



**Mekong River Commission**

**MRC's Role in Agriculture  
and Agricultural Water Management**

**Strategy Paper**



10 September 2009

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### Disclaimer

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## Executive Summary

The MRC's role as a regional river basin organisation is to understand and evaluate the combined effects of (i) development activities and (ii) the potential effects across the basin of medium and long-term development planning by all MRC Member Countries. This role requires the integration of the many sectors that involve water – including aquatic ecosystems, fisheries, hydropower development, potable water supplies, navigation, irrigation and agriculture.

In the past, agriculture has had a fairly low profile at the MRC. However, the organisation is in the process of re-orienting its portfolio and focusing on the provision of strategically relevant advice, guidance and analysis for the sustainable development and management of the Lower Mekong Basin (LMB).

Past programme work in agriculture has focused on projects in irrigation management and on catchment management. Whilst they have provided insights, information and techniques that are valued by Member Country line-agencies, these projects have not had a strategic coherence that helps inform basin level planning and management.

With a brainstorming workshop with national and international stakeholders in December 2008, the MRC began to evaluate the potential for developing a more strategic role in agriculture, with a focus on agricultural water management. There are many national, international and bilateral agencies that are deeply involved in various aspects of agricultural development and management in the LMB. It remains clear that further work is required in understanding the range and depth of agricultural assistance across the basin, and that future initiatives by the MRC in agriculture need to involve strategic partners, and a clear analysis of the roles, goals and programmes of major agricultural players in all four countries.

A preliminary strategy was subsequently discussed through a round of national consultations. These consultations were held with the National Mekong Committees and other national representatives in Thailand, Cambodia, Viet Nam and Lao PDR, between February and March 2009. The MRC's role in the sector was discussed from two principle perspectives: 1) the comparative strengths of the MRC in agriculture and natural resource management and 2) strategic focus and content.

The discussion paper reviewed some background and rationale for MRC's engagement with agriculture and provided a summary of the options – covering:

- **Agricultural knowledge base:** development of stronger capacity and institutional memory in sector-related information and knowledge within the MRC itself;
- **Planning support:** linking basin-wide water resource planning to national agricultural sector management and planning: establishing a functional process that links MRC strategic planning to national planners, ensuring strong two-way communication and action;
- **Support to agricultural management and development:** support to (pilot) projects that have the potential for learning on cumulative and trans-boundary issues in resource management and development, or pilot replicable development solutions; and
- **Capacity development:** supporting above elements.

A clear outcome of the national consultations as well as a following regional consultation held at the MRC Secretariat in April 2009 was that Member Countries would like more active engagement in agriculture by the MRC. The consultations confirmed that the MRC should strengthen its expertise in agriculture, in-house, in order to better inform and interpret development scenarios, and to provide a continuous and active link with national agricultural planners. A major, but not exclusive, focus should be on agricultural water management and the monitoring of basin development, particularly with respect to land-use change and its impacts. As far as possible, the MRC should avoid becoming directly involved in the implementation of physical projects in the agricultural sector, both to preserve strategic focus, and to be “light” in terms of resource requirements.

## 1. Background

### 1.1 Rationale

This Strategy Paper outlines the need and context for an agricultural strategy at the MRC, and summarises a provisional approach and programme. A first draft version, based on a brainstorming workshop in December 2008 (then termed “discussion paper”), provided the basis for a series of national consultations in February and March 2009, as well as a regional consultation in April 2009.

The Strategy Paper is divided into the following sections:

- Main agricultural characteristics and emerging issues in the Lower Mekong Basin;
- The agricultural context for the MRC, focusing on agricultural water management, and land-use management in relation to basin hydrology and its multiple benefits;
- A brief summary of the agriculture related works already undertaken by the MRC;
- An analysis of the strengths, weaknesses, opportunities and threats concerning MRC’s role in agricultural development and management; and
- A proposed strategy and some accompanying programme detail. The focus of the proposed strategy is on agriculture and agricultural water management at the basin scale, and in strengthening the links between national agricultural planning agencies and basin level perspectives on sustainable and equitable resource use.

### 1.2 Key agricultural water management issues

Agriculture provides livelihoods for more than 70 percent of the Mekong Basin’s population, with 45 percent of the population considered to be below the poverty line. Although population growth rates are still high in Cambodia and Lao PDR (>2.25%), significant, demographic changes are taking place and more are expected in terms of migration away from rural areas, to the point that the area planted in the dry season in NE Thailand, for example, is limited by the availability of labour. The agriculture sector is commonly the first point of intervention in raising living standards, improving livelihoods and mitigating poverty.

The natural flow regimes of the river and its tributaries result in high water levels during and after the monsoon, and low levels in the dry season. Throughout NE Thailand and Lao PDR, some form of water storage is required to allow irrigation in the dry season, and it is clear that dry season irrigation areas are substantially smaller than wet season ones, except in the Delta, where farmers may be able to harvest up to seven rice crops every two years.

Soils in the basin are generally poor, with low nutrient status, and extensive areas are acidic when not water logged, imposing limits to crop cultivation and suitability. There is considerable diversity in the character and extent of agricultural systems in different reaches of the basin, complemented by an extremely rich natural bio-diversity and aquatic resources.

Rain-fed cropping occupies the largest area and is dominated by rice culture, due to high wet season rainfall, extensive flooding and water logging of riparian soils. Although irrigation water-use accounts for more than 70 percent of current utilisation, relatively little water is diverted for agriculture in the basin, typically less than 10 percent of the total mean annual flow. Groundwater is extensive, and not greatly used, but the potential for sustainable use is uncertain in many places. There are potential problems with arsenic contamination, which have been clearly identified in the Mekong Delta and Cambodia, and are likely to be more widespread.

In general, agricultural productivity is low in the Thai, Lao and Cambodian parts of the basin, although agriculture is extensively developed, diversified and intensive in the Mekong Delta, with significant areas of fruit trees and a substitution of rice by aquaculture. Diversification in enterprises has been plagued by extreme price volatility, exemplified in catfish aquaculture in the upper Mekong Delta, where it initially expanded as a very profitable alternative to rice cultivation. Shrimp culture in coastal production systems has experienced similar unpredictability. A recent report on fisheries in rice

paddies (MRC, 2008) observed that land tenure is not formalised or secure in practice for many, if not most, farmers and natural resource users in Lao PDR and Cambodia, and that this imposes limits on investment to develop or intensify production.

Thailand and Viet Nam are the two leading rice exporters in the world. Cambodia and more recently Lao PDR have planned significant expansion in rice area to become players in the export market. The recent rise in global rice prices has strengthened this position, but longer-term patterns of rice growing and productivity will be directly determined by the evolution of world prices, and to an extent developments and reforms within rice marketing channels in individual countries.

Throughout the basin there is evidence of a rising tide of commercial agriculture in addition to traditional, small-scale subsistence cultivation. Until the re-emergence of a “global food crisis” in 2007, in the wake of rising commodity prices, livelihood strategies and export earnings have been the complementary ends of the agricultural policy agenda in the region. The revivals of a food security agenda, and to an extent, concerns about the likely impacts of global climate change, have reignited interest in larger interventions in public and private irrigation and agricultural development. The recent parliamentary approval of the proposed water grid in Thailand and similar proposals for large-scale irrigation development in Cambodia are obvious examples of intended large-scale water engineering. Food security interests are likely also driving alternative “private sector” investment in contract farming and both corporate and foreign direct investment into irrigation development, with strong interest in both Lao PDR and Cambodia.

Recent rates of deforestation have been alarming, averaging 0.5 percent per year over a period of four years, attributed to logging and slash-and-burn agriculture in the upper catchments, commercial concession plantations and mining developments, especially in Cambodia and Lao PDR.

Changing land-use has a great impact on the hydrology of a basin, the most sensitive production systems in the basin are:

- Forests in the upper catchments;
  - Rain-fed farming systems, that are vulnerable to nutrient depletion, poor management practices and are likely to be especially sensitive to climate change impacts in the future;
  - Agricultural and fisheries systems associated with flooding around the Ton Le Sap; and
  - The Mekong Delta, where year-round maintenance of water levels is essential to the management of saline and acid-sulphate soils, and to control saline intrusion from the sea.

### 1.3 The MRC remit

The goals and objectives of the MRC are outlined in its current Strategic Plan 2006-2010 (Figure 1 below) – pursuant to the 1995 Mekong Agreement, which emphasises balanced and sustainable development of shared water and related natural resources in the basin.

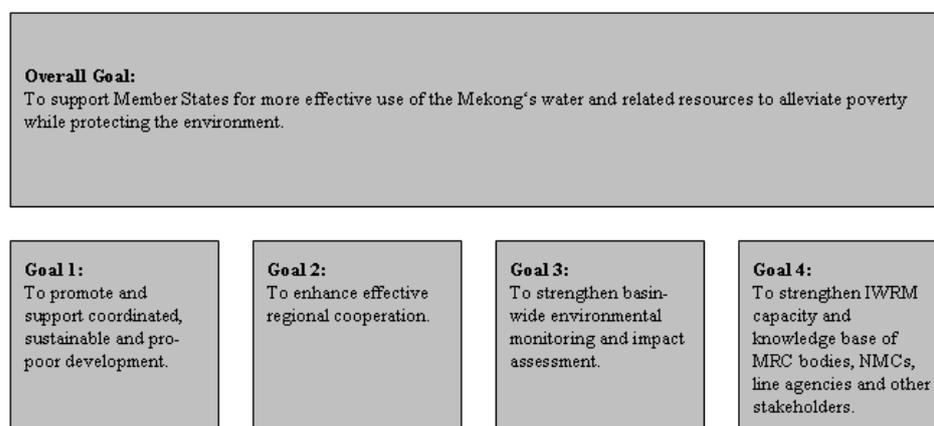


Figure 1: Goals of the MRC, Strategic Plan (2006-2010)

Agricultural management and support is the responsibility of national agencies in the Mekong Basin, but the options and agricultural plans developed imply water-use and land-use changes that affect production systems, and can have cumulative, trans-boundary and/or basin scale impacts. Complementary to this, the MRC's role is to understand and evaluate the combined effects of 1) development activities and 2) the potential effects across the basin of medium and long-term development planning by all Member Countries. This role requires the integration of the many sectoral perspectives that involve water – including aquatic ecosystems, fisheries, hydropower development, potable water supplies, navigation, irrigation and agriculture.

