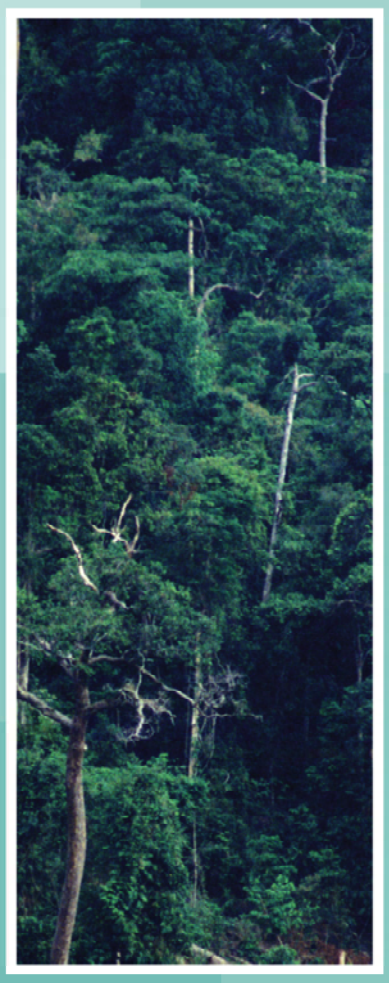

# The MRC Basin Development Plan

## Data System and Knowledge Base

**BDP Library Volume 6**

**March 2005**
**Revised December 2005**

**Mekong River Commission**

# BDP

## The MRC Basin Development Plan

## Data system and knowledge base

BDP Library Volume 6

March 2005, revised December 2005

Mekong River Commission

# 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 The work was done from 2002 to 2005, and some information may already have been superseded by new developments and new knowledge.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'.*

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# Acknowledgement


The term *'BDP data system and knowledge base'* origins from the distant past and is not fully appropriate. Rather, the data system and knowledge base is a shared asset of MRC and the NMCs, spanning across the various core and sector programmes, and accommodated within the MRC Information System. The particular BDP applications and contributions have been developed 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 data, information, guidance and support received in connection with the work have been indispensable and are gratefully appreciated.

# Acronyms and abbreviations

| | | |
|---|---|---|
| BDP | : | Basin Development Plan (of MRC) |
| CNMC | : | Cambodia National Mekong Committee |
| DSF | : | Decision-Support Framework (of MRC) |
| EIA | : | environmental impact assessment |
| ISDIT | : | Information System Design and Implementation Team (of MRCS and the NMCs) |
| IWRM | : | integrated water resources management |
| JC | : | Joint Committee (of MRC) |
| LMB | : | Lower Mekong Basin (the Mekong Basin parts of Cambodia, Lao PDR, Thailand and Viet Nam) |
| LNMC | : | Laos National Mekong Committee |
| MRC | : | Mekong River Commission |
| MRCS | : | Mekong River Commission Secretariat |
| NA, n/a | : | not applicable |
| NMC | : | National Mekong Committee |
| PIN | : | project information note |
| RAM | : | Resource Allocation Model (of BDP) |
| SEA | : | strategic environmental assessment |
| TNMC | : | Thailand National Mekong Committee |
| TSD | : | Technical Support Division (of MRCS) |
| VNMC | : | Viet Nam National Mekong Committee |
| WUP | : | Water Utilization Programme (of MRC) |

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# Executive summary

Formulation of a Basin Development Plan (BDP) relies on having accurate information that covers the Lower Mekong Basin (LMB) as a whole, and the four riparian countries individually. Agreement on the reliability of such information enables it to be held in common by the four countries, and underpins regional planning and cooperation for water resources in the LMB. Establishing a shared information system was one of the first tasks of the BDP.

## *BDP Data System*

During BDP Phase 1, significant progress has been made in data sharing and management within MRC. The work of Technical Support Division has established the MRC Information System (MRC-IS), the ISDIT process and the MRC Procedures for Data and Information Exchange and Sharing (adopted by MRC Council in November 2001). The BDP has built on these achievements, rather than developed separate information systems

## *Data sharing for BDP*

- Protocols for exchange and sharing of data for the BDP are covered by the MRC Procedures for Data and Information Exchange and Sharing (November 2001) and supplementary guidelines.

- Data for BDP will be compiled within the MRC Information System (MRC-IS).

- The BDP Coordinator in each country will be the main contact for access to national data, in consultation with ISDIT NMC representative.

- Although the existing agreements cover all required fields of information, BDP may require data that have not been routinely exchanged for MRC purposes (for example, socio-economic data) and it may be necessary to negotiate mechanisms for data sharing with agencies that have not been involved in the MRC process.

## *National data management*

- Under the MRC Procedures for Data and Information Exchange and Sharing, each country has a responsibility to provide information required for BDP. However, the details of management of national data compiled for BDP within each country are the responsibility of each NMC. There is no need for a standardised system of data management within the four countries, since the compiled data will be held in common in the MRC Information System and managed by MRCS according to the standards agreed through ISDIT.

- ISDIT is the main forum for coordination of data issues between the four countries for MRC. The BDP Coordinator and ISDIT representative will work together to facilitate access to national data from line agencies and other sources

- all data compiled for BDP will be held in the MRC Information System and will be available to the NMCs.

- screening of national data and information available will take place as part of the process of sub-area analysis (see BDP Guideline 005), within the broad framework identified in the Information Needs Assessment (below).

### *Information needs assessment and information available within MRCS*

Because of its broad scope, BDP requires information about a wide range of sectors and issues. BDP requires information to describe

- current patterns of water use and availability
- options (scenarios) for development in different regions and sectors
- potential impacts of development scenarios on water resources, production, environment and socio-economic conditions

The level of detail required will vary between sectors, and between sub-areas.

It is important to make a balance between collecting enough information to adequately describe the impacts of proposed development scenarios, and feasibility of collecting and processing the information within the 3 year timeframe of the BDP. This will require careful scoping of information requirements. Details of data needs will be determined as sector analyses and sub-area studies are compiled - information assessment will be a part of the on-going process of basin planning.

An important function of BDP is to synthesise information from MRC and national programs – primary data collection should be kept to a minimum. BDP will have a major role in identifying data gaps and promoting collection of key datasets in the future. BDP must work with available information, but make provision for information gaps to be filled at later stages.

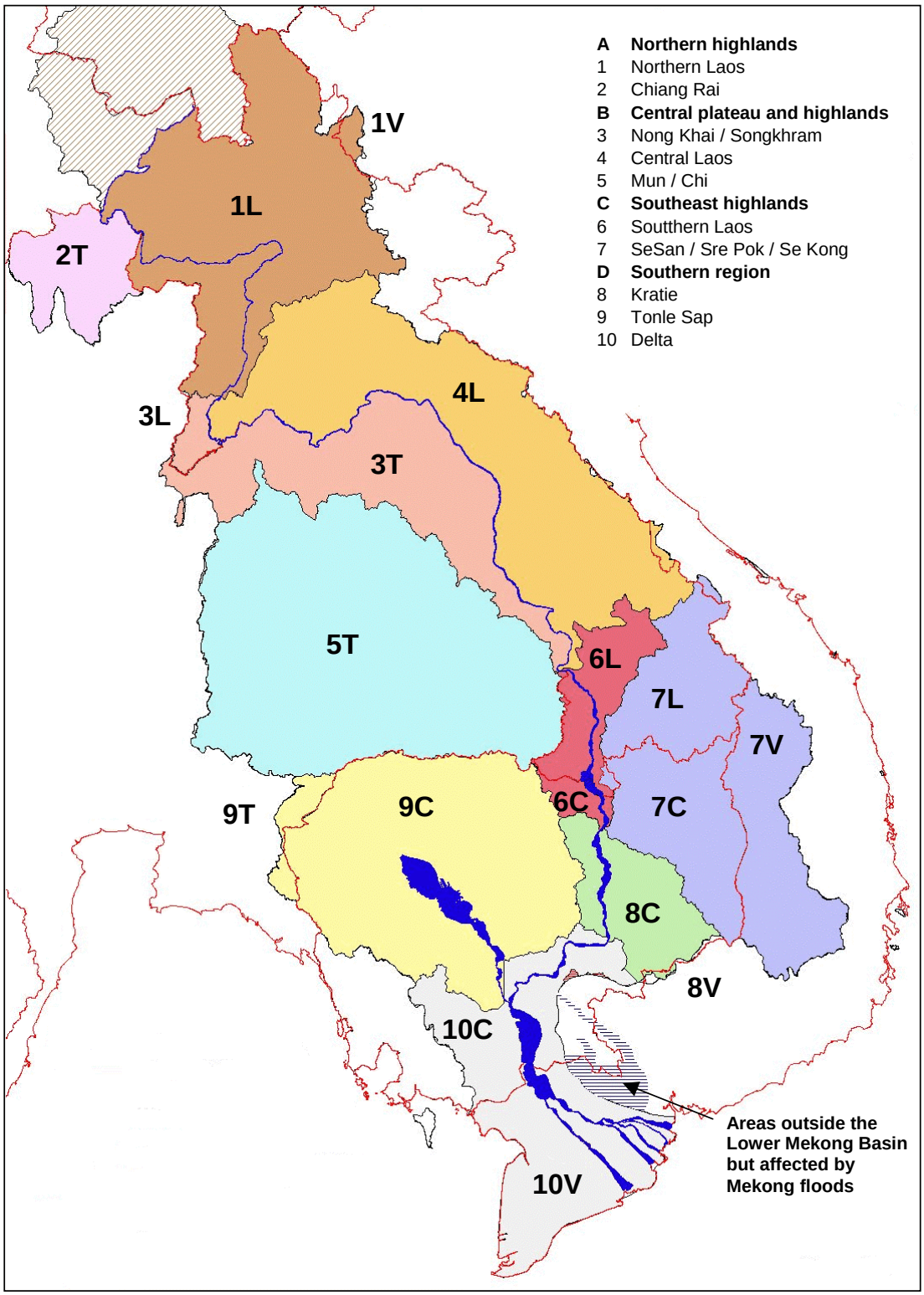
Major information gaps identified early in BDP Phase 1 included:

- data on water use in all sectors
- systematic listing of water related projects
- minimum flows required to maintain riverine and wetland ecosystems
- information on the economic value of water in different sectors.

There is also a lack of information to quantify cause / effect relationships relating to environment and ecosystem functions (for example, the relationship between changes in water regime and fisheries production). Similarly, very few aspects of social impacts of change can be quantified from existing data.

Most datasets held by MRCS are at scales suitable for regional analysis. Local information on specific development options will be required from national and provincial agencies.

# 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 knowledge base for the planning process.

## 1.1 Origin of document

The present volume is based on the following documents:

> MRC-BDP (Sep 02): BDP Data System. (i) Summary; (ii) draft guidelines on data sharing; (iii) draft guidelines on national data management; and (iv) information needs assessment and information held by MRCS
>
> MRC-BDP (Mar 05): BDP Projects Database, Version 1.2 (listings as at 11 March 2005)

## 1.2 Basis and context

### 1.2.1 Link/relationship of subject to IWRM

Integrated Water Resources Management (IWRM) has been defined (by Global Water Partnership) as *'a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems'.*

Evidently, such co-ordinated management, across sectors and territories, requires a good, and - particularly - broad knowledge base, not only of the hydrologic cycle, but also covering present water uses, future demands of water, and the related economic, social and environmental implications.

Knowledge-building and knowledge-sharing are effective ways to improving the quality and enhancing the benefits of IWRM, for example in relation to

- formulation of development goals that are clear and operational, and well understood by all;
- development of good administrative practices, as a necessary supplement to rules and regulation;
- development of appropriate progress indicators and criteria;
- inter-agency information exchange (as a basis for improved co-ordination);
- identification of practical instruments for cost recovery and demand management;
- targeted (rather than explorative) data production in connection with (expensive!) monitoring, field campaigns, and pilot surveys;
- implementation of suitable, comprehensive (and inexpensive!) post processing routines, and of modern information technology tools for decision support; and
- skill development at all levels, from the minister to the staff gauge reader.

### 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 knowledge base contributes to Stages 1 and 2, from where results are carried forward to Stage 3 and the following stages.

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

The data system and knowledge base is linked to the large majority of other BDP reports and activities, notably

- the MRC State of the Basin Report (June 2003) (that was produced interactively with the Social Atlas from may 2003 and the People and Environment Atlas from August 2003);
- the regional and national sector reviews, and the sub-area studies, which contributed substantially to the knowledge base;
- the hydrological and economic scenario analyses (which have both drawn on the knowledge base and at the same time added to it); and
- the subsequent IWRM strategy formulation.

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

The data system and knowledge base constitute, or contribute to the following outputs and activities in the Logical Framework Matrix:

Output 1.1 Planning Process

Activity 1.1.4 : Good practices for data sharing for BDP

Output 1.3 Data system

Activity 1.3.1: Information needs assessment

Activity 1.3.2 National data management

Activity 1.3.3 GIS implementation

Activity 1.3.5 Project data system

Output 2.1 Sub-area studies

Activity 2.1.5 Sub-area analysis (data compilation)

Activity 2.1.7 Data assessment

## 1.3 Significance

### 1.3.1 Significance of subject for strategic planning

An adequate knowledge base is essential to strategic planning of water resources and related resources.

The data and information used by the BDP have been produced by other MRC programmes and by national sector agencies. For the purpose of the BDP, the data and information have been compiled and synthesised, in order to allow for an integrated, cross-sector overview.

### 1.3.2 Significance of subject for Mekong Basin

The value of synthesised information is illustrated by its use for formulation and analysis of scenarios, which illustrate a set of boundaries for conceivable future developments in the Lower Mekong Basin.

It has been said that *'in formulating a year 2020 development perspective/scenario, it is important to recognise that it is impossible to forecast the future'.* [1] While this is correct, decisions - including ones with far-reaching implications - need to be made, even if the knowledge base is less that perfect. Access to the *'best possible knowledge available at the time when the decision must be made'* will add to its relevance and usefulness and reduce the risk of resource-related mistakes.

### 1.3.3 Significance of subject for MRCS / BDP 1

During BDP Phase 1, the knowledge base (as developed and expanded during the scenario analyses) has provided a platform for identification of inter-sector dependencies (synergies and constraints), as well as for the preparation of a holistic, integrated IWRM Strategy[2] and for identification of viable development projects.

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[1] Douglas Webster (Dec 96): Establishing a strategic planning process in the Mekong River Commission: Some notes on methodology. Prepared for the Mekong River Commission, page 6

[2] In preparation (mid 2005)

# 2 Summary of approach

The general need of improved knowledge about water availability and about water-related economic, social and environmental states, relations and implications was highlighted by two studies published in 1997:

- UNEP and MRC (May 1997): Mekong River Basin Diagnostic Study. Final Report. United Nations Environment Programme and Mekong River Commission; and

- Öjendal, Joakim and Elin Torell (August 1997): The Mighty Mekong Mystery - a study on the problems and possibilities of natural resources utilization in the Mekong River Basin. Prepared for SIDA, Department for Natural Resources and the Environment

In consequence, data collection and knowledge-building was mainstreamed into the BDP Phase 1 approach as described in the BDP Inception Report (July 2002).

The BDP knowledge base was developed in parallel with the WUP knowledge base (that focused on hydrological data and water utilization) and also in parallel with many studies undertaken by the various other MRC sector programmes. A shared framework for MRC's data management was developed as the MRC Information System, which offers particular facilities for management of time series data and spatial data (maps).

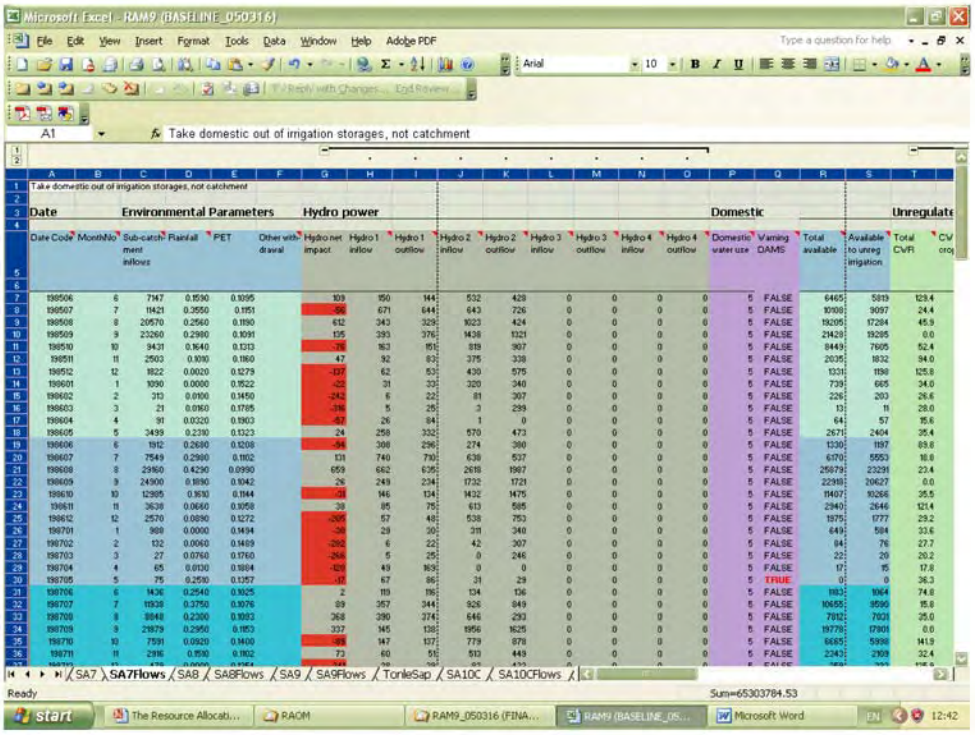
For the purpose of the BDP, however, an even broader knowledge is required - notably extending into development economics, institutional aspects, national development policies, and planned and potential development initiatives in the LMB.

The purpose of BDP's data management has not been production of primary data, but rather acquisition, processing, conversion of data into synthesised information, and subsequent dissemination.

