

Expected outputs

1 A comprehensive legal study of the current navigation regime

2 Basic principles for the development of freedom of navigation

3 Navigation roles for MRC as river commission

4 Harmonised legal regime – Operational Framework/ Navigation Agreement

5 Legal capacity building, legal working group

6 Legal assistance and implementation by MRC

2.3.3 Component 3: Traffic safety and environmental sustainability

Objectives

1 To increase the efficiency of domestic and cross-border waterborne transport in the LMB and to reduce the accidents in ports, on the vessels and on the waterways;

2 To propose measures for the progressive removal of physical obstacles to navigation duly taking into account environmental and social aspects;

3 To promote and realise the concept of environmental standards 'for clean' river transportation, focusing on strategic prevention of environmental damage;

Relationship to the MRC Navigation Strategy

The MRC Navigation Strategy calls for harmonisation and enforcement of common rules and regulations on environmental protection, EIA and safety measures. The Strategy also highlights a strong need for awareness-rising on environmental protection within the navigation sector.

Expected outputs

Sub-Component 1: Interventions to improve traffic safety and efficiency

1 Installation of aids to navigation

2 Updated charts and maintenance plans

3 Updated and harmonised rules and regulations

4 Formation of river police patrols and rescue units

5 Development of a safety management system

6 Concrete removal of physical and non-physical barriers

Sub-Component 2: Environmental sustainability

1 Risk analysis and scope for prevention and contingency

2 Management strategy for prevention, and managing pollution

3 Development of a standardised regulatory framework

4 Environmental protection and impact assessment

2.3.4 Component 4: Information, promotion and coordination

Objectives

1 Establish an integrated Mekong River Information System necessary for navigation development that covers operational data, traffic monitoring and information on navigation development and management throughout the lower Mekong Basin.

2 Demonstrate the advantages and potentials of the waterborne transport sector and disseminate essential information to relevant stakeholders with a view to change misguided perceptions and promote public and private investments in this sector.

3 Avoid duplication of efforts and ensure the countries' commitment to increase international trade by identifying coordination and cooperation mechanisms that include national and regional initiatives, the private sector and the two dialogue partners the People's Republic of China and the Union of Myanmar.

Relationship to the MRC Navigation Strategy

The MRC Navigation Strategy identified an immense need to introduce a regional River Information Services to support Mekong navigation as the countries were facing development opportunities for trade and transport development on the Mekong that needed operational support in terms of fairway information and operational services.

Expected outputs

Sub-Component 1: River information services (RIS) for Mekong navigation

1 Integration of navigation issue in national planning

2 Promotion and information campaigns

3 Navigation information and promotion training

4 Pilots projects. Public participation in Regional Navigation Development

Sub-Component 2: Promotion of regional navigation development

1 Integration of navigation issue in national planning

2 Promotion and information campaigns)

3 Navigation information and promotion training

4 Pilots projects. Public participation in regional navigation development

Sub-Component 3: Coordination of regional navigation activities

1 National and regional navigation forums

2 Coordination between upper and lower Mekong navigation

3 Coordination framework for public-private Partnerships

4 Strengthen regional coordination mechanisms

5 Mekong navigation development catalogue

2.3.5 Component 5: Institutional development

Objectives

1 'To establish the institutional structures on the regional level and to provide the necessary resources for the MRC member states to establish the management structures on the national level for implementing the Navigation Programme'

2 'To facilitate, coordinate and harmonise the identification, formulation and implementation of a capacity development programme for the waterborne transport sector in the member countries'

Relationship to the MRC Navigation Strategy

The MRC Navigation Strategy provides the basis for a much stronger future involvement of MRC in regional navigation. In various national and regional workshops organised during and after the NAP strategy formulation, the strengthening of institutions and capacities was generally considered a high priority. Most of the strategy objectives can only be reached when institutions or capacities are strengthened.

Expected outputs

Sub-Component 1: Development and functioning of the programme management

1 General preparations and coordination for the programme implementation

2 Selection and nomination of the Working Group on Navigation (NWG) and the Navigation Expert Groups (NEG)

3 Establishment and functioning of the Navigation Advisory Body (NAB)

4 Establishment and functioning of the Navigation Programme Office and Working Groups

5 Strengthening of Management Capacities of National Counterparts (NAP implementation

6 Establishment and functioning of the industry associations

7 Publication of MRC Navigation Management and Coordination Handbook

8 Preparation for phase 3

Sub-Component 2: Institutional strengthening, capacity building and planning

1 Facilitate and support other components

2 Navigation training standards, common core syllabi and a harmonized certification

3 Strengthening of management capacities of national line agencies and institutions

4 Collaboration mechanisms between the major players – monitoring and reporting

3 The Regional Navigation Master Plan

3.1 Introduction to the Regional Navigation Master Plan

The main strategy for navigation will be formulated in Component 1 of the MRC NAP and will be called the Regional Navigation Master Plan. It is expected that the formulation process will be carried out between September 2005 and August 2006. However, as we need to proceed with the IWRD, it is essential to illustrate what opportunities really exist in terms of navigation development in the Mekong Basin. Anticipating the results of the Regional Navigation Master Plan, and fulfilling the request of the BDP Team to be provided with a better sense of what opportunities there really are in terms of navigation development in the

Mekong Basin, the NAP manager has prepared realistic and feasible development scenarios for waterborne transport development in the region for the short, medium and long term.

Unlike the comprehensive Master Plan, which will detail the needs in terms of physical and institutional infrastructure, this report only focuses on the geographical trading routes in the context of the following regional axis:

- Flows of goods oriented North-South in the Upper Mekong, including the use of the Mekong river as multimodal link between Kunming and Bangkok as economic poles;
- the second flow is orientated East-West in the area where the Mekong river is the borderline between Laos and Thailand, mostly, with some domestic long-haul traffic in Laos;
- the third major flow involves the Mekong delta: domestic flow in Southern Vietnam, between Cambodia and Vietnam, and maritime import/export trade.
- cross-river flows: Regional cross-haul traffic between Lao PDR and Thailand and domestic cross-haul traffic between Lao PDR and Thailand, and in Cambodia, Lao PDR, and Viet Nam.
- Domestic long-haul traffic along the waterways and canals from the delta in Viet Nam to the ports of Ho Chi Minh City and Can Tho, and between Phnom Penh and the ports of Siem Reap, Kampong Cham, Kratie and Stung Treng in Cambodia;
- access to southern and land-locked Lao PDR from the sea by means of multimodal transport;
- rural but socially important water transportation between communities along the river where navigation is the only mode of transport; and
- transport of passengers and tourists.

3.2 Existing situation

During the last decade, the Governments of most Mekong-riparian countries have initiated series of market-oriented policy reforms. The growth in intra-regional trade and investment has surpassed the prospected average. In order to achieve an overriding common interest, namely to increase international trade, the MRC member states opted for a separate article in the 1995 Agreement on Cooperation for the Sustainable Development of the Mekong Basin, namely Article 9: Freedom of Navigation.

Shipping is a necessary means to achieve this, and the governments and private sector acknowledge the advantages of waterborne transport: it is cheap because of its large cargo carrying capacity, relieves road congestion and maintenance, boosts tourism, and is environmentally friendly. Revenues from international trade such as export earnings can be used to purchase capital equipment and goods from other countries which are required for their own economic development. Larger markets result in economies of scale in production and higher returns; commercial interaction and communication provide learning effects, improvement of human resources; and enhance their close relationship. It provides an important stimulus to socio-economic growth in their own country and what is important, in the whole region. MRC realizes, however, that the current economic status in all Mekong countries is not even and that some countries may export more than others, even though demand creates a basis for mutually advantageous trade.

The Mekong river will play an increasing role over the coming years in regional and sub-regional transport development. This role will be enhanced by the development, facilitation

and coordination of international and cross-border navigation and the anticipated linkage with other modes of transport in the Mekong region.

Nowadays, the traffic on the Mekong river is concentrated in Southern Vietnam and Cambodia with a sustained growth rate of some 10% per year. An increase of the traffic can be observed across the Mekong river between Vietnam, Laos and Thailand, contemplated by the Chinese province of Yunnan as an external route for its regional trade, in particular with Laos and Thailand.

In order to cope with the production and trade increase Thailand has made it a priority to improve transportation throughout the country. Studies, conducted under Thai Economic Quadruple Plan, have indicated that, among other transport scenarios, the improvement of river transportation and construction of additional river ports are needed, in order to serve the needs for transportation, in trade as well as tourism, between Thai border provinces and neighbouring countries, including China and Myanmar. Now that the Upper Mekong Navigation Agreement has been signed, the challenge will come when the protocols have to be made and the implementation to be started.

The economic policies of Laos, Cambodia and Vietnam have become much more open towards market oriented. After a long period of hesitancy, more and more foreign investors have started many projects in various fields. Their participation in the Association of the South East Asian Nations (ASEAN) is also an important breakthrough. It could be foreseen that co-operation among these countries would increase in every field, in particular, exchange of commodities, which consequently will require improvement of transportation networks, including regional navigation scenarios.

Although the trade opportunities are there, and although some improvements for waterborne transport and maritime shipping access have been carried out, many physical and non-physical obstacles still remain. These constraints consist of operational and administrative shortcomings (no common navigation rules and safety standards, no training, inefficient custom and immigration procedures, etc.), channel obstructions (shoals and sedimentation, insufficient waterway maintenance, lack of aids to navigation, etc.), poor port and related facilities and a lack of transport promotion capacity (marketing strategy, hinterland facilities, acquisition of cargo), etc. All these weaknesses, problems and threats have been identified and analysed during the formulation of the MRC Navigation Strategy.

3.3 The physical characteristics – navigability of the Mekong river

3.3.1 The river's natural capacity

Navigation modes on the Mekong river can geographically be divided into two major portions:

- Upper portion suitable for inland navigation only (from the port of Simao down to Kampong Cham in Cambodia, and from Kampong Chnnang to the Great Lake in Cambodia);
- The lower portion suitable for inland and maritime navigation (from Kampong Cham to the sea and from Kampong Chnnang to the sea on the Mekong, Bassac and Tonle Sap rivers)

Not all stretches of the Mekong show the same "economical" potential for an increased ship size or for better and safer navigation. Some stretches may increase the allowable tonnage of ship sizes by simple dredging of some minor shoals or clearing one or two rapids, others require substantial civil engineering work with big volumes of capital dredging and important

maintenance dredging and rapid clearing (by rock blasting) with dubious environmental impact.

The Mekong River is highly controlled by the geological units through which it flows and is described below. A major feature is that the difference in water level on the Mekong River system between the dry and wet seasons can go up to 18 meters. This has to be taken into consideration when assigning classification of cargo volumes as the high water season allows vessels with much more draught, and accordingly more cargo, to sail on the river system.

Due to the high sediment load, the river is relatively dynamic from a morphological point of view. As a consequence, the location of banks may change, especially during and after the flood season. If these changes occur at the intersections of the river with other sections of the waterway, they may temporarily show poor navigation conditions that need to be improved either by channel marking or maintenance dredging.

The bed topography of the Mekong River reflects the influence of the plan form of the river and of the local geological controls with bedrock outcrops . All the bars and pools present in the Mekong are of the so-called forced type: imposed on the river by outward controls. For design of improvement works of the waterway for navigation it is necessary to study whether bars are forced or free-moving. Free bars (like alternate bars) move through the river system and may cause deeper scour holes travelling to occur at places where now the bed level is still fairly elevated.

Bends in the river give rise to point-bar formation at the convex (inner bend) side with an associated deep outer bend pool along the concave side. Local constrictions lead to increased velocities and these scour the river bed. Deeper river reaches can be observed at many locations due to this phenomenon. Localised bedrock outcrops cause local riverbed erosion due to a strong 3-dimensional flow pattern and increased turbulence. At some locations the presence of local rocky outcrops causes the formation of islands. When a rocky outcrop is only locally present, bank erosion may cause a new channel to arise at the bank side of the rocky outcrop. Due to bank erosion in the outer bends new channels form. Local rocky outcrops can therefore have a major influence on the plan form and the bed topography of a river reach for navigation.

Each engineering navigation improvement work starts with the usual "data-collection" which in this case means "survey". The most fundamental survey in river engineering work is a hydrographic survey of the riverbed (bathymetrics), usually completed with topographic survey of the riverbanks and mapping. Hydrographic survey brings all invisible information under water (the river bed) on a map which makes it possible to define the geometric of the navigation channel and the "thalweg" (the deepest line in the river bed). The thalweg is not necessarily (but often) the optimum navigation channel.

The natural navigational capacity of a stretch is determined by observing the LAD ("Least Available Depths"), the curves and bends of the "natural" navigation channel, the current velocity and the direction of these current towards the navigation channel, and finally the shores, embankments and natural "berths", which could accommodate vessels for loading and unloading operations; without the need of any physical improvement work.

The river's maximum natural capacity requires a sound knowledge of all hydrographic data, and is often underestimated since not always the optimum navigation channel is found or used. Therefore, it is necessary to update these data, by continuous survey activities if we want to make use of the river's natural capacity and avoid carrying out the expensive engineering improvement works.

3.3.2 Initial steps in navigation improvement

After the extensive surveys for a continuous updating of the hydrographic data, it is necessary to transmit the gained information to the waterway users (the captains, helmsmen, skippers and sailors..), who use the waterway every day and usually define their "maximum capacity" (e.g. the LAD) on a test and trial basis.

Making updated hydrographic information available to the navigation sector is a way of improving the quality and safety of river transport.

The next step, following these updates, is the installation of a reliable set of aids to navigation system, such as shore marks, buoys, beacons, leading lines, and channel marks. In unstable (sandy, silt or muddy) river beds, these aids to navigation require a continuous update and follow up, illustrated by a great flexibility and ease response to rapidly changing situations. Additional difficulty is the great level difference between "low flow regime" and "flood regime", in the upper Mekong stretches often more than 10 to 13 metres. Channels also change under these circumstances.

So far, no engineering improvement work has been carried out along the Mekong River. The measures described here aimed at taking benefit from the existing natural navigation capacity without any physical improvement.

3.3.3 Navigation improvement by physical engineering

However, it is not wise enough to keep a river's natural capacity under the condition, e.g. by its only existing shoal on a sandbar at several places, making the navigation channel shifts from left to right, realising that removing this sandbar (by dredging for instance) the river stretch's LAD increases with 0.50 m. Physical work fully justifies the removal of such hindrance, provided that the economical justification for the expenditure -and the maintenance- is possible.

The Mekong river, in most of its stretches, is a typical example of this fact. Multiple small sandbars (or shoals, rapid-thresholds, etc.) hinder navigation and unfairly reduce the LAD to disturbingly low values, when realised that 90% to 95% of the river length has a much greater potential and navigation capacity than the "official" LAD. These obstacles are the focus of the navigation and waterway expert. They unfairly limit navigation capacity where, for moderate expenses distinct results can be obtained.

However, externally imposed changes to an existing stability of a river morphology results in the nature attempting to return the situation to its original equilibrium. Dredged channels silt up, cleared rapids change the water tables up and downstream and redefine the river morphology. No changes to the "natural" riverbed can be made without having a more or less serious disturbance of the natural balance between sedimentation and erosion, with consequences for the water levels up- and downstream the affected areas.

Environmental impact assessments are compulsory to any "external" morphology change of the riverbed.