Since the MRC is primarily concerned with trans-boundary water resource management, its prime focus is on understanding the hydrology (land and water) of the basin, and using this to support and advise on the sustainable management and development of land and water resources, with particular emphasis on improving the livelihoods of the poor.

Therefore, future agricultural expertise and activities at MRC should logically focus on:

- Land cover and land-use – and its implications for upstream watershed management and on downstream water availability and quality;
- Agricultural water management, including informal traditional water systems, irrigation and drainage management and development using both surface and groundwater; with a particular focus on cumulative and trans-boundary aspects, as well as environmental implications;
- The nexus of basin-wide water and related resource planning and agricultural sector management and planning in Member Countries, centred on 1) scenario assessment and planning; and 2) ensuring alignment of basin-wide and national perspectives;
- Management and mitigation of drought and flood impacts on agricultural communities; and
- The future direction of the sector - longer-term qualitative and quantitative trends of water and related resources, for instance climate change implications on the agricultural sector.

The next Strategic Plan will be developed for the period 2011-2015. It can be expected that it will move the organisation towards concentrating on core functions that support routine management, monitoring and planning in the river basin. The MRC is in the process of defining these core river basin management functions, and seven are currently under consideration:

- Data acquisition and exchange, monitoring;
- Analysis and modelling;
- Basin-wide planning;
- Forecasting, warning and emergency response;
- Implementing MRC procedures;
- Promoting dialogue and co-ordination; and
- Reporting and dissemination.

Agricultural elements are needed to some degree in all, and will be further cross-referenced in this Discussion Paper.

#### *1.4 Expectations and needs from the MRC Member Countries*

National agricultural planning and sector agencies are principally concerned with the development and management of food production systems that:

- Mitigate poverty and improve the livelihoods and nutrition of the poor;
- Achieve national food security; and
- Generate export earnings.

**Cambodia:** The Ministry of Agriculture, Forestry and Fisheries (MAFF) and the Ministry of Water Resources and Meteorology (MOWRAM) developed a co-ordinated Agriculture and Water Strategy (2007), which includes the following activities:

- to provide farmers with the quantity and quality of water they need, when and where they need it, and within the limits of available water resources and technology;
- to promote the rehabilitation and construction of irrigation, drainage, and flood management infrastructure, in order to provide sufficient water for agricultural production and to alleviate the adverse consequences of excess water;
- to promote the development and extension of appropriate water management technologies that are particularly suited to rain-fed agricultural areas, such as water harvesting, improvements to the moisture-holding capacities of soils and the use of farm ponds;
- to strengthen and expand the Farmer Water User Communities, to enable them to participate in water management and allocation, and to effectively and sustainably maintain irrigation infrastructure;
- to minimise the impact on water resources from the use of chemical substances in agricultural production by encouraging people to implement diversified agriculture and Integrated Pest Management (IPM); and
- to introduce and implement the IWRM concept into the priority river basins by establishing River Basin Organisations (RBOs).

**Lao PDR:** The overall framework for agriculture sector development is provided in the National Socio-economic Development Strategy 2001-2010 (NSEDS) and the 6<sup>th</sup> National Socio-economic Development Plan 2006-2010 (NSEDP), both documents recognise the important contributions of irrigated agriculture. Whereas there is no comprehensive strategy for the agricultural sector as such, the Ministry of Agriculture and forestry (MAF) updated its strategy for the irrigation sub-sector in 2006. MAF, however, acknowledges that in future a more holistic sector strategy should establish effective linkages between research for technology development, extension of the introduction of technology and markets for both inputs and outputs.

**Thailand:** The Ministry of Agriculture and Cooperatives (MOAC) has recently revised its national agricultural policy, strategy and plans. It focuses on three areas: (i) water resources development, i.e. the expansion of irrigation perimeters; (ii) the optimisation of water-use – with focus on irrigation efficiency as well as participatory management of irrigation infrastructure; and (iii) mitigation of losses due to floods and droughts.

**Viet Nam:** There is significant amount of planning information and data for the Mekong Delta and for the upland sub-basins in Viet Nam, co-ordinated by the National Institute for Projection and Planning (NIAPP – Southern) in Ho Chi Minh City. In the Mekong Delta, the major agricultural priorities related to raising income and living standards are:

- Crop diversification;
- Improving product quality; and
- Differentiated planning in sub-areas of the delta.

National representatives in the workshop and consultations identified the following possible roles in a new MRC agricultural strategy:

- To assist countries to develop Basin Development Plan (BDP)<sup>1</sup> outputs and turn findings into concrete plans for inclusion in national socio-economic and financing plans and investment pipelines;

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<sup>1</sup> The BDP programme is central to the MRC's role of guiding sustainable development in the river basin. The BDP assembles scenarios of development across all sectors (hydropower, fisheries, flood mitigation and management, agriculture, navigation etc), based on national programmes and plans. It uses a sophisticated modelling framework to analyse the hydrological and economic consequences of different scenarios, accounting for up-stream-downstream impacts of development, and impact of developments on one sector on those of another. Land-use change due to agriculture, and irrigation development, are two key factors affecting and affected by the hydrology of the river.

- To facilitate the funding of the implementation pipeline, in cooperation with development partners;
- Provide technical assistance on agricultural and natural resource management strategies and programmes within Member Countries; and
- To assist and facilitate with the preparation and development of trans-boundary agricultural development and management projects, that increase experience and understanding of trans-boundary and basin level management issues.

There was also strong consensus from the country representatives that the BDP scenario outputs published to date do not fully reflect current national agricultural plans and that these need to be better integrated into: (i) setting the development scenarios and (ii) interpreting the results from agriculture, irrigation and forestry sector perspectives. At the same time, BDP outputs and guidance in sector level development planning are considered useful and desirable.

The country representatives also expressed continued interest in project work. Some of the outputs from previous project work, such as the irrigation database were appreciated and filled an information gap. In Thailand, the collaboration in data collection and the picture provided by the results are valued, as no national irrigation database existed before that. There was considerable discussion on the need to ensure that project work, if undertaken, would be relevant to multiple countries and be focused towards more strategic basin level outputs in the future.

This was largely confirmed in the round of national consultations, a summary record of the national consultations is presented in Annex 2. Under an MRC programme portfolio which has evolved to: (i) fill knowledge gaps, especially in disciplines such as fisheries and environment; (ii) consolidate data and knowledge about the physical, hydrological and socio-economic characteristics of the basin; and (iii) develop the analytical capacity to support triple bottom-line assessment of development scenarios, country representatives felt that it was important that MRC develops and maintains in-house agricultural capacity. A minimum level of agricultural expertise should encompass:

- Development and strengthening of agricultural capacity and institutional memory within MRC; coupled to
- A much stronger effort to link and coordinate national agricultural planning and perspectives with scenario development, assessment, and interpretation, leading to harmonised objectives; and
- Practical outcomes in agricultural development, arising out of the planning process and the interaction between basin perspectives and national needs.

## 2. MRC's Role in Agricultural Water Management

### 2.1 Previous MRC work in the sector

Previous work by the MRC could be classified into two streams of effort: (i) data collection and analysis; and (ii) local pilot project activities, in irrigation and watershed management. The former is mostly focused on providing information needed in scenario development and analysis, and has been conducted across a range of units within the MRC. Project activities have generally been bilaterally funded and staffed, and have considered aspects of land and water management that are felt to be generic, for example, efficient and effective water-use, and institutional aspects of catchment management.

The main projects being conducted under the current MRC Agriculture, Irrigation and Forestry Programme (AIFP) are given in the following sections, and are complemented by a table summarising the available agriculturally related data and reports generated by the MRC presented in Annex 1.

#### *Demonstration of Multi-functionality of Paddy Fields over the Mekong River Basin, 2002 - 2005*

In order to achieve a “better understanding of multi-functionality of paddy fields in the Lower Mekong Basin”, this project set its immediate objective “to show visible examples of paddy fields’ functions with quantified evaluation”.

Major outputs have so far included:

- Basin-wide GIS formatted data collection, including an irrigation database updated using 2001 data, land-use map focused on paddy fields, and rice crop data including rice production, rice eco-systems, cropping patterns, etc.;
- On-farm level data collection on eight pilot plots: compiling basic information (land-use, irrigation infrastructures, rice production, farmers’ activities, etc), and information related to the water cycle (water inflow and outflow, rainfall, evapo-transpiration, percolation, water quality, etc);
- Analysis to estimate irrigation water-use in the LMB;
- Analysis of multiple functions of paddy fields, considering four functions: (i) flood mitigation, (ii) soil conservation and erosion control, (iii) nurturing aquatic ecosystems, and (iv) livelihood analysis; and
- Technical reports integrating all the major outputs are being prepared and should be completed by mid-2009.