The work started with a series of regional sector overviews (that were reported in 2002). These reviews, as compared with anticipated needs of data and information, identified substantial knowledge gaps to be filled or otherwise mediated. Several working papers (incorporated in the present report) addressed the data needs and data availability within MRC and at the national level.

The knowledge gaps were highly reduced, if not entirely filled, during the comprehensive sub-area studies, and as a result of water resources studies and sector studies carried out under the various MRC programmes.

A need remains of maintaining, consolidating and expanding the knowledge base, to the benefit of all parties that are involved in or otherwise have an interest in water-related development in the Lower Mekong Basin.




# 3 Information needs

## 3.1 Introduction

The BDP provides a general planning tool and process to identify, categorise and prioritise development projects and programs for the LMB. The aim is for the member countries of MRC to coordinate in the development of the full potential of sustainable benefits from the resources of the Mekong to all riparian countries, while maintaining a balance between environmental, social and economic issues.

BDP draws heavily on existing national plans and policies, and is supported by a wide range of programs both within MRC and in the national line agencies. An important function of BDP is to synthesise information from MRC and national programs – it should not be primarily concerned with data collection. BDP will, however, have a major role in identifying data gaps and promoting collection of key data.

The purpose of this chapter is to

- assess the information requirements of the BDP process (output 1.3)
- screen available information in MRC Secretariat , and
- identify major gaps in information.

Subsequently, with the assistance of the NMCs, information relevant to BDP available within national agencies has been identified.

## 3.2 The BDP process and related information flows

There are 5 stages in the BDP planning process, as follows:

Stage 1: analysis of the LMB and of sub-areas to establish key options and constraints for development

Stage 2: analysis of development scenarios for sub-areas and the Basin, and the impacts of different scenarios

Stage 3: formulation of management and development strategies for sub-areas and the Basin

Stage 4: a long list of potential development projects for the Basin

Stage 5: a short-list of basin-wide programs and projects, based on agreed selection criteria.

The information flows involved with this process are illustrated in Figure 3.1. In summary, information is needed in three steps:

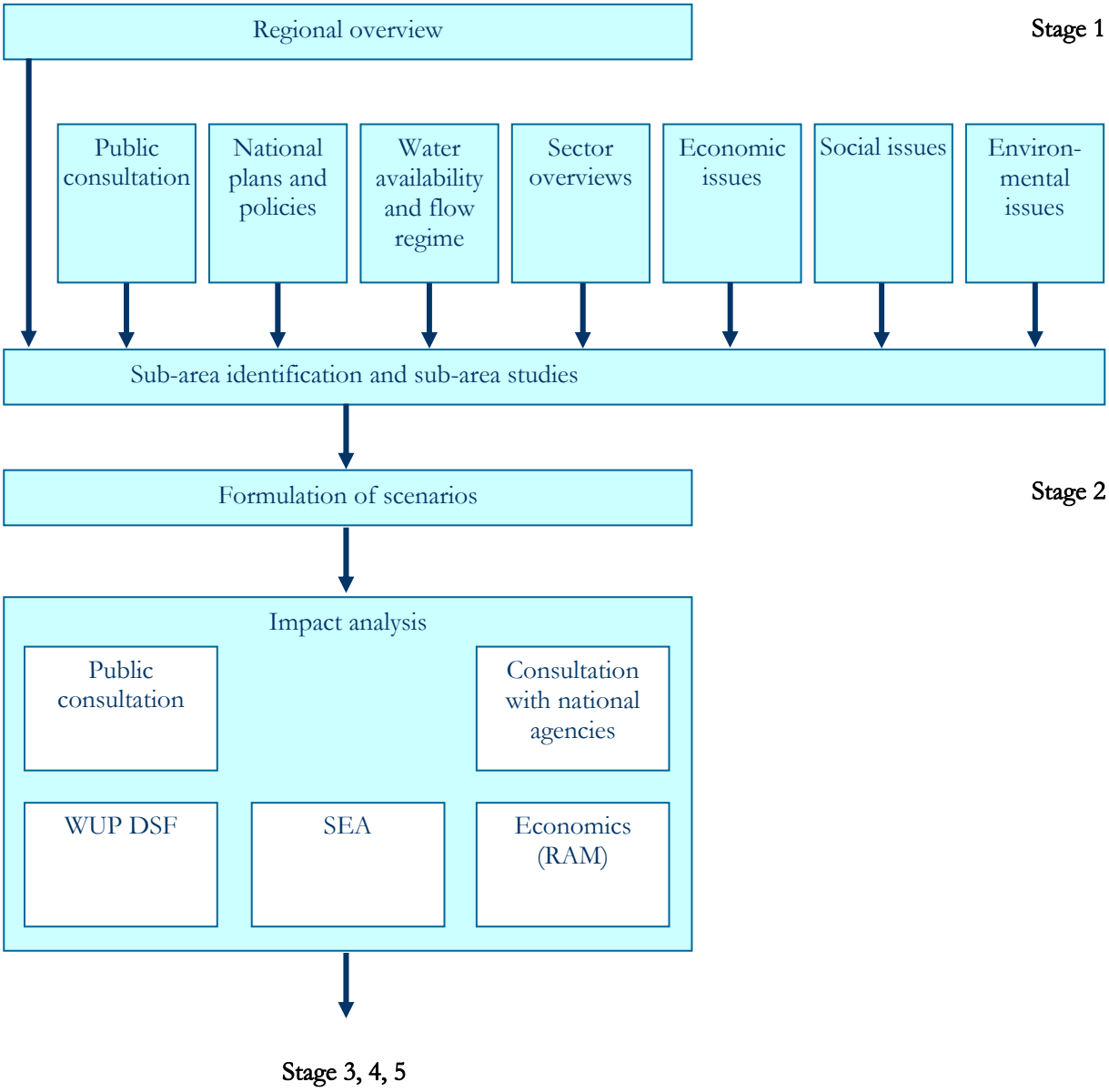
– regional overview to set the context, establish the resource policy framework and facilitate delineation of sub-areas for planning (Stage 1)

– sub-area overview information to describe baseline conditions and identify needs, opportunities and constraints, as the basis for formulating scenarios for water use in the sub-areas (Stage 1)

– more detailed information within the sub-areas to analyse the impacts of different scenarios. Some information requirements at this stage will be specific to the issues and localities concerned – these may not be basin-wide datasets (Stage 2)

Each of these steps defines the scope of the one following, so that regional overview is a scoping exercise for sub-area overview, which will in turn define the scope of the impact analysis for each sub-area.

*Figure 3.1: Information flows for sub-area identification and analysis*



Regional overviews were been prepared during the BDP detailed planning Phase (1999) and later during BDP Phase 1. They have been reported as BDP working papers, and also in the MRC State of the Basin Report.

Later stages of the BDP (Stages 3, 4 and 5) are concerned with formulating and prioritising development strategies for water resources in a basin-wide context, balancing the needs of the different countries and sectors. In these stages, it will be important to be able to provide

a clear exposition of the economic, social and environmental priorities of the riparian countries (to develop criteria for selection of projects), and

summary information on how specific scenarios or interventions meet those priorities (economic, social and environmental indicators).

These stages of the project will be concerned with identifying appropriate selection criteria (Outputs 2.6.1) and development indicators (Output 1.3.4), which will in turn define the information required to compile these. Most of the required information will be derived from data acquired during Stages 1 and 2, but it is not feasible to provide a detailed analysis of information needs for developing indicators at this stage.

This chapter concentrates on the information requirements for sub-area overview and analysis. Details of information required for impact analysis within each sub-area will be defined as the work progresses. In assessing the impacts of scenarios, BDP will draw on a number of tools, as outlined in Figure 3.1:

- The WUP Decision Support Framework will provide quantitative description of water flows, as well as tools for assessing the environmental and socio-economic impacts of changes in flow (see MRC-WUP-A Jan 2002, Feb 2002a);
- guidelines for Strategic Environmental Assessment and Cumulative Environmental Assessment developed under EP provide a framework for assessing environmental impacts (MRC-EP Feb 2002);
- consultation with national agencies;
- consultation with stakeholders and the public. MRC is currently drafting a Strategy on Public Participation which provides guidelines for stakeholder consultation; and
- an economic assessment tool..

## 3.3 BDP and the MRC-IS

The importance of shared and agreed information as the basis for decision making has been recognised in the MRC Procedures for Data and Information Exchange and Sharing, adopted by the MRC Council in November 2001 (MRC Nov 2001). These procedures will govern information exchange between the countries and MRC Secretariat for the purpose of the BDP (see BDP Output 1.1.4).

The Procedures make provision for compilation of national data and information relevant to MRC programs into a shared information system (the MRC-Information System or MRC-IS), which will be the major repository of data and information used in BDP. BDP will not develop a separate information system. Thus all data collated or collected for BDP should comply with MRC-IS standards for formats, metadata and quality. MRC-IS includes a geographic information system for storing and analysing spatially referenced data. Much of the information for BDP will be stored and manipulated in the GIS and linked data tables.

## 3.4 Information requirements and in-house availability

Analysis of the sub-areas is primarily to identify the major issues around which to base development scenarios and assess their impacts. The emphasis is on needs, opportunities and constraints for water resources development. Information is required to:

- describe water availability and flow regimes, including ecological demand
- summarise the resource base, production and economic value for each sector, and describe current patterns of water use (by sector) as a baseline
- identify the ways in which water demand and use might change, in the light of national and regional plans and priorities
- identify populations and ecosystems likely to be affected beneficially or adversely by these changes, and if possible the magnitude of the impacts
- identify dependencies between sectors and between sub-areas.

BDP requires information on use of water resources in 8 main sectors:

- Fisheries (capture and aquaculture)
- Agriculture (including irrigation)
- Hydropower
- Navigation
- Tourism
- Urbanisation / industry
- Forestry / watershed management
- Flood management and mitigation

### 3.4.1 Water availability and flow regime

BDP requires quantitative information on the availability of water in the LMB, (including seasonal variation in flow) and effects on downstream flows of withdrawals from the river or its tributaries. An essential component of defining water availability is defining the ecological demands of the system – the amount and timing of flow required to protect the functioning of river, wetland and lake ecosystems.

A further requirement is that it must be possible to analyse whether a given development scenario complies with the Rules for Water Utilisation being developed under WUP.

#### *Information available within MRC Secretariat*

In the later stages of the project, the WUP Basin Model will provide quantification of water availability and water flows in the Basin, both for the baseline case, and for the scenarios formulated by the BDP. The Basin Model will also predict whether a given scenario meets the rules for water sharing. For details of the Basin Modelling Package and the information it will provide, see MRC-WUP-A (Jan 2002). *"If the water resources data requirements for WUP are fulfilled, this will be adequate for BDP as well, with respect to baseline conditions and cause-effect relationships. The difference between BDP and WUP is that BDP requires*

*information about potential future developments in addition to present conditions"* (MRC-BDP July 1999)

Initial outputs from the WUP Basin Model will not be available until late in 2002 or early 2003[1]. In the first instance, BDP sub-area analysis will have to use estimates from alternative sources (for example, HYMOS models based on data in the WUP hydrological and meteorological databases).

### *Identified information gaps* [2]

Very little information is available on environmental flow requirements within the LMB. EP has instituted a project to develop environmental flow analysis for the basin and is also compiling an inventory of aquatic ecosystems in the basin. Initially, environmental flow requirements may have to be based on *"best guess"* estimates from national experts with knowledge of particular sub-areas.

## 3.4.2 National plans and policies

Sub-area and basin-wide scenarios and strategies will be developed based on national and regional plans and priorities. Information required for sub-area analysis includes:

- national plans and policies for each relevant sector
- national laws relating to water resources
- provincial plans relating to water resources, and provincial authorities with responsibility for implementation of water resources projects
- information on the way in which provincial and national planning and implementation processes interact.

### *Information within MRC Secretariat*

The institutional, legal and planning framework within which BDP will function within each of the four riparian countries has been examined in detail:

- MRC-BDP Mar 1999c (Consultation with line agencies) reviews institutions with responsibility for particular planning issues
- laws relating to water resources within the four countries are reviewed in BDP Output 1.1.2)
- national policies, strategies and plans are being reviewed in BDP Output 1.1.3.

### *Identified information gaps*

Formulation of scenarios at the sub-area level will require detailed information on current plans and the provincial planning processes. This information will be required from the national agencies, through the National Mekong Committees.

At present, there are no systematic records of water resources development projects implemented or planned within the Basin.

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1 (Delays occurred, and initial information was not available before the - also delayed - completion of the BDP sub-area studies)

2 Here. and in the remainder of this chapter, *'information gaps'* refers to late 2002. Since then, many (if not all) information gaps have been closed

### 3.4.3 Social Issues

The analysis of each sub-area will include a social and socio-economic profile that summarizes the major population, social and economic conditions of the people living in the territory. This is a summary based on key parameters, not a detailed analysis. It may be supplemented by the analysis of socio-economic conditions that are specific to the issues of different sectors. Socio-economic assessments within sub-areas will require information at province to district level. A detailed description of the data requirements for socio-economic analysis is provided in Chapter 4.

Further information on socio-economic impacts to be considered in impact analyses are available in the Strategic Environmental Analysis Guidelines developed under EP (MRC-EP (Feb 2002).

#### *Information available within MRC Secretariat*

At the present time1, the MRC database on socio-economic conditions is very limited in its scope (i.e., the number of parameters for which information has been collected). For BDP, a socio-economic database will be constructed within MRC-IS, based mainly on national census data.

Tools for social impact analysis will also be provided in the WUP Decision Support Framework, drawing on the environmental impacts of a specific scenario to identify the potentially impacted population, identify the type of impact and whether it is beneficial or adverse, and provide a socio-economic analysis including loss of assets or income, and equity/ distribution of impacts. These are qualitative tools, because in most cases there is insufficient information to quantify the effects. Quantitative socio-economic assessments would require information on the interactions between environment, economy and society, which in most cases is lacking. MRC-WUP-A (Feb 2002a) suggests that *'attempts at quantification have misled rather than informed decision making'* because of the difficulties inherent in describing these relationships.

A further source of information on social aspects of water use is the *'Water Voice'* project, which aims to collect grass-roots opinion and comments on water related issues from people around the world (for further information, see http://www.worldwaterforum.org/voice ).

#### *Identified information gaps*

Consultation with potentially affected populations will be an important source of information on the socio-economic issues considered to be important within each sub-area, and on the possible nature and magnitude of social impacts. This consultation will form part of the public participation strategy for each sub-area (see BDP Output 1.2.5).

### 3.4.4 Environmental issues

Formulation of development scenarios for each sub-area requires information on

- ecological demands for water (environmental flows)
- environmental resources of the area in general terms
- significant ecosystems / protected areas within the sub-area

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1 i.e. by September 2002

- current or likely environmental degradation issues, including areas at risk and driving processes.

Ecological demands for water (flows required to protect the functioning of river, wetland and lake ecosystems) should be specified in terms of both amount and timing of flows. EP has a continuing program to provide an inventory of significant aquatic ecosystems within the LMB, and has instituted a project to develop an environmental flow analysis for the basin (MRC-EP Jan 2002).

Analysis of the impacts of proposed scenarios on the environment requires information on the links between development processes and environmental quality / degradation. Environmental impacts of proposed scenarios will be analysed in the context of a Strategic Environmental Assessment (SEA), using the guidelines developed under the Environment program (MRC-EP Feb 2002). It is particularly important that the basin-wide assessment take account of cumulative and indirect effects (see the specific guidelines in the EIA report). These assessments will be undertaken in collaboration with EP. The EIA Guidelines give a comprehensive description of the process and information requirements for SEA.

Full EIA for specific developments will only be undertaken at the pre-feasibility stage following agreement on the preliminary Basin Plan, and so is not a part of the BDP program. However, the Sector Guidelines for EIA for each sector provide a valuable checklist of the possible environmental impacts which could result from development, and these should be used in scoping the information requirements for each relevant sector within the sub-area (MRC-EP (Feb 2002).

### *Information available within MRC Secretariat*

Much of the spatial data required to describe the environmental resources of the basin is available within MRC Secretariat. Datasets available include

- forest cover
- wetlands
- topography (digital elevation model)
- hydrology
- water quality
- climate
- soils
- protected areas.

A description of key environmental datasets available within MRC is given in Chapter 4.

Impact tools being developed under WUP will provide analysis of the environmental impacts of changing water flows. The WUP Basin Models will estimate changes to water flow and quality for each scenario or component, including analyses of flood, low flow and Tonle Sap reversals, based on hydrological models. They will also provide tools for describing and mapping broad bio-regions and special habitats and their relation to water flows. Impact analysis tools will provide methods to analyse the effects of changes on water flow for 32 issues in six main areas:

- water quality deterioration and sedimentation

- fisheries productivity and ecosystem functioning
- river bank erosion
- obstructions to navigation
- inadequate dry season flows
- flooding

These impact analysis tools are directed mainly at predicting abiotic habitat parameters, rather than biotic or ecosystem response. Information on the indirect impacts of changed water flows and the environmental processes which drive them is very limited. This represents a major information gap for BDP. For example, information on the effect of changed water flows on fisheries production is essential for BDP, but very limited.

### *Identified information gaps*

Data are available within MRC to provide an overview of the type and distribution of ecosystems within the LMB. However, information on environmental processes affecting many of these ecosystems is lacking, for example:

- effects of changes in flow on aquatic ecosystems (especially Tonle Sap)
- the significance of flooding in maintaining aquatic ecosystems
- effects on changes in flow on river bank erosion
- effects of deforestation on erosion, sedimentation and water quality.
- effects of low dry season flows on salt intrusion in the delta and the potential consequences on flora and fauna

There is very rapid change in land use within the LMB, including clearing of forests and wetlands, due to the expanding population. There is very little reliable data on the rate of conversion of natural ecosystems for agriculture and aquaculture.

## 3.4.5 Economic issues

Formulation of scenarios for sub-areas and the region should take into account the macroeconomic context of sub-area development, including national and regional forecasts of economic growth, employment and terms of trade. This information is available from national finance and planning departments (see MRC-BDP Mar 1999c), and from country overviews published by international financial institutions such as the World Bank and ADB.

