
RESILIENCE TO CLIMATE CHANGE – INDUCED CHALLENGES IN THE MEKONG RIVER BASIN

The Role of the MRC

Susanne Schmeier



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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
AIFP	Agriculture, Irrigation, and Forestry Programme
ASEAN	Association of Southeast Asian Nations
CCAI	Climate Change Adaptation Initiative
CIPM	Commission International pour la Protection de la Moselle
DC	Danube Commission
EP	Environment Programme
EU	European Union
EUWFD	EU Water Framework Directive
FMMP	Flood Management and Mitigation Programme
FP	Fisheries Programme
GEF	Global Environment Facility
GMS	Greater Mekong Sub-Region
GTI	Greater Tumen Initiative
GTZ	German Technical Cooperation
ICBP	Integrated Capacity Building Programme
ICPDR	International Commission for the Protection of the Danube River
ICPO	International Commission for the Protection of the Odra
ICPR	International Commission for the Protection of the Rhine
IJC	International Joint Commission
IKMP	Information and Knowledge Management Programme
IMC	International Meuse Commission
ISH	Initiative on Sustainable Hydropower
IWRM	integrated water resources management
IWT	international water treaty
JC	Joint Committee
JWC	Joint Water Committee
LCBC	Lake Chad Basin Commission
LMB	Lower Mekong basin

LTA	Lake Tanganyika Authority
LVFO	Lake Victoria Fisheries Organization
MDG	millennium development goal
M-IWRM-P	Mekong Integrated Water Resources Management Project
MoU	memorandum of understanding
MRC	Mekong River Commission
MRCS	Mekong River Commission Secretariat
NAP	Navigation Programme
NAPA	National Adaptation Program of Action to Climate Change
NBA	Niger Basin Authority
NMC	National Mekong Committee
PIC	Permanent Indus Commission
OCTA	Organization for the Amazon Cooperation Treaty
ODA	Official Development Assistance
OKACOM	Permanent Okavango River Basin Water Commission
OMVS	Organisation pour la Mise en Valeur du Fleuve Sénégal
ORASECOM	Orange-Senqu River Commission
PIC	Permanent Indus Commission
PNPCA	process of notification, prior consultation, and agreement
RFMMC	Regional Flood Management and Mitigation Center
RBO	River Basin Organization
SADC	Southern African Development Community
SEA	Strategic Environmental Assessment
UNFCC	United Nations Framework Convention on Climate Change
VBA	Volta Basin Authority
WUP	Water Utilization Programme
ZRA	Zambezi River Authority

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APPROVING MANAGER

Julia Bucknall, Sector Manager, Transport, Water, and ICT Department, Water Anchor (TWIWA)

CONTACT INFORMATION

This paper is available online at <http://www.worldbank.org/water>. Author may also be contacted through the Water Help Desk at whelpdesk@worldbank.org.

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EXECUTIVE SUMMARY

Climate change and its consequences, ranging from increased water variability to more extreme weather events and from sea level rise to ecosystem changes, introduce new challenges to transboundary watercourses, which already face a variety of collective action problems due to their border-crossing nature. Other changes occurring in river basins, such as changing water-use patterns, development of large infrastructure schemes, and changing socioeconomic development levels of riparian states also challenge the institutional capacity of current cooperative management mechanisms. Thus, River Basin Organizations (RBOs), which manage the river basins, must be highly adaptive to ensure not only resilience to change but also long-term sustainable development of the basin and its people.

This paper examines the “adaptation capacity” of the Mekong River Commission (MRC), which manages the Mekong River Basin, a river basin particularly vulnerable to challenges related to climate change as well as to human-caused change. Resilience may be encoded in treaty provisions, but in practice it depends on a broad array of factors, most importantly the capacity of the major institution established by the riparian states to cooperatively manage the river basin. Several key points have been identified regarding the contribution of the MRC to increasing resilience to environmental and human-caused change in the Mekong River Basin:

- The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin (hereinafter referred to as 1995 Agreement) that established the MRC does not explicitly refer to climate change, water variability, or other challenges potentially occurring in the river basin; nor does it provide the institution with mechanisms to deal with such change. Indirectly, however, articles concerning the use of water in the mainstream and in tributaries provide a starting point for adaptive management.
- MRC Procedures provide important additional clarifications on water resources use and management and add to the adaptation capacity of the organization; however, their implementation could be strengthened further.
- MRC’s membership structure excludes upstream riparians, significantly reducing the opportunities for integrated river basin management and adaptation across actors. Thus, strengthening coordination and cooperation with nonmember riparians is of great importance for strengthening resilience in the basin.
- MRC’s functional scope is defined broadly and allows for integrated river basin management and the inclusion of adaptation measures into the organization’s portfolio. Nevertheless, there remains room for improvement regarding coordination among programs, projects, and initiatives.
- Data and information management mechanisms within the MRC are highly developed, with technology at a high level and data availability relatively good compared with other river basins in the developing world. However, there remains room for improvement, especially with regard to forecasting models.
- Dispute-resolution mechanisms within the MRC are rather weak. Because changes in the basin have the potential to produce conflict, strengthening dispute-resolution mechanisms is important for building resilience.
- Financing mechanisms within the MRC are well developed and funding is secured for the 1st period of several MRC programs, including the Climate Change Adaptation Initiative (CCAI), most of the next period of Flood Management and Mitigation Programme (FMMP)

and – to a large extent – for Initiative on Sustainable Hydropower (ISH). However, MRC's funding structure faces several challenges related to donor alignment and harmonization, financial riparianization and long-term funding sustainability.