3.3.4 The ultimate navigation improvement

Each river has its "natural navigation capacity". Each river has its "maximum navigation potential" whether defined on an economical basis or on an engineering basis. There are no common rules for that and gradually, as engineering works progress, as navigation improvements are being realised, it will become clear that "sustainability" of each step is an "economical value" which defines how much money can be spent on "maintaining" a situation which externally has been imposed.

The more funds are available for "maintaining such situation" the higher the "economical navigation potential" of a river stretch will be.

However, there is always a "limit", either determined economically or technically. A navigation channel can no longer be dredged because the authorities can no longer afford the expenditures, which are in disproportion of the "economical" benefits, or the channel can no longer be dredged because it silts up faster than it can be maintained.

3.4 Regional navigation development scenarios

According to the workshop organised by the BDP Team on the sector/cross sector development objectives for IWRM, held at the MRC Secretariat in January 2005, the development objective for Navigation in the LMB was defined as:

> *Coordinated and improved navigation developed as an independent mode of transport and as part of a multimodal transport system*

In view of this development objective, two major sections have been regarded:

(1) The Upper Mekong Navigation, which includes the busy Simao – Chiang Khong/Chiang Saen route and the smaller but socially very important domestic traffic downstream of Louang Prabang to the border between Cambodia and Lao PDR.

The physical border for navigation is the Khone Falls at the border between Cambodia and Lao PDR. Multimodal transport links North-South are possible by transhipment to road traffic by-passing the Khone Falls.

(2) The Lower Mekong Navigation, downstream of the Khone Falls which includes maritime transportation up to Phnom Penh (and Kampong Cham in the future) and the very busy network of waterways in the Viet Nam part of the delta as vital links to Can Tho and Ho Chi Minh City.

Important note:

These scenarios focus on the prospective routes between hinterland zones and economic poles. The Regional Master Plan will of course also deal with the broader picture such as required physical infrastructural works, (dredging, river training works, construction of ports and landing facilities, modernization of ports, multimodal requirements, surveys, mapping, removal of wrecks, fleet modernization, cargo handling, dock yards and ship building, night navigation, etc.), institutional arrangements, training, private sector involvement, etc.

The MRC Navigation Programme will undertake a substantial part of this through transport planning, legal frameworks and navigation agreements, standardisation and harmonisation of rules and regulations, improvement of safety and efficiency, environmental protection, set-up of river information services and capacity building in selected areas.

3.4.1 Upper Mekong navigation, upstream of the Khone Falls

Between the year 2000 and now, waterborne transportation on the Lancang-Mekong has increased drastically, mainly in the Upper stretches between Simao and Louang Prabang, based on the navigation agreement that was signed in April 2000.

- Major flow is oriented North-South – Upper Mekong Corridor, a multimodal transport system linking two major economic hinterland poles, Kunming and Bangkok.

The other stretches between the Cambodia- Lao PDR border and Louang Prabang form a smaller part of multimodal transport links but constitute important parts of domestic routes.

- Regional cross-haul and long haul traffic between Lao PDR and Thailand and domestic long-haul and cross-haul traffic in the Lao PDR.
- Access to southern and land-locked Lao PDR from the sea by means of multimodal transport;
- rural but socially important water transportation between communities along the river where navigation is the only mode of transport; and
- transport of passengers and tourists.

3.4.2 Lower Mekong navigation, downstream of the Khone Falls

The junction between the Mekong, the Bassac River and the Tonle Sap at Chaktomuk, in Phnom Penh, creates a unique hydrologic behaviour of the latter, with both-way current, due to the role of the Great Lake as flood regulator. Then, in the delta area the Mekong and the Bassac both run into the South China Sea through nine mouths, known as the Nine Dragons, in Viet Nam. Passage between these two rivers is possible at the Vam Nao Pass in Vietnam.

The transport system of the Mekong Delta in Viet Nam and Cambodia is based on dense and efficient network of navigable waterways whereas the share of road traffic of which one is dedicated to the transport of goods between Phnom Penh and the sea-port of Sihanoukville. The main ports in the delta are the ports of Ho Chi Minh City (Saigon Port), Vung Tau, Can Tho, Sihhanoukville and Phnom Penh. Since the Doi Moi policy in Viet Nam, the economic boom has been significant. The virtually non-existent private sector has now become an important development force. Throughout the eighties Viet Nam experienced shortages in food but has since grown into one of the biggest rice exporting nations in the world. It is forecasted that rice export will reach 5-6 million tonnes by the year 2010. A large proportion is exported to other South East Asian countries. Other important trades are in other agricultural products, seafood, construction materials, fertilizer. From Cambodia the main export volumes are garments. The main port hubs are Ho Chi Minh City and Bangkok (and Laem Chabang) which act as smaller mother ports maritime links with Europe and the Middle East, the United States/Canada and Australia. The smaller ports such as Sihanoukville and Can Tho act as feeders. Phnom Penh Port acts as both: direct feeder port (e.g. sea-going traffic between Phnom Penh and Singapore) and inland barge traffic to and from Ho Chi Minh City.

A particularly significant inter-relationship exists between the Mekong Delta and Ho Chi Minh City. A considerable proportion of the Delta's agricultural output is processed in Ho Chi Minh City and a significant part of Delta related trade and transportation is run out of Ho Chi Minh City. It stands to reason that this will change in the future. Viet Nam is trying to make the port of Can Tho its third largest port mainly to provide an export import hub for the Delta. The Bassac river will then form the most important transport corridor in the Delta, together with the main feeder waterway channels. One problem here however is the difficult physical accessibility for sea-going vessels entering the hydrodynamically complex Bassac Estuary which is now limiting vessels to 5000 – 7000 DWT. The Government of Viet Nam wants vessels with capacity up to 20,000 DWT to have passage up to Can Tho port all year round. Until improvements are made in the access channel however, the further development of navigation on the Mekong Delta and the development of Can Tho Port will be closely related to the use of river-sea vessels which can connect the South China

Sea with Phnom Penh Port in Cambodia and to the inland water transport network in the LMB.

For Cambodia, a link between its main garment production center, Phnom Penh, and its overseas trading partners will be vital for this industry. Now that Cambodia has entered the WTO as a full member, the textile trade quota are abolished as from January 2005. This means Cambodia will have to compete with textile producing nations that have a better infrastructure network and thus less transport expenditures. In order to guarantee a place in the world textile production scene, Cambodia will have to focus all its efforts on reducing its textile export expenditures, basically speaking lower the transport costs. In the MRC Navigation Programme a general action plan was made to reduce the physical and non-physical barriers to non-stop navigation between Phnom Penh and the sea.

The challenge is now to find the optimal solution that will serve both Cambodia and Viet Nam in developing trade facilities using the Mekong River System to its fullest and with mutual benefit.

4 Comments on the impacts on navigation by the BDP scenarios

Mekong River Commission is currently[1] assisting the World Bank towards developing a Mekong Regional Water Resources Assistance Strategy that will set out the scope for potential assistance to both regional and national projects in the basin over the next 10 years. A comprehensive Decision Support Framework is under development and the hydrological component is already in place, and has been calibrated, tested, approved and adopted by the MRC. It comprises a suite of models that make it possible to simulate major hydrological aspects of river basin behaviour, which can in turn support and inform the negotiations that are now addressing the water-sharing issues. These models have the capacity to test and evaluate development scenarios defined generically in terms of hydropower development, irrigation development and inter-basin diversions. The output of the models is quite narrowly hydrological - water utilised for irrigation and power generation; river flow and stage at key locations; volumes; inundated areas, depths and duration of inundation; and salinity levels. These parameters can in turn provide insights into possible impacts on a number of sectors, including navigation.

All the scenarios generally show substantially improved opportunities for navigation in the LMB upstream of Kratie. This is a result of the redistribution of flow from wet to dry season as a result of hydropower dams, and is particularly significant in the higher reaches of the river, where navigation access that is currently only experienced for 2-3 months each year on average will in future be virtually year-round.

A link is prepared between the changes in river flow, in terms of river depths) and the respective increase/decrease in tonnage capacities of shipping.

[1] (by late 2004/early 2005)

Appendix 2: Strategic directions for IWRM in the Lower Mekong Basin

Contents

Acronyms and abbreviations

ADB	:	Asian Development Bank
ASEAN	:	Association of South East Asian Nations
BDP	:	Basin Development Plan (under MRC)
DSF	:	Decision Support Framework
GMS	:	Greater Mekong Sub-Region
GMS-SEF	:	GMS Strategic Environment Framework
GWP	:	Global Water Partnership
IFI	:	international financial institution
IUCN	:	International Union for the Conservation of Nature
IWRM	:	Integrated Water Resources Management
IWT	:	inland waterway transport
LMB	:	Lower Mekong Basin
M&E	:	monitoring and evaluation
MDG	:	Millenium Development Goals (under the UNDP)
MRC	:	Mekong River Commission
MRCS	:	Mekong River Commission Secretariat
NGO	:	non-government organisation
RBO / RBC	:	river basin organization / committee
UNDP	:	United Nations Development Program
WSP	:	Water and Sanitation Program
WSSD	:	World Summit on Sustainable Development, Johannesburg,
WUP	:	Water Utilisation Program (under MRC)
WWF	:	Worldwide Fund for Nature

Map of the Mekong River Basin

1 Introduction

1.1 Purpose

This document sets out strategic directions for development of water resources in the Lower Mekong Basin for the next 20 years. It is intended to lend guidance to sustainable water resource development and management in the LMB, and is relevant to all stakeholders. It aims to synthesize directions identified in national plans and strategies and add a basin dimension, and to promote the approach of Integrated Water Resources Management (IWRM) within the Basin.

Implementation of IWRM is the responsibility of all stakeholders in the Basin, from local communities to national governments and regional organizations. This document provides a context and broad framework for a coordinated approach. It will be translated into action through a range of national and regional instruments, including the MRC Strategic Plan (2006-2010), national IWRM strategies, and regional initiatives such as the World Bank Mekong Water Resource Assistance Strategy (MWRAS), ASEAN Strategic Plan of Action on Water Resources Management, ADB's Greater Mekong Subregion program.

From the strategic directions identified in this document, the MRC Strategic Plan (2006-2010) will draw out goals and actions relevant to regional and trans-boundary issues that are under the mandate of MRC, to establish MRC's areas of action for the next 5 years. Within this, the MRC Basin Development Plan will provide a specific framework for identification and promotion of high priority projects; and support to national IWRM to ensure consistency between national and regional strategies.

1.2 Rationale and approach

Due to the complexity of water resource development and management in the Lower Mekong Basin a joint approach to water resource planning is essential. The complexity of the system and its stakeholders means that it is not realistic to frame a single, all-encompassing plan for water resources in the LMB. However, based on national water policies and plans and on international agreements, the countries of the LMB share a set of goals, issues and concerns regarding water resources and from these it is possible to identify agreed priority areas for action in water-related sectors.

This paper has been prepared as a part of the Mekong River Commission's Basin Development Plan (BDP) program (Appendix 1). It draws together information from a wide range of sources, including

- the extensive process of national consultation under BDP regarding regional, national and sub-area development plans, policies, strategies and options (coordinated by the National Mekong Committees)
- information and analyses from the BDP's planning process (for example, sub-area analyses and development scenarios)
- consultation, information and strategic directions identified under MRC programs
- enhanced understanding of LMB hydrology resulting from the Basin Models and DSF developed under MRC's Water Utilization Program
- consultation with donors and investment banks (including World Bank, ADB, Danida, SIDA, AusAID).

It spells out the concepts, principles, practices and guidelines that constitute 'good' IWRM, and why it is important such concepts and guidelines drive the next phase of Mekong basin water resources development. It identifies eight major areas of IWRM that are seen as of most relevance to the Mekong basin at this stage, and specifies a broad reaching objective for each category with a general description as to how the various 'players' in the basin might address issues as a means of moving toward the objectives.

2 Shared vision, goals and values

2.1 Vision

The countries of the Lower Mekong Basin, through the MRC, have enunciated a shared vision of

> *"an economically prosperous, socially just and environmentally sound Mekong River Basin" (MRC Mar 2001).*

This vision is reinforced by a shared commitment to

- Regional political and economic cooperation, as embodied in ASEAN (Association of South East Asian Nations) and the Asian Development Bank Greater Mekong Sub-region program (ADB-GMS)
- Millennium Development Goals (set out by the United Nations – see below);
- Sustainable development (as defined under Agenda 21)[1]
- Integrated Water Resource Management (see Section 2.3); and
- Poverty alleviation (as set out in national policies)[2].

Millennium Development Goals

1 Eradicate extreme poverty and hunger
2. Achieve universal primary education
3 Promote gender equality and empower women
4 Reduce child mortality
5 Improve maternal health
6 Combat HIV/AIDS, malaria and other diseases
7 Ensure environmental sustainability
   - Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources
   - By 2015, reduce by half the proportion of people without access to safe drinking water.
8 Develop a global partnership for development

1 http://www.un.org/esa/sustdev/documents/agenda21/index.htm

2 National poverty reduction strategies of Cambodia, Lao PDR and Viet Nam; and the 9th National Economic and Social Development Plan of Thailand

2.2 Shared goals and values

Based on the 1995 Mekong Agreement, the Millennium Development Goals, and on national policies and plans, a set of shared goals and values can be identified which will guide the way in which the river and its resources are used to achieve the shared vision.

Economic growth and development

Realising the economic value of the Mekong for development: To achieve equitable and sustainable use of the Mekong River and its resources to contribute to social and economic development.

Poverty alleviation[1]: To give high priority to water resources developments which contribute to poverty alleviation.

Maximising water productivity: To make efficient use of Mekong Waters and prevent wasteful use by treating water as an economic good.

Freedom of navigation: To ensure freedom of navigation throughout the mainstream of the Mekong, without regard to territorial boundaries to promote regional cooperation, trade and economic exchange.

Regional integration: To promote economic and social integration in the Mekong region through coherent water resource development and environment protection

Protection of Mekong resources: To protect the productive capacity of the Mekong (including the fishery and aquatic resources). The Mekong is an important resource base for many industries. In particular, the freshwater capture fisheries is an important economic resource and forms the basis of semi-subsistence livelihoods for many people in the LMB.

Dealing with climate variability: To prevent, minimize of mitigate people's suffering and economic loss due to climate variability (floods and drought).

Social development and equity

Access to water for basic human needs: To provide access to sufficient water of adequate quality for basic human needs to all the people of the basin.

Cultural and heritage values: To respect and preserve the important cultural and heritage values for the Mekong for the people of the LMB.

Reasonable and equitable use: To take account of equity between countries, and encourage equity of access for different ethnic and social groups (particularly women and the poor) in development of water resources; and to ensure that benefits in the future are not precluded (inter-generational equity).

Environmental protection

Protection of environment: To protect environment, natural resources, aquatic life and conditions and the ecological balance of the Mekong Basin from harmful effects of development.

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1 Poverty alleviation is equally an economic and a social goal

Prevention of pollution: To prevent pollution and other harmful effects of development, and acceptance of responsibility for damage caused.

Protection of important habitats: To protect important habitats and wetlands, including Tonle Sap Great Lake.

Maintenance of flows: To maintain Mekong flows in both the wet and dry seasons within agreed limits (negotiated under the 1995 Agreement).

Governance

National sovereignty: To protect the entitlement of the riparian countries to use the waters of the Mekong system within their respective territories, within the limits of reasonable and equitable use, and subject to the Procedures negotiated under the 1995 Mekong Agreement.

Regional cooperation: To promote cooperation between the countries of the Mekong basin in managing the Mekong and related resources for the mutual benefit of all.

Watershed-based management: To encourage all countries to recognize the watershed as the most appropriate unit for water resources management.