#### *Improvement of Irrigation Efficiency on the Paddy Fields in the Lower Mekong Basin, 2005 - 2008*

The project objectives were:

- To appraise irrigation efficiencies and irrigation systems based on modern concepts in selected irrigation schemes;
- To enhance capacity of all the stakeholders in using up-to-date concepts of irrigation efficiency and water balance, and assessment tools and procedures; and
- To produce guidelines for improving irrigation efficiency on paddy fields based on actual water-use conditions in the Member Countries

Major outputs included:

- Improved knowledge on irrigation modernisation: through a four-day Rapid Appraisal Process training workshop and initial scheme assessment activities at four pilot sites with the collaboration and continuous support of the UN Food and Agriculture Organisation (regional office Asia and Pacific, Bangkok), sixteen engineers from Member Countries have gained and improved basic knowledge of irrigation modernisation including water control methods, modern concepts of water balance, irrigation efficiency and productivity;

- Irrigation system performance assessment: through field work using the Rapid Appraisal Process (RAP), a primary data set of four pilot sites concerning water-use and scheme management has been established in a uniform format;
- Field observation and data collection by Member Countries: on-farm data regarding flows in canals, rainfall, evapo-transpiration, percolation, crop production, water distribution practice and management appraisal, etc. were collected through intensive field observation. This data has been collated as country reports and is useful for the pilot project staff and also as reference material for a wider audience; and
- Guidance for efficient irrigation water-use, arising from analysis and synthesis of the field data and experience, covering some aspects of irrigation water management and system management in the LMB. However, there are some basin level and strategic issues that need to be addressed in this project: (i) strategic planning and management, and in particular financial and economic aspects of managing the irrigation sector; (ii) service orientation has become part of national irrigation policy in both Thailand and Viet Nam, and (iii) there are niches in the irrigation sector, such as mountain irrigation, colmatage (a traditional system of managing the flood plain for irrigated agriculture, mainly used in Cambodia) and fish-agriculture system management that are important.

#### *Challenge Programme on Water and Food*

The global 'research for development' initiative of the Consultative Group on International Agricultural Research (CGIAR) operates through a network of partnerships. It seeks to develop innovative ways of producing more food with less water across nine 'benchmark river basins' in the developing world, including the Mekong Basin. The MRC coordinated some ten research projects of various sizes, implemented by several institutions (see Annex 1).

#### *Watershed Management Project, 2002-2011*

This project is institutionalising watershed management planning in the Member Countries, focusing on pilot areas.

The project has achieved the following outputs:

- A compilation of water related laws and regulations in the four LMB countries;
- Watershed Management Committees have been created in the project's six pilot watersheds
- [www.Mekonginfo.org](http://www.Mekonginfo.org), the project's information and document repository on natural and water resource management;
- The draft Watershed Management Resource Kit has been completed; Information and Learning Centres have been established in the project's six pilot watersheds; and
- Plans of Action on critical watershed issues have been formulated in the project's six pilot watersheds.

#### *Agriculture related data and reports held at MRC*

A brief summary of the agriculturally related data held at the MRC is shown in Annex 1. A larger selection of spatial data is held at: <http://www.mrcmekong.org/spatial/spatialdata.htm>, although there are no specific agricultural data sets apart from those on irrigation.

Agricultural knowledge and data is collated and made available by a number of organisations working in the basin. The most generic is the Greater Mekong Sub-region Agricultural Information Network (<http://www.gms-ain.org>). It is presented in English and in all the basin languages. The ASEAN Secretariat website (<http://www.aseansec.org/4921>) has an extensive section on cooperation in food, agriculture and forestry sectors. Specialist databases, such as fish-base (of the WorldFish Centre) and the Rice Atlas (of the International Rice Research Institute, IRRI) also contain considerable detail about production systems in the region. FAO websites and databases likewise contain much relevant and useful information.

Therefore, the niche in agricultural information provision at the MRC revolves around agricultural water management, and basin scale information related to land-use and land-use change, that has direct relevance to hydrology and river basin planning.

## 2.2 Problems and solutions—SWOC analysis

The SWOC (Strengths, Weaknesses, Opportunities, and Challenges) analysis presented below provides the framework for identifying MRC’s role in agricultural water management, and for defining the respective work packages.

Strengths	Weaknesses
<p><b>What we have:</b></p> <ul style="list-style-type: none"> <li>• Basin-wide mandate to coordinate sustainable development of water and related resources.</li> <li>• Basin level coordination framework through MRC governance structure, the outreach to line agencies through National Mekong Committees.</li> <li>• Coordination and cooperation arrangements with regional organisations (such as ASEAN, GMS), international development banks (such as ADB, World Bank), research organisations and academia, as well as international NGOs.</li> <li>• Basin-wide mandate and IWRM-based planning mechanism for water related developments.</li> <li>• Basin-wide knowledge base on environmental conditions, and sector aspects, e.g. GIS database.</li> <li>• Access to up-to-date information, including socio-economic atlases of Cambodia and Lao PDR.</li> <li>• Analytical capacity for assessing cumulative and trans-boundary implications of water resource development, e.g. modelling.</li> <li>• Expertise on food production systems, spread across different groups and projects.</li> <li>• Project experience that is valued by partners – irrigation and water shed management.</li> <li>• Riparianisation – path to enhancing ownership and closer integration with national governments.</li> <li>• Definition of longer-term core functions of MRC – transition to being a service organisation</li> <li>• Process of opening up MRC to a wider range of stakeholders <ul style="list-style-type: none"> <li>○ Information availability (website).</li> <li>○ Consultation processes well established.</li> </ul> </li> <li>• National policies on food security, export agriculture and poverty reduction.</li> </ul>	<p><b>What is not working:</b></p> <ul style="list-style-type: none"> <li>• Poor strategic focus and overview.</li> <li>• Weak collective agricultural knowledge and institutional memory within MRC. <ul style="list-style-type: none"> <li>○ Agriculture related databases have little relation to poverty alleviation, or relevance in the BDP process.</li> <li>○ Limited uptake of results of short-term consultancies into the corporate knowledge base.</li> <li>○ Poor technical capacity in the irrigation sector</li> </ul> </li> <li>• Lack of detailed knowledge about agricultural systems, trends and hotspots in the basin, leading to an inability to target priorities for coordinated planning and development: <ul style="list-style-type: none"> <li>○ Fisheries and agriculture nexus</li> <li>○ Floods and agriculture nexus</li> <li>○ Agricultural water management systems</li> <li>○ Actual land-use</li> <li>○ Agriculture and poverty nexus.</li> </ul> </li> </ul> <p>Little ability to prioritise agricultural investments and manage trade-offs across sectors and across the basin.</p> <p><b>Where the gaps are:</b></p> <ul style="list-style-type: none"> <li>• No basin-wide agricultural sector vision (say for 2020) developed</li> <li>• Weak links to poverty alleviation, and national MDG targets.</li> <li>• Weak links between national level agricultural planning and the basin perspective. <ul style="list-style-type: none"> <li>○ Two-way communication and mutual feedback</li> <li>○ Triangular working relations MRCS – NMCs – line agencies</li> <li>○ limited national agricultural input into scenario development</li> <li>○ understanding of “triple bottom line” assessment.</li> </ul> </li> <li>• Weak agricultural focus in modelling scenarios and in analysis of results.</li> <li>• Weak links to other parties in agricultural development – the development banks, bilateral agencies, and supra-national bodies such as ASEAN and GMS.</li> <li>• Weak links within MRC between different groups concerned with livelihood and production systems – especially fisheries systems, and possibly livestock.</li> </ul> <p>Direct trans-boundary planning and management experience, especially in relation to agricultural and fisheries impacts.</p>

Opportunities	Challenges
<p><b>Development drivers:</b></p> <ul style="list-style-type: none"> <li>• General economic growth: <ul style="list-style-type: none"> <li>○ Higher commodity prices <u>may</u> benefit farmers.</li> <li>○ Export potential.</li> <li>○ Diversification of crops, bio-fuels, leading to potentially higher income.</li> <li>○ Foreign direct investment (FDI) in dry season irrigation, export oriented agricultural commodities.</li> </ul> </li> <li>• Poverty alleviation: <ul style="list-style-type: none"> <li>○ Reawakened donor interest in rural development, agriculture and irrigation.</li> </ul> </li> <li>• Food security: <ul style="list-style-type: none"> <li>○ State investments in irrigation and drainage schemes.</li> <li>○ Generally low levels of crop productivity / irrigation efficiency offer room for improvement.</li> </ul> </li> <li>• Infrastructure development: <ul style="list-style-type: none"> <li>○ Hydro-power development, leading to opportunities for multi-purpose schemes.</li> <li>○ Improved road network, leading to better market access of farmers.</li> <li>○ Rural electrification, opening opportunities for value adding to agricultural produce; and for groundwater pumping.</li> </ul> </li> <li>• Demographic and socio-economic changes <ul style="list-style-type: none"> <li>○ Migration out of agriculture, leading to land consolidation and better access of urban markets.</li> <li>○ Migration out of uplands and lowland flood plain, reducing ecological pressure and degradation of marginal lands, and increasing potential for sustainable management and improved livelihoods (Thailand only).</li> </ul> </li> <li>• Poverty atlases have recently been completed for Lao PDR and Cambodia, which allow better targeting of agricultural interventions and associated planning.</li> </ul>	<p><b>Challenges to sustainability:</b></p> <ul style="list-style-type: none"> <li>• Competing developments: <ul style="list-style-type: none"> <li>○ Land-use change and degradation, due to FDI in mining, plantations and irrigated agriculture.</li> <li>○ Water regime changes to fisheries, and agriculture - fisheries systems due to mainstream and tributary hydropower development.</li> <li>○ Downstream implications (on Tonle Sap and Mekong Delta) of large scale irrigation development (e.g. Thai water grid, or Cambodian irrigation sector plan).</li> </ul> </li> <li>• Environmental degradation and loss of biodiversity: <ul style="list-style-type: none"> <li>○ Downstream impacts of deforestation.</li> <li>○ Barriers to fish migration by mainstream and tributary dams – compensatory livelihood issues (implying compensatory agricultural development).</li> <li>○ Sediment trapping by dams, resulting in morphological changes on tributaries and Mekong mainstream.</li> <li>○ Instability and erosion of river banks, resulting from flow fluctuations downstream of HP schemes.</li> </ul> </li> <li>• Climate change: <ul style="list-style-type: none"> <li>○ Greater climatic variability: greater variability in runoff.</li> <li>○ Increased crop water demand.</li> <li>○ Higher peak flood flows and durations (possibly offset by dam storage).</li> <li>○ Lower dry season flows.</li> <li>○ Sea level rise and saline intrusion in Mekong Delta.</li> <li>○ Morphological changes on Mekong mainstream and tributaries, resulting from hydrological changes.</li> </ul> </li> <li>• Rapid population growth, and resulting socio-economic dynamics, in Lao PDR and Cambodia: <ul style="list-style-type: none"> <li>○ Small agricultural production units, with limited potential to generate income.</li> <li>○ Increased pressure on marginal lands, leading to increased ecological degradation.</li> </ul> </li> <li>• Governance issues: <ul style="list-style-type: none"> <li>○ Management of infrastructure development and FDI: ensuring equitable benefit sharing, and minimising environmental and social costs.</li> </ul> </li> </ul>
<p><b>Opportunities within MRC's remit:</b></p> <ul style="list-style-type: none"> <li>• Facilitate multi-purpose projects (e.g. hydropower, irrigated agriculture, fisheries).</li> <li>• Leverage (bilateral) donor support to agriculture, forestry and natural resource management.</li> </ul>	<p><b>Challenges to MRC's role, capacity and options:</b></p> <ul style="list-style-type: none"> <li>• Organisational sustainability of MRC following riparianisation (e.g. long-term staffing and funding).</li> <li>• Limits to access to information and information sharing.</li> </ul>