- Cooperation with and integration in other regional cooperation structures within Southeast Asia remains low, with the potential benefits of cooperating with other actors, such as the Association of Southeast Asian Nations (ASEAN), the Greater Mekong Subregion (GMS), and epistemic community actors, on adaptation measures not fully exploited.
- Linkages among governance levels are often weak and adaptation efforts on the MRC level and within the member states are not always well coordinated. Improving these links through better institutional management mechanisms could make an important contribution to strengthening overall adaptation efforts in the river basin.

For the World Bank, which has cooperated with Mekong riparian states and the MRC for many years, these points raise the possibility of supporting RBOs through various actions:

- Promoting the incorporation of climate change adaptation activities and efforts to adapt to other changes in the basin into an RBO's overall mandate, legal framework, institutional mechanisms, and work program.
- Strengthening adaptation mechanisms in agreements established among riparian states for joint river basin management and promoting the development of additional provisions during the course of the development of an RBO, for example, through financing the development of such mechanisms and providing technical advice.
- Promoting integrated adaptive river basin management with all actors in the river basin, including coordination with nonmember riparian's, for example, through joint data and information management activities.
- Strengthening integrated adaptive river basin management across all sectors, such as by financing additional programs and providing technical capacity for integrated management.
- Enabling member states and the RBO to manage data and information efficiently and acquire, analyze, and disseminate knowledge required for adaptation, perhaps through financial means and technical support.
- Helping to develop new or to improve existing dispute-resolution mechanisms by providing financial means as well as technical and institutional knowledge and experience.
- Strengthening linkages among governance levels, namely by building capacities on all levels and supporting the clarification of roles and responsibilities among them (including integrating adaptation efforts into the overall regional management structure).

1. INTRODUCTION

Climate change and related challenges, especially the increasing variability of water availability and increasing severity of extreme weather events, pose serious threats to watercourses as well as to communities and countries that depend on them for their socioeconomic development. Climate change, among other consequences, affects water quantity and the allocation of water resources across different users, alters the quality of water and related natural resources, influences the operation of water-based infrastructure schemes, and causes changes in water demand and water use.

In parallel to climate-change-related developments, other changes occur in many river basins – especially in the developing world – as a consequence of socioeconomic development efforts, including the development of large infrastructure schemes (mainly for irrigation and hydropower generation), the alteration of rivers for navigational or other purposes, or the deterioration of water quality due to industrialization and household use. All these developments have significant impacts on the river, its resources, and its ecosystem, and ultimately on riparian communities and states. In transboundary river basins, such developments are further intensified by the fact that the actions of one riparian state regarding the use and/or protection of water resources necessarily affects the opportunities of other states, potentially leading to collective action problems. These problems not only risk of turning into conflicts threatening security in the river basin, but also can negatively influence socioeconomic development prospects in the basin.

To mitigate such collective action problems, international water treaties (IWTs) have been signed and river basin organizations (RBOs) have been established in a number of international river and lake basins.¹ However, the capacity to adapt to the aforementioned challenges is often limited, threatening the often fragile balance in river basins and thus the overall development opportunities of riparian communities and states. It is therefore important to integrate adaptation mechanisms in river basin management at all governance levels, ensuring long-term resilience to change. Although this has been acknowledged by policy makers in most international basins, practical implementation is still lacking and resilience often remains limited. At the same time, scholarly research focusing on the adaptation capacity in international watercourses is increasing (refer, for instance, to Fischhendler 2004, Conway 2005, Hinkel and Menniken 2007, Ansink and Ruijs 2008, Drieschova *et.al.* 2008, Goulden *et.al.* 2008, Kistin and Ashton 2008, Cooley *et.al.* 2009, Van Pelt and Swart 2009, De Stefano *et.al.* 2010, Dinar *et.al.* 2010, Drieschova *et.al.* 2010, Eckstein 2010, Schmeier and Schulze 2010, and Zawahri 2010). However, our understanding of what actually makes river basins and the institutions that have been established to manage them sustainably resilient to change remains limited and policy actions are often inadequate.

The aim of the paper is to assess the adaptation capacity of a particular RBO, the Mekong River Commission (MRC), and the related resilience of the Mekong River Basin with regard to climate change but including other challenges such as hydropower development and the related change

¹ For reasons of brevity and clarity, as well as for consistency with other hydropolitics and integrated water resources management (IWRM) literature, the remainder of the paper will not distinguish between river and lake basins as the two types of international watercourses, but instead include the notion of international lake basins into the more common notion of international river basins. The concept of RBOs thus includes institutions managing lake basins.

induced in the basin. This assessment is based on an analytical framework developed with the overall aim to provide a means for assessing the adaptation capacity of RBOs and thus apply it to other river basins as well.