Institutional and legal frameworks: To promote the establishment of open, transparent and accountable institutional and legal frameworks for water resource management that are consistent across the Basin.

Monitoring and evaluation: To ensure that monitoring and evaluation are an integral part of all water resource development programs to promote equity and efficiency.

Stakeholder participation in decision making: To base water resources development and management on a participatory approach, involving users, planners and policy makers at all levels.

Human resource development: To improve the capacity of all stakeholder groups to manage water resources through training and education programs.

Areas of cooperation

The 1995 Mekong Agreement states that the countries agree "to cooperate in all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River Basin including, but not limited to irrigation, hydropower, navigation, flood control, fisheries, timber floating, recreation and tourism"[1].

[1] 1995 Mekong Agreement, Chapter 3, Article 1

2.3 Principles of Integrated Water Resource Management [1]

> "Integrated Water Resources Management is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."
>
> *Global Water Partnership*

MRC member countries are committed to implement IWRM principles in managing the water resources of the LMB. IWRM is not an end in itself but a means of achieving three key strategic objectives (Global Water Partnership, 2003):

Efficiency in water resource development and use: Maximising the economic and social welfare derived both from the water resources base and from investments in water services;

Equity in the allocation of water resources and services across different economic and social groups, to reduce conflict and promote socially sustainable development;

Environmental protection, as ultimately all attempts at water management reform will fail if the water resources base and associated ecosystems are compromised.

The following benchmarks of "good IWRM" can be defined (Millington 2004):

- Institutional and regulatory frameworks with clear pathways of accountability – establishing the ethic and performance of good governance
- Knowledge-driven planning and management, with open sharing of information
- Community and stakeholder participation – partnerships between government and community for demand-responsive approaches to development
- Integration and coordination of policies and programs across sectors, countries, competing stakeholder interests and levels of government.

All activities, programs and projects relating to water resources should be guided by IWRM concepts and contribute to sustainable development.

The World Summit on Sustainable Development (WSSD) in Johannesburg, 2002, set at target of developing "IWRM and water efficiency plans by 2005" (WSSD Plan of Implementation, Article 26). All countries in the LMB are engaged in formulating water resource strategies at the national level (see Section 3.3), but these are at varying stages of completeness. This paper aims to give a regional view, as an overarching framework of principles and guidelines within which the national strategies will provide more detailed plans for action.

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[1] In this context, management explicitly includes the concepts of both development and utilization.

3 Situation analysis

3.1 State of the Basin – current conditions

The water resources of the Lower Mekong Basin are described in some detail in the MRC State of the Basin Report (MRC 2003). In strategic terms, important characteristics of Mekong water resources include:

Abundance: Annual runoff averages around 475 km3 / year. Per capita resources currently stand at over 8500 m3/person/year – compared with 2200 for the Nile; 1400 for the Rhine; 2265 for the Yangstze and 1700-4000 for the Ganges (WRI, 2003).

Low level of exploitation for extractive uses: Average annual withdrawals are estimated at around 60,000 million m3, or 12% of total annual flows; the total volume of regulated storage in the basin (including the Upper Basin) for hydropower and irrigation is less than 20,000 million m3 (less than 5% of annual flows).

High dependence on in-stream uses (particularly by the poor): The Mekong fishery is the largest inland fishery in the world, estimated to be worth at least $US 2,000 million annually, and providing the major protein source for many people in the basin. Inland navigation is an important mode of transport for many areas where road access is limited. There is an urgent need to balance in-stream uses against extractive demands as agricultural production in the LMB is expanding rapidly.

Extreme seasonality: 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 (MRC DSF).

Importance of the flood pulse for the ecology of the floodplain and the Mekong fishery: During the wet season, between 1 and 4 million hectares of floodplain are submerged, including the Tonle Sap Great Lake.

Dry season water shortages: Dry season shortages occur as a result of the rainfall seasonality, concentration of extractions in the driest period and drought events during the onset of the wet season.

Water quality: Water quality in the mainstream is generally good, and is rarely a constraint to water use. The exception is saline intrusion, acid sulphate drainage and pollution in intensively used areas of the Mekong Delta

Groundwater: Groundwater resources are very widely used as a source for domestic and industrial supply. Use for irrigation is limited, but expanding. Groundwater systems in the flood plain are closely coupled to the river.

Upper Basin: Flows from China and Myanmar constitute around 18% of total Mekong flows. The proportion is higher in the dry season, when snow melt contributes a significant component of flow.

3.2 Scenarios for the future

Over next 20 years, the Mekong Basin will undergo great social and environmental change. The rate of change is already very rapid, driven by a complex mix of demographic, economic, technological and social factors, as well as external factors such as globalization and climate

change. It is not possible to predict the exact path of change, but existing trends can be used to outline likely directions. By 2025, population in the LMB could reach between 75 and 90 million. Demands for food, water supply and energy will increase even more quickly, as a result of economic growth, industrialization and urbanisation. To meet these needs, production in both agriculture and fisheries will need to increase significantly. Irrigated area could increase by over 30%, and intensification of cropping will further increase demand for water. Increased demand for energy, for internal use and export, could result in development of up to 50,000 million m3 of new storage.

Studies have been initiated by MRC to investigate the impacts of different future development scenarios for the Mekong. Scenarios were formulated to investigate the likely "development space" within which the LMB will operate over the next 20 years, based on national policies and plans, demographic trends and market demands, as well as external factors such as the impact of development in the Upper Mekong. The results describe the possible effects that such assumed developments might have on the hydrology and selected environmental indicators in different parts of the basin and provide a preliminary assessment of broad development options. Strategic conclusions from these studies are summarized below. A summary is given in Appendix 3, and full details are available in MRC-BDP (2005a,b).

- Construction of the planned cascade of dams on the Upper Mekong in China (MRC 2005a, Plinston and Daming 2000) would change flow conditions in the northern reaches of the Mekong (in Thailand and Lao PDR), mainly by increasing flow in the dry season and reducing flow in the flood season. Short-term (hourly to daily) flow variability may also increase. The impact on the floodplain, Tonle Sap and the Delta would be largely mitigated by inflows from major tributaries within the LMB. Long term development plans for LMB should be evaluated in the context of the resulting changed flow regimes.

- Construction of storages (whether in the Upper or Lower Basin) will result in transfer of flows from the wet to the dry season, with corresponding opportunities for increased dry season irrigation and improved conditions for dry season navigation. Storages may impact on fishery productivity by obstructing migration routes; by reducing the overall extent and duration of inundation of floodplain and wetland ecosystems (particularly in low flow years); by increasing dry season flows; and by increasing short-term flow variability. The impacts of increased dry season flows on fish ecology are not yet well understood.

- Without offsetting storage, extraction and diversion of water for irrigation development may result in decreased dry season flows and a concomitant increase in the area affected by salinity intrusion. However, additional water storage and increased dry season flows associated with planned hydropower development are more than sufficient to offset likely increases in irrigation withdrawals.

- Developments on the floodplain (such as embankments and dykes) can potentially change flood patterns and duration in the floodplain significantly. Changes on the floodplain itself are likely to have larger impacts on the floodplain than flow changes in the river due to upstream regulation.

- The impact of development on Mekong flows is likely to be significant and observable, but that currently proposed levels of development are not likely to dramatically change the nature of the Mekong's seasonal flow patterns or the functioning of the Tonle Sap Lake. The ecological significance of local changes,

particularly to the floodplain, needs to be carefully assessed. The analysis reinforces the importance of a balanced and coordinated approach to water resources development and management.

3.3 Institutional analysis

At the **national level** [1], administration, planning and legislation for water resources in each country is generally distributed between several ministries. National planning is often sector driven, with limited consideration given to cross-sectoral interactions. In addition, each country has national, provincial, district and local (village, tambon or commune) levels of administration, all of which may have responsibility for aspects of water resources management. In all countries there is a move to decentralization and devolution of planning, moving responsibility to the lowest appropriate level (following the subsidiarity principle).

All four countries have **provincial, district and local level** government organizations which have responsibility for the management of local water resources, such as dams, water supply, and irrigation projects. A summary of the planning processes within each country is given in Poppe (2004).

National water resource laws and strategies have been formulated, or are under consideration in all four countries[2].

- In Lao PDR, a water sector strategy and action plan have been prepared by the National Water Resources Coordinating Committee. The strategy includes initiation of an IWRM approach in important river basins.

- In Viet Nam, a law on water resources was adopted in 1998 and a National Water Resources Council was recently established. Implementation of the law is underway, including establishing river basin organizations (RBOs) for major river basins, including the Mekong Delta. A National IWRM Strategy is currently being formulated.

- In Thailand, a water resources law is being formulated. In line with Thailand's emphasis on decentralized planning and management, the National Water Resources Committee has begun implementation of water resources management through river basin committees (RBCs). A National Water Resources Strategy Plan is currently being formulated.

- In Cambodia, the National Water Law has been submitted to the National Assembly for approval. A national water strategy is being formulated through integration of relevant sector strategies by the Ministry of Water Resources and Meteorology (MOWRAM).

As part of the implementation of their new water laws and policies, **River Basin Organisations** (RBOs) or Committees (RBCs) have begun operation in parts of Thailand and Viet Nam, and are being formed in Cambodia. These will represent a wide stakeholder base,

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1 Comprehensive reviews of the institutional and legal frameworks relating to water resources planning and management in the Mekong countries are given in MRC-BDP (2002); Poppe (2004); Hannam (2003); Zhang (2005); Badenoch (2002); Birch (2005) and Millington (2005).

2 In accordance with the WSSD target, WSSD Plan of Implementation, Article 26.

incorporate the principles of IWRM and provide a spatial basis for inter-sectoral integration of water resources planning.

At the **Basin level,** international and multi-lateral agreements and laws potentially play an important role in promoting sustainable use of land and water. Hannam (2003) identifies 25 international and regional conventions, treaties, protocols and declarations relevant to water and land management in the Mekong region. These have the status of guidelines or protocols – there are currently no binding regional legal frameworks. The most comprehensive regional agreement relating to water is the 1995 Mekong Agreement, which established MRC as a platform for cooperation and negotiation regarding shared water resources (see Section 3.3.1). MRC has a potential regulatory role for water through the rules and procedures envisaged in the 1995 Agreement. Regional cooperation and joint planning may be a more efficient mechanism than strict regulation.

Economic co-operation in the region is promoted through both the Asian Development Bank Greater Mekong Sub-region Program (ADB-GMS) and various mechanisms of the Association of South East Asian Nations (ASEAN)[1]. Both organisations have programs in sectors relevant to water resources, including energy, transport and agriculture. Neither ASEAN nor ADB-GMS have associated regulatory or legal frameworks, although the GMS Strategic Environmental Framework (GMS-SEF) provides guidelines for promoting sustainable development and use of natural resources.

Mekong River Commission

The Mekong River Commission was established by the 1995 Mekong Agreement, specifically to promote cooperation for sustainable water resource development in the Lower Mekong Basin. MRC is the lead agency for coordination of water related issues in the LMB. The member countries are Cambodia, Lao PDR, Thailand and Viet Nam; China and Myanmar are dialogue partners, and cooperate increasingly in MRC programs.

Under the 1995 Agreement, the countries established a clear management framework for the Mekong River Basin, of which the key elements are:

- An **institutional framework** (the MRC) to act as a focal point for cooperation, and to provide technical guidance and mediation
- A **policy framework** of agreed goals and objectives for development
- **Procedures, rules and guidelines** that facilitate interaction between the member states, provide a mutually agreed basis for utilizing the waters of the Mekong in a reasonable and equitable manner (see Box)
- A **monitoring system** and procedures to ensure that sustainable limits are not exceeded and to provide information to guide future development
- A **basin-wide planning process** (the BDP) by which the member states can identify and promote projects and programs to fulfill the aims of the Agreement.

[1] GMS includes all six countries of the Mekong Basin - Cambodia, Lao PDR, Thailand, Viet Nam, Myanmar and China. All except China are members of ASEAN.

Procedures negotiated through the Mekong River Commission

- Procedures for Data Information Exchange and Sharing (PDIES) – 2003
- Procedures for Water Use Monitoring (PWUM) – 2004
- Procedures for Notification, Prior Consultation and Agreement (PNPCA) – 2004
- Procedures for Maintenance of Flows in the Mainstream (PMFM) – under negotiation
- Procedures for maintenance of water quality - under negotiation

MRC Water Utilisation Programme

4 IWRM in the LMB – strategic priorities

Eight key result areas in IWRM of most relevance to the Mekong Basin at this time have been identified, recognising that later, other areas or categories might become dominant:

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

4.1 Economic development and poverty alleviation

Objective: To promote economic growth through use and development of joint water resources in a manner that significantly alleviates poverty

The most pressing requirement for all the countries is to realise economic and social development through use of water and related resources. This drive must be balanced by two considerations: protection of the water resource base to ensure environmental sustainability; and equitable distribution of the benefits from development, to ensure social sustainability and prevent conflict.

In addition to the macroeconomic benefits of accelerated growth, properly managed economic development can also have a significant and positive impact on poverty alleviation.

The water and related resources of the Mekong Basin serve as inputs into productive activities. As a resource management organization, the MRC's role is to lend guidance to the development of the resources to build a favorable investment climate that is attractive to donors and private sector investors alike. Through their work, the MRC can further ensure that economic development patterns have a poverty alleviation impact while protecting the environment.

The abundance of surface water, low level of development and generally good water quality in the LMB indicate that very significant opportunities exist for exploitation and development of water and water-related resources. Except in the Delta and more mountainous parts of Lao PDR, land suitable for irrigation is not limiting; abundant sites suitable for hydropower development exist; and the potential for expansion of navigation and tourism is high. In most cases, access to markets will be as significant a constraint as access to natural resources and it will be necessary to partner with other regional initiatives to simultaneously improve access to markets and resources.

Key issues for water resource development and utilization are:

- Providing a predictable and fair resource management framework, as a basis for a favorable investment climate
- Identifying and promoting investment opportunities that are responsive to real development demands and have a favorable poverty impact
- Linking with appropriate regional initiatives to exploit comparative advantages in pursing basin development
- Ensuring balanced and equitable development, between different areas and different sectors

Priority areas for action

Priority areas for action have been identified from national policies and plans, national and regional sector overviews and from sub-area and national consultation processes under the Basin Development Plan program. Development opportunities have been identified from each of the major sectors; summaries for each sector are provided in Appendix 2.

Common priorities emerging from all sectors include:

- Formulation of consistent or non-conflicting regional development strategies for key sectors, in particular irrigated agriculture and hydropower.
- Identification of synergies between proposed national projects, and combining projects into joint and/or cross-sectoral programs
- Improved cross-sectoral planning through a coordinated programme of land use planning (land suitability / capability assessment)
- Identification of an agreed set of indicators to assess trade-offs between sectors (through economic valuation methods)
- Value-adding through processing, market development and improved access to markets
- Mechanisms for developing joint and basin-wide projects from the agreed IWRM framework (for example, through MRC's Basin Development Plan program).

Agriculture and irrigation:

- Increased irrigation water use efficiency
- Land suitability / capability studies to identify the most promising areas for irrigation expansion
- Expansion and development of irrigation in priority areas
- Restoration and modernization of existing irrigation schemes
- Assessment of the feasibility of inter- and intra-basin transfer of water to priority areas
- Higher returns from irrigated and rain-fed agriculture, through improved farming practices, promotion of high quality production (rather than mass production), intensification and diversification of crop types and livestock, and support to processing, distribution and marketing.