Analysis of the impacts of development scenarios will include sector-specific information on the economic effects of interventions, such as the value of increases or changes in production and impacts on employment. Information on economic conditions and outputs for particular sectors are available from the relevant national agencies.

BDP Bridging documents suggest that quantitative economic tools could be used to assess development scenarios: for example, cost-benefit analysis, economic valuation of water use options, and economic optimisation models. Such models require that economic valuations be made for sectors that are not included in the formal economy, for example environment and subsistence sectors. The economic value of environment is poorly characterised and hotly debated internationally, even where underlying data is abundant. Such a process is likely to be both difficult and contentious in the context of the Mekong Basin.

Ringler (2001) carried out a preliminary study of optimum allocation of water in the Mekong Basin using economic –hydrological models. She found that primary data was lacking, and much of the analysis had to be based on secondary and estimated data. However, she concluded that economic models provide a very useful framework for examining the trade-offs required between sectors and sensitivity of the system to specific factors. A proposal is currently being developed by a partnership of CGIAR institutes to expand Ringler's methodology to assess tradeoffs and complementarities in water allocation using an economic optimisation model for the LMB, including an analysis of the relative economic effectiveness of alternative water allocations and an estimation of the social costs and benefits and environmental externalities. Results from the project are not likely to be available within the timeframe of the initial BDP.

### *Information available within MRC Secretariat*

MRC does not currently hold a database of economic information, although macroeconomic indicators are available from country yearbooks, national plans and from the Web.

### *Information required from NMCs*

- Economic information on specific sectors within sub-areas, disaggregated to province where possible. The nature and details of this information will be determined during sub-area analysis
- Macroeconomic data relating to national economic planning and investment.

### *Identified data gaps*

- Economic value of the subsistence sectors, particularly fisheries.
- Value of domestic and industrial water use
- Information to allow economic valuation of environment.

## 3.5 Sector analyses

### 3.5.1 Fisheries (capture and aquaculture)

Information is required for each sub-area on:

1. **People:** Importance of fish to the livelihood /economy of the people in the area. This can include catch, consumption, number (and distribution) of people involved in fishery, revenue earned, nutritional importance, level of dependence of people in the area on fishery (especially subsistence fisheries).

2. **Ecology and habitats:** Does the area have a wider importance for fisheries, such as migration route, spawning habitat, important feeding habitat, floodplain and safe sanctuary?

3. **Key species:** What are key species either endemic to the Mekong, or globally threatened

4. **Aquaculture:** Extent of commercial aquaculture, volume / value of paddy-field fish production

5. **Potential impacts:** Quantification of links between ecological changes and fish production

### *Information available within MRC Secretariat*

A detailed description of fisheries data available within MRC SECRETARIAT is given in (REF Final Report on Internal GIS Database Visit and Review of The Fisheries Programme (Main Report and Annex), April 2001). In summary, the information available comprises:

- an overview of the status of fisheries in LMB
- detailed information at 4 sites
- a preliminary fisheries model which predicts impact on fisheries of changes in flow and flood regime – data for model validation is very limited (Barab et al 2001)
- Mekong fish database (species descriptions, locations etc).

Additional observations are made in Chapter 4 about fisheries information requirements for the BDP, and potential sources of data.

### *Identified information gaps* [1]

- Nutritional importance of fisheries
- Value / size of subsistence fisheries
- Improved estimates of fishery yield and value
- Quantification of ecological basis for fish production in the LMB (eg flood – fishery relationships, importance of particular wetland habitats) - improved data for validation of existing fisheries model
- Complementarities between irrigated agriculture and fish production.

## 3.5.2 Agriculture irrigation

The information required on agriculture will vary between sub-areas, and detailed requirements will be framed during the sub-area analysis. General information required includes:

1. Farming patterns such as land use (main crops, grazing, and forest land); agricultural inputs (fertiliser, pesticides); cropping pattern; farming practices (affecting water use efficiency)
2. Water demands (food crop vs industrial crop vs livestock vs fishery/aquaculture)
3. Irrigation systems (water resource, irrigation infrastructure)
4. Agricultural production and value (crops, livestock, fishery / aquaculture)
5. Agricultural commercialisation: food value, export value, processing value; development plans for agricultural production (expansion of the crop growing area, intensification)

Critical issues for agricultural production include:

- soil degradation (acid sulfate soils / saline soils)
- flooding hazard
- shortage of irrigation water

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1 Significant achievements in this respect have been made since 2002

- salinity intrusion in the Delta
- residues/effects of chemical use on water quality
- drought
- transformation of wetland or forest into agricultural land,
- siltation and erosion impacts on the river
- impact of agriculture on fisheries (eg pesticides use, destruction of fish habitat)

### *Information available within MRC Secretariat*

Basin-wide datasets relevant to agriculture developed by the Agriculture, Irrigation and Forestry Program include:

- a database of over 12500 irrigation schemes, including project location, headwork, canals, irrigation area, reservoir area and other attribute data. (MRC-LRIAD Feb 2002)
- soil types and soil properties (nearing completion – see MRC-LRIAD Mar 2002)
- agricultural areas (1997 land cover dataset – MRC-TSD 2001) -
- areas suitable for agriculture (Watershed classification dataset- MRC-TSD 2001)

Other studies either proposed or in progress include (MRC-AIFP Dec 2000)

- a study to demonstrate the multi-functionality of paddy fields in the LMB
- a comprehensive agricultural development plan for the Tonle Sap Basin
- a study on sustainable irrigated agriculture in Dien Bien – Muong Mai (with an emphasis on water use efficiency).

### *Identified data gaps*

- Details of land use and agricultural production at the provincial level
- Information on land management practices
- Options and constraints regarding dry season water withdrawal (BDP Br Final report)
- Detailed information on the relationship between dry season flows and withdrawals, farming practices and salinity intrusion
- Actual level of water withdrawals and returns for irrigation
- Rates of clearing of forests and wetlands for conversion to agriculture.

Vietnam has conducted extensive studies of salt-water intrusion in the Delta, but there are still uncertainties about the level of dry season flows required to prevent incursions.

The WUP Basin Model requires information to calibrate and run models relating water consumption to land use. Specifically,

- the SWAT model component requires land management information such as irrigation and cropping, to quantify consumptive water use. As a minimum, data to calibrate a simple crop water use model is needed for each identified crop;

- the IQQM model component, the complexity of data required depends on the choice of model, from fixed annual crop patterns, to complex crop yield models. The choice of model may be constrained by availability of data (MRC-WUP 2002b).

### 3.5.3 Hydropower

At the regional level, information is required on national power generation strategies and power consumption trends to assess the demand for hydropower.

Information required for each proposed or existing development includes:

- **Reservoir information:** Location including type of stream (mainstream vs tributary), reservoir type, reservoir area and capacity, total installed power capacity
- **Flow regime analysis :** Impact on flow regime for wet and dry season
- **Economic analysis:** Value of power generation, distribution of benefits
- **Local impacts:** Will people be displaced? How many? To where? What ecosystems will be flooded? Effect on fisheries of new reservoir?
- **Downstream impacts:** Impact on fisheries, flood recession agriculture, flow regime for wet and dry seasons, flood control, creation of environmental flow.

#### *Information available in MRC*

The MRC Hydropower Development Strategy (MRC October 2001a) provides regional context for hydropower development.

Information on proposed and existing developments is available from MRC Secretariat. MRC-BDP (July 1999) concluded that *"It may be reasonably supposed that all hydropower schemes to be initiated in the next few decades have already been identified, and that at least some information about each is available at MRC Secretariat. ...What is not yet in place is data and information required for quantitative assessments of actual impact"*

The WUP Basin Model will provide a quantitative analysis of the impacts of proposed hydropower developments on flow regimes and water availability. Secondary impacts of flow changes on environment and other sectors are considered under the relevant sections (see particularly the sections on environmental issues and fisheries.

Socio-economic analysis of potentially impacted population will be available from the MRC Secretariat socio-economic database.

#### *Identified information gaps*

- Analysis of impacts of proposed mainstream developments in China
- Analysis of the economics of hydropower generation, and the socio-economic distribution of benefits
- Quantitative assessments of actual impacts of existing hydropower developments, including socio-economic and environmental effects of resettlements schemes.

### 3.5.4 Navigation

Navigation and water transport issues are best considered at a regional level. A report being prepared by the Navigation Section of MRCS (MRC Oct 2001b) will provide a comprehensive overview of navigation in the LMB, covering

- the importance of water transport and trade, and how it relates to regional transport routes
- national traffic profiles, including
  - navigable length of rivers, lakes, canals
  - type, volume and value of cargo; passenger numbers
  - domestic vs international trade
- navigation infrastructure (ports, bank protection, dredging etc)
- development status and trends in inland waterway transport
- maritime transport in the Mekong and Bassac
  - international agreements and standards governing trade
- physical and non-physical barriers to maritime and inland water transport in LMB

Additional information required for the BDP includes:

- projected future value of maritime and inland water trade
- proposed infrastructure developments
- potential impacts on access due to changes in water flow from withdrawals (hydropower, irrigation)
- role of water transport in tourism
- impacts on economy, environment of increased traffic
- impacts on environment of river works for access.

### *Information available in MRC*

The MRC Navigation Program can provide much of the required information, as outlined above.

In addition, MRCS holds hydrographic charts at a scale of 1:20,000 for the Lower Mekong (digitized for Vietnam; digitizing for Cambodia, Laos and Thailand will start in mid 2002)[1].

### *Identified information gaps*

- Opportunities for tourism and water transport
- Impacts on economy and environment of increased traffic
- Impacts on environment of river works for access.

## 3.5.5 Tourism

Tourism has the potential to generate significant income and employment opportunities in the LMB. However, at this stage, MRC SECRETARIAT does not have an active program on tourism. The State of the Basin report will provide a preliminary overview, which can be used to scope the information required for BDP.

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[1] Subsequently published as the *'MRC Hydrographic Atlas'*

An ADB study on tourism infrastructure projects in the Greater Mekong Subregion has been completed (http://www.adb.org/GMS/tour_pp.asp).

### *Information available in MRC*

A preliminary overview of tourism and the LMB will be available from the State of the Basin report, covering

- importance of tourism in local economy
- types of tourism in the basin, potential for future development
- trends in tourism development
- government policies and regulations to promote tourism
- collaboration between Mekong Basin countries in promoting tourism
- social and environmental consequences, policies to mitigate negative effects.

### *Identified information gaps*

Information requirements will be scoped after the State of the Basin report becomes available.

## 3.5.6 Domestic and industrial water use

Domestic and industrial demands for water in the LMB are relatively small (compared to agriculture) – the critical issue in this sector is water quality. A detailed list of information requirements for assessing this sector is set out in Appendix 6. For preliminary sub-area analysis the main information requirements are:

*Domestic use*

- size and location of communities which draw their water supply from Mekong River or major tributaries, and/or use Mekong River or major tributaries as wastewater outlet
- % of urban residents with access to clean water and sanitation
- population growth rate in urban areas and projected demand
- current and planned water supply infrastructure

*Industrial use*

- identify major industries (including mining), and water usage
- identify industries with potential high risk of water pollution
- value of industries, and numbers employed within the industrial sector
- projected / planned industrial development

*Wastewater*

- existing wastewater treatment
- water quality below urban outlets
- existing (and future) plans on water supply, sanitation, and wastewater treatment

- legislative and regulatory framework for development of water supply and sanitation?
- financial and economic factors affecting wastewater treatment and disposal

Note that Phnom Penh is recommended for support through "City Development Strategies" (World Bank).

#### *Information available in MRC*

- MRC GIS includes major cities in LMB. Data on their population could be attached, if available from national sources.
- Some information on access to water and sanitation will be available from the national census data in BDP's socio-economic datasets (see Appendix 2).
- Data on ***water quality*** are available from EP's water quality monitoring network (WQMN), from 108 stations (see Appendix 3). EP is currently upgrading and expanding the WQMN, and will begin a *"Water Quality Diagnostic Study of the Lower Mekong River Basin"* in 2002.

#### *Identified information gaps*

Adequate information on manufacturing and mining is available from the relevant national agencies, but has not been collated within MRCS.

Information on urban development is generally lacking, including reliable data on urban populations. Projections for domestic demand will be made from population data, but reliability will depend on the accuracy of the population statistics.

Data on water quality is available for a limited set of stations and parameters, but is not generally suitable for detailed water quality modelling (MRC-EP Nov 2001).

### 3.5.7 Forestry / watershed management

Information requirements to assess watershed management practices, options and impacts vary very widely between sub-areas. In general terms information is required to characterise watersheds in terms of

- nature of the watershed (topography, land cover, land use and contribution to flow)
- changes in land use or land cover that affect the quantity or quality of run-off
- options for mitigating or preventing these impacts.

Issues relating to watershed management are reviewed in MRC-Arcadis (Jan 2000) and by MRC-BDP (Apr 1999c).

The major issues in watershed management are forest management and shifting cultivation in the uplands; and wetlands management and saltwater intrusion in the lowlands and the delta. Because of the extensive use of forest and wetland resources in subsistence land use by ethnic minorities, the social dimensions of changes in land cover must be addressed.

To adequately assess the options for watershed management, a realistic appraisal is required of the value of undisturbed forest or wetlands, for protection of water resources, habitat, subsistence and traditional lifestyles, non-wood forest products, eco-tourism and possibly

carbon offset trading. While data exist on the economic value of forestry operations, these are often unrealistic because of the prevalence of illegal logging.

Information is required on the extent of shifting cultivation, and its impacts. Estimates suggest that up to 25% of the population of the LMB is involved in shifting or semi-shifting cultivation practices. There is debate over the extent to which shifting cultivation contributes to deforestation and erosion, although it is likely that environmental degradation occurs when population density increases.

### *Information available within MRC Secretariat*

Much of the information required to characterise the watersheds at a level suitable for sub-area analysis is available within MRC Secretariat, with the watershed classification maps (MRC-TSD 2001) and related datasets (see Chapter 4 for detailed descriptions).

### *Identified information gaps*

- Reliable information on land use and land use changes (particularly deforestation and clearing of wetlands)
- Extent of shifting cultivation
- Quantitative impacts of reduced dry season flows on saltwater intrusion in the Delta
- Impact of shifting cultivation on erosion, sedimentation and water quality
- Reliable information on actual extent and value of forest operations (including illegal logging)
- Impact of deforestation on erosion, sedimentation and water quality
- Impact of wetland clearance on fisheries production and water quality
- Economic valuation of environmental services of forests and wetlands.

## 3.5.8 Flood management and mitigation

Information is required on

- extent of area within the sub-area subject to flooding
- social and economic impact of flooding
- current flood management and mitigation strategies
- existing and proposed flood mitigation structure
- role of flooding in ecosystem functioning, and the environmental value of floods

MRC has prepared a Strategy on Flood Management and Mitigation in the Lower Mekong Basin (MRC, October 2001), which reviews the impact of flooding, and options for flood management and mitigation. [1]

MRC-BDP (July 1999) reviewed the evidence on long-term climate variability in the region, and concluded that there was considerably uncertainty, but that current models predict an

[1] In 2004, the MRC Flood management and Mitigation Programme was established as a new MRC core programme

increase in run-off volumes by the 2050s, and a change in the timing of flows. These uncertainties should be factored into regional planning.

### *Information available within MRC Secretariat*

A number of datasets describing the extent, level and duration of inundation in previous years (see Chapter 4).

Flood hazard maps have been derived for 1 in 2 years, 1 in 5 years and 1 in 20 years flood (MRC-AIFP, in preparation).

The MRC website provides operational river monitoring and flood forecasts for 23 stations along the river, including observed and forecasted water levels, and yearly observations (http://www.mrcmekong.org).

### *Identified information gaps*

- Role of flooding in ecosystem functioning
- Social and economic impacts of flooding
- Impact of long-term climate variation on flood risk.

## 3.6 Conclusions

The BDP aims to formulate agreed coordinated strategies for sustainable development in the region. Thus the information base used in BDP must be agreed between the countries. Strategies for ensuring that all countries acknowledge the information base used in MRC as reliable are being developed and implemented by TSD, under the Procedures for Data Sharing.

Because of its broad scope, the BDP has very considerable data and information requirements. While it is essential that the information is adequate to describe the impacts of proposed development scenarios, it must also be feasible to collect and process the information within the timeframe of the BDP. This will require careful scoping of information requirements. The structure of the BDP is such that each stage can be used to define the scope of information required in the next stage.