Understanding what makes a river basin resilient and what RBOs contribute to resilience through their adaptation capacity is of particular relevance for development and poverty alleviation efforts. Climate change and its consequences in river basins influence ecosystems, land availability, agriculture and fisheries, thus directly concerning the food security component of Millennium Development Goal (MDG) 1; consequences for water quality affect health and mortality and are thus relevant with regard to MDG 4; and, most directly, changes in a river basin due to environmental or human-caused change influences MDG 7. The relevancy to these MDGs makes climate change adaptation a crucial component of the World Bank's work. Indeed, the World Bank is engaged in supporting the strengthening of resilience in international river basins by increasing the adaptation capacities of RBOs. This work is based on the World Bank's overall strategy on climate change and development (World Bank 2008a), which formulates the goal of helping developing countries access additional financial resources, technology, technical assistance and knowledge to adapt to climate change risks and constraints (World Bank 2008a: 7), as well as its Water Resources Sector Strategy and its current Implementation Progress Report (World Bank 2010b). In the Mekong River Basin, more specifically, the World Bank is funding projects on water resources management in Cambodia and Laos, including components that increase adaptation capacity. In addition, the World Bank promoted regional river basin management through the MRC, namely through the Water Utilization Programme (WUP) from 2000 to 2007 and, recently, through the Mekong Integrated Water Resources Management Project (M-IWRM-P) that was appraised in November 2010.

To successfully implement projects to strengthen the adaptation capacity of international river basins and to achieve the World Bank's goals, it is important to understand what actually determines "adaptation capacity." This paper targets Bank staff working on transboundary water resources management, especially, but not exclusively, in the field of climate change adaptation, as well as the broader water resources management community interested in finding means for systematically assessing the adaptation capacity of an RBO. Although the paper is largely focused on the Mekong River Basin and the MRC, it provides an approach for analyzing RBO adaptation capacity in other river basins as well, thus providing a tool to World Bank staff in other regions and other water resources management experts working with RBOs.

The paper is structured as follows: First, an analytical framework is developed for the assessment of RBO's adaptation capacity based on findings from various disciplines, namely hydropolitics, international water law, and water economics, as well as on more policy-related IWRM approaches. Next, this framework is applied to the Mekong River Basin and the MRC, focusing both on the various challenges the basin is facing and on the responses the MRC has provided so far. It includes an analysis of MRC's treaty provisions (namely the 1995 Agreement and the various MRC Procedures) and a detailed assessment of MRC's main programs and initiatives focusing on strengthening resilience (the Climate Change Adaptation Initiative (CCAI), the Flood Management and Mitigation Programme (FMMP), and the Initiative on Sustainable Hydropower, (ISH).

This analysis found that a variety of factors can increase the adaptation capacity of RBOs and the overall combination of legal, institutional, and organizational design factors influences whether an RBO can successfully adapt to change in the river basin. Regarding the MRC, the majority of these factors are present, but some (namely the coordination and exchange with nonmember actors in the basin, the dispute-resolution mechanisms, and the coordination with other regional initiatives) show room for improvement in the day-to-day work of the organization, most often related to the overall capacity of member states. These findings provide an important entry point for development partner engagement, with options for the World Bank discussed in Chapter 8.

2. ANALYTICAL FRAMEWORK

This chapter develops the analytical framework for assessing the adaptation capacity of institutionalized cooperation mechanisms in transboundary watercourses, starting with treaty provisions, but going beyond legal components of resilience² to integrate institutional factors as well.

2.1 Moving Beyond Treaty Resilience – The Need for Incorporating Institutional Factors

The resilience of transboundary watercourses to climate change has received increasing scholarly attention in the past few years (e.g. Fischhendler 2004, Ansink and Ruijs 2008, Drieschova *et.al.* 2008, DeStefano *et.al.* 2010, Drieschova *et.al.* 2010). Research has mostly focused on IWTs and their specific provisions for dealing with water resources variability. Several factors have been identified as crucial for treaty resilience. The seemingly most important factor is provision of water allocation mechanisms that are adaptable to changes in water flow and water quantity (Fischhendler 2004, Ansink and Ruijs 2008, Drieschova *et.al.* 2008). Water-sharing agreements require either flexible allocation mechanisms, basing water allocation on percentage shares, or fixed allocation mechanisms, requiring specific nominal volumes of water. Flexible allocations are perceived as more suitable for ensuring adaptive management.

Other mechanisms for strengthening the capacities of treaties and allocation mechanisms to adapt to variability of water resources are escape clauses (included, for instance, in the Treaty on the Lesotho Highlands Water Project) and regular treaty renegotiations and reviews (found, for instance, in the Great Lakes Water Quality Agreement between the United States and Canada signed in 1972). A recent report, commissioned by the World Bank (DeStefano 2010) analyzed treaty resilience to climate change along five characteristics derived empirically from an analysis of existing RBOs: (1) presence of an IWT, (2) presence of water allocation mechanisms, (3) existence of variability management mechanisms, (4) existence of conflict management mechanisms, and (5) establishment of an RBO. Findings regarding these five variables were then mapped to changes expected in different basins, allowing for analyzing which basins are both most vulnerable to climate change and have the least capacity to absorb such change, thus increasing the likelihood of conflict among riparians (based on Wolf 2004: 6).

Resilience, however, goes beyond treaty provisions and incorporates the broad ability of a system to adapt to permutations and change (UNEP 2009: 4). Adapting to change in a river basin requires more than just the existence of an agreement providing legal rules and norms for water use. This is particularly the case if other issues — such as floods or droughts, hydropower dam

² So far, hydropolitics and climate change research has not yet developed a consensus definition for terms such as “resilience,” “adaptiveness,” and “adaptation capacity.” Instead, a lively debate is concerned with mapping the different notions (refer, for an overview, to Gallopin 2006). Since it is not the aim of the paper to contribute to this debate, but rather to assess the independent variables actually accounting for a certain degree of resilience, a broad understanding is applied here. In this paper, adaptation capacity is the capacity of an entity (an RBO) to adapt to changes that occur in the issue-area or the geographical area with which it is concerned. A high degree of adaptation capacity leads to a state in which change can actually be absorbed and the sustainable management of the issue-area (water resources) can be ensured – that is, to resilience in the river basin.

management, changes in the ecosystem due to temperature changes, or salinity intrusions that threaten the fisheries sector — challenge a river basin and its riparians.