### 3. Proposed Strategy

There are clear pressures to re-orient the agricultural programme of the MRC to meet short-term deadlines, such as contributions to the BDP2 scenario assessment, and to evaluate the potential for agricultural and irrigation development over the next 20 years. There are also longer-term needs to better integrate and coordinate with national systems, to the point that there is “seamless and direct interaction” between basin-scale and national/local perspectives, for example in conjunctive management of surface and ground waters, or in the longer-term, water quality and climate change and adaptation. Principles for considering MRC’s future role could include:

- Contribution to MRC’s overall objectives (economic prosperity, social equity and environmental soundness);
- Basin-wide relevance and meaningful contribution to national sector management and development;
- Focus on water related issues (e.g. irrigation and water quality) as well as related cross-cutting issues (e.g. farming systems, livelihoods);
- Relevance to MRC core river basin management functions; and
- Building on MRC’s comparative advantages (strengths) and entry points (opportunities).

Developing the strategy would need to include a period of consultation and development to better refine focus, specific tasks and staffing, expertise, cost and institutional requirements, and create strategic partnerships. Resulting from the above, a proposed strategy could include the following elements:

- Agricultural knowledge base: development of stronger capacity and institutional memory in sector related information and knowledge within MRC itself;
  - Planning support: linking basin wide water resource planning to national agricultural sector management and planning; establish a functional process that links MRC strategic planning to national planners, ensuring a strong two-way communication and action;
  - Support to agricultural management and development: support to (pilot) projects that have potential for learning on cumulative and trans-boundary issues in resource management and development, or pilot replicable development solutions; and
  - Capacity development and building: supporting above elements.

#### 3.1 *Agricultural knowledge base*

Although AIFP and BDP have accumulated significant information about irrigation systems, combined agriculture and aquaculture systems, and to a lesser extent, land-use, considerable work still needs to be done to consolidate and improve the agricultural knowledge, and institutional memory concerning agriculture in the basin. This includes better monitoring and assessment of land-use change, including private sector plantation development and contract agriculture; continuing patterns of shifting cultivation and associated forest clearance; logging; irrigation development; changing patterns of flooding in agricultural areas. In order to interpret such monitoring information, the MRC needs to better understand the range and complexity of farming systems across the basin, and to strengthen its capacity to assist in planning appropriate, livelihood focused, agricultural development strategies. There is a particular niche in irrigation planning in the Mekong Basin, which requires much better assessment of irrigation potential, based on improved and more detailed soil classification, and the seasonal and long-term availability of water resources. This niche is defined at basin scale by the complex interactions of water abstraction for irrigation, and the effects on downstream production systems, including fisheries in the Ton Le Sap and intensive agriculture that has already been developed in the Mekong Delta.

Achieving these targets can be realised by aggregating existing information collected by different programmes at MRC, and by synthesis of past work. Gaps can be filled by strategic partnerships with research organisations from the Member Countries as well as international agencies such as the International Water Management Institute (IWMI) and FAO, and universities and research institutes.

There is an option for the MRC to evolve as a learning organisation, which would oversee the synthesis and dissemination of appropriate agriculture and water management information that informs national planning within a basin context.

Thematic areas, which could be developed into work packages, may include:

*Monitoring of agricultural water management practices, rain-fed agriculture, soil type, land-use*

Starting from defining a set of Agricultural Ecological Zones, which cross national and catchment boundaries, a detailed typology of agricultural water management systems in the LMB should be developed. This should include a functional description of each production system (especially those that are not formal, canal-based systems) and its current trends in extent and productivity. It should categorise performance and estimate each systems' socio-economic importance and potential for further development or improvement of its productivity. All classes in the typology should be mapped in as much detail as possible, with contextual GIS information on soil type, agro-ecology, market access, income, population density and trends, and other important variables.

The importance of the different systems should be assessed in relation to different perspectives – food security; export earnings; provision of livelihoods (numbers of people, nutritional adequacy and income generation).

This analysis should result in a number of useful outputs concerning:

- The relative importance and sustainability of different production systems in terms of food security, poverty alleviation, environmental conservation, etc.;
- Identification of where remedial action and protection are required;
- Identification where there is potential for intensification or new development;
- A clear understanding of links between production systems (fish, livestock, cropping) and between agricultural systems and other aspects of water management – such as flood and drought management;
- An understanding of current demographic, food preference, land development and productivity trends that establish a vision for future demand and supply, for example in 2020.
- Identification of the locations, extents and trends in private sector developments (contract farming, and plantation or agro-industrial concessions), with appropriate classification and detail; and
- A system of (periodic) basin level monitoring that is more independent and timely than the secondary statistical data collated through existing channels. Experience elsewhere in the world (for example the Murray Darling Basin in Australia) indicates that a consistent basin overview, using a consistent methodology that is current (i.e. not reliant on census and statistics that are up to five years out of date) is a key aspect of monitoring that informs effective planning. The monitoring data on agriculture and land-use would be one of the key knowledge outputs presented on the MRC website. There should be a process to compare and consult on differences emerging between the basin picture, and the picture seen in each individual country, covering aspects such as: land-use; productivity; poverty and social equity impacts and trends; flood and drought extents, spatial and temporal patterns and impacts; quantitative and qualitative impacts on surface and ground water bodies.

*Irrigation potential*

Elaborating the existing typology of major farming systems, in conjunction with the irrigation inventory already undertaken by AIFP, BDP2 and national partners, plus the portfolio of irrigation development projects and investments identified through institutional analysis, an evaluation of irrigation potential would include:

- A clear understanding and mapping of irrigation potential, with respect to country and basin-wide priorities: types of benefits and specific focus on poverty alleviation and improved incomes, food security, export potential and risk associated with non-point source pollution

from different types of development; assess the scope to minimise new irrigation development through improving the productivity of existing systems;

- A clear understanding of the nature and distribution of groundwater systems and of their connections to surface water, with potential yields, economic limits to abstraction – capital and operation costs versus depth and yield, water quality and other limitations to exploitation - for example, arsenic content in the Cambodian and Vietnamese Mekong Deltas, and probably all through the basin;
- Identifying where current and proposed irrigation development impacts other production systems, and estimate the performance of these investments; establish the relative benefits and costs of such programmes;
- Identifying where feasibility studies more generally are inadequate for sustainable irrigation development;
- Complementary study to assess related factors such as detailed soil suitability, market access, availability of inputs, farming technology support etc.; and
- Investigating and understanding the environmental trade-offs of further irrigation development and the evolution of environmentally friendly irrigation management plans. Environmental impacts of land-use change and irrigation development are more likely to be of cumulative nature and occur on a trans-boundary scale, water quality impacts can be local and cumulative, and can manifest on a trans-boundary scale.

A study of irrigation potential should also have a strong strategic focus, that is consistent with developing a future vision for the basin, that would incorporate all the elements described above, matched to different scenarios of demand, climate change and acceptable environmental impact.

#### *Drought vulnerability and management, and climate change adaptation*

Country representatives at the workshop and consultations expressed their interest in a one-time flood and drought risk mapping exercise, in association with simulation outputs. This exercise could assist country efforts to plan drought and flood management strategies. Since there are limited possibilities to provide forecasting services for farmers with practical lead times, longer-term preparedness measures are required. This would entail a better definition of the nature, extent, impacts and timing of drought and flooding on agriculture, fisheries and livelihoods.