It is important to note that improvements to irrigation will not be effective unless the underlying institutional structures for agriculture, such as land reform and land titling, are in place

Hydropower

- Ranking of proposed projects in terms of efficiency, financial viability and social and environmental outcomes
- Optimising operation rules to minimize downstream environmental impacts
- Assistance with preparation of detailed proposals for high priority projects
- Identification of joint projects to take advantage of synergies between hydropower generation and irrigation development (in terms of additional dry season flows from storages)
- Cooperation with upstream countries in planning and managing hydropower projects.

Navigation:

- Development and implementation of ports, river works and regional waterways
- Regional standardisation schemes (border regulation, navigation aids, navigation rules, pollution control, certification, pilotage, monitoring, statistics)
- Morphological management, including bank protection and dredging
- Promotion of international navigation both within the LMB and with upstream countries.

Fisheries

- Management and protection of the capture fisheries, particularly co-management of fisheries involving local communities
- Development of reservoir fisheries and aquaculture; in particular, small scale aquaculture for rural households and aquaculture of indigenous Mekong species
- Value-adding through marketing and processing

Watershed management:

- Development and promotion of watershed-related knowledge, awareness and attitudes among stakeholders and decision-makers in the public and private sectors
- Integrated spatial planning for water related natural resources at local, national and basin levels
- Improved agricultural practices in upland areas (particularly with regard to shifting cultivation)
- Support to sustainable commercial forestry, agro-forestry and traditional forest-related livelihoods, including reforestation and greening schemes
- Appropriate management (including management plans and monitoring) of important habitats, including restoration and protection.

Tourism

- Promotion of water-based tourism, particularly community-based eco-tourism and agro-tourism.

Domestic and industrial water supply and sanitation

- Maintenance, rehabilitation and expansion of urban and rural water supply and sanitation infrastructure (particularly for the poor)
- Provision of rural water supply (in line with MDG 7)
- Prevention and mitigation of pollution (both urban and rural)

4.2 Environment protection

Objective: Protection of environment, natural resources, aquatic life and conditions and the ecological balance of the Mekong River Basin from... harmful effects of development (1995 Agreement)

Protection of the water resource base is crucial both to secure human uses, and to protect the natural and cultural values of the river. Potential threats include loss of wetland habitats and active flood plains, unsustainable water consumption, river regulation, loss or degradation of habitats, pollution (both from industry and agricultural runoff), and over-harvesting of significant species. Several threats have a trans-boundary and/or a distinctive cumulative character. One of the key issues in environment protection in the LMB is a lack of coordinated environmental planning, and coherent regulatory and planning structures and institutions are essential for effective environment protection (see Sections 4.5 and 4.8).

Protection of the water resource base falls into four broad areas (MRC 2005c), all of which are covered by the 1995 Agreement:

- Maintenance of flows
- Maintenance of water quality
- Protection of aquatic ecosystems and biodiversity (habitat management)
- Protection of watershed functions (catchment land use management)

Changes to the river associated with development will inevitably change the river's ecosystems. A balance between development and protection will often mean trading off some degree of environmental value to gain a development benefit. Determining where the balance should lie requires understanding of the potential impacts of change, and of the value of ecosystems in terms of the total range of goods and services they provide.

Maintenance of flows

Procedures for maintenance of flow in the mainstream (PMFM) are being negotiated under the Water Utilisation Programme (WUP), in accordance with the 1995 Agreement. Determining acceptable limits for change from the natural regime that allow utilization of the river without causing unacceptable change to the ecosystems requires a clear understanding of the links between river flows or quality and the health of particular ecosystem components. MRC has instituted the Integrated Basin Flow Management Program (IBFMP) to provide a technical assessment of impacts of changes in flow on the ecology of the river.

Maintenance of water quality

Procedures[1] for water quality are to be drafted by MRC under the Water Utilisation Program, by the end of 2005. Since 1995, MRC has provided technical advice on defining acceptable water quality parameters. The main area of concern for water quality in the LMB are diffuse pollution from agricultural inputs (fertilizers, pesticides, herbicides) due to intensification of agriculture with irrigation development (particularly in the Delta); and pollution from sewage and industry downstream from major population centres (point source pollution). Integrated watershed management is key to addressing these concerns, and River Basin Organisations (RBOs – see Section 3.3) potentially have an important role in this process.

Protection of aquatic ecosystems and biodiversity

To maintain biodiversity, it is necessary to preserve a diverse range of habitats, and also to preserve the linkages between them – for example, migration paths and connections between river and floodplain. Particular attention should be given to identifying and preserving important or unique ecosystems, such as the Great Lake of Tonle Sap and its surrounding inundated forest areas.

Maintenance of watershed functions

Deforestation and poor agricultural practices can significantly degrade both the quantity and quality of run-off and alter groundwater recharge. Management of catchments must take account of the links between land use, surface water and groundwater. The ecological, economic and social functions are closely linked, and there is a need for better understanding of the links (see Appendix 2.8).

Priority areas for action

- Early identification of environmental consequences of development options using SEA / CEA approaches, so that protection or mitigation measures can be included in planning
- Valuation of environmental and livelihood benefits from in-stream uses of water
- Improved knowledge about cause-effect relationships and management options for ecosystems

[1] termed "Rules" under the 1995 Mekong Agreement

- Identification of key habitats for protection
- Assessment of influence of flow regimes on the riverine systems, particularly for key locations such as Tonle Sap Lake and high value wetlands
- Integrated land use planning and management, based on land suitability / land capability assessment, and consideration of land access / land tenure issues and their impacts on water resources
- Protection of water quality through provision of sanitation for all communities, control of industrial effluents and sewage disposal
- Finalisation of procedures for maintenance of flow in the mainstream and water quality (under the 1995 Agreement).
- Enhanced collaboration with upstream countries in environmental planning and management programs.

4.3 Social development and equity

Objective: To ensure equity in the allocation of water resources and services across different economic and social groups to reduce conflict and promote socially sustainable development.

Social development is, along with economic development, a cornerstone of the development strategies of all MRC member countries. The quality of life of the poorest people in the basin area has improved only slowly, if at all, as a result of recent economic growth, and a significant share of the rural population continues to live in poverty.

Key issues of concern regarding social development include:

- Access to water for basic human needs
- Access to water-related resources (fish, wetland products)
- Equity of access for different ethnic and social groups, particularly women and the poor
- Protection of access for traditional lifestyles, cultural and heritage values
- Protection from the impacts of floods and droughts

Issues of equity and social development can be best addressed by ensuring that all stakeholders participate in planning and management decisions. As a general precept, local communities and civil society organization should always be consulted, although identification of stakeholders and the level at which they participate in decision will differ for different issues and areas.

Planning processes, in which the maintenance of water shed functions are addressed, like land use plans, village development plans, district development plans, watershed management plans are the ideal platform for community consultation and participation.

MRC initiatives in this regard include

- a Public Participation Strategy (MRC 2002) to guide integration of stakeholder consultation into its work plans and practices

- MRC Gender policy, which calls for mainstreaming of gender perspectives in all MRC development efforts, ensuring that all MRC development programs benefit men and women equally.

Priority areas for action

- Provide safe water and sanitation for all communities (in line with MDG 7), coupled with moves towards cost recovery where appropriate
- Establish clear mechanisms for community and stakeholder consultation and participation in water resource development
- Support River Basin Organisations to act as focal point for community consultation and participation
- Improve public awareness of regional water-related development and management concerns, options and constraints. This will be facilitated by producing documents in national languages
- Identification of social impacts of development policies and programs at an early stage (using Social Impact Analysis), so that adequate distribution and/or protection measures can be included.

4.4 Dealing with climate variability

Objective: People's suffering and economic loss due to climate variability prevented, minimized or mitigated

Water resource development and management takes place within the context of inherently variable climate conditions. Although the hydrology of the Mekong is one of the most regular and predictable of any river of its size, there is still significant annual variability. In addition, the possibility exists of long term changes in flow due to climate change. Dealing with variability due to floods, droughts and climate change is an integral part of water resource management and development, which impacts on all sectors. Responses must make a balance between adapting the hydrological systems (for example with storage dams and flood protection works) and adapting human systems (agricultural systems and patterns of settlement) to fit better with the existing conditions.

Flood management and mitigation

Floods are part of the natural cycle of the Mekong, and are vital to the functioning of Mekong ecosystems. The flood pulse is the engine which drives the enormous productivity of Mekong fisheries (MRC 2002). The urgent need for improved flood management and mitigation is reflected by the recurrent damage in the Lower Mekong Basin. The poor are often the most adversely affected by floods. The extent of damage will increase as the population and economy develop.

Drought

As with flooding, drought is a natural part of the climate cycle of the region. In addition to the on-going problem of access to water during the months of the dry season, drought may occur due to low overall rainfall for the year, or to delay or breaks in the on-set of the wet season causing short-term water shortages at crucial points in the cropping calendar. It is not uncommon for the Mekong floodplain to experience flooding and drought

simultaneously, with high river levels fed by rain in the upper parts of the basin, but drought conditions away from the river. Provision of irrigation storage is an important "drought-proofing" measure. Increasingly, groundwater is used to provide secure water supply for domestic use and in some cases, irrigation; but groundwater systems in the floodplain are very closely linked to the river and may also experience shortages in periods of drought.

Climate change

The overall conclusion from international climate change studies for the Mekong region, is that the total level of rainfall is not likely to change dramatically over the next 20-50 years, but that variability may increase, with longer, drier dry seasons and wetter, more intense monsoons (Hoanh et al 2002). Predictions for the Himalayas (WWF 2005) suggest that global warming could result in increased snow melt over the next 20-50 years, with resulting higher flows in rivers; but a long term decrease as the area of snow pack declines. In the long term, more specific strategies must be developed based on an improved understanding of the likely direction and magnitude of change.

Priority areas for action

- Improve flood preparedness (flood forecasting and regional flood warning system, community based preparedness) and flood emergency management
- Improved land-use planning for flood hazard areas
- Irrigation development, including storage of water for use in the dry season
- Development of drought management approaches for vulnerable communities and sectors
- Undertake studies to improve understanding of the groundwater resource and its sustainable limits
- Promote conjunctive use of ground and surface water during dry periods
- Research programs to refine long-term climate predictions for SE Asia, particularly impacts on snow melt
- Participation in relevant international conventions regarding climate change.

4.5 Integration through basin planning

Objective: Implementation of a participatory, multi-sectoral basin planning process which integrates economic, social and environmental concerns across the LMB

Integration and coordination of water resources development in the LMB has many dimensions:

- Integration between and within water use sectors to ensure maximum efficiency of resource use and economic growth (Section 4.1)
- Integration of the concerns of different stakeholders to ensure equity (Section 4.3)
- Integration of environmental and social concerns into development planning to ensure sustainability (Section 4.2, 4.3)

- Integration and cooperation between geographic areas (countries, upstream – downstream areas) to prevent water use conflicts (Section 4.7)
- Integration of policy, institutional and regulatory frameworks at different levels to ensure consistency (Section 4.8)

Basin planning provides a framework to promote integration at all levels. MRC has initiated a scenario-based assessment of broad development options for the basin (see Appendix 1 and Section 3.2). This approach integrates both across sectors (by considering multi-sector development scenarios), and spatially (through the delineation of watershed-based planning units, termed "sub-areas"). Potential impacts of different development paths are assessed in terms of the effects that planned interventions in one part of the basin will have on the natural resource systems in another part or country (using hydrological models)1. Impacts on the water resource are linked to environmental, social and economic values by considering the effect of hydrological change on ecology and livelihoods. An understanding of these values is fundamental to assessment of trade-offs between benefits and cost associated with particular development paths.

Scenarios provide a new and important perspective on the cumulative effects of development in the LMB. Analysis of scenarios indicates that proposed levels of development of water resources are hydrologically feasible, but reinforces the need to find an acceptable balance between water use and resource condition.

Key issues emerging from the basin planning process include:

- Links between regional and national planning agencies need to be clarified and strengthened, and mechanisms developed to ensure that regional planning concerns are taken up in national plans.
- Because basin planning must take into consideration all water-related developments, not only those that are implemented at the basin level, a regional inventory of all water resource developments is needed, in order to assess cumulative impacts and sustainability
- The importance of a basin-wide approach to balancing withdrawals and storage of water, through negotiation between countries and integration between sectors (specifically, irrigation and hydropower)
- Providing a strategic and rational approach to assessing trade-offs by understanding the impacts (direct, indirect and cumulative) of interventions within the context of the basin as a whole.

Priority areas for action

- Improved mechanism to integrate regional and national strategies and plans
- Regional inventory of all existing and planned water related developments
- Improved methods for describing and quantifying trade-offs inherent in different development options.

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1 The Water Utilisation Program Decision Support Framework (WUP-DSF)

4.6 Information-based management

Objective: to ensure that water resource management decisions are based on best available information.

The importance of shared information for regional decision making was recognized in the 1995 Agreement, and in accordance with its provisions, the countries have signed

- Procedures for Data Information Exchange and Sharing (PDIES)
- Procedures for Water Use Monitoring (PWUM)
- Procedures for Notification, Prior Consultation and Agreement (PNPCA).

MRC has built a shared MRC Information System (MRC-IS), available to all countries, which allows MRC to provide reliable information in three key roles.

- independent monitoring of changes in flow and water quality in the river
- prediction and assessment of potential impacts of different development options, through the use of scenario analysis
- notification and prior consultation of proposed developments which may have transboundary impacts.

Given the cost of creating and managing information, links to policy and the adoption of demand-driven data management are important considerations.

Priority areas for action

- Consolidation of monitoring programs (flows, water quality and ecological parameters)
- Improve return of information to the countries by provision of information in accessible formats
- Strengthening information capacity in national and provincial agencies through support for hardware / software, and training of key staff
- Strengthen predictive and analytical capability
- Collate information on all water related projects and programs in the LMB to allow coordinated planning and analysis of cumulative impacts
- Develop an information base for the Upper Mekong Basin (UMB) for issues relevant to LMB (e.g. land use information, proposed water resource developments, hydrological and climate models for UMB particularly for snow melt and climate change issues).

4.7 Regional cooperation

Objective: Integrated and coordinated water resource development and management between countries to optimize benefits from the joint resource and minimize the risk of water-related conflicts

The 1995 Mekong Agreement provides a clear statement of intent of the four riparian countries to cooperate in sustainable development of Mekong water and related resources to mutual advantage. It also provides a management framework for regional cooperation in the four countries of the Lower Basin (see Section 3.3). Within the LMB, MRC has a clear mandate to coordinate water resource development issues.

China and Myanmar are not members of MRC, although both are cooperating in the areas of hydropower, navigation, flood and drought management and tourism. Liaison and coordination with the Upper Basin is a high priority.

The countries of the Mekong are increasingly inter-dependent in terms of trade, economic development and political cooperation. Regional initiatives for cooperation in economic development complement MRC's role in water resources. Of these, the most important are the ADB sponsored Greater Mekong Sub-region (GMS) initiative (which includes Myanmar and China); and programs under ASEAN (Association of South-East Asian Nations) (which includes Myanmar, but not China). Bilaterally, China is an important economic partner for all the Lower Mekong countries, as a developing market for energy, raw materials and food; and as an exporter of manufactured goods.