Thus, resilience is supported by factors not necessarily captured by an IWT. Such factors include national adaptation strategies and their coordination on the regional level, pre-existing regional cooperation structures (even beyond water resources management), a framework for cooperation, data and information-sharing provisions and their respective implementation, and dispute-resolution mechanisms. With such nontreaty-related resilience factors in a river basin, it is possible to achieve a high resilience to environmental change despite a generally low treaty resilience. Conversely, the existence of treaty-based adaptation mechanisms alone is not sufficient for effective overall resilience in the river basin, since their practical implementation and their long-term impact depends on institutional factors. Focusing on treaty resilience alone is insufficient for understanding why some river basins show a relatively high adaptation capacity while others are seriously challenged by change emerging in relation to climate change or human-caused activities.

Analyzing the institutional dimension of resilience cannot be achieved by a global analyses such as DeStefano *et.al.* did in analyzing climate change consequences and identifying basins particularly challenged by change. Rather, it requires case studies – as provided here for the Mekong River Basin and the MRC – that follow up on previous identification exercises and focus on specific details of a particular basin and RBO.

2.2 Treaty- and RBO-Based Determinants of Resilience: Mapping the Explanatory Factors

Based on the assumption that adaptation capacity goes beyond treaty provisions, the following factors have been identified as likely to influence the resilience of transboundary river basins and their respective RBOs (the first two being directly related to the legal basis of joint river basin management on a shared watercourse, the rest being related to the institutional design of the RBO):

- The **legal principles and provisions** contained in the agreement on which the RBO has been established and that determines the general set-up of institutionalized river basin management.
- The **legal procedures or mechanisms** the RBO has initiated in addition to its founding agreement (e.g., legal documents, treaty revisions or amendments, or specific legal mechanisms for governing a specific issue in the river basin).
- The **membership structure** of the RBO, most importantly, whether all riparians are part of the organization and thus the management of the river basin.
- The **functional scope** of the RBO, namely the question of whether integrated water resources management across sectors and issue-areas is ensured.
- The existence and effective functioning of **data and information sharing mechanisms**, allowing for sharing information on change in the river basin and ensuring long-term cooperation.
- The existence and effective functioning of **dispute-resolution mechanisms**, allowing for solving collective action problems that emerge as a consequence of climate or other environmental change in a peaceful and cooperative manner.

- The integration of RBO-based river basin management and adaptation activities into its **regional environment**, including coordination with other regional and international organizations.
- The embeddedness of the RBO's adaptation activities into member states' activities and the **coordination of programs and projects on different governance levels** (local, national, regional levels).
- The **secured and sustainable availability of financial resources** for climate change adaptation programs and projects and other resilience-strengthening activities.

2.2.1 Treaty Provisions

The agreement on which the RBO is based provides the starting point of the analysis of adaptation capacity and has therefore already been studied extensively by scholars (refer to section 2.1.). Based on existing research, the following treaty provisions are considered important: The inclusion of principles of international water law (namely the obligation to cooperate, the principle of equitable and reasonable utilization, and the obligation not to cause significant harm); the inclusion of mechanisms to deal with variability and change in the basin (such as flexible allocation mechanisms, and renegotiation provisions); and the clear definition of how an RBO based on the treaty is to be designed, including institutional mechanisms for sharing data and information, managing disputes, acquiring funding, and an overall river basin management system ensuring integrated river basin management even under changing framework conditions.

In reality, treaty provisions in international river basins vary, with very few agreements emphasizing the risk of uncertainties (Drieschova *et.al.* 2008:268 and Drieschova *et.al.* 2010:9): Only two agreements mention climate change as a source of uncertainty– the convention underlying the Lake Victoria Fisheries Organization (LVFO), signed by the riparian states in 1994, and the convention underlying the Volta Basin Authority (VBA), signed in 2007. Other treaties mention uncertainty in a broader sense, including environmental but also other (political, economic, etc.) reasons of uncertainty – however, most only mention the possibility of uncertainties and do not provide clear mechanisms for how to deal with them.

With regard to mechanisms and treaty provisions for dealing with uncertainty, some agreements include far ranging mechanisms for dealing with water variability, extreme weather events, or other changes in the basin, while other agreements contain no such mechanisms. The most common mechanisms for dealing with uncertainty focus on water availability, variability, and water allocation and foresee specific allocation mechanisms that can be adapted to change (for instance, the Agreement on the Lesotho Highlands Water Project (LHWP) allows for a six month grace period during which states can react flexibly to short-term water shortages without necessarily questioning the joint management provision, and the 1959 Nile Waters Treaty between Egypt and Sudan assigns the Permanent Joint Technical Commission on the Nile (NJTC) to work on means for dealing with low flow periods and to advice governments on measures to be taken. Overall, most agreements do not deal with change in the river basin or with mechanisms for mitigating such change, and the few treaties that do usually do not provide readily available mechanisms for dealing with change in an adequate, timely, and efficient manner.