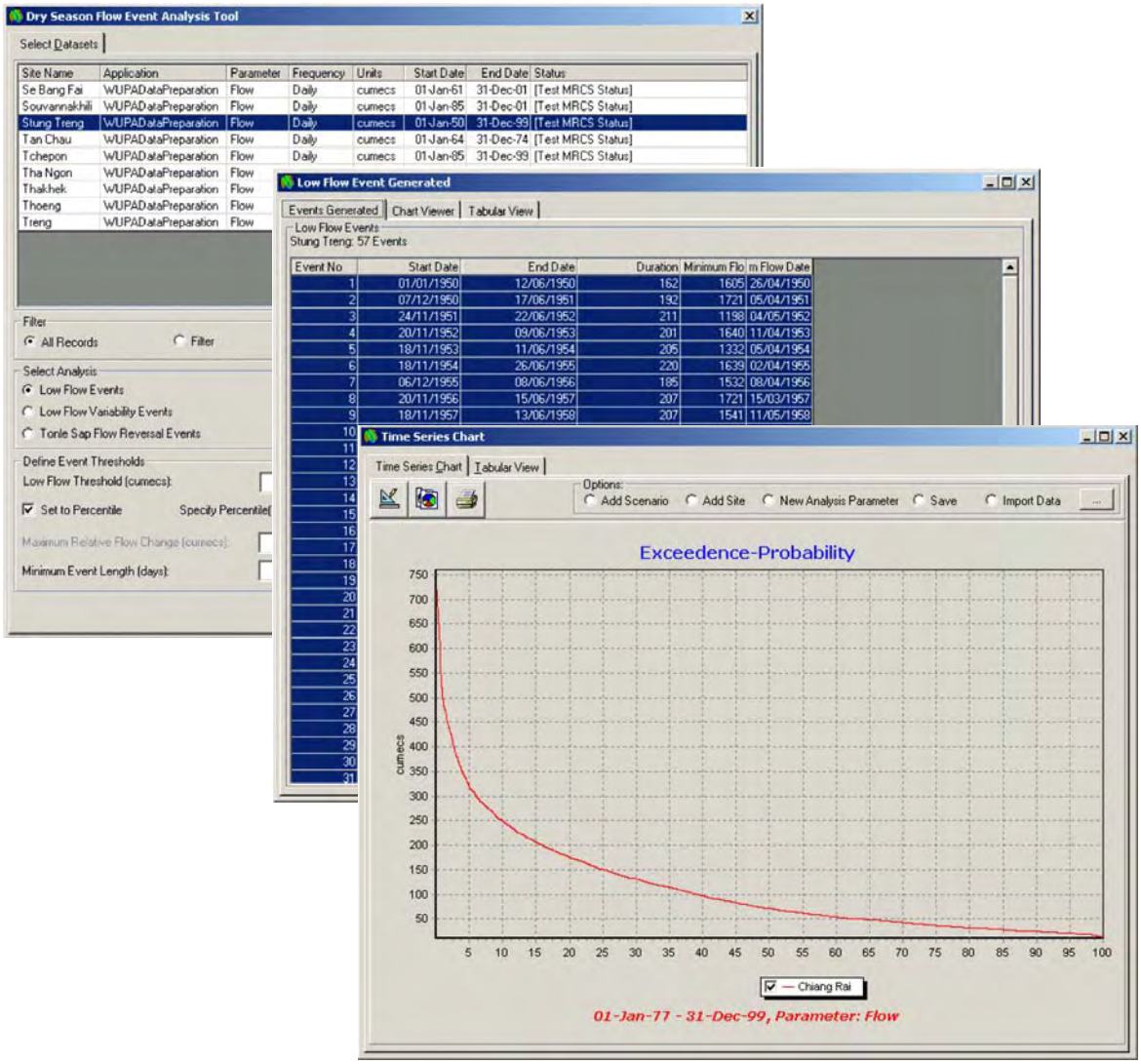
The BDP is not being developed in isolation – it draws on existing national plans and policies, and is supported by a wide range of programs both within MRC and in the national line agencies. An important function of BDP is to synthesise information from MRC and national programs – it should not be primarily concerned with data collection. BDP will, however, have a major role in identifying data gaps and promoting collection of key data.

It is also important to recognise that crucial information may not be available within the BDP timeframe. The processes of national planning and development will proceed regardless of access to adequate information, and BDP must plan accordingly, making provision for information gaps to be filled at later stages within the process, but working with what is available.

Major information gaps identified are in quantification of cause / effect relationships, particularly relating to environment and ecosystem functions. For example, the relationship between changes in water regime and fisheries production cannot be quantified at this stage. Similarly, very few aspects of social impacts of change can be quantified. However, where quantitative data are lacking, there may be a reasonable understanding of qualitative

relationships. "It is more important to identify likely ... impacts, than to precisely quantify the more obvious ... impacts" (MRC-WUP-A Feb 2002a).

Landsat TM imagery could provide a very useful synoptic tool at a scale suitable for sub-area analysis, since it provides a good overview of land cover / land use and spatial relationships within the sub-area.




# 4 Guidance on data collection

## 4.1 Water resources development

Specific information requirements for water resources development and management are listed in the following table, together with viable sources of information.

*Table 4.1: Water resources development & management – information requirements and sources*

| No | Information needed | Sources |
|---|---|---|
| I. | Water Resources Issues | |
| 1. | Legal and institutional | Water related agencies, WRMP |
| 2. | Limited water resources and their spatial and temporal distribution | WUP, water development and water use sectors |
| 3. | Disparity between water supply and demand | WUP, water development and water use sectors |
| 4. | Environment degradation | Water and Environment agencies, EP and WUP |
| 5. | Management existing projects | Water resources sectors, AIFP and sector programmes |
| 6. | The need for management coordination | WRMP,WUP, EP and sector programmes |
| II. | Availability of Water Resources | |
| 7. | Physiography | Hydrological section, WRMP and water agencies |
| 8. | Climate | Meteorology and hydrology agencies, WUP, WRMP |
| 9. | Rainfall | Meteorology and hydrology agencies, WUP, WRMP |
| 10 | Temperature | Meteorology and hydrology agencies, WUP, WRMP |
| 11. | Surface water | Meteorology and hydrology agencies, WUP, WRMP |
| 12. | Ground water | Domestic water supply, WRMP ? |
| 13. | Surface-water quality | Water quality laboratory, water supply agencies? |
| 14. | Non-conventional water resources | Water related sectors |
| III. | Water Resources use | |
| 15. | Agricultural | Agricultural sector, AIFP, Fisheries programme? WUP, WRMP |
| 16. | Domestic water supply (urban and rural) | Water supply agencies, WUP.... |
| 17. | Non-consumptive water use | Hydro-power, Tourist, Fisheries sectors |
| 18. | Projects for water utilization and flood protection | WUP, Flood Mitigation Mgt, water sub-sector agencies |
| IV.. | Future Water Demand | |
| 19. | Irrigation | AIFP, WRMP, Irrigation Sub-sector |
| 20. | Domestic use | Water Supply agencies |
| 21. | Industrial | Industry sector |
| 22. | Non-consumptive use | Hydro-power, Recreation, Fisheries |
| V. | Management of Water Resources | |
| 23. | Administration | Water related agencies |
| 26. | Basic policies for water management | Water related agencies |
| 27. | Public participation, including Gender Issues | |
| VI. | Irrigation Sub-sector | |
| 28. | Institutional | Irrigation sub-sector, AIFP, WUP..... |
| | - Development policy | |

| No | Information needed | Sources |
|---|---|---|
| | - Strategies | |
| | - Legislation | |
| | - Agencies involved | |
| 29. | Existing Development Plan | Irrigation sub-sector, AIFP, WUP..... |
| 30. | Water use and management | Irrigation sub-sector, AIFP, WUP..... |
| 31. | Development Plan and Master plan | Irrigation sub-sector, AIFP, WUP..... |
| 32. | Economic value and cost recovery | Irrigation sub-sector, AIFP, WUP..... |
| 33. | Coordination with other sector | |

## 4.2 Social and socio-economic profiles

The analysis of each sub-area should include a social and socio-economic profile that summarizes the major population, social and economic conditions of the people living in the territory. This is a summary based on key parameters, not a detailed analysis. It may be supplemented by the analysis of socio-economic conditions that are specific to the issues of different sectors. For example, in the hydropower sector, important populations are those located within and downstream of proposed reservoir areas.

### *General guidelines*

1 All demographic data should be gender disaggregated where appropriate and available.

2 Urban and rural differences on social and socio-economic parameters should be included where appropriate.

3 The analysis of social and socio-economic profiles should serve to understand the conditions of vulnerable groups within sub-areas, e.g., women (i.e., gender), ethnic minorities, the poor.

### *Data collection and reporting*

1 As a general rule, the most recent available data should be used. This may include census data, the results of special socio-economic surveys or reliable data (and estimates) obtained from donors and international organizations.

2 Basic population data (e.g., total population by sex by age) should be collected for the entire territory of the sub-area. Depending on the sub-area, this will entail data at the level of provinces and, in cases where only a portion of a province is located in a sub-area, the districts or sub-provincial levels.

3 Most other social and socio-economic data for sub-area analysis can rely on national data (e.g., health and education data). If data is published and readily available for country regions (e.g., the North, Central and Southern regions in Lao PDR), the region that most closely corresponds to the sub-area can be substituted for national-level data.

4 However, in some sub-areas, it may be necessary to collect more detailed information (similar to basic population data, item #5 above). For example, in sub-areas with large and/or diverse ethnic minority populations, the social profile should accurately reflect the distribution of the population among major ethnic groups or categories of groups.

### *Parameters for social and socio-economic profiles*

The following *minimum* data are required to develop social/socio-economic profiles of the population in each sub-area. Depending on the issues and conditions in sub-areas, *it may be necessary to develop profiles for specific target groups within the sub-areas,* e.g., ethnic minorities or other vulnerable groups.

1 Population data: The recommended population data for social profiles and the recommended level of reporting are as follows:

| | Parameter | Recommended level of reporting |
|---|---|---|
| a) | Total population by sex | Sub-area |
| b) | Population (%) by major ethnic group | Sub-area or region |
| c) | Population distribution, % urban/rural | Region |
| d) | Population density, urban/rural | Region |
| e) | Population growth, average annual | Region |

2 Social data: The recommended data to reflect social well-being and the recommended level of reporting are as follows:

| | Parameter | Recommended level of reporting |
|---|---|---|
| a) | Life expectancy, male/female | Country (or region) |
| b) | Total fertility rate | Country (or region) |
| c) | Adult literacy, male/female | Country (or region) |
| d) | Net primary school enrolment, male/female | Country (or region) |
| e) | Net secondary school enrolment, male/female | Country (or region) |
| f) | Access to safe drinking water, urban/rural | Country (or region) |

3 Economic data: The recommended data to reflect economic conditions and well-being and the recommended level of reporting are as follows:

| | Parameter | Recommended level of reporting |
|---|---|---|
| a) | GDP by sector + GDP growth rates | Country |
| b) | Labor force participation rates, male/female | Country (or region) |
| c) | Employment by sector, male/female | Country (or region) |
| d) | GDP per capita, male/female | Country (or region) |
| e) | Poverty and food poverty headcounts, urban/rural | Region |
| f) | Gini coefficient, urban/rural | Region |

### 4.2.1 Accessing social and socio-economic data

At the present time, the MRC database on socio-economic conditions is very limited in its scope (i.e., the number of parameters for which information has been collected). However, some of the information for sub-area analysis will be reported in the upcoming State of the Basin Report. [9]

1 Most social and socio-economic data will come from national census data.

Cambodia: The most recent census is 1998.

Lao PDR: A national census was carried out in 2000. Whenever available, this data should be used. Otherwise, full census data is available from the 1995 census.

Thailand: A national census was carried out in 2000 and some preliminary data is already available on the NSO Internet site. Every effort should be made to use 2000 data as the last census in Thailand was in 1990.

Viet Nam: A national census was carried out in 1999.

2 National governments also carry out and publish many other socio-economic or related surveys that are good sources of data, e.g., Cambodia Socio-Economic Survey (1999), Cambodia Poverty Assessment (1999), Lao PDR Agricultural Census (1999), Viet Nam Human Development Report (2002). Data are reported for different levels, including national, major country regions and – sometimes – provinces.

3 International organizations and donors are often very good sources of data, particularly at the national level (e.g., GDP per capita may only be available for the entire country). Much of this data is posted on the websites of these organizations. Good places to look include World Bank, ADB, ESCAP, UNDP; also, a keyword search at Google (www.google.com) or similar search sites often yields good sources.

### 4.2.2 Analyzing the data

1 In general, the social/socio-economic profile should be prepared at the level of the sub-area. Therefore, data obtained at provincial and/or district level should be aggregated to the level of the sub-area. Where only national data are available, they should be used as a proxy for the sub-area.

2 Comparison with past performance: In some instances, it may be useful to compare the present population growth rate with previous rate(s) and/or it may be used to calculate a projected population at a certain date in the future. Other parameters such as fertility rate, literacy rate or economic data (labor force participation rate, employment by sector, GDP, etc.) may also be compared with previous rates.

3 Identifying targets: Countries have established targets to improve performance on a range of social and socio-economic parameters, e.g., improving adult literacy, reducing poverty levels, etc. It may be useful to include some of this information in the social/socio-economic profile.

[9] Published in June 2003

## 4.3 Population issues and emerging trends

1- Some of the population issues and emerging trends in the MRB include:

a) poverty reduction is a major policy of all member countries in MRB

b) increasing population pressures  related to continued high fertility rates while major steps are being taken to reduce infant/child mortality

c) shift of population from rural areas to urbanized areas (primary and secondary cities and towns) → reflected in population distribution and density, increasing proportion of employment in non-agricultural activities, etc.; related to increasing poverty and poverty gaps in urban areas

*Comments:*

a) gender equity: documenting and tracking whether there are equal opportunities and benefits for both men and women

b) vulnerable groups: special attention should be paid to the needs, capacities and issues of ethnic minorities and other vulnerable groups

2 Other issues such as how people use natural resources can be addressed in the analysis of agriculture, fisheries, water resources (e.g., rural water supply), urbanization (urban water supply).

## 4.4 Key environmental and land use data available within MRCS

... are listed in the following table.

*Table 4.2: Environmental and land use data available within MRCS*

| Description | Nominal scale | Comment |
|---|---|---|
| *Country boundary of the LMB | 50 – 250,000 | |
| *Provincial boundaries of the LMB | 50 – 100 – 250,000 | Not completely consistent with country boundary |
| *Major city of the LMB | | |
| *Road network of the LMB | not given | |
| *The LMB boundary | 50 – 100,000 | |
| *Digital Terrain Model of the LMB | 50 m grid | |
| *Subcatchment boundaries of the LMB | 50 – 100 – 250,000 | |
| *Forest cover 1993&1997of the LMB | 50,000 (based on TM imagery) | 30 classes |
| *Slope classes of the LMB | 50 m grid | |
| *Watershed Classification of the LMB | 50 m grid | 5 classes. Hard copy report includes other information (eg protected areas) |
| *Inundation of the LMB (4 dates, 1999-2000) | 50,000<br>Derived from Radarsat | |
| *River network of Cambodia, Lao PDR, Thailand, Vietnam Delta and Vietnam Highland | 50,000 (C, L, V)<br><br>100,000 (T) | Not connected between countries; flow networks not established |

| Description | Nominal scale | Comment |
|---|---|---|
| Wetlands | 1:250,000 | Classes used are different in each country. See CDE Report 2001 |
| Irrigation areas<br>Cambodia<br>Lao PDR<br>Thailand<br>Viet Nam | <br>50,000<br>50,000<br>varies<br>250,000 | Attributes include project location, headwork, canals, irrigation area, reservoir area and others. Complete metadata in LRIAD Final Report. |
| Inundation datasets<br>Field surveys 1995, 1996 2000.<br>RADARSAT 1999, 2000 2001.<br>Modelled water profile for 2000 and 2001 floods<br>Estimated extent of 1 in 2, 1 in 5 and 1 in 20 year floods | | Near completion<br>Complete metadata in LRIAD Final Report |
| Soils<br>Coverage of T, V complete. 75% of L (areas at slope>55% not covered). 45% of C (not yet complete) | 1:250,000 | FAO soil classes, plus derived soil properties<br><br>Description from LRIAD project. Near complete, March 2002. |
| Ethnic groups | 1:250,000 | |
| Forest function | 50 – 250,000 | |
| Fisheries lots, Cambodia only | 50,000 | 3 dates: 1919, 1940, 2000 |
| Dry season water bodies | 50,000 | March 1999 |
| Population density | 250,000 | |
| Villages | 50 – 100,000 | Cambodia and Laos only |

* MRCS GIS Core datasets (TSD, May 2001)

## 4.5 Fisheries data requirements and sources

... are listed in the table below.

*Table 4.3: Fisheries data requirements and sources*

| What information | From where |
|---|---|
| Importance of fish to the livelihood /economy of the people in the area. | |
| Fish catch, consumption, number ( distribution) of people involved ( employed) in fishery, revenue earned, nutritional importance, level of dependence of people in the area on fishery | MRC Fishery data base, DOF survey, survey of local Universities, local NGOs<br>*MRC Fishery survey reports & data base, FAO Fishery reports, Local Universities, NGOs/PO survey<br>* MRC Fishery survey reports, UNDP report, AIT Aqua Outreach<br>* Health and Nutritional survey of DOH<br>Base line report of development agencies in the area, country poverty survey, DOF? |

| What information | From where |
|---|---|
| Ecology and Important Habitats<br>Area with a wider importance for fisheries? floodplain , flooded forest, migration route, spawning habitat, important feeding habitat, floodplain and safe sanctuary? Specific water movement important for some species. | *Land / forest cover map MRC, Provincial map, DOF fish map<br>* Fish hotspots / species migration route of IUCN, ICLARM map & report, Map & report from NRM NGO /PO in the area on fish local reserves<br>* Each country list and map of important reserve site<br>1) Ramsar site<br>2) Biosphere reserve<br>3) national/regional Protected area |
| Key species under protection<br>( Mekong endemic, globally threatened species including water birds, and reptiles) | IUCN'S RED LIST AND BLACK LIST<br>( which include main habitat migratory route ) |

## 4.6 Agriculture / irrigation data requirements

... are listed in the table below.