In addition, there are a number of regional programs which focus specifically on water resources, including

- Global Water Partnership – South East Asia (GWP-SEA) which promotes and facilitates the concept of IWRM, including Network of Asian River Basin Organisations (NARBO)
- Water and Sanitation Program (WSP), which coordinates efforts to improve access to water and sanitation in Cambodia, Lao PDR and Viet Nam
- World Bank's Mekong Water Resource Assistance Strategy.
- Under ASEAN, a Long-Term Strategic Plan of Action on Water Resources Management (ASEAN 2003) was endorsed by the ASEAN ministers responsible for environment in 2003. The ASEAN Working Group on Water Resources Management (AWGWRM) has developed the ASEAN Strategic Plan of Action on Water Resources Management which is currently being considered by the ASEAN Senior Officials on the Environment.

Priority areas for action:

- Strengthening the regional negotiation process between the MRC member countries and establishing a water use agreement for the LMB
- Enhanced technical cooperation with China, particularly as regards development of hydropower and navigation in the Upper Mekong
- Closer coordination with GMS regional programs, particularly in transport and energy generation and transmission

- Cooperation and collaboration with ASEAN on common strategic priorities for water resources, as identified under respective strategic plans
- Coordination of strategies for water resources development with those of the major regional programs (particularly ADB and World Bank).

4.8 Governance

Objective: Open, transparent and accountable institutions and regulatory frameworks that will promote IWRM at all levels

Improved integration of planning and management across the various management levels is key to achieving IWRM in the LMB. In general, national water administration is fragmented, with responsibility for water spread between different agencies and between national, provincial and district levels of administration. In the past, national planning has often been sector-driven, with little consideration given to cross-sectoral interactions, accountability and stakeholder participation.. All countries are working towards more integrated and responsive approaches to water management and planning (see Section 3.3).

At the regional level, MRC has a clear mandate to coordinate water resource issues and a number of other regional and international agreements also relate to water resources development (see Section 3.3). These regional agreements are cooperative, rather than regulatory. Links between national and regional planning need to be clarified and strengthened.

Key issues for effective water governance include

- Accountability and transparency at all levels of government. Roles in the legislative and executive processes need to be clear. Each institution must explain and take responsibility for what it does.
- Monitoring and evaluation of programs and projects against IWRM goals and principles, to ensure equity and efficiency.
- Coordination of water policy within countries, through structures such as coordinating councils, or a designated ministry with responsibility for water resources.
- Some issues impacting on water governance may fall outside the water domain – for example, land tenure. Water managers will need to engage in dialogue with other branches of government to seek solutions.
- Coordination of water policy between countries, through effective involvement in MRC
- Harmonisation between national water laws and procedures governing cross-border issues through MRC.

Priority areas for action

Establish mechanisms to

- Increase transparency and accountability at all levels of administration (in particular, monitoring and evaluation systems)

- Strengthen capacity of national coordinating agencies for water resources
- Improve the capacity of stakeholder groups to manage water resources sustainably, through training and education programs.
- Encourage establishment of RBOs, and provide support (particularly information and capacity building).

5 Implementation

To meet their development needs, the countries will need to implement a wide variety of water resource projects and programs. The principles and priorities identified here should guide implementation of actions at national and local level, as well as basin-wide and regional programs. Water-related programs and projects should be consistent with IWRM principles and contribute to the economic, social and environmental goals agreed by the countries (see Section 2). However, criteria for selection of projects must go beyond assessment of projects individually. Sustainability and equity of water resource use can be assessed only in the context of all development in the basin, because of the cumulative and trans-boundary nature of potential impacts.

5.1 Roles and responsibilities

Implementation of the strategic priorities identified in this document will rely on a broad coalition of governments at all levels, private sector, communities, UN and other international organizations, research institutions, international financial institutions and donor agencies. The roles and responsibilities of different actors should be negotiated with reference to the IWRM principles of integration and coordination. An important consideration for effective implementation is the need to upgrade the institutional capacities of the relevant agencies, building intellectual capital by strengthening capability and capacity of key officials.

The primary role in water resource management will always rest with **national governments,** which have responsibility for all aspects of policy and planning. Implementation of programs will usually be carried on in partnerships with other actors. Some of the national responsibility may be devolved to provincial or local levels, in line with policies on decentralization and subsidiarity principles. National governments are responsible for ensuring integration of water across different economic sectors, through the formulation of coherent water resource laws and policies; and by providing coordinating institutions and mechanisms. They are also responsible for monitoring and coordinating private sector involvement in water management.

A substantial proportion of water resource development at the national to local level will be financed through **international financial institutions 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 the overall regional strategy. IFIs and donors have a responsibility to ensure coordination of programs at the regional level, and to incorporate IWRM principles into their water-related programs.

Under the 1995 Mekong Agreement, 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 and as the basis for planning and research. Through the Basin Development Plan, MRC has a role to promote joint planning for water resources in the LMB, and to facilitate and coordinate project implementation.

The **National Mekong Committees** are the link between MRC and the countries, and maintain liaison with the various national bodies and agencies that are involved in water-related development. They play an important role in collating national information and policies, and coordinate public participation at the national level. They are also key agents for facilitation of implementation of joint development initiatives.

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. Because of their involvement in regional sectoral development, an evolving role of regional programs is promoting and mediating the integration of, and balance between, water-related development and the sectors more broadly.

River basin organizations are being organized within key catchments in the LMB, though most are still in the formative stages. They will increasingly become focus for community involvement in water management, and for on-ground integration of sectoral requirements.

International organizations (such as IUCN, WWF and Oxfam) play an important role in regional research programs and implementation of projects in environmental and social issues relevant to water resources; and in awareness building, both locally and in the international sphere. **Local NGOs and civil society organizations** provide links into communities to promote stakeholder participation in planning and for implementation of projects at the local level.

Research priorities and directions for **research and development institutions,** (including regional and national universities and the CGIAR system) should take account of the information requirements for IWRM. Research organizations have a potential role in monitoring and evaluation of progress towards IWRM, and recommendations for improvements in implementation.

Since all four MRC member countries are promoting market-based economies, **the private sector** will play an increasing role both as users and providers of water-related services. Governments have a responsibility both to provide an enabling environment for private sector investment in water-related sectors, and to ensure that private companies understand and conform to IWRM principles.

5.2 Partnerships

Partnerships are essential to IWRM. The breadth and complexity of issues to be addressed means that no single agency can possibly fulfill all the roles needed to ensure appropriate coordination and integration. IWRM assigns to all actors in water resource management the responsibility and mandate to coordinate with other actors.

Basin-level IWRM takes place within a network of partnerships that is maintained between the national governments and a wide variety of other actors and stakeholders in water resources (see above). Partnerships are important at both the strategic level and at the level of implementation of programs and projects, to ensure cooperation, prevent duplication of effort, and assign responsibilities and actions to the most appropriate groups.

5.3 Financial mechanisms

An important aim of regional collaboration on IWRM is to facilitate investment in IWRM by enhancing the certainty of the investment environment; promoting efficiency; and increasing accountability.

Investment in water resources in the Basin will come from two main sources: public (government and ODA) and private. The role of each funding source is different, but complementary. The majority of investment for water resource development will be financed and administered nationally or in the private sector. Donor funding can assure targeted intervention for timely achievement of priority developments that would otherwise not be possible. Private – public partnerships and innovative financial mechanisms can enhance involvement of user groups in water management. Monitoring and evaluation of investment at all levels is essential to ensure accountability, and M&E programs should be an integral part of all investment plans.

Certainty in the investment environment for both public and private sectors can be improved by clear delineation of an acceptable "development space", within which investment can proceed without controversy. This is assisted by setting out agreed priorities and directions (see Section 2), and identification of priority joint projects under BDP. It would be greatly strengthened by establishing a regional "clearing house" mechanism to certify that projects conform with regional agreements, and do not have unacceptable impacts (see Section 5.1).

As a follow-up to the World Panel on Financing Water for All (Camdessus Panel), the World Water Council, Global Water Partnership and the World Bank have established a working group of major international bodies on financing water infrastructure for agricultural water management. It is critical that MRC and other regional implementation agencies consider how to coordinate and share implementation financing in the most appropriate and effective manner.

5.4 Monitoring and evaluation

Monitoring and evaluation of outcomes against agreed objectives and criteria are an essential component of IWRM. The aims of M&E are to check that programs have the desired impacts, to avoid unintended impacts, and to ensure equity, efficiency and accountability. In many cases, the underlying aims of IWRM projects (such as poverty alleviation and economic development) will be influenced by factors well beyond the water resource sphere, so M&E must take account of the broader economic and social context within which water resource development occurs.

M&E should take place at two levels: monitoring of individual programs and projects; and regional monitoring and evaluation of the cumulative impacts of programs.

The responsibility for M&E in individual programs lies primarily within the program – every program should have an M&E component, and major donors and banks have developed guidelines in this regard. External monitoring and reporting is also needed at a level appropriate to the program – usually local, provincial or national government as part of their accountability processes. River Basin Organisations, with both government and non-government stakeholders, can provide an effective mechanism for M&E.

At a regional level, the 1995 Mekong Agreement and later procedures assigns responsibility for monitoring of the impacts and equity of water resource use and development to the

MRC. The mandate could be broadened to include monitoring of overall progress towards IWRM.

6 Conclusion

The shared goals and priorities which the countries have identified and which are presented in this document provide a solid basis for cooperation and a platform for coordinated action to facilitate integrated water resource management in the LMB. At the national level, each country has outlined a commitment to sustainable water resources management and development, through their national policies and strategies. At the regional level, the involvement of all countries in regional and international agreements, conventions and programs demonstrates a willingness to work together towards mutually beneficial development.

It is hoped that the strategic directions and IWRM approach encapsulated here will provide a sound basis for MRC's regional cooperation program for sustainable water resource development in the LMB.

References

National plans

Cambodia (Mar 2001): Second five year socio-economic development plan, 2001-2005. Compiled by Ministry of Planning, Kingdom of Cambodia. Second draft

Cambodia (Dec 2002): National Poverty Reduction Strategy

Lao PDR (2001): 5th Socio-Economic Development Plan 2001-2005

Lao PDR (Apr 2001): Interim Poverty Reduction Strategy Paper

Lao PDR (September 2003): National Poverty Eradication Program, 8th Round Table Meeting, Vientiane

OEPP (Dec 1997): Policy and prospective plan for enhancement and conservation of national environmental quality 1997-2016. Office of Environmental Policy and Planning, Ministry of Science, Technology and Environment, Thailand

Thailand (Oct 2001): 9th national economic and social development plan 2002-06, compiled by National Economic and Social Development Board, Office of the Prime Minister

Viet Nam (May 2002): The Comprehensive Poverty Reduction and Growth Strategy (CPRGS)

Viet Nam (2001): Socio-economic Development Plan for the period 2001-05, compiled by Ministry of Planning and Investment

National sector reviews

CNMC (June 2003 a): Fisheries management. National sector review prepared by Ministry of Agriculture, Forestry and Fisheries in association with CNMC

CNMC (June 2003 b): Flood mitigation and management. National sector review prepared by Ministry of Water Resources and Meteorology in association with CNMC

CNMC (June 2003 c): Hydropower. National sector review prepared by Ministry of Industry, Mines and Energy in association with CNMC

CNMC (June 2003 d): Irrigated agriculture. National sector review prepared by Ministry of Water Resources and Meteorology in association with CNMC

CNMC (June 2003 e): Navigation, transport and river works National sector review prepared by Ministry of Public Works and Transport in association with CNMC

CNMC (June 2003 f): Tourism development. National sector review prepared by Ministry of Tourism in association with CNMC

CNMC (June 2003 g): Watershed management. National sector review prepared by Ministry of Agriculture, Forestry and Fisheries in association with CNMC

CNMC (June 2003 h): Water supply: Domestic water and sanitation, and industrial water use. National sector review prepared by Ministry of Water Resources and Meteorology in association with CNMC

CNMC (August 2003): Integrated water resources management in Cambodia, National Sector Review

LNMC (February 2004): National sector overviews

TNMC (April 2004): National sector review, integrated report. Executive summary

VNMC (May 2003): National sector overviews

Sub-area studies

CNMC (Dec 2003): Basin Development Plan Program, sub-area analysis. The Tonle Sap Sub-area. Prepared for CNMC by Dr Pichara Leang, National Consultant, Phnom-Penh

LNMC (March 2004): Past and future analysis for the Mekong BDP, Sub-Area 1L, Lao PDR. Prepared by Michael Tuckson, Vientiane, 4 March 2004. Draft

LNMC (April 2004a): Key outcomes of all sub-area studies and analysis carried out in Lao PDR

LNMC (April 2004b): Report on the outcomes of studies and analysis carried out in Sub-area 4L

LNMC (April 2004c): Report on the outcomes of studies and analysis carried out in Sub-area 6L

LNMC (April 2004d): Report on the outcomes of studies and analysis carried out in Sub-area 7L

OEPP (Oct 2000): Kok River Basin, pilot study for water resources and environment management (basinwide). Final report, prepared by Office of Environmental Policy and Planning, Thailand, and MRC

VNMC (Oct 2002): Nam Rom River Basin - case study & project ideas. Prepared by Pham Tuyet Mai for MRC and VNMC in association with Lai Chau Province

VNMC and IWRP (July 2003): Basin Development Plan, analysis of sub-area 7V. Report prepared by VNMC and Institute of Water Resources Planning, Hanoi

VNMC and SIWRP (Nov 2003): Basin Development Plan, analysis of sub-area 10V. Report prepared by VNMC and Sub-Institute of Water Resources Planning, Ho Chi Minh City

MRC publications and documents

Mekong Agreement (Apr 1995): Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, entered on 5 April 1995 between Cambodia, Laos, Thailand and Viet Nam

MRC (Aug 1998): Guidelines on mainstreaming gender in water resources development in the Lower Mekong Basin. Prepared for MRC by Alexandra Stephens (MKG/R.98023)

MRC (Apr 1999): Public participation in the context of the MRC. Prepared by MRCS

MRC (Jan 2000): Strategy study on the development of the watershed management / forestry sector in the Lower Mekong Basin. Strategy and action plan. Prepared by Arcadis for MRCS, January 2000

MRC (Dec 2000): Agriculture, Irrigation and Forestry Program for 2001 – 2005

MRC (Mar 2001): MRC Strategic Plan 2001 to 2005

MRC (Oct 2001a): MRC hydropower development strategy

MRC (Oct 2001b): MRC flood management and mitigation strategy

MRC (Feb 2002a): Proceedings of the Regional Consultation Workshop on Public Participation in MRC, MRCS, Phnom Penh, Cambodia, 30-31 January-1 February 2002

MRC (Feb 2002b): Development of an EIA/SEA system for the Lower Mekong Basin. Volume I: Review report and volume II: Policy and guidelines. Final Draft Report prepared for MRCS by Environmental Resources Management, London. February 2002

MRC (Feb 2002c): Tools for impact analysis. Water Utilization Project Component A: Development of Basin Modelling Package and Knowledge Base, Working Paper No 6, prepared for MRC by Halcrow Group Limited

MRC (May 2002): Fisheries in the Lower Mekong Basin: Status and perspectives

MRC (June 2002): MRC Programming Manual

MRC (Oct 2002): Fish migrations in the Lower Mekong Basin: Implications for development, planning and environmental management

MRC (Nov 2002b): Strategy for navigation development and coordination in the Lower Mekong Basin. Draft report submitted by Royal Haskoning to MRCS, 29 November 2002

MRC (Nov 2002c): MRC Work Program 2003

MRC (June 2003): Biodiversity and fisheries in the Mekong River Basin

MRC (2003a): State of the Basin Report 2003

MRC (2003b): Social Atlas of the Lower Mekong Basin

MRC (August 2003): MRC Navigation Strategy

MRC 2004 Overview of the hydrology of the Mekong Basin, Water Utilisation Program Start-up Project, Mekong River Commission, Vientiane, Lao PDR. 55pp

MRC-BDP (Jul 2002): Basin Development Plan. Inception Report

MRC-BDP (Nov 2002a-g): BDP regional sector overviews. (a) Executive summary and sectors, including fisheries and tourism development; (b) Agriculture and irrigation; (c) Watershed management; (d) Hydropower; (e) Navigation; (f) Water supply - domestic water and sanitation, and industrial water use; (g) Flood management and mitigation

MRC-BDP (Oct 2002): Economics in the BDP: Macroeconomic overview of the Lower Mekong Basin

MRC-BDP (Apr 2003a): BDP stakeholder participation working paper # 1: Stakeholder participation in the formulation of the Basin Development Plan. Final draft

MRC-BDP (Apr 2003b): BDP stakeholder participation working paper # 3: Sub-area forums, approach and process for stakeholder participation in BDP sub-area analysis. Final draft, April 2003

MRC-BDP (March 2003): Social Atlas of the Lower Mekong Basin

MRC-BDP (March 2004): Strategic Framework for BDP

MRC-BDP (Sept 2004): The BDP Planning Cycle (final draft)

MRC-BDP (2005a) "Modelled Impacts of Scoping Development Scenarios in the Lower Mekong Basin" . Draft BDP Report. MRC, Vientiane.