This lack of attention to change in treaty agreements underlines the argument in Chapter 1 that the agreement and the provisions for dealing with variability alone are not a sufficient condition for

effective adaptation to climate change or other challenges in a river basin. Instead, the resilience of a river basin and the contribution an RBO to increasing it, depends on whether the few treaty provisions that exist are implemented in day-to-day river basin management by the RBO and on whether the institution possesses the capacity to internalize negative externalities related to change. Cooperation and joint river basin management that ensures the creation of joint benefits can prevail over collective-action problems and conflict that may threaten the overall socioeconomic development prospects in the basin. To assess additional resilience components, it is necessary to look into a specific river basin and its RBO in greater detail (on the basis of a case study approach) and assess it on the basis of the explanatory variables in sections 2.2.2 to 2.2.8.

2.2.2 Additional Legal and Treaty-Based Provisions

Beyond the founding agreement of the RBO, riparian states cooperating in river basin management have often established additional legal documents – either in the form of additional agreements further specifying the original IWT or by adding new strategic components to joint river basin management. Additions of particular importance include provisions for dealing with variability and change (in the flow of the river, in the ecosystem, in the riparian states – related to environmental changes or human-created developments) as well as mechanisms for ensuring integrated river basin management across actors and sectors. The content of such additional legal documents, therefore, must be included in the analysis of adaptation mechanisms of an RBO, since they often provide more concrete mechanisms applicable to adaptation than the founding agreements themselves.

Additional provisions can, for instance, be found in the Rhine Basin, where member states of the International Commission for the Protection of the Rhine (ICPR) have, since the 1950s, several times changed the underlying agreement, with the most recent version being the Convention for the Protection of the Rhine, signed in 1999. These changes helped integrate newly emerging challenges (such as the changing pollution situation in the river) into the overall management framework of the river basin. Similarly, in the Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS), member states have added a number of agreements during the course of the organization's development. These agreements further specify important issues of cooperation, such as the status of joint projects (with the 1978 Convention Relative au Statut Juridique des Ouvrages Communs), the financing of joint projects (with the 1982 Convention Relative aux Financements des Ouvrages Communs), or additional principles of water resources use (the 2002 Charte des Eaux). Other RBOs often include less legally binding but relevant additional provisions, such as protocols or guidelines concerning certain aspects of river basin management (in the International Commission for the Protection of the Danube River (ICPDR), for instance, various guidelines concerning public participation or the inclusion of private businesses in the river basin management process were included).

Whether such additional legal or procedural provisions contribute to strengthening the adaptation capacity of the RBO based on the agreements depends on a variety of factors, namely the specificity of these provisions, the compliance of member states with the provisions, the enforcement mechanisms in place, and the implementation of these provisions within the day-to-day work of the RBO, as well as on their flexibility regarding future change.

2.2.3 The Membership Structure of an RBO

The membership structure of an RBO is of great importance for the effective management of shared water resources in general and for adapting to change in the river basin in particular. The fact that activities by one actor necessarily affect the opportunities for the use and/or the protection of the river and its resources by other riparian actors requires the inclusion of all (relevant) riparian actors in river basin management. Although there is a trade-off between organizational management efficiency and river basin management effectiveness, and some scholars favor the efficiency of river basin management mechanisms with a limited number of participants (e.g. **Just** and Netanyahu 1998, Verweji 2000), the concept of IWRM requires a broad membership structure to integrate all relevant³ actors influencing water resources into institutionalized mechanisms for solving related problems, especially with regard to adaptive management (GWP 2000, Kliot *et.al.* 2001, Mostert 2003, Cooley *et.al.* 2009, Gerlak and Grant 2009, Schmeier and Schulze 2010).

The membership structure is of particular importance for change in the river basin and riparian states' adaptation efforts: If upstream riparians are not integrated in joint governance mechanisms, as it is, for example, the case in the MRC, or was, until recently, in the OMVS, their activities in response to change will affect downstream riparians. For instance, if farmers in upstream riparian states move from rainfed to irrigated agriculture as a response to decreasing rainfall, downstream water availability will be affected. The same holds true for large upstream infrastructure projects, such as hydropower or water diversion schemes, like the Chinese dams on the Mekong or Turkish dams on the Euphrates (where no institutionalized management mechanism exists).

Among international river basins, inclusive and noninclusive RBOs are distributed relatively evenly. With major changes occurring in river basins worldwide, there are strong incentives for integrating nonmember states into cooperative river basin management. If membership of all riparians is not possible for political or strategic reasons, other means for integrated river basin management across actors must be found. Some examples are dialogue partner constellations (as practiced in the MRC for China and Myanmar), coordination bodies (as established in the ICPR for observer states Austria, Belgium, and Liechtenstein), and overarching regional water resources management frameworks linking different, often noninclusive, management initiatives as found in Southern Africa under the Southern African Development Community (SADC) Protocol on Shared Watercourses, or in the European Union (EU) with its EU Water Framework Directive (EUWFD).

2.2.4 The Functional Scope of an RBO

Having an inclusive functional scope of the RBO is important for effective river basin management and successful adaptation to change in the basin. IWRM principles state and hydropolitics research (e.g. Kliot *et.al.* 2001, Dombrowsky 2007, Sadoff *et.al.* 2008, Cooley *et.al.* 2009) most often comes to the conclusion that RBOs are more effective if all relevant functional issues in the river basin are included in the scope of the organization. (Although it must be acknowledged that

³ "Relevant" actors, here, refers to riparian states that significantly influence the river basin and/or its resources. The noninclusion of riparian states with a negligible influence on the watercourse, such as Italy or Poland, which cover less than 0.1 percent of the Danube Basin's territory respectively, in the ICPDR is not necessarily required for effective river basin management and successful adaptation.

the trade-off between efficiency and effectiveness as described for the membership structure exists here as well.)