There is considerable interest in climate change adaptation in agricultural management, and this has to be linked to both MRC's Climate Change and Adaptation Initiative, and the efforts of the international research community. Workshop participants understood that the scale and diversity of these adaptations would not be captured in the BDP and climate change scenario outputs. For example, it is clear that sea level rise in the Mekong Delta would significantly impact rice production; the Vietnamese for example would like to know how to address this. Similarly, the climate change impacts and adaptation in rain-fed agriculture, and the evolving balance between rain-fed and irrigated agricultural development at whole basin scale have implications for water availability and flow regimes.

#### *Benefit sharing and payments for environmental services*

Benefit sharing and payments for environmental services will surely become a more common feature of downstream-upstream management for sustainability of hydropower installations. Nam Theun 2 is already scheduled to make sizeable contributions to upper watershed management. On a broader basin scale, the stakeholders involved will be very different from the historic mix of government, NGO and civil society groups, and will include powerful private sector interests. The MRC's Initiative on Sustainable Hydropower (ISH) will develop a basin strategy of engagement and best use these revenue streams in the future, for which agricultural expertise and input will also be required.

### 3.2 *Planning support*

Considerations, which will inform the strategy, and thematic areas for basin scale planning support may include:

#### *Institutional analysis*

Institutional mapping should identify: (i) all involved institutions, (ii) their objectives, (iii) what they do, (iv) how much money they are investing, and possibly (v) what additional challenges they need to overcome to meet their targets.

The mapping would include: (i) organisations (development partners, NGOs, government departments, regional organisations, such as ASEAN and GMS, and international research and support organisations); and (ii) projects in all four lower riparian countries that relate to the following topics:

- Agricultural policy;
- Agricultural development and investment;
- Farming systems analysis;
- Poverty mapping and assessment;
- Food security and nutrition;
- Forest inventory and management, watershed management;
- Land-use policy, mapping and monitoring;
- Flood and drought management in agriculture;
- Irrigation management and development;
- Soil surveys;
- Livestock production; and
- Rice-fish farming production systems.

The analysis should also identify where there are overlaps and gaps. The mapping should identify any existing mechanisms for research, aid or sector co-ordination.

Ultimately, the institutional analysis should have the following outputs:

- A set of potential partners for different activities;
- A set of potential issues that are not addressed by current efforts;
- Proposals for improved trans-boundary co-ordination of agricultural development; and
- A set of entry points for the MRC to support existing initiatives.

A preliminary listing of some of the identified institutions is provided in Annex 3.

#### *Linking basin wide water resource planning to national sector management and planning*

The MRC has developed the capacity to analyse development scenarios and determine their physical, social and economic consequences. This is encapsulated in the current BDP2, which has the tasks of:

- Envisioning a development strategy for the basin;
- Integrating sectoral knowledge and national development plans into scenarios;
- Interpreting and disseminating the scenario outputs; and
- Coordinating and producing basin level plans.

Within this planning context, the MRC needs to establish a functional process that links basin-wide strategic planning to national sector plans, and vice versa, ensuring a strong three-way communication between MRC, NMC and line agencies through the following activities:

- Formulating basin level scenarios from a stronger agricultural development perspective – better and more detailed information; incorporation of sufficient agricultural and land-use change activity; demographic and food preference trends; water-use and water quality trends; watershed conditions and deforestation trends.

- Developing long-term strategies of long-term agricultural changes in the basin (20 year perspective);
- Interpreting scenario outputs in terms of the impacts and implications for agricultural development, productivity, value, food security and rural livelihoods;
- Interpreting the agricultural impacts of other sector development in the basin; and
- Communication.

#### *Basin-wide irrigation sector plan*

New opportunities for dry season irrigation development may arise from the combined upstream development of large-scale storage in Yunnan (40 km<sup>3</sup>), and to a lesser extent from the proposed tributary and mainstream hydropower development in the Lower Mekong Basin. These could be explored and integrated through the BDP process, but requires considerable further detail and coordination in the assessment of the true potential that can be developed on the ground. An appropriate place to start is with a more comprehensive synthesis of the detail in national agricultural and irrigation development plans. This will involve an in-depth look at the sector assistance plans from multilateral and bilateral agencies, and follow-up with them.

Other basin-wide key issues that need more explicit treatment are rain-fed agricultural development, the evolution of mining and contract farming and plantation systems, and patterns and trajectories in forest cover. In due course, such work could build a regional strategy for watershed management, defining hotspots and remedial activities and institutional development requirements in different parts of the basin.

#### *Project promotion*

Leading from the basin-wide assessment and prioritisation conducted through the basin development plan, the MRC could play a technical role in assisting Member Countries with funding proposals for: (i) actual development or (ii) further targeted investigation. There may be a particularly useful role for the MRC to play in assisting with the environmental impact appraisals that have trans-boundary dimensions, and are likely required for all future irrigation developments using bilateral or multilateral funds.

### *3.3 Support to agricultural management and development*

The future agricultural programme at the MRC could continue to support project activities that have a clear benefit across the whole basin, through the generation of thematic knowledge that has broad application, through active learning on cumulative and trans-boundary issues in resource management, or by piloting replicable solutions. Such activities that would ideally bring agencies from different countries together in active management of specific development or management issues, as well as generating models for cooperation, and generic knowledge.

Thematic areas for applied research and pilot projects could include:

#### *Trans-boundary water resource management projects*

Country representatives in the workshop noted that there are considerable practical trans-boundary issues in agricultural water management that arise from infrastructure development in shared basins between Viet Nam and Cambodia (Se San, Sre Srepok and Se Khong).

Capacity building assistance is also sought for trans-boundary management and institutional development, and learning by doing can be a productive way to achieve this.

#### *Hydropower and agriculture*

It would be useful to develop a regional strategy for the management of the upstream parts of the basin, in the context of dam development. Similar benefits would derive from looking at management strategies for hydropower dams and irrigation at sub-basin scale too.

The MRC has been working with the World Fish Centre to understand the impacts of upstream development on the Mekong capture fisheries. It is clear that barriers to fish migration reduce fish stocks, and could perhaps reduce the livelihoods derived from fishing by 30 percent or more. This would have to be compensated by other agricultural development, and further work is needed to evaluate options, costs and benefits.

#### *Nexus of floodplain sedimentation and soil fertility*

Although the recent proposals for a sequence of hydropower dams on the mainstream has galvanised interest, there are also longer-term cumulative impacts from tributary developments that also need to be factored into the analysis, with a better understanding of the additional impacts arising from sediment trapping by perhaps 40 to 60 structures. MRC is already engaged in furthering the understanding on sediment balance implications for soil fertility and river morphology, but additional work is needed to understand the livelihood impacts.

#### *3.4 Capacity development and building*

The following needs for capacity building were identified in the workshop, held in Vientiane in December 2008, and subsequently confirmed during the consultations. These need to be refined, and are illustrative rather than final. Logically, the needs become clearer once a stronger agricultural knowledge base and other elements of a future programme are developed within MRC.

Areas, on which capacity development activities could focus, may include:

##### *Irrigation and rain-fed area management and development plans*

- Assistance with improving the management of water resources for irrigation and the development of dry season irrigation. (Thailand, Cambodia, Lao PDR);
- Assistance with the development of country long-term master plans for agriculture<sup>2</sup> in Cambodia and Lao PDR, incorporating:
  - An assessment of land-use potential, planning and development strategies (note that there is a new ADB project to strengthen land-use planning in Lao PDR);
  - Explanation and incorporation of the results of BDP scenarios on agriculture and irrigation in the Ton Le Sap and upper Delta regions;
  - Evolution of BDP2 scenarios for sub-basin planning and irrigation development in Lao PDR.
  - More information on options, strategies, technologies and institutions to better use available water for agricultural production (Thailand) For example, “if we expand irrigation and or improve water-use efficiency, how much can we increase production and maximise returns?”

##### *Improving the productivity of agricultural systems*

Participants identified a lack of knowledge and expertise in water-use and water productivity aspects of irrigation and agricultural planning. They specifically identified the following aspects:

- Drought and flood mitigation for rain-fed agriculture: risk mapping and mitigation guidelines, crop options and water saving irrigation techniques;
- Assessment of agricultural strategies to best mitigate poverty through agriculture and irrigation management and development (the MRC, Cambodia, Lao PDR, Thailand);
- The effects of climate change on seasonality and rainfall regime in Cambodia; and

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<sup>2</sup> The greatest potential for agricultural development and for impact on downstream water resources, lies in these two countries, and so assistance to ongoing national agricultural development planning is likely to pay dividends at the basin scale.

- Support to facilitate funding for modernisation and improvement of existing irrigation systems, mainly in Cambodia, Lao PDR and Thailand, to consolidate and improve the productive use of water.

*Understanding and monitoring land-use change and its nexus to poverty*

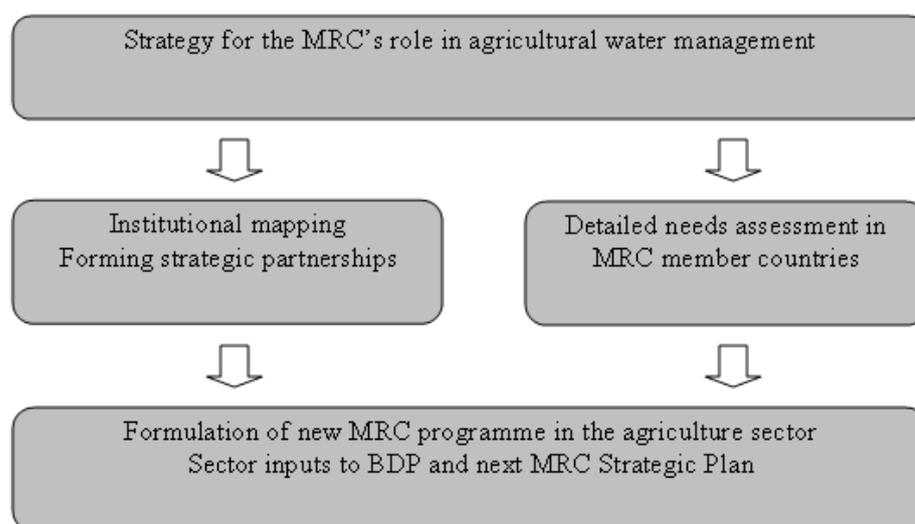
- Support to land-use mapping and monitoring – keeping abreast of developments outside the public sector planning process. Monitoring agricultural concessions, plantations and contract farming, using consistent systems across the basin.