MRC-BDP (2005b) A report on likely infrastructure developments in the Mekong floodplain in Cambodia and their signficance in changing flow patterns" . Draft BDP Report. MRC, Vientiane

MRC-WUP-WG2 (Sep 2001): On preliminary trans-boundary analysis. Working Paper 1, prepared by WUP Working Group 2, February 2001, revised September 2001

MRC-WUP-WG2 (Feb 2002):Steps towards a public participation strategy. Working Paper 5, prepared for WUP Working Group 2 by Helen Rosenbaum

Poppe, M (2004) Integrated watershed management planning in the Lower Mekong Basin. MRC-GTZ Cooperation Program, MRC, Vientiane, Laos PDR.

Rowcroft, P and Ward, K (in press) Economic Development and Water Resource Demands in the LMB. MRC Development Series. MRC, Vientiane.

Other publications and documents

ASEAN (2003) ASEAN Long Term Strategic Plan for Water Resources Management. Initiative for ASEAN Integration Unit, Indonesia.

Badenoch, N (2002) Transboundary Environmental Governance – Principles and Practice in Mainland Southeast Asia. World Resources Institute. Washington, USA. 37pp.

Birch, A (2005) Benchmarking National Water Sector Capacity in the Lower Mekong Basin Countries. Unpublished paper prepared for an World Bank-ADB Mekong Water Resources Review.

Chu Thai Hoanh, H. Guttman, P. Droogers and J. Aerts (2003) Water, Climate, Food, and Environment in the Mekong basin in southeast Asia. Final Report, ADAPT Project. International Water Management Institute, Colombo, Sri Lanka. sheba.geo.vu.nl/~ivmadapt/ downloads/Mekong_FinalReport.pdf.

Hannam, I (2003) A method to identify and evaluate the legal and institutional framework for the management of water and land in Asia. IWMI Research Report 73. IWMI, Colombo, Sri Lanka.

Jønch-Clausen, T (January 2004): Integrated Water Resources Management (IWRM) and Water Efficiency Plans by 2005 - Why, What and How? Global Water Partnership

GWP-TAC-4 (March 2000): Integrated Water Resources Management. Global Water Partnership, Technical Advisory Committee (TAC) Background Papers no. 4, edited by Henrik Larsen (Available on the Internet)

Millington, P (2004) Integrated water resources management – what need the countries do? Contribution to "Towards a Mekong Water Resources Assistance Strategy for the World Bank". Unpublished paper commissioned by World Bank.

Nesbitt, H (2003) Water used for agriculture in the Lower Mekong Basin. BDP Report 017. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia

Öjendal, J (2000): Sharing the Good - modes of managing water resources in the Lower Mekong Basin. Department of Peace and Development Research, Göteborg University, Sweden, ISBN 91-87380-46-3, 325 pp

Ringler, C (May 2001): Optimal water allocation in the Mekong Basin. ZEF Discussion Papers on Development Policy no. 38. Centre for Development Research, Bonn University, Bonn. (Available on the Internet)

UNESCO (1983) Preliminary Appraisal of the Hydrogeology of the Lower Mekong Basin, UNESCO-IMC

WCD (Nov 2000): Dams and development, by World Commission on Dams. (Available on the Internet)

World Bank (2004): Modelled observations on development scenarios in the Lower Mekong Basin

World Resources Institute (2003): Watersheds of the World CD, http://www.waterandnature.org/eatlas/

WWF (2005) An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China. WWF Nepal Program, Kathmandu, Nepal. 79pp.

Zhang, J (2005) Scoping Study of Existing Frameworks Relating to the World Commission on Dams Strategic Priorities. IUCN unpublished report. IUCN, Bangkok. 48pp.

Appendix 1: MRC Basin Development Plan

In Article 2 of the 1995 Mekong Agreement, the parties agreed

> *'to promote, support, cooperate and coordinate in the development of the full potential of sustainable benefits to all riparian States 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 through 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.'*

Preparation of the Basin Development Plan was initiated in October 2001, and the work was divided into 2 phases. Phase 1 is scheduled to finish in January 2006; and a second phase will be initiated during 2006. Formulation of the BDP is guided by the BDP teams at MRC Secretariat and in each NMC. The work has involved a broad network of national planning and line agencies, private sector and civil society actors. The work is supervised by the MRC Joint Committee and by national Sub-Committees.

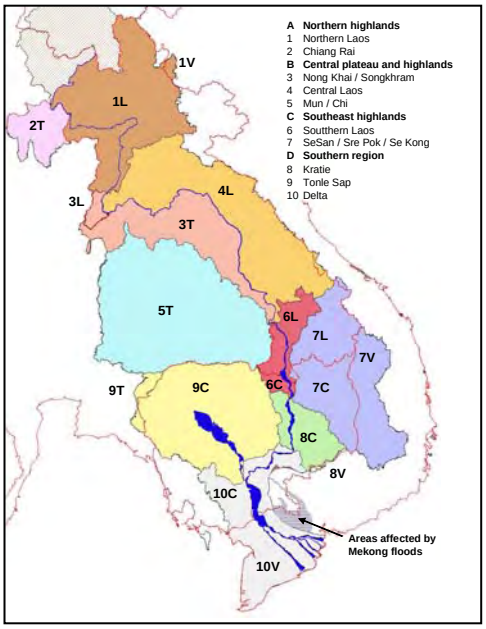
BDP Phase 1

The objectives of Phase 1 of the BDP formulation are to establish:

- A participatory basin-wide planning process (based around hydrological divisions of the LMB known as sub-areas – see Figure A2.1)
- An IWRM Plan, including:
- an IWRM Strategy for water-related development in the LMB
- a portfolio of priority projects and programs that will support the Strategy
- IWRM tools and a knowledge base.

All outputs are produced in a close collaboration with the other MRC programs. Notably, the tools and knowledge base (shared by all MRC programs) have been produced in a close and active collaboration with the Water Utilisation Program, the Environment Program and the Technical Support Division.

Figure A2.1: BDP Sub-areas



BDP Phase 2

BDP Phase 2 is scheduled to begin in 2006. A draft program document for BDP Phase 2 is currently being prepared, which proposes 3 components, covering:

- A rolling IWRM based Basin Development Plan produced in support of sustainable development in the Mekong River Basin
- Knowledge base and assessment tools further developed and utilized effectively in MRC and NMCs
- Capacity built at MRC and NMC levels for IWRM planning and for facilitation/mediation in areas where trade-off management is required

Appendix 2: Sector analyses

A2.1 Agriculture and irrigation

Sector objectives: Safe food production, high value and high employment generated by agricultural water use

Current status

- Irrigated area in the LMB in 2002 was around 2.1 million ha in the dry season, and 5.34 million ha in the wet season.
- Irrigated agriculture is by far the largest water user – total annual withdrawals for agriculture are estimated at around 57,000 MCM, of which over 60% is extracted in the Vietnamese delta (MRC DSF).
- Irrigated agriculture in the LMB is estimated to be worth about $650 - $700 million annually (difficult to define irrigated – whole spectrum from recession rice to wet season supplementary to dry season fully irrigated).
- Differences in value extracted, depending on crop grown, market prices and access, labour inputs etc. Estimates vary from around $6,200 /MCM in Mun Chi, to $14,600/MCM in Vietnamese delta.
- Dry season withdrawals are at critical levels in NE Thailand, where water shortages occurs in some years; and in the Vietnamese Delta where large irrigation withdrawals in the dry season have resulted in intrusion of sea-water, threatening crops.
- Much of the irrigation infrastructure in the region is old, poorly maintained and inefficient.

Development opportunities and constraints

- Except in the Vietnamese Delta and more mountainous parts of Lao PDR, land suitable for irrigation is not limiting
- Access to markets is limiting for development in many areas, as well as access to land and water.
- Construction of both Chinese and LMB dams will result in significantly increased dry season flow, presenting opportunities of increased irrigation (see Section 3.2).
- Without offsetting storage, extraction and diversion of water for irrigation development results in a significant decrease in dry season flows and a concomitant increase in the area affected by salinity intrusion
- Major development of irrigation will thus require construction of regulatory storages; but due to very seasonal nature of rainfall, even construction of very large storages will not completely remove risk of water shortages
- Use of groundwater for irrigation is not highly developed except in Central Highlands of Viet Nam. The groundwater resource is not well studied – there may be significant opportunities for conjuctive use to relieve pressure on surface water supplies in critical periods in some areas. However, groundwater irrigation potential in the Korat Plateau is limited due to salinity and low supplies.

Cross-sectoral opportunities

- Possibilities for multi-purpose storages (irrigation – hydropower – fisheries)
- Importance of rice-field fisheries and shrimp-rice agriculture
- Land capability / suitability assessment and land use planning

Trade-offs

- Impact of irrigation extractions on dry season low flows and salinity intrusion
- Impact of intensification of agriculture (both irrigated and non-irrigated) on water quality due to agricultural chemicals
- Alienation of flood-plain and clearing of wetlands for irrigation development
- Impacts of storages on water flow patterns and water quality (sediment loads)
- Upstream – downstream demand competition
- Transfer to areas in other basins to mitigate water shortage

Priority areas for investment and cooperation

- Higher returns from irrigated agriculture, through improved farming practices, increased efficiency of water use, diversification of crop types and support to distribution and marketing
- Changes to farming systems in the Delta to reduce withdrawals in the critical dry season period
- Conjunctive use of groundwater to reduce pressure on surface water in critical periods
- Expansion of irrigation to utilize potentially higher dry season flows resulting from increased regulation and storage which will result from hydropower development
- Expansion of irrigation to utilize potentially higher dry season flows resulting from increased regulation and storage, particularly due to hydropower development in Yunnan, for example
    - Savannakhet and Vientiane plains
    - Bolovens Plateau and Southern Laos
    - Battambang region in NW Cambodia
    - Eastern Cambodia
    - NE Thailand (eg Kong – Chi - Mun)
- Upgrade and improvement of existing infrastructure
    - for example, colmatage systems south of Phnom Penh in Cambodia
- Support for farmer water user groups

References

BDP 012-2: Regional sector overview: Agriculture. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia. November 2002. (46 pages)

State of Basin Report 2003: Chapter 8

Nesbitt, H (2003) Water used for agriculture in the Lower Mekong Basin. BDP Report 017. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia.

A2.2 Hydropower

Sector objectives: The increasing demand for affordable electric energy in the MRC member countries is met with minimal negative impacts on the environment and local people, thereby promoting economic growth for the countries' mutual benefit

Current status

- Total energy demand in the four countries in 2000 was estimated at 125,000 GWh. Of this, around 22% is supplied from hydropower, with the balance mainly from fossil fuels.
- Current installed capacity in the LMB is 1600 MW in 11 schemes, xx% in Lao PDR
- Electrification rates are very low in Cambodia, Lao PDR and parts of Viet Nam. Demand is growing very rapidly, particularly in Thailand and Viet Nam.
- Hydropower is a significant component of the power sector in all four countries, but particularly for Lao PDR where potential substantially exceeds projected demands and export of power is an important component of GDP
- Export trade in power is well established between Thailand, Lao PDR and Viet Nam; China is becoming a player in LMB power sector with the construction of the joint Thai-Chinese Jinhong power station on the upper Mekong.
- Viability of hydropower will be enhanced by extension and upgrading of regional transmission systems under ADB and ASEAN programs

Development opportunities

- LMB has very abundant sites suitable for hydropower development – over 60 have been identified, with total potential estimated at 30,000 MW – 13,000 on the mainstream, 13,000 MW on Lao tributaries, 2,200 MW on Cambodian tributaries and 2,000 in Viet Nam. No further dams have been proposed for Thailand.
- The viability of hydropower development is determined by the relative cost of power from other sources, and effective hydropower planning requires very close integration with the rest of the sector
- Demand for power is expected to increase by 7% a year over the next 20 years – requiring generating capacity four times greater than at present. ABD (2001) estimates that MRC member countries will need to develop about 20,000 MW of new generating capacity in the next 10 years, and that after that demand will increase even more quickly.
- Export demand in growing from within the MRC member states, but also possibly from China, Malaysia and Singapore
- China's planned development of large scale hydropower on the Upper Mekong will be an important factor in regional energy policy and directions. Depending on the extent to which the planned cascade is implemented, China may become either a net importer or an exporter of power in the region.

Cross-sectoral opportunities

- Possibilities for multi-purpose storages (irrigation – hydropower – fisheries)

- Enhanced dry season flows from hydropower development may provide opportunities for additional dry season irrigation
- Enhanced dry season flows may improve navigation reliability.
- Recreational and tourist potential of reservoirs
- Some potential for flood mitigation (but probably limited - see Section 3.2)

Trade-offs

- Impacts of dam construction, including environmental (loss of habitat) and social (resettlement)
- Impact of changed flows (quantity and quality) on downstream environments, particularly wetlands
- Impact on fisheries of dam construction, due to blocking of migration route, and changed flow patterns

Priority areas for investment and cooperation

- Sector planning and efficient integration of hydropower
- Ranking of regional projects in terms of efficiency, financial viability and social and environmental outcomes
- Efficient hydropower generation and distribution mechanisms
- Optimising operation rules to minimize downstream environmental impacts
- Predicting and responding to changes in flow conditions due to hydropower development in the Upper Mekong (Yunnan)
- Assistance with Environmental Impact Assessments for proposed developments – in particular, incorporating processes proposed by the World Commission on Dams
- Consideration of environmental and socio-economic factors in hydropower development – in particular:
    - cumulative impacts of hydropower development
    - impacts on fisheries
    - possible mitigation measures

References

MRC Hydropower Development Strategy (October 2001)

State of Basin Report 2003: Chapter 10

BDP 012-4: Regional sector overview: Hydropower. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia. November 2002. (33 pages)

A2.3 Navigation

Sector objective: To increase the international trade opportunities for the MRC member countries' mutual benefit, and to assist in co-ordination and co-operation in developing effective and safe waterborne transport in a sustainable and protective manner for the waterway environment (Article 9, 1995 Mekong Agreement).