The high interlinkage of climate change and other adaptation issues to overall river basin management and the interdependencies among different sectors concerned with and/or affected by water resources management make integrated water resources management across sectors and issue-areas particularly important. If this concept can be kept in mind when establishing new RBOs, integrated management, including newly emerging challenges in a basin, can be ensured from the beginning. Existing RBOs may find it difficult to integrate new developments in their scope and portfolio. Single-issue RBOs (such as the Danube Commission (DC), the Permanent Indus Commission (PIC) or the Zambezi River Authority (ZRA), focusing on navigation, water allocation and hydropower respectively) do struggle with including adaptation mechanisms into their limited functional scope. Few-issue RBOs (such as the International Commission for the Protection of the Odra (ICPO), or the ICPR) have managed to extend their portfolios, but often need to establish new organizational bodies and expand their overall management structure. For instance, the ICPR, per its mandate to focus on water quality/pollution control and –to a lesser extent – flood protection, has recently included climate change adaptation work in its portfolio by establishing an Expert Group on Climate Change (KLIMA Group) that works under the supervision of its Working Group on Flooding but incorporates other issue-areas as well. True multi-issue RBOs (such as the Lake Tanganyika Authority (LTA), or the OMVS) have the mandate and the scope to more easily integrate river basin management across different sectors and to include climate change or other newly emerging challenges in their portfolio; but they need to ensure the availability of sufficient financial, technical, and human resources to effectively implement new tasks.

2.2.5 Data and Information Sharing Mechanisms

To come to joint decisions and to set up programs and projects for adapting to changes in the river basin, riparian states and the RBO itself rely on the availability of data and information on the river basin, its riparian states, and developments in the basin. In addition to its direct management purpose, data and information sharing among participants of a cooperative process also ensures the long-term sustainability of cooperation by strengthening linkages among actors, building confidence, and prolonging the shadow of the future – a fact emphasized by a variety of hydro-politics scholars (see Burton and Molden 2005, Grossmann 2005, Raadgever and Mostert 2005, Sadoff *et.al.* 2008, Zawahri 2010) as well as by IWRM-approaches (GWP 2000, GWP 2009).

It is not only important that data and information is shared, but that it is shared and managed at the RBO level (Schmeier and Schulze 2010:7-8). RBO-level data and information sharing ensures that information is accessible to all riparians (and, if public participation mechanisms are sufficiently developed, to all stakeholders), and that data is acquired and analyzed and conclusions are drawn in a consistent way, producing results all members can accept. Data and information management is thus considered a core function of an RBO and provides the basis of all other forms of joint river basin management – especially in times of change.

Data- and information-sharing mechanisms are thus an important prerequisite for effective climate change adaptation work of an RBO. Our knowledge about climate change effects is often limited, especially at the river basin level. The same holds true for other developments such as the

consequences of large infrastructure projects. It is, therefore, of great importance for successful adaptation to acquire and gather data on these developments, to carefully analyze available information in an open and cooperative manner, and to develop adaptation strategies based on the available knowledge. This task has indeed been taken up by a number of RBOs. Efforts to map climate change consequences have been undertaken in recent years: for example, the the KLIMA Group in the ICPR gathered information and knowledge on the impact of climate change in the river basin, with a particular, though not exclusive, focus on flood protection; in the ICPDR, studies have been initiated to summarize available knowledge, data, and information on climate change consequences in the Danube River Basin on which future adaptation activities are to be based; and in the Organization of the Amazon Cooperation Treaty (OCTA), an ongoing GEF project is mandated to better understand climate change challenges in the river basin and, based on newly gathered information, develop response mechanisms. However, achievements remain limited and progress is slow, especially in river basins lacking financial, technical, and human capacity.

2.2.6 Dispute-Resolution Mechanisms

RBOs are established to mitigate conflict caused by collective-action problems related to the use of water resources by various actors. However, challenges related to climate change, environmental change or unexpected developments in the river basin can lead to the reemergence of old conflicts or the emergence of new ones. It is important to have well-defined and well-functioning dispute-resolution mechanisms in place. Considered a prerequisite for long-term stable cooperation on shared watercourses in general – as it has been outlined by a number of scholars (e.g. Giordano and Wolf 2003, Sohnle 2005, Dombrowsky 2007, Fischhendler 2008) – dispute-resolution mechanisms are even more important for internalizing collective-action problems related to change in the basin (DeStefano *et.al.* 2010, Schmeier and Schulze 2010, Zawahri 2010). Dispute-resolution mechanisms – one of the main functions of RBOs in general – become even more important when changes occur in the basin that affect riparians' opportunities for water use.

Existing dispute-resolution mechanisms vary across RBOs: contested issues can be negotiated bilaterally among involved parties (the Greater Tumen Initiative (GTI) or the International Meuse Commission (IMC) rely on bilateral solutions for disputes); they can be referred to oversight bodies explicitly in charge of water resources related conflicts (as it is the case for the International Joint Commission (IJC) for shared waters between Canada and the United States); disputes can be solved directly by the RBO (as in the ICPR, the LTA or the PIC); RBOs can be involved in dispute-resolution but have the opportunity to refer to contested subject to external bodies if RBO-level mitigation fails (the Commission International pour la Protection de la Moselle (CIPM), in the ICPDR, and the OMVS); or regional bodies in charge of water resources management can serve as mediators (for example, the SADC for disputes occurring in the SADC region water basins and their respective RBOs).