#### 4. Priorities and Implementation Arrangements

The proposed strategy stresses the development of stronger agricultural capacity and institutional memory within MRC itself. This does not imply a large programme or major staffing, but does require specialist recruitment and subsequent continuity, to contribute to a balanced MRC agricultural team that has all the required core competencies. The round of national consultations confirmed these priorities and proposed implementation arrangements.

#### 5. Planning and Implementation Process

In accordance with the strategy and country priorities, the next step of formulating a new agricultural programme at the MRC would be to embrace a period of consultation and development to better refine focus, specific tasks and staffing, expertise, cost and institutional requirements, and create strategic partnerships with other agencies in the short and medium term (see below Figure 2).



*Figure 2: Process for further consultation and programme formulation*

## Annex 1: Agriculture Related Data Held at MRC

Data Type	Description	Remarks
<b>A. Agriculture</b>		
<i>1. Land-use maps</i>		
1.1 Lower Mekong Basin forest and land cover type	Forest cover map, scale 1:50,000, 1993 & 1997 overlaid	Updated version will be completed by the end of 2009
1.2 Lower Mekong Basin forest and land cover boundary	Forest cover map, scale 1:50,000 for Thailand, Viet Nam, and Cambodia, 1:100,000 for Lao PDR, 1993 & 1997 overlaid	Updated version will be completed by the end of 2009
1.3 Land-use	Unpublished land-use map (GIS file, JPEG files): forest cover, agriculture farming, rice growing, etc, 2004	Publication in process
<i>2. Soil maps</i>		
2.1 Lower Mekong Basin soil classification	Soil map, scale 1: 250,000, in 1989 (Lao PDR), 1960 (Thailand), 2000 (Viet Nam)	No description for Cambodia
<i>3. Reports series prior to 2005</i>		
3.1 Final Report for Land Resources Inventory for Agriculture Development Project (LRIAD): Final Report	A final report with annexes of inundation mapping in the LMB (hard copy), in 2001	
<b>B. Irrigation</b>		
<i>1. Irrigation database</i>		
1.1 Irrigation database Version 1 by DMPF/ AIFP project	Irrigation database mapping: project locations, headwork, canals, reservoirs, irrigation areas, 2001	Overlaid with data of 2004 in process
1.2 Irrigation database by BDP	Irrigation data base: existing irrigation areas, potential areas, irrigation types, canal, head works, 2008	Will be completed at the end of 2009
<i>2. Water-use / water infrastructure database</i>		
Not available		
Concept under consideration at IKMP		
<i>3. Irrigation reports, including information on donor irrigation sector programs</i>		
3.1 Final reports for DMPF	Final project report, 2008	DMPF: Demonstration of Multi-functionality of Paddy Field in the LMB
3.2 Final report for IIEPF	Final project report, 2008	IIEPF: Improving of Irrigation Efficiency on the Paddy Field in the LMB
3.3 Irrigation water-use	Technical report on irrigation water-use, 2004	
3.4 Technical Report of DMPF	Technical report of the DMPF, 2009	In process
3.5 Irrigation sector review	Irrigation policy of Member Countries and irrigation country database (existing & potential irrigation areas)	In process (BDP), to be completed by the mid 2009

Data Type	Description	Remarks
4. <i>Pilot projects on water-use efficiency and irrigation efficiency</i>		
4.1 Technical report on irrigation performance using RAP	Technical report on irrigation system performance evaluation by using RAP (pdf), with cooperation of FAO, 2007	
4.2 Paper: Summary of country reports	Paper analysing irrigation efficiency and water productivity in 4 pilot sites, 2007	
4.3 Country reports	4.3 country reports of the data collection and field observation by Member Countries for DMPF at 6 pilot sites in 2005 and IIEPF at 4 pilot sites in 2007	
4.4 Guidance for efficient irrigation water-use	Guidance for efficient irrigation water-use in the LMB including pilot sites, 2009	In process
<b>C. Catchment Management</b>		
1. <i>Pilot studies (WSMP): Analysis of participatory management</i>	Reports of 4 watershed pilot sites on watershed functions, institutional participatory management analysis 2008	
<b>D. Fish production system</b>		
1. <i>Fish database</i>	Monitoring station on the mainstream for deep pools survey 1999, fish mitigation 2001, fishing lots of Cambodia 2000 & 2001	
2. <i>Agriculture-fisheries nexus</i>		
2.1 Consumption and the yield of fish and other aquatic animals	MRC technical report No. 16 , 2007	
2.2 Yield and value of the wild fishery of rice fields in Battambang Province, Cambodia	MRC technical report No. 18, 2008	
<b>E. Basin level water quality monitoring and analysis</b>		
1. <i>Water quality database and mapping</i>	Water quality monitoring 2000 to 2005, maps of main station along mainstream	
2. <i>Water quality report</i>	MRC Technical report No 19	
<b>F. Flood risk</b>		
1. <i>Flood in inundation (mapping)</i>	Maps of inundation areas 1999-2002, inundation map in August 2001 of Tonle Sap and Mekong Delta	
<b>F. Water availability</b>		
1. <i>Updates on water availability (especially in summer) with further hydropower development</i>	Hydrological water balance,1985-2000, average, yield maps	in IKMP and BDP
<b>G. Water – Poverty Nexus</b>		
1. <i>CSIRO reports on water balance water productivity</i>	Working report on water productivity in the Mekong River Basin, 2007	
2. <i>Poverty mapping and agriculture intervention analysis</i>	BFP Final report, in draft	

## Annex 2: Summary Record of National Consultations

The round of national consultations, conducted in February and March 2009 confirmed that MRC needs to develop and maintain an agricultural capacity only in house. All countries requested that the minimum level of agricultural programme should encompass:

- Strengthening the agricultural capacity and institutional memory within MRC;
- A much stronger effort to link and coordinate national agricultural planning and perspectives with scenario development, assessment, and interpretation, leading to harmonised objectives; and
- Practical outcomes in agricultural development, arising out of the planning process and the interaction between basin perspectives and national needs.

Cambodian participants observed that although great steps had recently been made to develop a national agricultural strategy and a project pipeline, there was still a lack of funds, and a need to assist in attracting project funds. The Viet Nam meeting concluded that sufficient funds for agricultural projects were not likely to emerge through MRC. The Thai consultation, however, maintained a strong interest in projects that “learn by doing”, including pilot projects, especially in relation to: (i) efficient use of irrigation water; (ii) land and water management in rain-fed areas; and (iii) utilisation of agricultural areas for flood mitigation and management.

Most participants were naturally more at ease discussing projects than strategies and plans, since projects are more tangible in both content and output. Some of the discussion in the consultations stayed on to topics in agricultural development and management that were clearly outside the scope of any future role for MRC, such as marketing and institutional reform (participatory irrigation management). In the end, there was a clear understanding that funding for the implementation of physical projects does not fall within MRC’s mandate but that the MRC could, in certain circumstances, facilitate funding.

One possibility emerged in discussions in Thailand and Cambodia concerning Environmental Impact Assessment (EIA) for irrigation development. In the future, the EIA requirements for irrigation development are likely to become more demanding. MRC has the capacity to assess trans-boundary impacts and downstream impacts of proposed irrigation developments, and therefore could play a clear and impartial role demonstrating whether projects comply with required environmental safeguards.

All countries re-iterated the importance of poverty alleviation and the nexus of agriculture sector development to Millennium Development Goals, and the role that agriculture has to play in improving livelihoods. It was widely felt that a stronger agricultural focus is required in the BDP process to generate poverty focused development planning, through agricultural development. The Lao PDR meeting particularly stressed the importance of sub-area analysis for agricultural development. The outputs of the first round of BDP scenario analysis at basin scale are not considered to be of sufficient detail to develop and check such plans, but there are considerable expectations for BDP2. CNMC observed that BDP already provides a link between MRC and national planners, but felt the need to strengthen: (i) economic assessment of scenario outputs; and (ii) understanding of project safeguards (social, economic and environmental).

At the same time, the group opined that inter-sectoral coordination and cooperation with agriculture were not clearly emerging from the BDP scenario analysis, with particular reference to (i) hydropower development; (ii) environmental impacts of land-use change; and (iii) climate change. They also felt that the regional and external (policy) drivers for agriculture sector development were not effectively incorporated into scenario analysis. In Cambodia, the Ministry of Rural Development was also identified as a key player that understands this perspective.

All countries expressed considerable interest in understanding the implications of climate change for agriculture and for agricultural development plans. Climate change was identified as exacerbating existing problems of drought and flood management in agriculture. Thailand, Cambodia and Lao PDR expressed the need for assistance in planning drought responses that address:

- Agricultural zoning and farming systems;
- Potential adaptations (season, crop mix etc, improving rain-fed water-use and productivity); and
- Other changes such as labour shortage, economic crises and reverse migration to rural areas.