Current status

During the last decade, the Governments of most Mekong-riparian countries have initiated series of market-oriented policy reforms. The growth in intra-regional trade and investment has surpassed the prospected average. One way of keeping this momentum in shape is by improving navigation on the Mekong River; shipping is a necessary means to facilitate regional trade. Establishing strategic links with the road and rail in the Basin will form a comprehensive multimodal transport network.

The use of the river for transportation does not only depend on the physical potential of the waterway but also on the demand for trade. In 2002, trade estimated at $4.7 billion was distributed by inland waterway transport ($88m between Thailand and China; $350m between Lao PDR and Thailand; $235 million in Cambodia; and $4 billion in the Mekong Delta).

Waterway transport has traditionally been the principal means of travel for much of the population, both locally and for international trade. Around a third of the population in rural areas of Cambodia and Lao PDR live further than 10 km from a road that can be used year round. Waterborne transport represents 85 % of all means of transportation in the Mekong Delta of Viet Nam.

Navigation modes on the Mekong river can be divided into two major portions:

- Upper portion suitable for inland navigation only (from the port of Simao down to Kampong Cham in Cambodia, and from Kampong Chnnang to the Great Lake in Cambodia. There is no traffic between Cambodia and Lao PDR because fo the impassable Khone Falls.
- The lower portion suitable for inland and maritime navigation (from Kampong Cham to the sea and from Kampong Chnnang to the sea on the Mekong, Bassac and Tonle Sap rivers)

Conditions in the river are very dynamic. Water levels can vary as much as 10-13 m between wet and dry seasons: low flows constrain the size and capacity of vessels during the dry. The location of banks and channels may change after the flood.

A **Navigation Strategy** has been prepared by MRC, which sets out principles and objectives for involvement of MRC in development of navigation; and forms the basis for a comprehensive **Navigation Programme,** with five components:

1 Socio-economic analysis and regional transport planning

2 Legal framework for cross-border navigation

3 Traffic safety and environmental sustainability

4 Information, promotion and coordination

5 Institutional development.

Development opportunities and constraints

- Programs under ADB and ASEAN are upgrading transport links in the region, including construction of roads and bridges. IWT has greater operating efficiency and lower costs than other forms of transport, particularly for long-haul and large volumes. Better integration of IWT into the regional transportation systems could improve overall efficiencies

- Access to international and maritime routes through the Delta
- Water –based tourism, including long distance cruise routes from Ho Chi Minh City to Phnom Penh and Siem Reap; and on the upper stretch of the river, between Thailand, China, Myanmar and Lao PDR
- Constraints:
  - non-physical barriers to international navigation;
  - competition from other transport choices (notably road);
  - physical restrictions due to low water in dry season or (in the Delta) at low tide

Cross-sectoral opportunities

- IWT plays a crucial role in providing access to markets for agricultural produce
- Environmentally sound mode of transportation
- Opportunities for development of water-based tourism

Trade-offs

- Disruption of riverine ecosystems
- Risks for pollution if no rules are established and enforced

Priority areas for investment and cooperation

- Design, feasibility and impact studies related to ports, river works and regional waterways development
- Implementation of ports, river works and regional waterways development
- Morphological studies and bank protection schemes
- Basin-wide institutional capacity-building; development and implementation of education programs for pilots, skippers, and administrative officers
- Regional standardisation schemes (navigation aids, navigation rules, certification, pilotage, monitoring, statistics)
- Streamlining of border regulation in general and transit regulation in particular
- Promotion of "clean" river transport; prevention of environmental damage

References

MRC Navigation Strategy (August 2003)

MRC Navigation Programme (Dec 2003)

BDP 012-5: Regional sector overview: Navigation. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia. November 2002. (21 pages).

Geerinck, L. (Jan 2005) Incorporation of Navigation into the Integrated Water Resource Development and Management Strategy. BDP unpublished document. MRC, Vientiane, Lao PDR.

A2.4 Fisheries

Sector objectives: Coordinated and sustainable development, utilisation, management and conservation of the fisheries

Current status

The Mekong has one of the largest, most diverse and abundant fisheries in the world. Around 2 million tonnes of fish and aquatic product are caught and cultured each year, with a total value of over $1,400 million. Fish is a vital food source in the Mekong, particularly for the poor. On average, people consume 36kg per person per year.

The natural capture fishery accounts for over 75% of total production. In addition, it underpins much of the aquaculture production, providing both fingerlings and a food source. Commercial aquaculture have developed rapidly in NE Thailand and the Vietnamese delta. Both capture and culture fisheries operate at commercial, semi-commercial and subsistence levels.

The fisheries sector is particularly significant for Cambodia, where it contributes around 12-16% to GDP due to the highly productive natural fishery of the Great Lake and floodplain. Fish catches are highly correlated with the size of the flood, and fish productivity is dependent on maintaining natural floodplain and wetland ecosystems.

Development opportunities and constraints

- In the Mekong capture fishery, catches have not decreased but size and species diversity of fish caught has declined over the last 20 years. Internationally, this is often an indicator that the fishery is at risk. It is likely that the capture fishery is at or close to its sustainable limits. Thus, the emphasis is on management and conservation of the existing resource.
- Improvements in licencing and management of commercial fishing lots
- Expansion of aquaculture, in particular small scale operations using native species
- Processing to reduce loss through spoiling, and to improve value adding
- Development of export markets, both within the basin and to nearby urban areas (Bangkok, Ho Chi Minh City)

Cross-sectoral opportunities

- Possibilities for multi-purpose storages (irrigation – hydropower – fisheries)
- Importance of paddy-field fish cultivation
- Opportunities for shrimp-rice cultivation systems in the Delta

Trade-offs

- The capture fishery is the most vulnerable sector in the basin. In particular, fisheries are threatened by loss of habitat due to clearing of wetlands, alienation of the floodplain and changed flow regimes; disruption of migration paths by dams; fishing pressure; and pollution of waterways. Loss of fish productivity often impacts most severely on the poor, who depend on fish as a vital part of subsistence livelihoods
- Alienation of the flood-plain to protect land for agriculture and urban development, preventing access for spawning and feeding
- Intensive aquaculture is highly polluting, releasing nutrients and chemicals into natural water sources
- Conflicts between brackish and freshwater production systems in the Delta

- Clearing of mangrove and wetland areas for large-scale aquaculture.

Priority areas for investment and cooperation

- Management and protection of the capture fisheries:
  - Protection of vulnerable habitat important for fisheries, such as floodplain, flooded forests, deep pools
  - Maintenance of major migratory paths (including Tonle Sap system and deep pools in mainstream)
  - Co-management of fisheries involving local communities, as well as provincial and national authorities
- Improved management and development of reservoir fisheries and aquaculture; in particular, small scale aquaculture for rural households and aquaculture of indigenous Mekong species.
- Opportunities for value-adding through marketing and processing
- Improving the information base for fisheries, in particular
- Economic value and nutritional importance of Mekong fishery
- Ecological studies of Mekong fisheries and basis for productivity
- Improved integration of fisheries into catchment planning

References

Fisheries in the Lower Mekong Basin: Status and Perspectives; MRC Technical Paper No. 6 (May 2002). MRC, Phnom penh, Cambodia.

MRC Programme for Fisheries Management and Development Cooperation. Annual Report April 2003 – March 2004. MRC Phnom Penh, Cambodia.

State of Basin Report 2003 – Chapter 7: Fisheries. MRC, Phnom Penh, Cambodia.

BDP 012-1: Regional sector overview: Fisheries. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia. November 2002. (10 pages).

A2.5 Tourism

Sector objectives: Regional water-related tourism further developed, with due regard to social and environmental impacts

Current status

Tourism in the LMB countries has developed rapidly since the early 1990's, and is targeted in the economic development policies of all as an area for increasing contribution to GDP. GMS has identified tourism as a key sector for cooperation. Tourism is a major source of foreign exchange earnings and foreign direct investment for all four LMB countries.

Within the LMB, major tourist destinations are Siem Reap (Angkor Wat), Luang Prabang and the Mekong Delta, all with important connections to the river system. The Mekong system is itself a major tourist attraction, both for the waterbodies (rivers, lakes, waterfalls) and for associated ecosystems and wildlife. Ecotourism is an increasingly important sub-sector – for example, about half of tourist arrivals to Lao PDR express an interest in the natural environment.

Development opportunities and constraints

- The GMS Mekong Lancang River Tourism Development Programme is promoting regional tourism
- Water-based and eco-tourism development focusing on the river and its environment
- Cross-sectoral opportunities
- Recreational and tourist values of irrigation and hydropower reservoirs
- Development of IWT as a major tourist transport mode (including long distance cruise routes from Ho Chi Minh City to Phnom Penh and Siem Reap; and on the upper stretch of the river, between Thailand, China, Myanmar and Lao PDR)
- Village based eco-tourism and agro-tourism
- Promotion of national parks and protected areas as tourist destinations

Trade-offs

- Social and cultural pressures
- Pressure on local water supply and sanitation systems, particularly in smaller destinations
- Disruption of riverine ecosystems and increased bank erosion, particularly from high-speed IWT traffic used by some tourist operators

Priority areas for investment and cooperation

- Promotion of water-based tourism, particularly in the context of promoting the Mekong countries as a joint destination
- Promotion of community-based eco-tourism and cultural tourism
- Monitoring and prevention of environmental degradation related to increased human activity in ecologically sensitive areas
- Raising awareness and capacity to deal with social issues arising from increased tourism
- Provision of adequate water supply and sanitation infrastructure

References

BDP 012b: Mekong River Commission, Basin Development Plan.

Regional sector overview: Tourism development. Prepared by Mekong River Commission Secretariat, Phnom Penh, Cambodia. November 2002. (10 pages)

A2.6 Domestic and industrial water supply

Sector objectives: Water available to people and industries in sufficient quality and quality

Current status

Provision of safe water supply and sanitation is one of the most urgent tasks facing the countries of the LMB. In rural areas of Cambodia and Lao PDR less than 40% of households have access to safe water, and access to sanitation is even lower. Health

outcomes are correspondingly poor, with infant mortality rates as high as 130 deaths per 1000 live births. Population is growing very rapidly, projected to increase from 55 million in 2000 to between 80 and 100 million by 2020 (depending on assumed growth rates, which vary widely).

Current requirements for domestic and municipal supply are estimated to be less than 0.5% of total Basin flows. Even so, dry season shortages sometimes occur, particularly in NE Thailand and in the Delta, where reliance on groundwater and stored rainwater is common. Demands for municipal use are increasing as populations grow, living standards rise and industries develop. It is estimated that domestic and industrial requirements will increase by over 250% by 2020. Water quality, rather than quantity, is likely to provide the most serious challenges for domestic supply, emphasizing the need for adequate waste disposal and sanitations systems in both urban and rural areas.

Rapid growth of urban areas has resulted in local pollution problems from effluent disposal, as well as straining supply systems. Provision of adequate water and sanitation in urban areas is an urgent priority. ADB-GMS programs addressing water supply in urban areas are under way in Phnom Penh, Vientiane, Luang Prabang and a number of other developing urban areas.

Under MDG7 the countries of the LMB aim to reduce by half the proportion of the population without access to safe water by 2015. Much of this effort is being carried out under small rural development projects and NGOs. In Cambodia, Lao PDR and Viet Nam, these efforts are coordinated by the Water and Sanitation Program of the World Bank (WSP) http://www.wsp.org/07_EastAsia.asp

Development opportunities and constraints

- Dry season water availability is limited in many areas away from the main rivers; supplies often rely on groundwater. Understanding of the groundwater resource is limited and studies are needed to determine the sustainability of groundwater use and its potential for large scale extraction for municipal and industrial use.
- Water quality issues (and particularly contamination of both surface and groundwater supplies by effluent disposal) may threaten supply more than availability.

Cross-sectoral opportunities and issues

- Multipurpose reservoirs – provision of water supply from irrigation and hydropower reservoirs
- Localised pollution problems downstream from major urban areas

Trade-offs

- Provision of safe water and sanitation has very few negative consequences, and can generally be accounted as low to no impact. In some cases there may be local loss of wetland amenity, where natural wetlands are used for primary treatment of effluent.
- It is important to establish that access to water for basic needs as highest priority, and provide adequate protection of domestic water supplies from overuse by other sectors

Priority areas for investment and cooperation

- Urban water supply (particularly for the poor) – maintenance, rehabilitation and expansion of existing water supply and sanitation infrastructure
- Rural water supply
- Efficiency of water use and distribution systems
- Prevention and mitigation of pollution (both urban and rural)
- Monitoring access for equity, sustainability and impact
- Innovative mechanisms for financing water supply (eg through public – private partnerships)

References

State of Basin Report 2003: Chapter 12

BDP 012-6: Regional sector overview: Domestic water, sanitation and industrial water use. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia. November 2002. (12+27 pages)

A2.7 Flood management and mitigation

Sector objectives: People's suffering and economic losses due to floods are prevented, minimised, or mitigated, while preserving the environmental benefits of floods.

Current status

Floods are part of the natural cycle of the Mekong, and vital to the functioning of Mekong ecosystems. Lifestyles and agricultural practices have evolved around the flood pulse - for example, cultivation of deep water and recession rice. The flood pulse is the engine which drives the enormous productivity of Mekong fisheries.

The urgent need for improved flood management and mitigation is reflected by the recurrent damage in the Lower Mekong Basin. In 2000, more than 800 people died, and the economic damage was assessed at more than US$400 million; significant damage also occurred in 2001 and 2002. The poor are often the most adversely affected by floods.

The extent of damage is increasing as populations rise, with more people living in flood-prone areas. Developments on the floodplain, such as levees to protect crops and infrastructure and construction of elevated roads, result in changes to patterns of flooding and may exacerbate flooding elsewhere. They can also block access of fish to feeding area on the floodplain.

Development opportunities and constraints

A **Flood Management and Mitigation Strategy** has been prepared by MRC (MRC 2001) . This forms the basis for the new **Flood Management and Mitigation Programme (FMMP)** (MRC 2002), with five components:

1 Regional FMM Centre,

2 Structural measures and flood proofing

3 Mediation of trans-boundary flood-related issues

4 Flood emergency management

5 Land use management.

Floods are natural events, and it is usually not possible to achieve complete protection – particularly in the context of the very large natural floodplain of the Mekong. In addition, large structural flood protection works induce major changes in ecosystems. However, the flood risk can be greatly reduced if communities are appropriately prepared. In many cases, a mixture of structural and flood preparedness measures will be most effective in reducing vulnerability.

Cross-sectoral opportunities

Land use planning is a crucial part of flood preparedness and reducing flood damage.

There is some potential for mitigation of floods by dams, particularly at a local level. Model results (see Section 3.2) indicate that construction of proposed storages will reduce average wet season flows by up to 0.3 m, but this may not provide a significant benefit in terms of flood protection on the floodplain and Delta. In many cases the worst floods occur in the late wet season, when storages operated for hydropower or irrigation are full and have no capacity to absorb extra flows.

Trade-offs

The major trade-off with flood protection is alienation of the floodplain and adverse impacts on environment and fisheries. There is also evidence that loss of the annual deposit of river silt in areas protected from floods may lead to decline in soil fertility.

Priority areas for investment and cooperation

- Flood preparedness (flood forecasting and regional flood warning system, community based preparedness)
- Strengthening flood emergency management
- Improved delineation and land-use planning for flood hazard areas
- Development and operation of hydraulic structures to reduce flood risk from inappropriate structural intervention
- "Flood-proofing" to reduce vulnerability (rather than aiming at full structural flood protection)

References

MRC Strategy on Flood Management and Mitigation. MRC, Phnom Penh, Cambodia. October 2001.