It is not so much the design of the dispute-resolution mechanisms, but rather their clear definition, their timely applicability, and their ability to bind disputing parties to a settlement that ensures their contribution to the solution of conflicts occurring in the river basin.

2.2.7 Financing of River Basin Management and Adaptation

To maintain institutionalized cooperation in a shared river basin and fund joint programs and projects for river basin management, financial means are required. While only few hydro-politics scholars have actually dealt with this issue (Bernauer 1997, Aberthny 2005, Komakech 2005, Dombrowsky 2007, Eckstein 2010), experiences of RBOs show that without the availability of sufficient financial resources, river basin management becomes impossible. Adaptation activities require additional finances, often lacking in river basins in developing countries, where RBOs already often lack basic financial means to maintain general water resources management activities. The provision of sufficient financial means is thus an important prerequisite for successful climate change adaptation.

Generally, RBOs can be funded either by member contributions or by external (donor) sources or any combination of the two. In addition, member state contributions can be shared equally (as it is, for instance, the case in the LVFO, the Niger Basin Authority (NBA) and the Orange-Senqu River Commission (ORASECOM)) or according to specific cost-sharing keys (found, for example, in the Lake Chad Basin Commission (LCBC), the OMVS and the ZRA). The way costs are shared must ensure the long-term compliance of member states' funding commitments, allowing for adjustments based on their economic capacity and political willingness to pay.

In developing regions, where riparian states often lack sufficient resources to finance river basin management in general and adaptation activities in particular, the involvement of international donors is important, as they can provide additional incentives and/or resources for cooperation and the implementation of specific measures. Besides traditional development financing, climate change adaptation projects can also benefit from innovative financing mechanisms (such as the United Nations Framework Convention on Climate Change (UNFCCC) Special Climate Change Fund or the UNFCCC Adaptation Fund, funding mechanisms developed by multilateral development banks such as the World Bank Climate Investment Funds, or various bilateral initiatives). Thus, it is important for RBOs lacking sufficient financial capacity in their member states to map out available funding and explore new opportunities for acquiring financial means beyond member contributions and traditional official development assistance (ODA).

2.2.8 Embeddedness of Adaptation Activities into the National and Regional Context

Linkages among RBOs and their respective member states often face challenges related to the institutional design and the day-to-day implementation of governance linkages (refer to **Schmeier 2010**). Change in the basin often further increases the complexity of linkages among national and regional governance levels, especially when it comes to linking RBO-level activities to efforts undertaken in the member states (on the national, subnational, provincial, or local levels).

Linking the activities of an RBO to the national level is of enormous importance for effective river basin management. Some RBOs ensure such linkages through working groups or expert groups, consisting of representatives from the member states and focusing on the management of particular issues in the river basin. Expert groups in the ICPDR focus on river basin management,

pressures and measures, flood protection, information management and geographic information system (GIS), monitoring and assessment, public participation and strategy). In the Okavango River Basin Permanent Water Commission (OKACOM), working groups deal with institutional issues, biodiversity, and hydrology). Other RBOs have established specific bodies to ensure national links (e.g. national committees in the LVFO or permanent national commissions in the OCTA). For these bodies, most often found in developing river basins, it is of particular importance to ensure that their mandate is clearly defined and consistent across member states, that there is an actual need for their work which is, moreover, reflected in their responsibilities and work program, and that they possess the human, financial, and technical capacity to successfully perform the tasks they have been assigned.

The same holds true for adaptation measures: adaptation efforts taken on the national level – especially construction of infrastructure schemes such as reservoirs for irrigation, dikes and other flood protection schemes, dams, or other measures altering the river and its basin – affect other riparians in the river basin, creating externalities that can alter the overall sustainability of river basin management and development. Therefore, activities at the RBO-level must be linked to and coordinated with activities undertaken in the member states to prevent overlaps and inefficiencies and create additional benefits on the basis of economies of scale.

Another dimension of embeddedness of RBO-based adaptation work is related to linking efforts to other regional initiatives or even other policy fields in the river basin. Establishing issue linkages that strengthen cooperation among riparian states contributes to better integrated adaptation activities as well. In some river basins, such linkages are ensured by legal provisions and agreements (e.g. on the basis of linking Southern African RBOs to the legal framework of the SADC Protocol on Shared Water Resources) or the embeddedness of the RBO into a broader regional integration framework (as it is the case with European RBOs in the context of the EUWFD, which prescribes certain river basin management activities). In river basins without such mechanisms, coordination becomes more difficult.

3. CLIMATE CHANGE AND WATER RESOURCES IN THE MEKONG RIVER BASIN – THE NEED FOR STRENGTHENING RESILIENCE

This chapter focuses on challenges related to environmental and human-caused change the Mekong River Basin is likely to face in the future. After briefly introducing general characteristics of the river basin and the use of the river and its resources by riparian populations, the chapter focuses on the impact of emerging change on the basin's ecosystem and its populations. Although the emphasis is on the consequences of climate change, other challenges – namely those related to the development of hydropower schemes – are briefly assessed.