*Table 4.4: Agriculture / irrigation data requirements*

| Information needed | How to get it? Where from? |
|---|---|
| Land use in the Mekong Basin:<br>land use by type of crop, grazing land, and forest land | MRC data<br>Koica: Volume 1<br>AIFP-MRC<br>National Agriculture Dept<br>National Statistic Dept |
| Agricultural inputs:<br>land holding, draft implement: mechanised, animal draft, fertiliser , pesticide | AIFP-MRCS<br>National Agriculture Dept |
| Cropping pattern:<br>No. of crop per season according to types of land and type of crop, and time of cropping | Koica: Volume 1 on shelf<br>AIFP-MRCS on shelf<br>National Agriculture Dept |
| Farming practices<br>planting methods, types of crop | Research institutes<br>National Agriculture Dept<br>FAO |
| Physical characteristics:<br>rainfall, temperature, humidity, light intensity | WRMP<br>WUP<br>Meteorology and hydrology Agencies |
| Water demand:<br>for food crop<br>for industrial crop<br>for livestock<br>fishery/aquaculture | WUP<br>WRMP<br>AIFP<br>IRRI, CGIAR<br>Meteorology and Hydrology Agencies |
| Irrigation:<br>water resource (rainfall, river water), irrigation system | WUP<br>WRMP<br>Meteorology and hydrology Agencies |

| Information needed | How to get it? Where from? |
|---|---|
| Agricultural production:<br>crop production: by type of crop, livestock production: cattle, pig, poultry, crop-livestock relationship; fishery/aquaculture production: | AIFP<br>FP<br>FAO<br>ACIAR<br>CGIAR<br>National Agriculture Dept |
| Agricultural commercialisation:<br>Food value, exportation value, processing value | AIFP<br>CGIAR<br>FAO<br>National Agriculture dept<br>National and international Commercial Agencies<br>National Industries Dept |
| Development plans for agricultural production:<br>expansion of the crop growing area, intensification of crops, research and development program | MRC data<br>AIFP<br>ACIAR<br>CGIAR<br>FAO<br>National Agriculture dept |
| Critical issues on agricultural production:<br>Acid sulphate soils?<br>Saline soils?<br>Flooding hazards?<br>Shortage of irrigation water?<br>Salinity intrusion?<br>Residues/effects of chemical use<br>Risks to flood and draught<br>Others? | EP<br>WUP<br>WRMP<br>MRC - Flood management Program<br>ACIAR<br>CGIAR<br>Research institutes<br>National Agriculture dept<br>National Environment Dept |

### *Examples of cross-sectoral and cross-regional issues*

- The impact of chemicals/pesticides use on water quality
- Salinity impacts on water quality
- Flooding impacts on the population and their agricultural activities
- Siltation and erosion impacts on the river
- Changes in agriculture and water flow in the downstream due to hydropower from the upper stream
- Impact of agriculture on fisheries: pesticides use, the transformation of forest land into agricultural land
- Impact of hydropower on agriculture and fisheries

## 4.7 Domestic and industrial water uses

### 4.7.1 Overall urban and water related issues

How many cities (and which) in the following categories:

>200.000 people

100.000 – 200.000 people

50.000 - 100.000 people

20.000 – 50.000 people

Which cities draw their water supply from Mekong River or major tributaries?

Which cities use Mekong River or major tributaries as wastewater outlet?

Which cities depend on Mekong River or major tributaries for transportation/navigation?

Which are the major industrial plants depending on Mekong River or major tributaries for water supply and/or for water outlet?

#### *Social issues*

Urban population as % of people living in the sub-area.

Population growth rate in urban areas

Unemployment rate of urban population

% of urban residents with access to clean water and sanitation

#### *Financial issues*

What are the present public investments in sanitation, water supply, industrial development, housing, and drainage? (in real terms and as % of total budget)

What are the private investments in sanitation, water supply, industrial development, housing, and drainage? (in real terms).

#### *Economic issues*

The importance of the urban areas in terms of employment and economic growth

Number of people employed by different urban economic sectors:

Service sector (formal and informal/public or private)

Industry (small/big scale, formal and informal, private or public)

What are the competitive strengths and advantages of the urban economies in the national and regional context?

#### *Technical issues*

What are the existing (and future) plans on water supply, sanitation, and wastewater treatment?

What is the treatment of sewage and wastewater from residential areas and industrial plants? Percentage of residential areas and industrial plants connected to water treatment?

What are the sources of water supply to residential areas and industry?

What is the water supple and demand for residential areas and industrial purposes?

What is the capacity of the water drainage system? How big is the over/under capacity?

### *Environmental issues*

Percentage of urban residence with access to safe and/or adequate water supply and sanitation?

What is the water quality of drinking water supply?

What are the policies concerning wastewater treatment?

What is the capacity of wastewater treatment plants? How big is the over/under capacity?

### *Urban management*

Does an urban master plan exist? Are there clear priorities of goals?

Do special policies exist regarding the poorer segments of the urban population?

Which decisions regarding water supply and sanitation are taken at what level (community, urban, district, provincial and national level)

What are goals and priorities and requirements among residents, local business and community leaders regarding water supply and sanitation?

### *Infrastructure*

### *Linkages to other development efforts, other regions or other sectors*

What are the national plans regarding urban development in sub-areas?

Which major donors are involved in the water supply and sanitation sector (and how much)? Does coordination of donor assistance exist?

## 4.7.2 Industrial water supply and wastewater

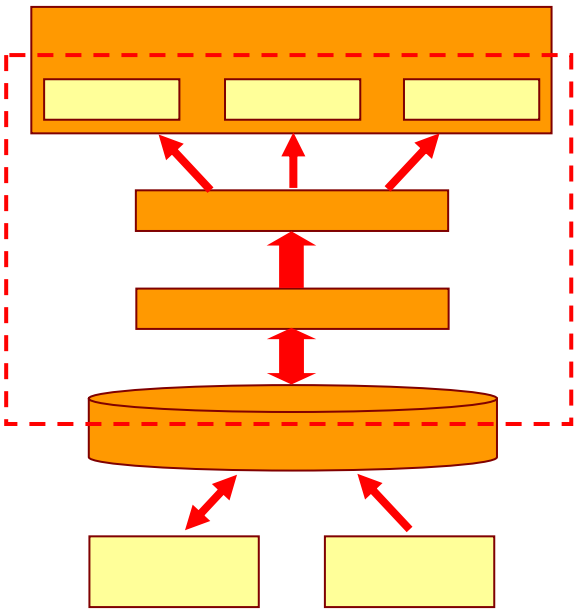
(Many questions that apply to urban water supply and sanitation also apply to industry)

Is there a shift from traditional large manufacturing to small-scale firms? How will that effect industrial water demand and quantity/quality of wastewater from industries?

Identify the major water demanding industrial plants – what is the yearly water demand?

Identify industries with potential high risk of water pollution (what are the polluting substances?)

How many people are employed within the industrial sector?



# 5 Data sharing

## 5.1 Summary

- Protocols for exchange and sharing of data for the BDP are adequately covered by the MRC Procedures for Data and Information Exchange and Sharing (November 2001) and supplementary guidelines.

- Data for BDP will be compiled within the MRC Information System (MRC-IS). The BDP Coordinator in each country will be the main contact for data access, in consultation with ISDIT NMC representative. At MRC, data access will be through TSD.

- Although the existing agreements cover all required fields of information, BDP may require data that have not been routinely exchanged for MRC purposes (for example, socio-economic data) and it may be necessary to negotiate mechanisms for data sharing with agencies that have not been involved in the MRC process.

## 5.2 Introduction

The Basin Development Plan should be based on best available basin-wide data and information for planning, development and monitoring. It is essential that the information base for the Plan be agreed between the four riparian governments. Exchange and sharing of data between the riparian countries, MRC Secretariat and other stakeholders is thus central to the success of the BDP.

## 5.3 The MRC procedures for data sharing

In November 2001 the MRC Council adopted an agreed set of Procedures for Data and Information Exchange and Sharing (Attachment 1). These Procedures govern the exchange and sharing of "information required for the implementation of MRC programs/activities and the Mekong Agreement", including the activities of the BDP. The Procedures will be supplemented by formal Guideline on Custodianship and Management of the Mekong River Commission Information System. A draft of the Guidelines is attached (Appendix 1).

The Procedures allow for exchange of information between the four governments and MRC Secretariat in the areas of

- water resources
- topography
- natural resources
- agriculture
- navigation and transport
- flood management and mitigation
- infrastructure
- urbanisation / industrialisation

- environment / ecology
- administrative boundaries
- socio-economy
- tourism.

These cover the main areas of information required by the BDP.

An on-going working group, known as the Information System Design and Implementation Team (ISDIT), is responsible for development of technical guidelines and standards for all matters relevant to implementation of the Exchange and Sharing Procedures. ISDIT comprises representatives of all MRC Secretariat divisions (including BDP) and representatives nominated by the four NMCs.

Protocols for information and data sharing for the BDP are adequately addressed by the MRC Procedures for Data and Information Exchange and Sharing (November 2001), and a separate set of protocols is not required.

## 5.4 Access to data and information

Requests for access to information held by the member countries and required for the BDP should be coordinated through the BDP Unit / Coordinator in each country. The National Working Groups (as proposed under Activity 2.2.3) will be able to provide advice on whether required data exist and which agency holds them. Under the Guidelines, the National Mekong Committees (NMCs) have a role in the acquisition, storage and management of original data and information in each country prior to exchange with the MRC-IS.

BDP may require access to types of data that have not previously been exchanged on a routine basis for MRC purposes. For example, BDP will require socio-economic information, including the most recent census and survey data. The agencies holding such data may not be represented in the National Mekong Committee, even though the type of data is covered by the Procedures. New arrangements may need to be negotiated for access to these data. The BDP Coordinator will need to take a lead role in identifying the appropriate line agencies in their country and negotiating access arrangements.

Member countries can access compiled BDP datasets once they have been finalised and placed in the MRC-IS. Requests for these datasets should be coordinated through Technical Support Division (TSD).

It is possible that BDP may require data that is not currently available within MRC Secretariat or the member government agencies. The Procedures contain a clause on additional and unavailable data stating that if required, this will be agreed by MRC Joint Committee, including procedures and cost sharing arrangements.

## 5.5 The MRC Information System

Information for the BDP will be held within the MRC-IS, subject to the same rules governing data standards, maintenance access and distribution. Figure 1 shows the structure of the MRC-IS.

Datasets developed for the BDP will be held within the MRC-IS. BDP will not set up a separate information system. Use of MRC-IS will :

- avoid duplication, since much of the information required by BDP is relevant to other MRC programs
- avoid problems with different versions of the same data, since MRC-IS will hold the definitive version
- provide a identified point for data distribution and exchange
- ensure the use of appropriate standards, metadata and quality control.

MRC-IS is an integrated database, with the following components existing or planned (see Situation paper on the Integrated Database of the MRCS, Sept 2001):

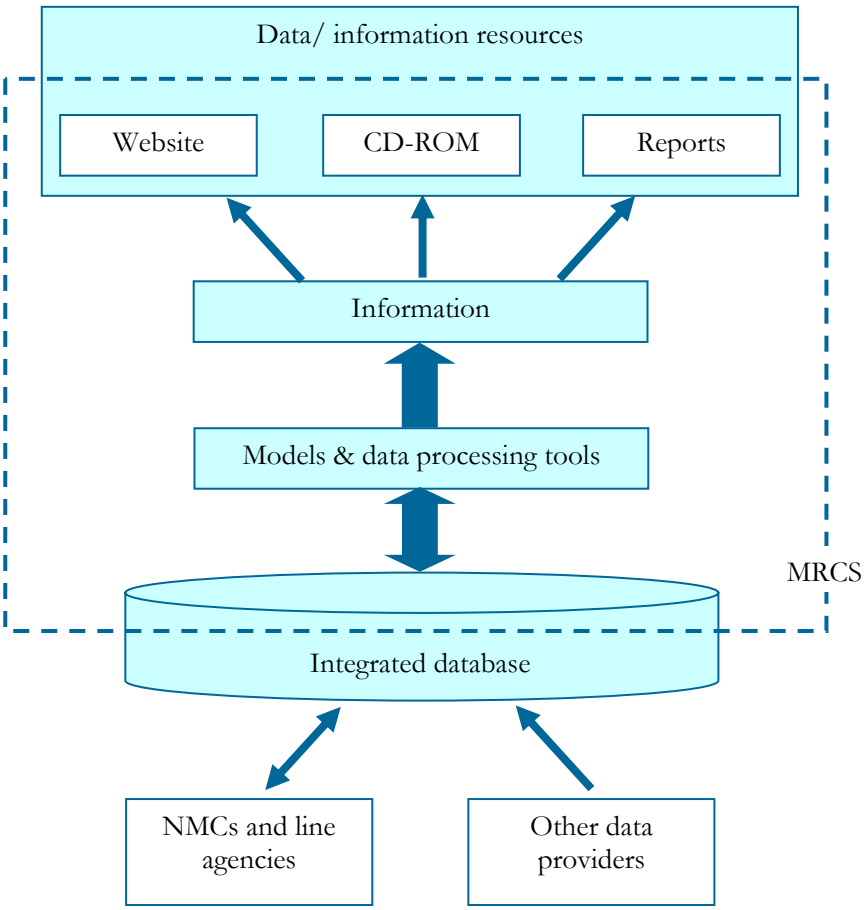
1. Spatial database (GIS)
2. meteorological / hydrological archive
3. meteorological / hydrological operational database
4. water quality database
5. socio-economic database
6. fisheries database
7. library database
8. navigation database
9. knowledge database for the WUP (Working Group 1).

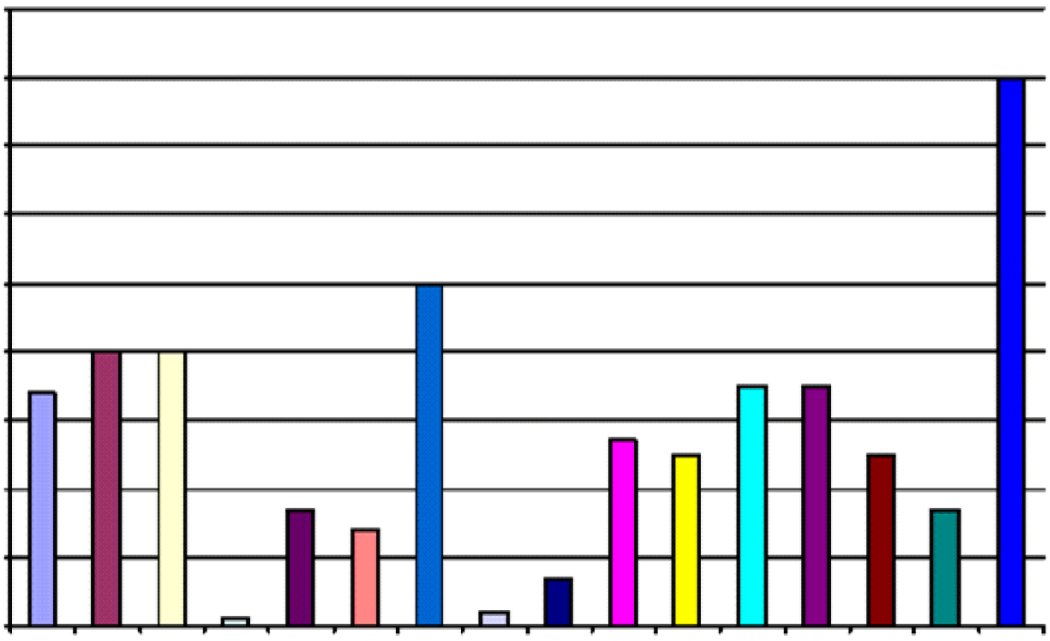
Data generated under BDP will mostly fall within existing components, in particular the spatial and socio-economic databases. In particular, it is likely that BDP will collate large socio-economic datasets and provision should be made to expand the existing database accordingly.

## 5.6 Data custodianship

The Guidelines cover issues of data custodianship. The agency which initially collected and processed a dataset will remain the "Primary Custodian", and the MRC Secretariat will be given responsibility as the "MRC Custodian" of MRC-IS data and information that is collected, processed and stored in the integrated database. BDP will not directly take custodial responsibility for any datasets – MRC-IS will be the custodian of all BDP datasets.

*Figure 5.1: Structure of the MRC Information System*





# 6 The BDP Projects Database

## 6.1 Background

As outlined in the BDP Inception Report, the Basin Development Plan Program aims to produce a database of proposed projects relating to water resources development and management in the Lower Mekong Basin.

## 6.2 The BDP Project Database

In August 2004 the member countries agreed on formats for proposal and listing of project ideas in a central MRC database. The format is a summary Project Information Note (PIN). An expanded format has also been agreed for full descriptions of proposals.

In consequence, the BDP Project Database has been developed to compile the identified projects, with fields based on the PIN format. The database is now operational and currently contains information on 317 water-related project ideas from the member states and from the MRC programmes.

Additional projects will be added on an on-going basis. The database should be seen as a *"live"* document, which will be updated and reviewed at regular intervals by the member states and by the JC, as envisaged in the BDP Planning Cycle Guideline.

Information on current listings (as at 11 March 2005) is given below. *Please note that the listings are subject to change, in response to advice received from the NMCs.*

## 6.3 Technical specifications

In technical terms, the database has been constructed in Microsoft Access, to provide the functionality of a relational database. A customized interface has been constructed to allow non-expert users to enter projects and produce listings of projects.

The current version (Version 1) is a development version, and will required refinement both of the fields used for data entry, and of the standard reports produced. The database is held as part of the MRC Information System and is completely compatible with it. Access links directly to ArcView and ArcGIS to allow map outputs.

MRCS has circulated Version 1 to the countries, and requested feedback on the format of the database before producing Version 2. When a final format has been agreed with the countries, TSD will hold the reference copy and administer the database.

## 6.4 Versions

Version numbering reflects two possible sets of changes: changes to the format of the database (first number in the version number); and changes to the contents (project listings) (second number).

Version 1.1 was circulated to the NMC at the Regional Consultation on 7 March 2005. It uses format version 1; and content listings as at 5 March 2005 (does not include Vietnamese national projects).

This Version 1.2 uses format version 1; and content listings at a 11 March 2005 (includes national projects submitted by Viet Nam in early March 2005).

## 6.5 Updates

Updates of the database should be delivered to the countries on a regular basis, and a procedure for this must be established, in collaboration with the NMCs. One possibility is that updates of the database could be undertaken using the current TACT structure (Technical Assistance and Coordination Team), which meets three times a year.