Flood Management Programme (November 2002)

State of Basin Report 2003: Chapter 13

A2.8 Watershed management[1]

Overall objective: Effective management of watersheds by relevant institutions in accordance with the maintenance of relevant ecological, economic and social watershed functions.

[1] Watershed management is intrinsically cross-sectoral, and so is not regarded as a "sector", but as an integrative process.

Current status

Watershed Management is the process of people guiding and organizing water, land and forest resource use on a watershed in order to provide desired goods and services without adversely affecting water, soil and vegetation resources. Embedded in this concept is the recognition of the ecological interrelationships among land use, soil and water, and the ecological, social and economical linkage between upstream and downstream areas.

Therefore the following areas need to be addressed:

- Consistent sector policies and planning processes
- Effective stakeholders negotiating processes
- Appropriate implementation technologies
- Adequate monitoring system
- Sustainable information- and data management including target oriented preparation of lessons learned

These include

- Conserving or rehabilitating resources and environment
- Promoting social and economic development
- Achieving specified and agreed land and water management targets
- Ensuring agreed upon level of biodiversity
- Minimizing land degradation.

Effective watershed management needs to be holistic in coverage and inter-disciplinary in scope. WSM has to consider the natural resources (land, water, forest) as well as the human resources and coordinate their management needs and development potentials. Watershed interventions should consider the different stakeholders' interest and include mechanisms for conflict resolution.

Large and unique areas of forest, wetlands and floodplain areas remain in the LMB (including the Tonle Sap Great Lake and its environments). These represent assets with a high economic, social, cultural and environmental value. In general, the forest and wetlands are under pressure. Headwater areas are exposed to deforestation from forestry activities intensified shifting cultivation and unsustainable agriculture systems. Wetlands are under pressure from cultivation and changed flow regimes from regulation, and floodplains are from land development and infrastructural intervention.

Deforestation and poor agricultural practices can significantly degrade both the quantity and quality of run-off and alter groundwater recharge, as well as threatening habitats and biodiversity. Mining in headwater areas (and elsewhere) requires a particular caution to minimise the environmental impacts such as soil erosion, habitat degradation, and release of toxic substances.

Watershed degradation threatens both rural and semi-subsistence livelihoods. Control of impacts is subject to complex socio-economic cause-effect relationships, and involvement of local communities is critical to effective management.

Issues of governance and subsidiarity are crucial for appropriate watershed management. Participatory land use planning and land allocation is the foundation for an IWRM approach. Integrated spatial planning should include institutional analysis and design, and transparent methods for participation and delegation of authority and responsibility. Special consideration must be given to underprivileged groups (such as ethnic minorities), comprising empowerment and targeted support.

Watershed management goal in the LMB

The overarching goal of watershed management in the LMB is that watersheds (including flood plains, wetlands and forest areas) are sustainably managed (preserved and/or utilised) in accordance with clear preferences and safeguards, described in transparent policies and land management plans and monitored continuously.

Important elements of this sustainable watershed management are:

- Community-based natural resource management
- Natural resource utilisation with a suitable, diversified balance between economic, social, cultural and environmental benefits
- Maintenance of hydraulic regimes (including upstream and downstream flow resistance, natural storage capacity, and runoff rates), to assure appropriate flow regimes in the rivers for maintenance of livelihoods and ecological health;
- Habitat conservation (especially in forests, wetlands, and floodplains);
- Management of flood risk (to reduce human and economic costs while maintaining ecologic values);
- Control of erosion and siltation (particularly in large lakes and reservoirs)

Cross-sectoral opportunities and trade-offs

Watershed management is intrinsically cross-sectoral. IWRM views the watershed as a coherent unit, within which the social, environmental and economic outcomes are inextricably linked. IWRM thus explicitly incorporates the concepts of watershed management with a special focus on the importance of maintenance of watershed functions.

Watershed management efforts interact positively with rules regarding flow regimes, environmental impact assessment, development of tourism and the recreation sector, with fisheries development, and with flood management efforts

Priority areas for investment and cooperation

- Development and promotion of watershed-related knowledge, awareness and attitudes among stakeholders and decision-makers in the public and private sectors
- Creation of relevant and effective watershed management related institutional framework
- Integrated spatial planning at local, national and basin levels
- Improved farming systems and agricultural practises in upland areas (particularly with regard to shifting cultivation)
- Support to sustainable commercial forestry, agro-forestry and traditional forest-related livelihoods, including reforestation and greening schemes

- Support to appropriate management (including land management plans and monitoring) of important habitats, including restoration and partial protection where necessary. Such habitats could be forests, wetlands, and floodplains, including inundated forests and other unique LMB ecosystems
- Measures to improve traditional forest-related livelihoods, such as mountain agriculture and non-timber forest production; including awareness and education programs, and scientific research
- Related education, capacity-building and awareness-building

References

State of Basin Report 2003: Chapters 8 and 9

Poppe, M (2004) Integrated watershed management planning in the Lower Mekong Basin. MRC-GTZ Cooperation Program, MRC, Vientiane, Laos PDR.

MRC (Jan 2000): Strategy study on the development of the watershed management / forestry sector in the Lower Mekong Basin. Strategy and action plan. Prepared by Arcadis for MRCS, January 2000

BDP 012-3: Regional sector overview: Watershed manageent. Basin Development Plan Program, Mekong River Commission, Phnom Penh, Cambodia. November 2002. (22 pages)

Appendix 3: Scenarios for development in the LMB

What are scenarios?

Scenario are used internationally many areas of planning as a way of analysing possible outcomes of different options. Scenarios are a structured way of asking (and answering) the question "What if?". They describe possible futures, but are options, not predictions.

Scenarios for basin planning

Scenarios are used in basin planning to illustrate the potential impact of different development options on the hydrology of the Mekong, and hence on environmental, social and economic outcomes. The analysis provide important insights into the way the Mekong Basin functions as a system, and underpins the formulation of strategies for sustainable development of Mekong water resources.

Scenarios can be used to

- compare development options at a strategic level;
- identify benefits and trade-offs; and
- provide an understanding of the sensitivity of the water resources system to change.

Formulating scenarios

Within the MRC Basin Development Plan (BDP), scenarios have been formulated to capture the impacts of different combinations of developments for the LMB. National plans for development and external trends (such as population growth) affecting water resources were identified with the help of the National Mekong Committee (NMC) BDP teams, based on sub-area reports and analysis, and on national and regional reviews of major sectors.

Proposed developments fall into four main categories in terms of their hydrological impacts:

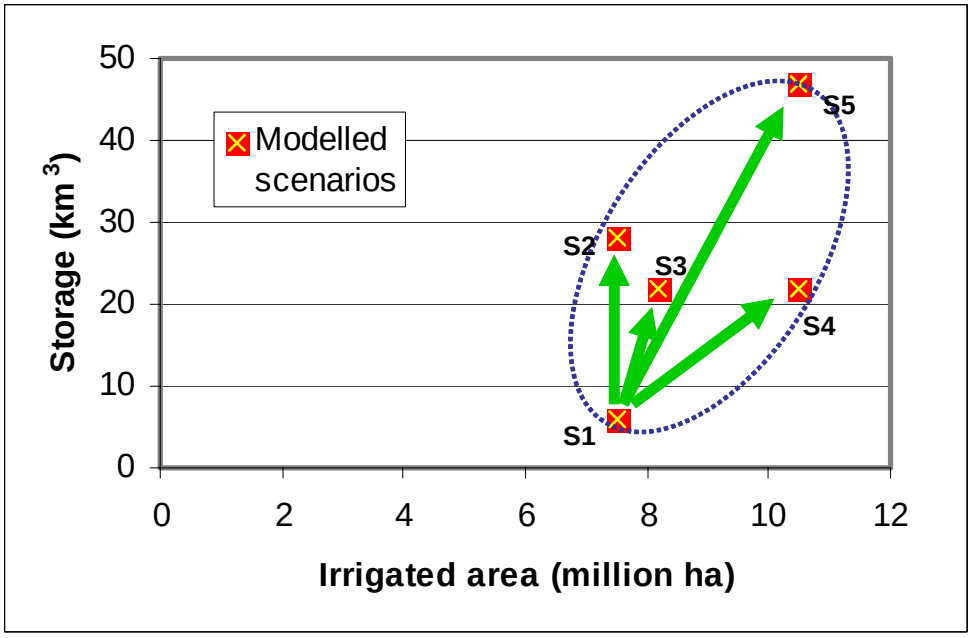
- Increased extractions for irrigation, domestic, industrial and other uses
- Storages which redistribute flow between wet and dry seasons (for hydropower or irrigation)
- Diversions of water either within (intra-basin) or outside (inter-basin) the LMB
- Physical changes to the flood plains (such as embankments, dykes, roads) which may change patterns of flow in the flood plain, Great Lake and Delta.

Preliminary scenarios were formulated to capture the impacts of different combinations of these developments. The details of components to be included in each scenario (such as areas irrigated, hydropower projects) were discussed with the NMC-BDP teams.

At this stage, five preliminary scenarios have been described and analysed for BDP using the Decision Support Framework and Basin models developed under MRC's Water Utilisation Program; and two have been analysed qualitatively, using available information rather than the models (see below).

This group of scenarios is only the beginning of the analysis. They have been formulated specifically to help define the "development space" (see Figure A2.2). Many other scenarios will be needed to give a comprehensive picture of basin development possibilities. This will be the focus of on-going work in BDP Phase 2.

Figure A2.2: Hydrological "development space" for the LMB, defined in terms of options for irrigation and hydropower development.



BDP scenarios

Five preliminary model scenarios were formulated for BDP, as follows:

S1 - Baseline: To describe current development conditions (for year 2000)

S2 - Upper Mekong development: To analyse impacts of planned large storage dams in the Upper Mekong without development in the LMB. This scenario was run to help define the relative impacts of developments within the LMB, compared to those in the Upper Basin.

S3 - Low development: Irrigation and hydropower development are assumed to keep pace with population growth, but without significant economic growth

S4 - Irrigation development: Large irrigation demand growth, without offsetting storages (but with intra- and inter-basin diversions)

S5 - High development: Irrigation and hydropower development significantly exceed requirements from population growth, to allow for export and economic growth (includes diversions)

A full description of these scenarios is available in MRC-BDP (2005a). These scenarios form the basis for work under the Integrated Basin Flow Management Program.

Two further issues were considered as non-model (qualitative) scenarios. The first described potential impacts of development on the floodplain. Because of the complexity both of possible development patterns, and of the likely impacts, a very large number of modeled scenarios would be required to describe the issues adequately. For this reason, a preliminary analysis of likely development patterns and potential impacts has been prepared based on existing information. This is described in MRC-BDP (2005b).

Climate change is an issue of some concern and interest internationally. Preliminary analyses have been made of the likely impacts on SE Asia and the Mekong region in the medium term. These have been reviewed in Hoanh et al (2003) and in WWF (2005).

Describing and analyzing scenarios – the models

The Basin models and DSF (developed under the Water Utilisation Program and now operated by TSD) provide an important tool for description and analysis of scenarios. The scenarios formulated by BDP were analysed by the TSD Modelling Group to give detailed descriptions of the expected hydrological changes resulting from different development options. The hydrological impacts were then analysed in the context of their likely impact on ecological, social and economic outcomes, with assistance from Environment Program and sector programs (notably Fisheries and Navigation).

Not all scenarios must be modeled. It is possible, and in some cases more flexible, to consider a scenario in qualitative terms, describing likely impacts on the basis of existing information rather than model outputs. This is the approach that was taken for floodplain development and climate change.

The results of scenario analysis are described in detail in MRC-BDP (2005a, 2005b).

Major conclusions from scenario analysis

While the detailed results are of considerable interest, the broad picture that emerges from the scenario analysis is more important in terms of basin planning. The strategic significance of the conclusions from these studies is summarised below.

Construction of the planned cascade of dams on the Upper Mekong will change flow conditions in the upper part of the LMB very substantially, but the impact on the floodplain, Tonle Sap and the Delta is largely mitigated by inflows from major tributaries within the LMB. Long term development plans for LMB should be evaluated in the context of the resulting changed flow regimes.

Construction of storages (whether in the Upper or Lower Basin) will result in transfer of flows from the wet to the dry season, with corresponding opportunities for increased dry season irrigation. Near-field impacts of developments may be substantial. However, even under a high development scenario (50,000 MCM of storage, or over 10% of average annual flows), the overall character of the hydrograph at Kratie is maintained. Low flows at Kratie are significantly increased (higher than the historically observed range), but high flows are reduced only marginally (within the historically observed range). Construction of storages in the upper reaches of the LMB or on the tributaries is unlikely to mitigate floods on the lower floodplain and Delta.

Storages may impact on fishery productivity by obstructing migration routes; by reducing the overall extent and duration of inundation of floodplain and wetland ecosystems (particularly in low flow years); and by increasing dry season flows. The impacts of increased dry season flows on fish ecology are not well understood.

Developments on the floodplain (such as embankments and dykes) can potentially change flood patterns and duration in the floodplain very significantly. Changes on the floodplain itself are likely to have larger impacts on the floodplain than flow changes in the river due to upstream regulation.

Without offsetting storage, extraction and diversion of water for irrigation development will result in a significant decrease in dry season flows and a concomitant increase in the area affected by salinity intrusion. However, planned hydropower development is more than sufficient to offset likely increases in irrigation withdrawals. Construction of storage, and intra-basin transfer of water, can greatly increase the reliability of dry season irrigation, but does not completely remove the risk of water shortages.

Existing studies of global climate change (Hoanh et al 2003, WWF 2005) indicate that climate variability in SE Asia may increase in the next 20 to 50 years, with longer, drier dry seasons and wetter, more intense monsoons. This reinforces the need for production and livelihood systems that can cope with variation in water availability.

Scenario analysis confirms that the impact of development on Mekong flows is likely to be significant and observable, but that currently proposed levels of development are not likely to completely change the nature of the Mekong's seasonal flow patterns or the functioning of the Tonle Sap Lake. The ecological significance of local changes, particularly to the floodplain, needs to be carefully assessed. The analysis reinforces the importance of a balanced and coordinated approach to water resources development and management.

Future work

Scenario analysis has helped to start defining the "development space" available to the Mekong, and the impacts that different options might have. The Integrated Basin Flow Management Program (IBFM) will extend the analysis, to increase the understanding of how hydrological change impacts on ecological, social and economic outcomes. Future work can build on this understanding, by considering, for example

- impacts of different crop types and cropping patterns on irrigation demands
- the impact of different operating rules for large storages
- the sensitivity of the system to different spatial patterns of development
- more detailed studies of the impacts of particular projects or groups of projects.

References

MRC-BDP (2005a) "Modelled Impacts of Scoping Development Scenarios in the Lower Mekong Basin" . Draft BDP Report. MRC, Vientiane.

MRC-BDP (2005b) A report on likely infrastructure developments in the Mekong floodplain in Cambodia and their signficance in changing flow patterns" . Draft BDP Report. MRC, Vientiane

WWF (2005) An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China. WWF Nepal Program, Kathmandu, Nepal. 79pp.

Chu Thai Hoanh, H. Guttman, P. Droogers and J. Aerts (2003) Water, Climate, Food, and Environment in the Mekong basin in southeast Asia. Final Report, ADAPT Project. International Water Management Institute, Colombo, Sri Lanka. sheba.geo.vu.nl/~ivmadapt/ downloads/Mekong_FinalReport.pdf.