Irrigation dominated the technical discussion in Lao PDR and Cambodia, especially with respect to poverty alleviation, and also in options to manage drought. The likely impacts of climate change on irrigation and irrigation potential were identified as areas where assistance was needed. Similar interest was expressed in the likely impacts of climate change on flooding and their secondary effects on pumped irrigation.

In all countries, there continued to be discussion and concern over land-use change from two perspectives: (i) monitoring, applying a consistent methodology; and (ii) understanding the impacts (for instance of deforestation on wetlands). Thailand has very strong capacity in mapping and monitoring land-use change at the Land Development Department, but Lao PDR and Cambodia continue to stress the need for improved capacity in-country, despite recent bilateral assistance efforts. More poignantly, participants indicated the need for a forum to resolve conflicts and problems arising from land-use change, both within and across national boundaries.

In general, there was only subdued interest in the knowledge management for agriculture, particularly (i) as they felt that this was already adequately covered by other regional organisations and research networks, and (ii) as they did not see a comparative advantage of MRC in agricultural knowledge base. Nevertheless, the Vietnamese in particular, felt that MRC is not just a consultative organisation, and that it should conduct or commission research on strategic aspects of water management for agriculture that has basin wide relevance.

The national consultations revealed a much lower level of interest in active management of trans-boundary issues relating to irrigation and agriculture.

In general, the topics of ‘benefit sharing’ and ‘payment for environmental services’ generated confusion, partly in the distinction between compensation (for impacts of water resources related development) and ‘benefit sharing’ in terms of balancing development benefits between up- and downstream communities. All countries felt strongly that trans-boundary benefit sharing was difficult if not impossible to implement, and did not see the need for an agricultural input into this process.

All countries appreciated the adoption of a strategic approach and the focus on the basin level in agricultural development. Unsurprisingly, this was not “news” for Viet Nam, as the downstream riparian, but the consultation in Cambodia revealed the existence of a co-ordinated Agriculture and Water Strategy (2007), developed by the Ministry of Agriculture, Forestry and Fisheries (MAFF) and the Ministry of Water Resources and Meteorology (MOWRAM), which strongly reinforces this approach, and enshrines basin level analysis within the national agricultural planning process. Interestingly, the process of strategy development used in Cambodia aligns very well with MRC’s efforts, and in turn has contributed to the resulting proposal.

Thailand’s Ministry of Agriculture and Cooperatives (MOAC) has recently revised its national agricultural policy, strategy and plans and these need to be reviewed by MRC. There is significant amount of planning information and data for the Mekong Delta and for the upland sub-basins in Viet Nam, co-ordinated by the National Institute for Projection and Planning (NIAPP – Southern) in Ho Chi Minh City. Currently, it is likely that most documentation is in Thai and Vietnamese language only, but nevertheless needs to be studied carefully.

In the Mekong Delta, the major agricultural priorities related to raising income and living standards are:

- Crop diversification;
- Improving product quality; and
- Differentiated planning in sub-areas of the delta.

The role for MRC that is relevant to these three priorities lies in: (i) predicting and monitoring water demand; (ii) understanding and predicting changes in water supply patterns and water levels and in providing a forum to safeguard them; and (iii) monitoring and sustaining water quality at the head of the Delta. It was noted that agricultural planners in the Mekong Delta cannot do their job effectively without good information on expected future flow regimes.

The consultations confirmed that MRC requires a strong agricultural capacity to support its planning role and to communicate and collaborate with national agricultural planners and sector agencies. MRC's agricultural team should focus on four main tasks:

- Building MRC's agricultural knowledge and capacity, in conjunction with IKMP;
- Making clear and sustained input to the development of BDP2 scenarios and subsequent scenario development and analysis;
- Active and frequent consultation and cooperative work with national agricultural planners, to both better inform scenario development at MRC and to: (i) explain and interpret the outputs from agricultural perspective; (ii) understand and explain impacts and opportunities arising from development in other sectors; and (iii) assist national planners in formulating appropriate programmes and project portfolios that support a mid- to long-term vision of the basin;
- Contribute agricultural expertise and perspectives to MRC's IWRM-based basin development plan, and where appropriate apply an IWRM-based approach to programme and project development in national agricultural planning and management agencies.

Since the core focus of the team will be on strategic, basin level planning, and coordination with line agencies, agriculture and irrigation, and forestry activities should be closely linked at the MRC. A land-use (and land-use change) perspective in planning needs to be broad and encompass all land uses.

The principal expertise required in the MRC agricultural team should cover:

- Land-use and land-use change, with detailed knowledge of rain-fed agriculture and forest productions systems; and
- Irrigated production systems and associated water resource management.

Additionally, they should have a working knowledge of:

- Climate change;
- Soil science;
- Agricultural systems that include livestock and fisheries production;
- GIS;
- Groundwater hydrology and groundwater use for agriculture;
- Agro-economics, markets; and
- Agriculture and poverty nexus, livelihoods, vulnerability assessment.

In conclusion, the apparent success of the round of national consultations is partly due to the sense that the participants were being consulted rather than simply being informed, even though one of the main benefits was in explanation of the possible roles of MRC in agricultural development. All national consultation meetings indicated the need for much stronger collaboration and consultation between MRC and national line agencies. In the past, it is felt that there has been an emphasis on data collection and provision by national agencies without the corollary consultation on input to pilot projects and scenario development, nor interpretation of their outputs. Staff turnover in line agencies was identified as a contributory factor, but it is apparent that MRC needs to do more in making its stakeholders fully aware of what it is and what it does.

### **Annex 3: Summary Record of Regional Consultation**

A regional consultation workshop was conducted on 22 and 23 April 2009 at the MRC Secretariat in Vientiane, Lao PDR. The proceedings of this workshop are recorded as a separate companion volume to this Strategy Paper.

## **Annex 4: Institutions and Projects to be Included in the Institutional Mapping**

### *Annex 4.1 Institutions*

#### *Regional*

ADB Greater MEKONG Subregion Economic Cooperation Programme, GMS, in particular GMS Working Group on Agriculture.

Association of Southeast Asian Nations, ASEAN, in particular Strategic Plan of Action on ASEAN Cooperation in Food, Agriculture and Forestry, 1999-2004, related ASEAN governance arrangements in the sector and recent policy developments.

#### *Cambodia*

Ministry of Water Resources and Meteorology

Ministry of Agriculture, Forestry and Fisheries, in particular Department of Planning

Ministry of Environment

Ministry of Planning

Ministry of Industry, Mines and Energy

Ministry of Rural Development

Ministry of Land Management, Urban Planning and Construction

#### *Lao PDR*

Ministry of Agriculture and Forestry

Water Resources and Environment Administration

Ministry of Industry and Commerce

Ministry of Planning and Investment

Ministry of Energy and Mines

#### *Thailand*

Ministry of Natural Resources and the Environment, in particular Department of Water Resources

Ministry of Agriculture and Cooperatives, in particular Royal irrigation Department and Land Development Department

#### *Viet Nam*

Ministry of Agriculture and Rural Development

Ministry of Natural Resources and Environment, in particular National Environmental Agency

Ministry of Fisheries

National Institute for Projection and Planning

#### *Development Banks and International Development Partners*

Asian Development Bank, in particular country programmes in Cambodia, Lao PDR, and Viet Nam

World Bank, in particular country programmes in Cambodia, Lao PDR, and Viet Nam

Agence Française de Développement (AFD) in particular country programmes in Cambodia and Lao PDR

#### *Technical Support and Applied Research, Networks*

UN Food and Agricultural Organisation, in particular Regional Office for Asia and the Pacific, in particular Southeast and Central Asia

International Rice Research Institute

Mekong Programme on Water, Environment and Resilience, M-POWER

Within the FAO Strategic Framework and Medium-Term Plan 2010 - 2013 the FAO Strategic Objective F: “the sustainable management of land, water and genetic resources and improved responses to global environmental challenges affecting food and agriculture” is particularly relevant for examining linkages to MRC’s remit.

This objective comprises six organisational results: (1) Countries have strengthened capacities to promote and develop sustainable land management; (2) Countries address water scarcity in agriculture and strengthen the capacities to improve water productivity of agricultural systems at national and river-basin levels including trans-boundary water systems; (3) Policies and programmes are strengthened at national, regional and international levels to ensure the conservation and sustainable use of biological diversity for food and agriculture and the equitable sharing of benefits arising from the use of genetic resources; (4) An international framework is developed and countries’ capacities are reinforced for responsible governance of access to and secure tenure of land and its interface with other natural resources; (5) Countries have strengthened capacities to address emerging environmental challenges, such as climate change and bio-energy; and (6) Improved access to and sharing of knowledge for natural resource management has been facilitated. The indicators are the number of countries or river-basin organisations adopting recommendations on water-scarcity coping strategies as a result of FAO policy, legal and strategy support, the number of institutions which have adopted FAO water productivity enhancement tools and approaches and the uptake of FAO water information products and global datasets. This was followed by an outline of the primary tools to be employed.

The 29<sup>th</sup> Asia-Pacific Regional Conference identified a number of priorities to be addressed. These include the issue of the growing regional water scarcity and competition for water, which is compounded by the effects of climate change. This represents a major threat to future advances in food security and poverty alleviation. Member Countries should strive to develop systemic national responses to water scarcity that address policy, institutional, legal, economic and technical obstacles, adopt more effective and strategically focused investment strategies in water management, assess the potential of international trade to offset water scarcity, and enhance regional cooperation. In addition, although supply-side responses are still an option in some basins, managing the demand for agricultural water-use should be the priority in the region. Member Countries should focus on water-use efficiency and agricultural productivity along the value chain from farm to market, including on-farm water management, irrigation system performance, improved governance and adjustments of national water and irrigation policies.