## 6.6 Database listings

*(Example, as per March 2005)*

*Figure 6.1: Projects by country*

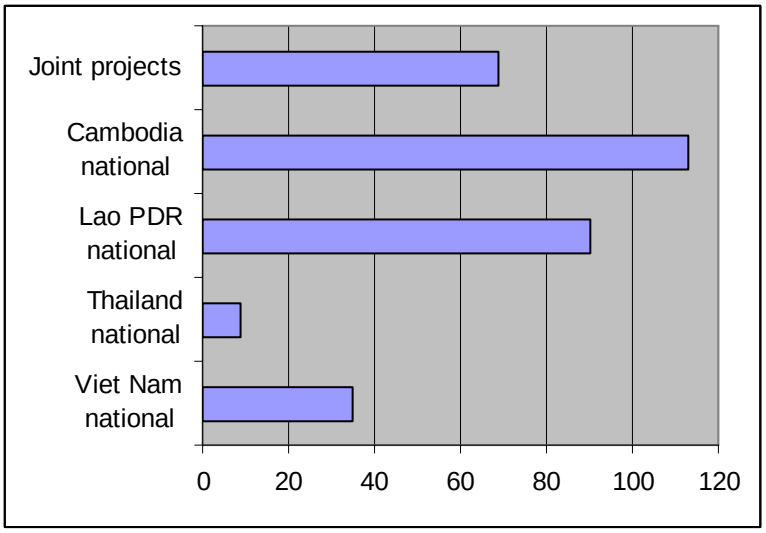
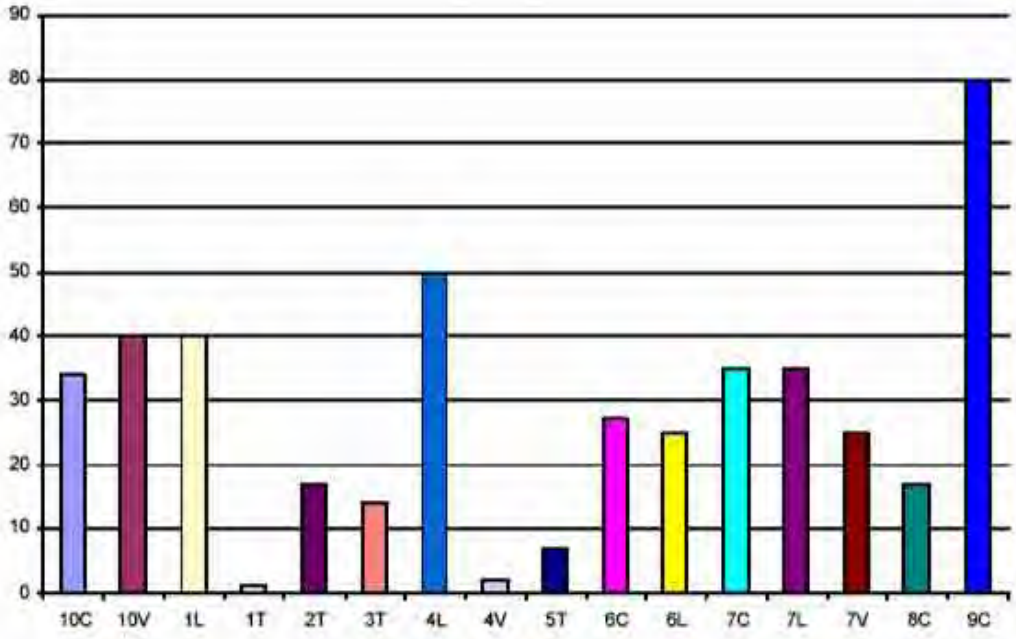



*Table 6.1: Project value, by country*

| Country | Number of projects | Total budget |
|---|---|---|
| Joint projects | 69 | $895,503,500 |
| Cambodia national | 113 | $1,167,717,531 |
| Lao PDR national | 90 | $7,228,990,500 |
| Thailand national | 9 | $100,000 |
| Viet Nam national | 35 | $240,500,000 |
| Total | 316 | $9,532,811,531 |

*Figure 6.2: Projects by sub-area*




| Sub-area | Total Projects |
|---|---|
| 1L | 40 |
| 1T | 1 |
| 2T | 17 |
| 3T | 14 |
| 4L | 50 |
| 4V | 2 |
| 5T | 7 |
| 6L | 25 |
| 6C | 27 |
| 7L | 35 |
| 7C | 35 |
| 7V | 25 |
| 8C | 17 |
| 9C | 80 |
| 10C | 34 |
| 10V | 40 |

*Figure 6.3: Joint projects by sector*

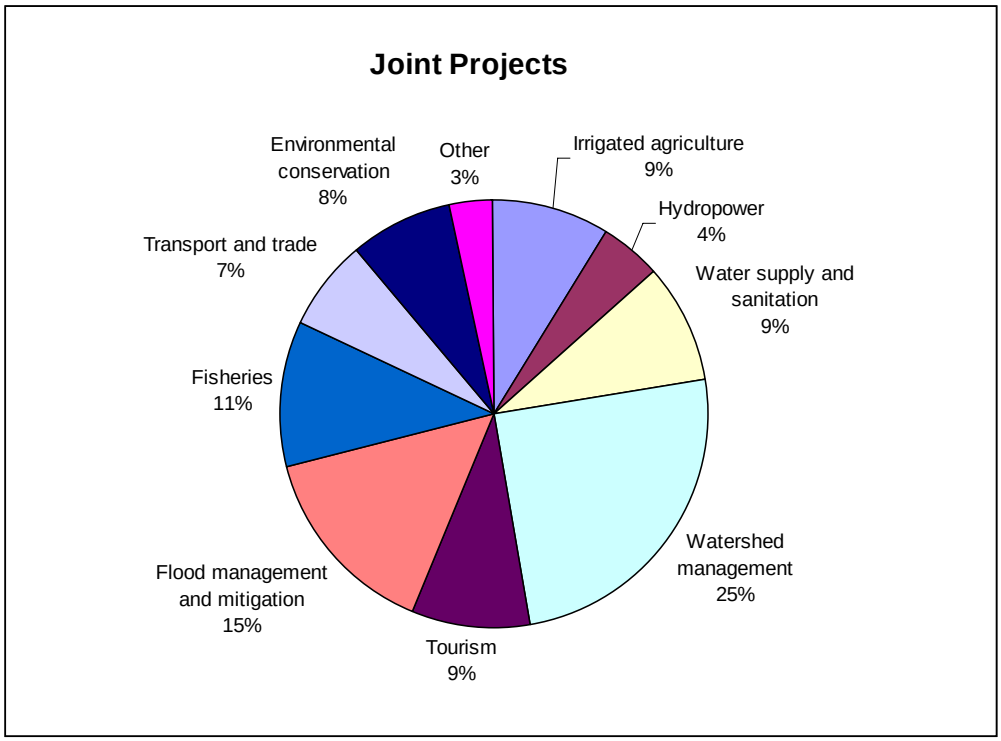
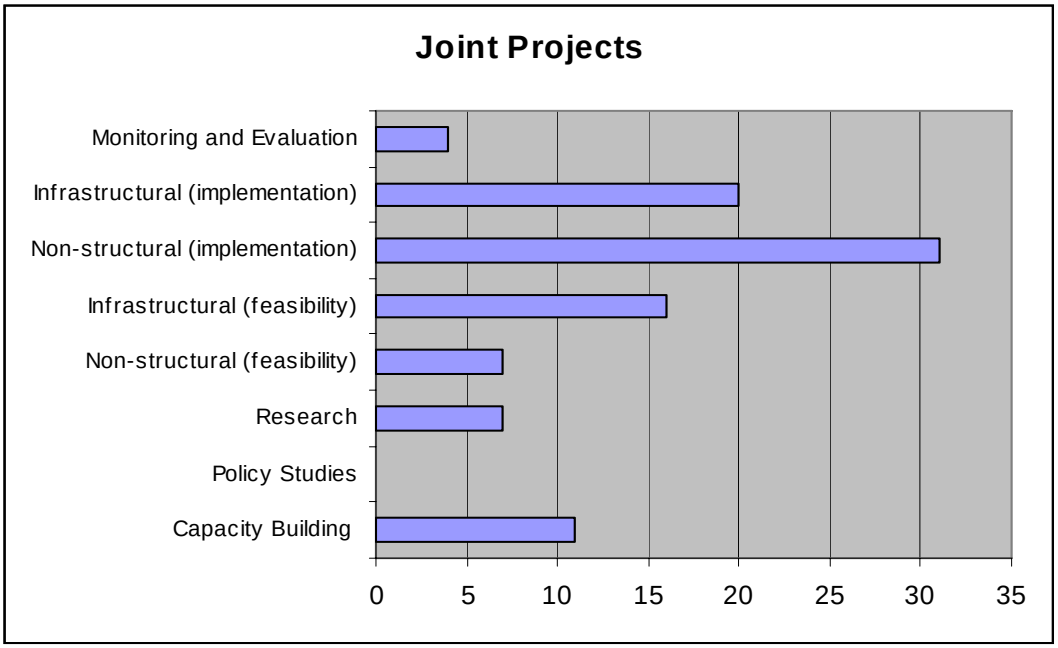



*Figure 6.4: Joint projects by type*




NOTE: projects may be listed by more than one sector or type

*Figure 6.5: Location of joint projects*

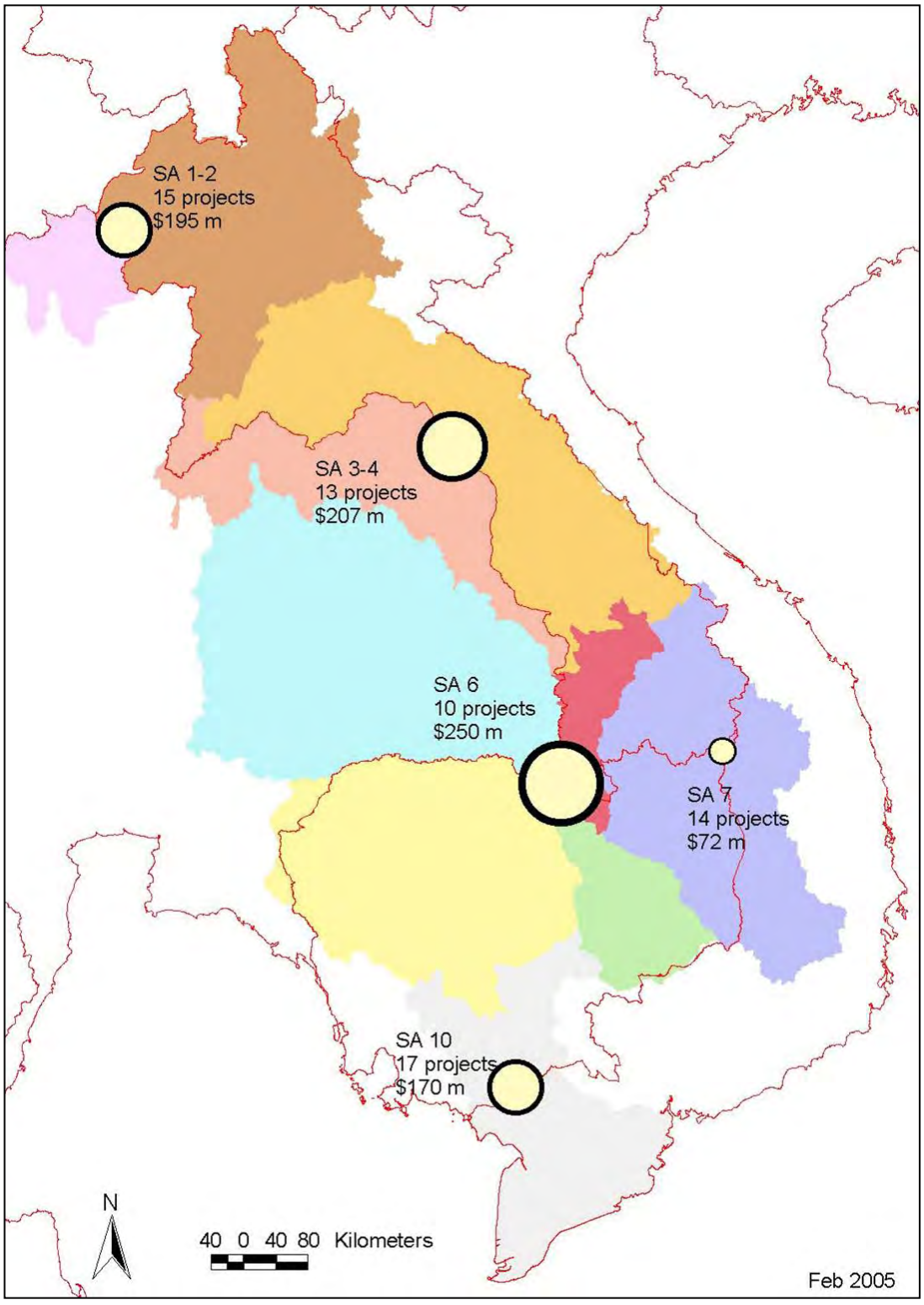


*Figure 6.6: Total projects by sector*

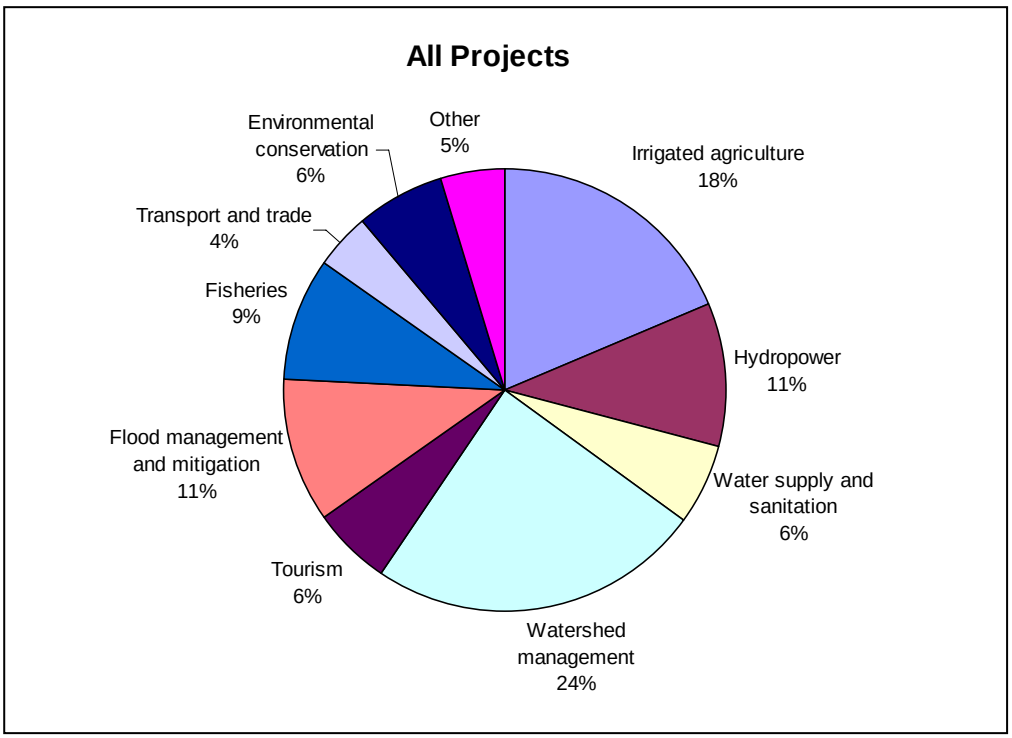
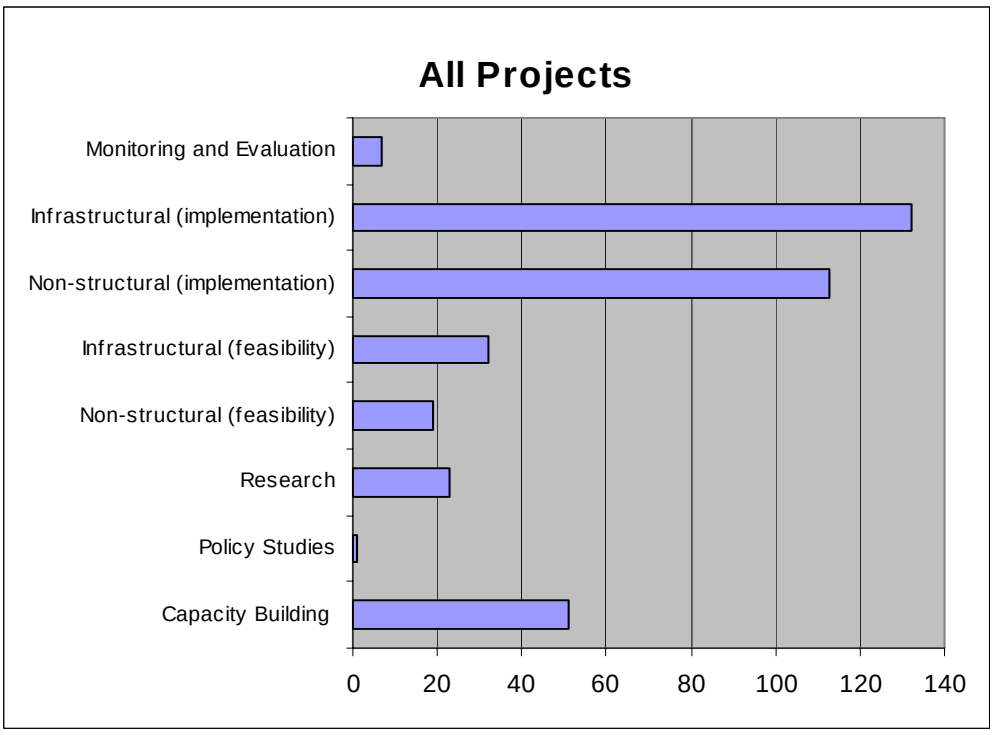



*Figure 6.7: Total projects by type*




NOTE: projects may be listed by more than one sector or type

## 6.7 PIN format and derived database fields

*Note: The PIN format has been modified in January 2006, and the database fields will be changed accordingly*

*Table 6.2: PIN format*

*(Use for project ideas – around 1 page)*

| | |
|---|---|
| Date: | |
| Raised by: | (MRC programme, NMC, line agency, others) |
| Working title: | |
| Development objective: | (Preferably 1 development objective) 10 |
| Background and justification: | (Short description - relation to BDP sector(s) |
| Strategic relationship: | (Relation to LMB strategy; relation to MRC Strategic Plan or sector strategy, if relevant) |
| Priority: | High - Medium - Low (choose one of them) |
| Expected outputs: | |
| Time frame: | |
| Cost sharing: | National contribution (in kind): xxx,xxx USD<br>External funds required: x,xxx,xxx USD<br>Total costs x,xxx,xxx USD |
| Location map for project | |

### *Fields for BDP Projects Database*

*Table 6.3: Database entries*

| |
|---|
| Date |
| Current date (date of data entry) - *generated automatically* |
| Submitting agency |
| Name - *freeform text* |
| Country submitting project - *selectable list*<br>1 Cambodia<br>2 Lao PDR<br>3 Thailand<br>4 Viet Nam<br>5 regional organization<br>6 other |

10 Can for example be taken from the BDP (draft) Discussion Paper *'Development Strategy for the Lower Mekong Basin'* (most recent version), or otherwise as preferred by the proponent

Type - *selectable list (>1 possible)*

1 National Mekong Committee
2 Other national government agency
3 Provincial government agency
4 MRCS
5 Non-government organization (international)
6 Non-government organization (national / local)
7 Private company or individual
8 Other

Title

Official project title - *freeform text*

Project code - *alphanumeric*

Project objective - *freeform text*

Background / description - *freeform text*

Sectors - *selectable list (>1 possible)*

1 irrigated agriculture
2 hydropower
3 water supply and sanitation
4 watershed management / forestry
5 tourism
6 flood management and mitigation
7 fisheries
8 transport and trade
9 environmental conservation
10 other

Strategic relationship - *freeform text*

Priority - *selectable list:*

1 Joint Project, full proposal available
2 Joint project, identified as high priority for developing full proposal
3 Other joint projects
4 National project, identified by NMC as high priority
5 National project, identified by NMC as medium priority

Expected outputs - *freeform text*

Beneficiaries

Target group - *freeform text*

Number - *selectable list*

1 <1,000
2 1,000 – 10,000
3 10,000 – 100,000
4 >100,000

| | |
|---|---|
| Timeframe | |
| Duration: | *number of years* |
| Project start date: | *year* |
| Project end date: | *year* |
| Current phase: | *yes/no* |
| Budget estimate | |
| National contribution: | *$US* |
| External funds: | *$US* |
| Total: | *calculated* |

Total value of project - *selectable list*

1 < $US 50,000
2 $US 50,000 - $US 1 million
3 $US 1 million - $US 10 million
4 $US 10 million
5 no estimate available

Location - *selectable list*

1 single location
2 multiple locations
3 whole country
4 whole basin

Coordinate: *latitude / longitude*

Country - *selectable list OR can be generated from lat/long (>1 possible)*

1 Cambodia
2 Lao PDR
3 Thailand
4 Viet Nam
5 other

Province - *selectable list (attached) OR can be generated from lat/long*

Sub-area - *selectable list OR can be generated from lat/long*

1 SA1 - Northern Laos
2 SA2 - Chiang Rai
3 SA3 - Nongkhai / Song Khram
4 SA4 - Central Laos
5 SA5 - Mun / Chi
6 SA6 - Southern Laos
7 SA7 - Se San – Sre Pok – Se Kong
8 SA8 - Kratie
9 SA9 - Tonle Sap
10 SA10 - Delta

| |
|---|
| Project type - *selectable list (>1 possible)* |
| 1 Capacity-building and management |
| 2 Policy studies |
| 3 Research |
| 4 Non-structural development (preparatory/feasibility) |
| 5 Non-structural development (implementation) |
| 6 Infrastructural development (preparatory/feasibility) |
| 7 Infrastructural development (implementation) |
| 8 Monitoring and evaluation |
| Stage of preparation - *selectable list* |
| 1 Proposal |
| 2 Pre-feasibility |
| 3 Feasibility |
| 4 Implementation |
| 5 Completed |

*Table 6.4: Selectable list for province names*

| GIS code | Province name | Country |
|---|---|---|
| 9999 | Outside LMB | |
| 101 | Banteay Meanchey | Cambodia |
| 102 | Battambang | Cambodia |
| 103 | Kampong Cham | Cambodia |
| 104 | Kampong Chhnang | Cambodia |
| 105 | Kampong Speu | Cambodia |
| 106 | Kampong Thom | Cambodia |
| 107 | Kampot | Cambodia |
| 108 | Kandal | Cambodia |
| 109 | Koh Kong | Cambodia |
| 110 | Kratie | Cambodia |
| 111 | Mondul Kiri | Cambodia |
| 112 | Phnom Penh | Cambodia |
| 113 | Preah Vihear | Cambodia |
| 114 | Prey Veng | Cambodia |
| 115 | Pursat | Cambodia |
| 116 | Ratana Kiri | Cambodia |
| 117 | Siem Reap | Cambodia |
| 119 | Stung Treng | Cambodia |
| 121 | Takeo | Cambodia |
| 122 | Otdar Meanchey | Cambodia |
| 124 | Krong Pailin | |
| 199 | Great Lake | Cambodia |
| 1999 | Tonle Sap Island | Cambodia |

| GIS code | Province name | Country |
|---|---|---|
| 201 | Vientiane Municipality | Lao PDR |
| 202 | Phongsaly | Lao PDR |
| 203 | Luangnamtha | Lao PDR |
| 204 | Oudomxay | Lao PDR |
| 205 | Bokeo | Lao PDR |
| 206 | Luangprabang | Lao PDR |
| 207 | Huaphanh | Lao PDR |
| 208 | Xayabury | Lao PDR |
| 209 | Xiengkhuang | Lao PDR |
| 210 | Vientiane | Lao PDR |
| 211 | Borikhamxay | Lao PDR |
| 212 | Khammuane | Lao PDR |
| 213 | Savannakhet | Lao PDR |
| 214 | Saravane | Lao PDR |
| 215 | Sekong | Lao PDR |
| 216 | Champasak | Lao PDR |
| 217 | Attapeu | Lao PDR |
| 218 | Xaysomboun Special Region | Lao PDR |
| 303 | Kalasin | Thailand |
| 305 | Khon Kaen | Thailand |
| 306 | Chanthaburi | Thailand |
| 310 | Chaiyaphum | Thailand |
| 312 | Chiang Rai | Thailand |
| 313 | Chiang Mai | Thailand |
| 315 | Trad | Thailand |
| 317 | Yasothon | Thailand |
| 318 | Nakhon Nayok | Thailand |
| 320 | Nakhon Phanom | Thailand |
| 321 | Nakhon Ratchasima | Thailand |
| 326 | Nan | Thailand |
| 327 | Burirum | Thailand |
| 330 | Prachinburi | Thailand |
| 337 | Phitsanulok | Thailand |
| 339 | Phetchabun | Thailand |
| 342 | Maha Sarakham | Thailand |
| 345 | Roi Et | Thailand |
| 350 | Lampang | Thailand |
| 352 | Loei | Thailand |
| 353 | Si Saket | Thailand |
| 354 | Sakon Nakhon | Thailand |
| 365 | Surin | Thailand |
| 366 | Nong Khai | Thailand |
| 368 | Udon Thani | Thailand |
| 369 | Uttaradit | Thailand |

| GIS code | Province name | Country |
|---|---|---|
| 371 | Ubon Ratchathani | Thailand |
| 372 | Phayao | Thailand |
| 373 | Mukdahan | Thailand |
| 374 | Sa Kaeo | Thailand |
| 375 | Nong Bua Lamphu | Thailand |
| 376 | Amnat Charoen | Thailand |
| 4301 | Lai Chau | Viet Nam |
| 4403 | Nghe An | Viet Nam |
| 4405 | Ha Tinh | Viet Nam |
| 4407 | Quang Binh | Viet Nam |
| 4409 | Quang Tri | Viet Nam |
| 4411 | Thua Thien Hue | Viet Nam |
| 4503 | Quang Nam | Viet Nam |
| 4511 | Khanh Hoa | Viet Nam |
| 4601 | Kon Tum | Viet Nam |
| 4603 | Gia Lai | Viet Nam |
| 4605 | Dak Lak | Viet Nam |
| 4703 | Lam Dong | Viet Nam |
| 4707 | Binh Phuoc | Viet Nam |
| 4801 | Long An | Viet Nam |
| 4803 | Dong Thap | Viet Nam |
| 4805 | An Giang | Viet Nam |
| 4807 | Tien Giang | Viet Nam |
| 4809 | Vinh Long | Viet Nam |
| 4811 | Ben Tre | Viet Nam |
| 4813 | Kien Giang | Viet Nam |
| 4815 | Can Tho | Viet Nam |
| 4817 | Tra Vinh | Viet Nam |
| 4819 | Soc Trang | Viet Nam |
| 4821 | Bac Lieu | Viet Nam |
| 4823 | Ca Mau | Viet Nam |

# 7 Issues and priorities

Because of its broad scope, the BDP has considerable data and information requirements. While it is essential that the information is adequate to describe the impacts of proposed development scenarios, it must also be feasible to collect and process the information within the timeframe of the BDP. This requires careful scoping of information requirements. The structure of the BDP is such that each stage can be used to define the scope of information required in the next stage.

The BDP is not being developed in isolation – it draws on existing national plans and policies, and is supported by a wide range of programs both within MRC and in the national line agencies. An important function of BDP is to synthesise information from MRC and national programs – it should not be primarily concerned with data collection.

It is also important to recognise that crucial information may not be available within the BDP timeframe. The processes of national planning and development will proceed regardless of access to adequate information, and BDP must plan accordingly, making provision for information gaps to be filled at later stages within the process, but working with what is available.

Major information gaps identified are in quantification of cause / effect relationships, particularly relating to environment and ecosystem functions. For example, the relationship between changes in water regime and fisheries production cannot be quantified at this stage. Similarly, very few aspects of social impacts of change can be quantified. However, where quantitative data are lacking, there may be a reasonable understanding of qualitative relationships. "It is more important to identify likely ... impacts, than to precisely quantify the more obvious ... impacts" (MRC-WUP-A Feb 2002a).

Important BDP-specific information needs include for example:

- The basic water availability (water resources generated) as a function of time and place;
- a broad variety of thematic maps (and related data) with ready access to analysis and editing; and
- national (water-related) development policies and plans, and specific planned development initiatives.

At a more detailed level, improved basic knowledge would be highly valuable about for example

- suitable demand management options;
- the demand of water for ecological habitat preservation *('environmental flows');* and
- new technologies for improved water efficiency.

# 8 Solutions

Collection and maintenance of data and information should be seen as a continuous process that must by necessity be carried out in an active collaboration between all MRC programmes and the NMCs. It is firmly believed that a continuous data- and knowledge-sharing will be highly valuable to all parties.

A scope is seen for strengthened dissemination of BDP-related data and knowledge, using a variety of modalities, such as traditional publications; shared GIS and database platforms; and the Internet.

The MRC Information System should remain the shared framework for data management among the MRC programmes and the NMCs. A continuous internal dialogue should be maintained about its coverage and operation.

# 9 Findings and recommendations/ lessons learnt

Some observations from BDP Phase 1 may be summarised as follows:

- The knowledge-base is as short-lived as fresh fish.. Most of the data and information require a steady maintenance, updating, and revision, adapting to new knowledge, new developments, and new information needs

- The national IWRM frameworks are - with differences from one country to another - in varying states of transition, development and consolidation. Continuous monitoring (via the NMCs) is required in order to maintain and sharpen the impact and the institutional interfaces of the BDP

- There is a scope for enhanced inter-programme coordination of knowledge base development. One example is the basic IWRM requirement of some knowledge, or at least concrete assumptions about the *water availability.* At the start of BDP Phase 1, it was anticipated that this knowledge would be produced under the WUP and would be available as a basis for the BDP sub-area studies, but for various reasons, including both technical issues and political sensitivity (the hydrological analyses being tied up with the critical water-sharing negotiations), this was not the case. At a late stage of BDP Phase 1, knowledge became available about *unallocated water,* but the basic water availability remains a subject of discussion and dispute.

- There is a scope for improved dissemination, including Internet dissemination, using the MekongInfo platform.

- There is a scope for improvement of the quality of a part of the data and information already available.

- There is a scope for improvement of the data and information available about IWRM-related institutional frameworks (that are in a state of transition or early consolidation in several MRC member countries); and about IWRM-related development policies, plans and initiatives (in order to assure harmony and identify and prevent inconsistencies, for example related to water utilization).

# 10 Relevance

## 10.1 Relevance for NMCs and/or line agencies

Good knowledge will enhance the value of integrated management in various ways:

- overview of options and constraints (as influenced by inter-sector linkages);
- beneficial interaction between economic development and resource conservation;
- realistic and consistent scenarios;
- early identification of sub-optimal scenarios and solutions (and, hereby, less waste of time and resources) (or, in other words, reduced opportunity costs);
- prediction of full impact and 'downstream' side effects (positive as well as negative);
- timely and appropriate response to opportunities and threats; and
- improved knowledge about causes, effects, risks and opportunities.

The basinwide overview provided by the BDP provides a useful perspective to the national sector development planning, both by illustrating (and offering quantitative estimates) of options and constraints, and by placing the national development initiatives in a basinwide context. The regional and sub-area analyses describe the basin-scale relations that can expand the scope of the national development efforts, and (via the subsequent planning activities) add value to these efforts.

## 10.2 Relevance for MRCS and/or BDP Phase 2

The data and information collected or produced during BDP Phase 1 provide valuable information to other MRC programmes and a good starting point for BDP Phase 2.

# 11 Concluding general outlook

Knowledge is not a finite resource - it has the unique property of expanding by being shared. A comprehensive exchange of knowledge serves a variety of good purposes and should be encouraged at all levels: National as well as basinwide, within and between sector-related professional disciplines, with NGOs, and within and between the public, private and academic spheres.

A good knowledge-base will contribute to well-informed, timely and appropriate analyses and decisions at all stages of the BDP planning process, hereby facilitating the process and its identification and promotion of useful water-related development initiatives. This will, in turn, support the MRC vision of *'an economically prosperous, socially just and environmentally sound Mekong River Basin'.*

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# Appendix 1: MRC data sharing procedures

## MRC Procedures for Data and Information Exchange and Sharing

PREAMBLE

Recognizing the existing cooperation in data and information collection, exchange, sharing and management through the Mekong cooperation frameworks from 1957 to date;

Affirming the imperative for operationalizing an effective, reliable and accessible data and information system for the Mekong River Commission (MRC) and its member countries to implement the AGREEMENT ON THE COOPERATION FOR THE SUSTAINABLE DEVELOPMENT OF THE MEKONG RIVER BASIN, signed in Chiang Rai, Thailand on 5th April 1995, hereinafter referred to as the "Mekong Agreement";

Pursuant to the Council Resolution on the Water Utilization Programme of 18th October 1999, and the Decision of the 13th Meeting of the Joint Committee of 8th March 2001,

WE hereby approve the following procedures for data and information exchange and sharing:

1. Definition of Key Terms

For the purpose of the present Procedures, the following terms shall mean, unless otherwise stated:

*Data:* representations of facts, in a formalized manner, suitable for communication, interpretation or processing.

*Data and information exchange:* reciprocal transfer of data and information among the member countries.

*Data and information sharing:* provision of full access to data and information maintained in the MRC-IS to the member countries through MRCS.

*Information:* data interpreted, processed and refined, and then displayed by the competent authorities having ownership or possession thereof, which is required for exchange and sharing for the purpose of the implementation of the Mekong Agreement.

*Standards:* guidelines for data handling that are recognized as best practice in their relevant scientific or technical disciplines, with the objective to minimize the transaction costs of using data.

2. Objectives

The objectives of the undertakings under the present Procedures are to:

- Operationalize the data and information exchange among the four MRC 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 Mekong River Basin.

3. Principles

In conformity with the provisions of the Mekong Agreement, the data and information exchange and sharing among the MRC member countries should be governed by the following principles:

- Subject to the laws and regulations in their respective countries, in particular concerning the national defence or security, and commercial-in-confidence and copy right protection, exchange, on a regular basis, data and information that are necessary to implement the Mekong Agreement;

- Data and information exchange and sharing, including the prioritization of information needs should be based on an efficient, equitable, reciprocal and cost effective manner.

- The data and information contained in the MRC-Information System that is maintained by MRCS (hereinafter referred to as "the MRC-IS"), should be relevant, timely and accurate, and exist in established usable formats for MRC and its member countries through an appropriate network and communication system.

- Any additional and unavailable data and information that is required from time to time to facilitate MRC activities, programs and projects will be agreed by the MRC Joint Committee, including procedures and cost sharing arrangements for collecting the minimum necessary data at the lowest feasible cost in a timely and equitable manner.

4. Data and Information Exchange and Sharing

Each NMC and MRCS shall cooperate with one another in the following:

a. Supporting and promoting the implementation of the present Procedures;

b. Providing data and information to the MRCS, as appropriate and where applicable subject to the following requirements:

    - Major Groups/types of data and information required for implementation of the MRC program/activities and Mekong Agreement, inter alia:
        - Water Resources;
        - Topography;
        - Natural resources;
        - Agriculture;
        - Navigation and Transport;
        - Flood management and mitigation;
        - Infrastructure;
        - Urbanization/Industrialization;
        - Environment/Ecology;
        - Administrative boundaries;
        - Socio-economy; and
        - Tourism.

- Standards to be determined by MRCS and approved by the Joint Committee, including but not limit to the format, standardization, classification, and acceptable level of data quality;
- Delivery schedules; and
- Modalities for exchange and sharing.

c. Endeavouring to provide, on a case-by-case basis, historical data required for the implementation of the Mekong Agreement.

Cost for collecting additional data and information other than those required for the implementation of the MRC projects, programs, and not available shall be borne by any requesting party.

Channel of communication shall be made through MRCS.

5. Implementation Arrangements

The MRC Joint Committee shall oversee the effective implementation of the present Procedures as required by the Mekong Agreement.

5.1 Custodianship of MRC-IS

The MRC Secretariat shall be responsible, as custodian, for the following:

A/ Obtaining and updating of required data and information;

B/ Managing of this on behalf of the Mekong River Commission (MRC);

C/ Ensuring proper access to, and maintenance and quality of the data and information that meet the required standards;

D/ Providing a recognized contact point for the distribution, transfer and sharing of the data and information;

E/ Estimating and collecting cost incurred according to Section 4; and

F/ Preparing the MRC guidelines on custodianship and management to be adopted by the MRC Joint Committee.