FAO will scale-up its regional irrigation modernisation programme in support of the Member Countries’ efforts to implement service-oriented reforms of irrigation institutions and adopt demand-driven irrigation modernisation strategies focusing on cost-effective water service delivery, while recognising multiple uses and services of agricultural water and extending participatory management to various local actors. In addition, FAO will give Member Countries the support for the needed significant new investments in irrigation systems by strengthening capacity at all levels and adopting benchmarking systems to monitor the effects of policy change and performance improvements in the irrigation sector. Member Countries should work towards boosting the productivity of rain-fed agriculture by providing incentives for the adoption of practices that minimise water risks, such as water harvesting, and by developing and promoting the use of seeds tolerant to flooding, salinity and drought. They should develop and report reliable information on agricultural water-use, facilitate effective dialogue among key water sector interests, establish robust and transparent methods to negotiate allocation amongst competing water-uses and users, and address institutional, those technological and economic obstacles which constrain progress towards optimal intra- and inter-sectoral water allocations, and consider and develop mechanisms for the compensation of providers of environmental services.

FAO will assist Member Countries in developing comprehensive policy and strategic frameworks for coping with water scarcity by:

- improving water governance at the level of communities, irrigation systems, river basins and aquifers;
- adopting multi-sectoral strategic planning approaches related to food security, agriculture, water, environment and investment;
- adopting demand-driven and service-oriented irrigation development and management;
- modernising irrigation systems;
- enhancing water productivity in rain-fed and irrigated production systems while maintaining environmental protection;
- developing and adopting improved on-farm water management including water-saving practices;
- safeguarding vulnerable agro-ecosystems and populations, such as those in tropical deltas and in arid or semi-arid areas; and
- addressing land tenure and land titling issues and access to natural resources to create a more conducive environment for investment and sustainable use of land and water resources.

Furthermore, FAO will assist Member Countries in promoting conservation agriculture, integrated pest management, integrated plant nutrition, sustainable forest management, best practices in livestock production, more efficient processing and marketing processes, water treatment facilities for industrial and marketing complexes, and other measures to conserve and protect water resources and water quality, while at the same time promoting the protection of inland fisheries, aquatic resources and aquaculture.

FAO plans to strengthen AQUASTAT in the region, and to support the establishment of regional networks of experts to facilitate the sharing of knowledge, information, experience, technologies and best practices related to water management and approaches for coping with water scarcity. In addition, FAO in collaboration with other relevant organisations will continue to facilitate regional and international dialogue on water scarcity issues and trans-boundary cooperation in the management of water resources. A regional initiative (FAO-IWMI) on re-inventing irrigation and agricultural water governance in Asia and the Pacific will be launched. Support will be given to the development of practical adaptation and mitigation strategies for climate change in the region and to the collaboration with regional centres of excellence to develop and promote appropriate and affordable water management technologies and mechanisation for effective on-farm water management. A high priority has been given to all these activities and to FAO strengthening its own capacity and resources.

The presentation closed with a brief overview of the on-going regional projects / programmes / initiatives which include the Regional Irrigation Modernisation Programme, a Study on the Analysis of Sustainable Water Resources Use, the IWMI-FAO Knowledge Hub on Irrigation Service Reform, support to ASEAN Food Security/AG policies and FAO-ESCAP Water Resources Strategic Planning Network. In the pipeline are capacity building in irrigation modernisation in China, India, Malaysia, Thailand and Viet Nam, the development of the FAO-IWMI Initiative on re-inventing irrigation and Agricultural Water Governance for MDGs in China, India, Pakistan, Indonesia, Malaysia, Thailand and Viet Nam and assessing the market demand for key agricultural products in China (Yunnan), Laos and Cambodia.

As background, IWMI is an international research and development agency that has offices in over ten developing countries, the organisation could be a potential strategic partner with MRC in agriculture and agricultural water management. The research focus on significant land and water management challenges would invite productive working relationships with key local partners and stakeholders. IWMI is strategically placed to take advantage of its position on the ground in developing countries and the linkages with other Consultative Group on International Agricultural Research (CGIAR) centres and advanced research institutes, to tackle the key development challenges facing the poor.

In terms of capacity, IWMI has a multi- and interdisciplinary research team that comprises expertise in the areas of hydrology, hydrogeology, soil science, engineering, social sciences, environmental science and economics. These resources have been deployed on research into water and food production that transgresses basin to field scales.

With respect to the Mekong River Basin and remit of the Mekong River Commission, IWMI has undertaken and is undertaking research into the following areas:

- Heavy metals in irrigation and its impact on human health has been an area of research that has focused on irrigated rice crops in the Mae Sot region of western Thailand and waste water irrigation in peri-urban agriculture around Hanoi, Viet Nam. The research has focused on understanding the uptake pathways associated with cadmium accumulation in rice grain and management options to reduce the risk of uptake in irrigated rice systems.
- Understanding root growth dynamics and root-soil interplay as a key to improving the sustainability and productivity of Southeast Asian cropping systems. The research has focused on cropping systems in the uplands of Lao PDR and rubber production systems of Northeast Thailand. It is argued that there is a need for a transformational approach to our agro-ecosystems that change them from exploitive production systems to ones that provide ecosystem services and are more conservative in nature. Multiple rooting production systems are seen as a component in the move towards developing more sustainable agro-ecosystems.
- The Management of Soil Erosion Consortium (MSEC) focuses on the impact of land-use change in the uplands of Lao PDR, Viet Nam, Thailand, Indonesia and Malaysia on sediment generation and water quality. By understanding the process associated with sediment generation predictive models have been developed that can be used to assessment the impact of changed land-use and severe events of sediment generation. The research has also investigated the potential role of incentive based systems that allow farmers to adopt more sustainable farming practices on sloping lands. Further the research has contributed significantly to our understanding on how watersheds respond from a hydrological perspective to land-use changes.
- Studying water pathways to improve the management of land and water resources within sloping headwater catchments. The research has focused on Lao PDR uplands and investigates the influence of riparian zones and their management in preventing sediment discharge to rivers.
- Managing land and water resources in the coastal zones region has focused on the Mekong Delta and included: Accelerating poverty elimination through sustainable resource management in coastal lands protected from salinity intrusion: Increasing water productivity by managing the land-water interface in Viet Nam: Effective water control for solving conflicts among agriculture-fisheries-aquaculture in coastal zones, a case study in Viet Nam; and Managing water and land resources for sustainable livelihoods at the interface between fresh and saline water environments in Viet Nam.
- ADAPT: Water, Climate, Food and Environment under Climate Change: An Assessment of Global and Regional Impacts and the formulation of Adaptation Strategies for River Basins. This global program had its regional focus on Mekong Basin countries assessed the impacts of climate variability and adaption strategies in each of the LMB countries. This initial research has built capacity within IWMI to look at downscaling global climate change models to a level

where they can be of practical use in the decision making process. IWMI is currently undertaking research into this area with CSIRO and MRC.

- IWMI has over the past several decades built up significant capacity in the area of irrigation management transfer and has had studies in Cambodia that investigate factors affecting the formation of farmer water user committees as part of a participatory irrigation management and development programme. This was the first of such projects to develop a set of criteria for the establishment and implementation of irrigation transfer in Cambodia and has been adopted by the Ministry of Water Resources and Meteorology as the standard approach.
- Reversing degradation of land and water resources that reduce smallholder's food security and quality of livelihoods: Bright spots a global assessment. This research has focused on quantifying the extent that farmers have adopted and adapted to more resource conserving approaches to their farming systems. This has significant relevance if one is looking at adaptation by farmers to climate change.
- Reversing land degradation through the development of 'Bright' spots using innovative approaches. The project focused on introducing innovative approaches to land based issues in Northeast Thailand that included the introduction of clay based technologies.
- Opportunities and constraints of integrated farming systems in Northeast Thailand. A case study of the Huai Nong Ian catchment, Khon Kaen Province. A comprehensive study was undertaken to quantify the various components of integrated farming systems in Northeast Thailand with respect to livelihoods and system diversity.
- Benchmarking the performance of river basin organisations through a peer review process. The project has developed a M&E process for assessing the performance of RBO's in Southeast Asia.

#### *Annex 4.4 Irrigated agriculture within the M-POWER framework*

M-POWER (Mekong Program on Water, Environment and Resilience) is a regional network of organisations and individuals focusing on the Mekong region as a whole and not just on the Mekong Basin. It aims to achieve improved livelihood security and human and ecosystem health in the Mekong region through better water governance. Its action research program is centred on empirical comparative studies and cross-cutting governance themes. However, of interest to this workshop are those activities undertaken in a comparative study of the irrigation sector focused on the opening-up for public deliberation any plans for large-scale water infrastructure for irrigation and the suggestion of alternative approaches for securing adequate water supplies for agriculture.

In this comparative study, the focus was on the rationale and processes for decisions taken on large scale water infrastructure developments and, in particular, on the ‘re-packaging’ different elements of the Thai water grid, and the irrigation works planned in the north west and north east of Cambodia. Research is conducted through theme leaders who lead the working group, together with partner organisations like the Insitute de Recherche pour le Développement (IRD)/France, IWMI-SEA, the Cambodian Centre for Study and Development in Agriculture (CEDAC-Cambodia), and the Unit for Social and Environmental Research (USER)-Chiang Mai University Thailand who contribute comparative studies, and the M-POWER research fellowships to conduct empirical studies.

An example of these comparative studies is the research undertaken under the title of “Improving Mekong Water Allocation (PN67)” which included a study of the expansion of irrigation in Viet Nam (IWMI-SEA) and in Cambodia (CEDAC) and a case study from the Chi-Mun basin in north eastern Thailand on the political drivers of water allocation.