The obligations and responsibilities of users, on the use of the data and information shall be elaborated in the MRC guidelines on custodianship and management of the MRC-IS.

5.2 Reporting

Report will be made annually by the MRCS to the MRC Joint Committee and Council respectively as to the overall effectiveness of the present Procedures, the status of the MRC-IS and the suitability of the technical guidelines and standards for ensuring the protection and integrity of the data, information and systems and its accessibility and quality, as well as the remedial and rectifying measures taken, and recommendations for further guidance and direction, including modification and amendments of the Procedures and related guidelines, if any.

6. Entry into Force

The present Procedures shall take effect among the member countries on the date of the signature by the MRC Council Members.

Adopted by the Council on 1st November 2001 at its Eighth Meeting in Bangkok, Thailand.

_____

MRC Council Member for Kingdom of Cambodia

_____

MRC Council Member for Lao People's Democratic Republic

_____

MRC Council Member for Kingdom of Thailand

_____

MRC Council Member for Socialist Republic of Viet Nam

# Appendix 2: Information system guidelines

MEKONG RIVER COMMISSION

GUIDELINES ON CUSTODIANSHIP AND MANAGEMENT

of the

MEKONG RIVER COMMISSION INFORMATION SYSTEM

Introduction

The member countries of the Mekong River Commission (MRC) have always recognised that the sustainable development objectives of the "Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin" signed in Chiang Rai, Thailand on 5th April 1995 (hereinafter referred to as the "Mekong Agreement") can only be achieved when data and information is used for planning, development and monitoring purposes. For this reason, paragraph C of Article 24 of the Mekong Agreement states that one function of the Joint Committee of the MRC is:

> To regularly obtain, update and exchange information and data necessary to implement this Agreement.

On 7 July 2001 the MRC Joint Committee endorsed the Procedures for Data and Information Exchange and Sharing (hereinafter referred to as the Exchange and Sharing Procedures). The Exchange and Sharing Procedures were subsequently adopted and brought into force by the Council of the MRC at its Eighth Meeting held on 1 November 2001 in Bangkok, Thailand.

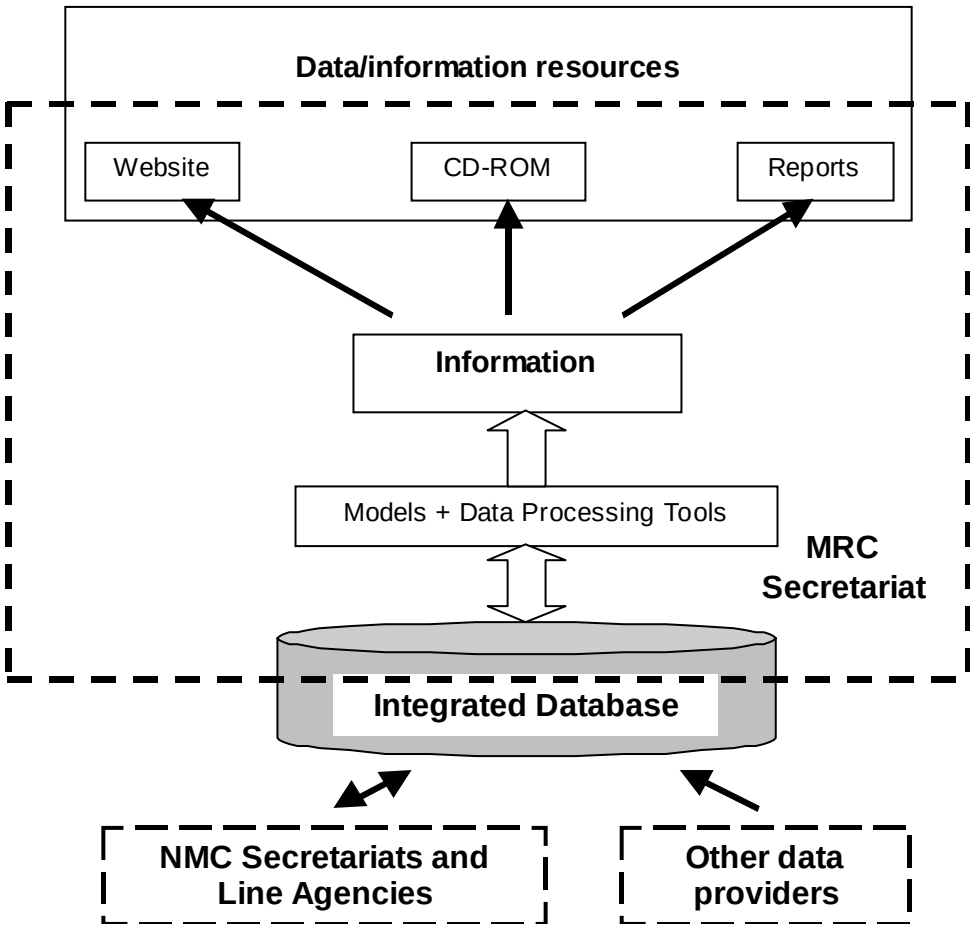
As provided in the Exchange and Sharing Procedures, a series of technical guidelines and standards need to be developed. These Guidelines on Custodianship and Management (hereinafter referred to as the Guidelines) have been developed under the provisions of Clause 5.1 of the Exchange and Sharing Procedures in order to define the key operating principles and activities of data custodianship and management.

Section 1 – Management of MRC Information System (MRC-IS)

1.1 Broad System Architecture for MRC-IS

The broad system architecture for the MRC-IS is being built around the philosophy and principles of an integrated database system.

An outline of this system is illustrated in the diagram below. These Guidelines are designed to support, maintain this broad system architecture, and to facilitate data and information exchange and sharing.




This diagram illustrates clearly the role of MRC Secretariat as the overall custodian of the MRC-IS, including shared data and information. The Exchange and Sharing Procedures list the MRC Secretariat's custodianship duties, among others, as: -

a) Obtaining and updating of required data and information;

b) Managing of this on behalf of the MRC;

c) Ensuring proper access to, and maintenance and quality of, the data and information to meet the required standards;

d) Providing a recognised contact point for the distribution, transfer and sharing of the data and information;

e) Estimating and collecting cost incurred according to Section 4 of the Exchange and Sharing Procedures (extra data); and

f) Preparing the MRC guidelines on custodianship and management to be adopted by the MRC Joint Committee.

The diagram also shows a custodianship role for the National Mekong Committees (NMCs)/line agencies. This role centres on the acquisition, storage and management of original data and information in each country prior to exchange with the MRC-IS.

Data and information custodianship is further detailed in Section 2.

1.2 Management Coordination between MRC Secretariat and National Mekong Committees

In order to promote cooperation and trust in the spirit of the Mekong Agreement, there has been established an ongoing working group comprising representatives of all MRC Secretariat divisions and representatives nominated by the four NMCs.

This working group, known as the Information System Design and Implementation Team (ISDIT), is responsible for development of technical guidelines and standards for all matters relevant to implementation of the Exchange and Sharing Procedures. The functions of the ISDIT are defined by its Terms of Reference.

Section 2 – Data and Information Custodianship

2.1 Data and Information Custodianship in the MRC

"Custodianship" is aimed at achieving clear accountability within the MRC for the data and information resources to be shared and for the combined basin-wide information resources.

Under the current data model being developed that has an integrated database, two groups of custodianship are recognised as appropriate for the MRC. It becomes the responsibility of the nominated custodian of a particular data collection to ensure data integrity, security and accessibility in accordance with these Guidelines.

The first group will mostly be the NMC Secretariat/Line Agencies of each riparian country. They are the *"Primary Custodians"* as the initial collectors, processors and storers of data that will later be shared and exchanged under the Exchange and Sharing Procedures.

The second group consists only of the MRC Secretariat which, as noted in Section 1, has been given the responsibility under the Exchange and Sharing Procedures as the Custodian of MRC-IS data and information that is collected, processed and stored in the integrated database. These Guidelines refer to this group as "MRC Custodian".

2.2 Principles of Data and Information Custodianship

Principle 1 - Trusteeship

The MRC Secretariat in its role as the MRC Custodian holds data and information in trusteeship on behalf of the MRC member states.

Principle 2 - Standard setting

The MRC Custodian, in consultation with the NMCs , and through the ISDIT, is responsible for determining appropriate standards for approval by the Joint Committee.

Principle 3 – Continuity of data and information

Each custodian will develop and implement data management plans, which ensure the continuity of collection, processing and maintenance of necessary data and information.

Principle 4 – Authoritative source

Each custodian is the authoritative source for the fundamental dataset(s) in its care.

Principle 5 – Accountability for Integrity and Access

Each custodian is accountable for the integrity of the data in its care and for maintaining agreed access even if the custodian contracts another party to collect some or all of the required data.

Principle 6 –Additional Data and Information Collection

Collection or processing of additional and/or unavailable data and information that is required from time to time to facilitate MRC activities, programs, and projects, is subject to the agreement of the MRC Joint Committee as to procedures and cost sharing.

Principle 7 – Metadata

Each custodian will establish and exchange metadata of the dataset(s) in their respective care in accordance with standards developed by the MRC Secretariat through ISDIT and approved by the Joint Committee.

2.3 Selection of Nominated Agencies as Primary Custodians

The selection of custodians for the datasets in each riparian country that are required for implementation of the Mekong Agreement will be a responsibility of each NMC . The MRC Secretariat, through ISDIT, may assist by the preparation of suggested selection criteria.

2.4 Scope of Data and Information

The Exchange and Sharing Procedures provide a list of 12 major groups/types of data and information required for implementation of the MRC program/activities and Mekong Agreement.

The MRC Secretariat, through the ISDIT, will develop, issue and regularly update the detailed specification required for each major group/type of data and information.

Section 3 – Obligations and Responsibilities of Users

3.1 Data and Information Users in the MRC Context

The Guidelines recognise four classes of data and information users, each with varying obligations and responsibilities.

3.2 Internal Data and Information Users

The internal data and information users are the various institutions and bodies of the MRC (Council, Joint Committee, Secretariat), NMCs, and Line Agencies.

Internal Data and Information Users will have full access to all data and information available in the MRC-IS.

Internal Data and Information Users shall respect the rights of the original data owner in relation to copyright and intellectual property, respect any specified confidentiality requirements, and acknowledge the source when appropriate on publication.

3.3 Commercial Data and Information Users

These users are those who intend to use MRC-IS data and information for profit or other commercial gain. They include, but are not limited to the following:

*1) independent commercial data and information users* (such as a development company using MRC data to design a private commercial project).

Their use of the data and information shall be subject to a legally binding licence issued by the MRC Secretariat. This licence will be specific to the particular requirements of each situation and, among other things, may include:

- Permission to use from the original sources
- Limitations on publication
- Matters of intellectual property rights
- Fees and charges

2) *directly contracted commercial data and information users* (such as a consultant contracted by MRC Secretariat, or NMCs and Line Agencies).

Their obligations and responsibilities, including inter alia matters of copyright and intellectual property, will be specified by the terms of the standard contract of engagement.

3) commercial data and information users associated with MRC partners (such as a consultant contracted by a MRC partnership organization for MRC purposes).

For users contracted by MRC partners, their use of data and information shall be governed by a license issued by MRC Secretariat. To ensure this, the MRC Secretariat will include appropriate provisions in partnership agreements.

3.4 Research /academic or Civil Society Data and Information Users

In the case of individual researchers and universities or institutions of higher learning and in the case of other civil society organizations, the regular conventions of international copyright will apply. The release of data and information must be in accordance with the Principles of the MRC Exchange and Sharing Procedures. Data users will acquire a license, issued by the MRC Secretariat, that establishes the conditions for use of the data and information.

3.5 Public Data and Information Users

The MRC, in line with established policies, will make appropriate data and information available to the public through various media. No special obligations and responsibilities apply to the general public other than those provided by any applicable laws.

Section 4 - Implementation and Review of these Guidelines

4.1 Implementation

The MRC Secretariat, in collaboration with NMCs, will be responsible to implement the present Guidelines.

The ISDIT will serve as the primary forum for implementation coordination between the MRC Secretariat and the NMCs. In addition the ISDIT is responsible for the detailed development of the technical guidelines and standards in conformity with the Exchange and Sharing Procedures.

Other responsibilities of the ISDIT are specified in its Terms of Reference.

4.2 Review

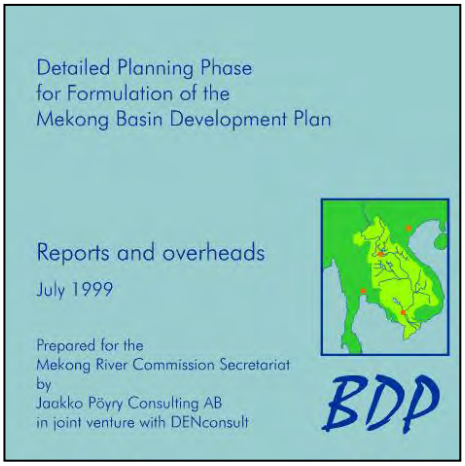
As part of the annual reporting process required by the Exchange and Sharing Procedures the MRC Secretariat is responsible for conducting a review of the Procedures and related guidelines, and for making appropriate recommendations for further guidance and direction. The MRC Secretariat will prepare an annual report to the Joint Committee and Council that should cover, as appropriate, the following:

- Overall effectiveness of the Procedures;
- The status of the MRC-IS;
- Suitability of the technical guidelines and standards for ensuring the protection and integrity of the data, information and systems and its accessibility and quality;
- Remedial and rectifying measures taken; and
- Recommendations, including modifications or amendments of the Procedures, and related guidelines, if any.

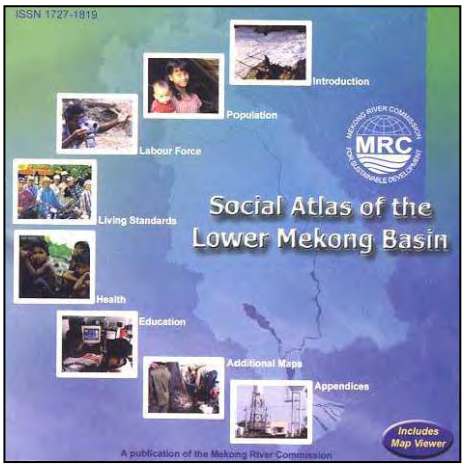
In formulating the report, the MRC Secretariat needs to take into account the views of NMCs, custodians, and users of shared data, including the extent to which their needs are met.

Any proposed amendment, modification, or revision of these Guidelines is subject to the Joint Committee's approval.

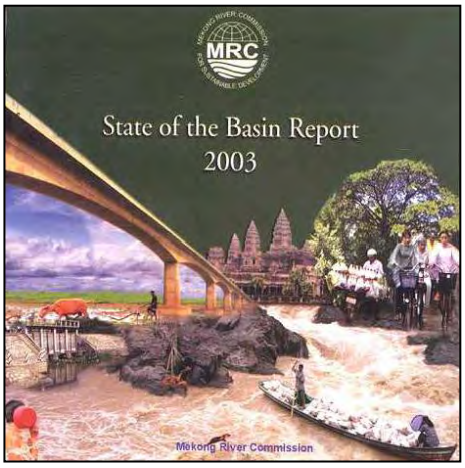
# Appendix 3: Documentation CDs



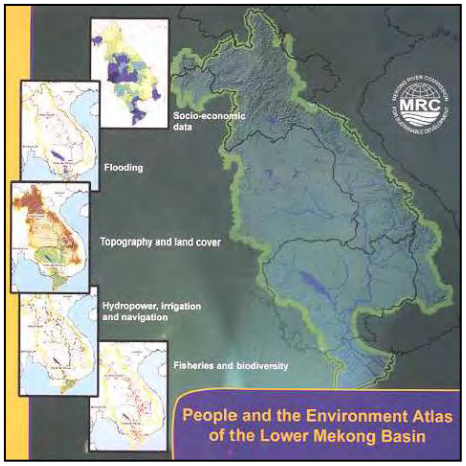

BDP - Detailed Planning Phase
June 1999
Contents: reports, working papers and OH presentations from the detailed planning phase (January-June 1999)
Distribution: Internal




Social Atlas of the LMB
May 2003
Contents: Maps and data about social conditions in the LMB
Distribution: Internal and external



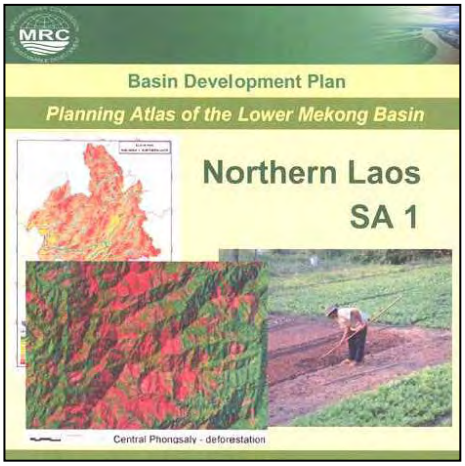

State of the Basin Report 2003
June 2003
Contents: The full State of the Basin Report + executive summary; produced in a collaboration between all MRC programmes
Distribution: Internal and external




LMB People and the Environment Atlas
August 2003
Contents: Maps and data about social and environmental conditions in the LMB.
Distribution: Internal and external


BDP - Archive
April 2005
Contents: Documents, data and OH presentations produced by or for BDP Phase 1, together with a collection of external reference documents
Distribution: Internal


BDP - Economics
September 2005
Contents: Documents, data and OH presentations about development economics studies undertaken under the BDP, and the BDP Resource Allocation Model (RAM)
Distribution: Internal




LMB Planning Atlas

(in preparation)

Contents: Planning information (documents and data) for each sub-area under the BDP

Distribution: Internal and external


BDP library

January 2006

Contents: Documents produced by or for BDP Phase 1, including the BDP Core Library, reports and working papers, OH presentations, and various drafts and supporting documents

Distribution: Internal and external

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