3.1 The Mekong River Basin: General Characteristics

The Mekong River originates in Tibet and flows more than 4,900 kilometers through China's Yunnan Province, Myanmar, Thailand, Laos, Cambodia, and Vietnam before emptying into the South China Sea (see figure 3.1). The catchment of the basin comprises 795,000 square kilometers and stretches over most of mainland Southeast Asia, making the Mekong River Basin the twenty-first largest river basin in the world (MRC 2003c). It consists of six geographical zones,⁴ each with specific characteristics regarding the flow of the river and the opportunities for natural resources and water use.

The river basin is characterized by a variety of unique factors (for more details on the basins geography and hydrology, refer to Akatsuka and Asaeda 1996, MRC 2003c, MRC 2005, MRC 2010c). First, riparian countries' share of the basin varies, with 25 percent of the territory of the entire basin being covered by Laos, but only 5 percent by China and Myanmar respectively. Second, the role of tributaries is of great importance for the entire river basin: more than 100 tributaries drain into the river in the Lower Mekong basin (LMB), the most important tributaries originating in Lao PDR, Cambodia, and Vietnam (namely the Central Vietnamese and Cambodia Se Kong, Se San and Sre Pok Rivers and the Lao Nam Ngum, Nam Theun, Nam Ou and Nam Hinboun Rivers). These tributaries provide more than 40 percent of the overall flow of the river, with particular importance during the wet season. Thus the entire basin highly dependent on its tributaries (and on developments in these tributaries, mostly related to water diversion projects and hydropower). Related to the role of the tributaries, the flow regime of the river is extremely variable, both inter- and intra-annually. The wet season (May-September) accounts for 85 percent of the total flow of the river. Water availability therefore varies highly and there are short-term water scarcities as well as floods based on seasonal changes.

The Mekong River basin's population of about 66 million people depends on the river and its resources for living and socioeconomic development (for more details, refer to MRC 2003c, Molle

⁴ A distinction is generally made among (1) the Lancang/Upper Mekong, the part between Chiang Sen in Northern Thailand and Vientiane/Nong Khai on the Thai-Lao border, (2) the zone downstream of Vientiane to Pakse in Southern Laos, (3) the Lao-Cambodian border region from Pakse to Kratie, (4) the Tonle Sap Region, and (5) the downstream section from Phnom Penh to the Delta (MRC 2005).

2007, Hoanh *et.al.* 2009, Schmeier 2009, MRC 2010c): First and foremost, the river provides water and sediments for agriculture, which accounts for 85 percent of the river's water use (although distributed unevenly across the basin, with Cambodia using the highest percentage 94 percent of the river's water use for irrigation). The agricultural sector employs 65–85 percent of the basin's population, making it extremely important for poverty alleviation and long-term economic development. The river is also of great importance for fisheries and local communities, especially in Laos, Cambodia, and Vietnam, which are highly dependent on fish catch for food security. Large-scale fish catch and aquaculture, especially in Vietnam, also supports larger industries and thus the overall economic development of the region. Furthermore, the river serves as a means for transport, especially in countries such as Laos, where land transport infrastructure is still insufficiently developed. Although the relevance of the river and its resources varies across the riparian countries, depending largely on their location and their state of economic development,⁵ the river and its resources are extremely relevant for all riparian communities and countries, making them highly vulnerable to changes in the river basin.

⁵ China, as the most upstream riparian, is most interested in developing the river's hydropower potential and benefiting from improved navigation on its upper stretches to link its southwestern region to mainland Southeast Asia. Myanmar has so far shown little interest in the use of the river, but will most likely increase its interest in the river's hydropower potential. Thailand's interest focuses mainly on water diversion for its southeastern Isaan region, which is highly dependent on irrigated agriculture; moreover, the country wants to increase the generation of electricity from hydropower plants, mainly in neighboring Laos. Laos' main interest is hydropower development, not necessarily for electrifying the country but for generating income from exporting electricity to neighboring countries. Cambodia depends on the agriculture and irrigation opportunities the river provides (especially in the particularly vulnerable Tonle Sap area). Vietnam, the most downstream country, has an interest in exploiting the river's opportunities for agriculture, fisheries, and aquaculture in the delta area, but also sees hydropower potential in the central highlands tributaries.



Figure 3.1: The Mekong Basin and its riparian countries

3.2 Climate-Change-Induced Challenges in the Mekong River Basin – Consequences for Economic Development and Poverty Alleviation

Climate change is expected to have severe consequences for the Mekong River Basin. Although knowledge about climate change effects in the region is still limited, certain scenarios developed by researchers (Hoanh *et.al.* 2003, Eastham *et.al.* 2008, IPCC 2008, MRC 2009a, MRC 2010c; for a summary of findings refer to Hinkel and Menniken 2007) can now be perceived as consensus for the basin, with results indicating similar trends and developments. Since it is not the aim of this paper to provide a detailed analysis of climate change scenarios for the Mekong River Basin, but rather to analyze the degree to which the basin, with the help of the MRC, is able to adapt to future challenges and build up resilience, this section summarizes the most important findings focused on the consequences for poverty alleviation and socioeconomic development opportunities.

First, higher temperatures are expected in the river basin, with rises of 0.79 degree by 2030 (Eastham *et.al.* 2008). Rising temperatures increase the risk of droughts, threatening agricultural production. Higher temperatures are particularly likely in Thailand, mainly in its northeastern area, which already experiences long droughts and water shortages and depends on irrigated agriculture. Second, increasing water temperatures influence the river's ecosystem, including fish populations and biodiversity in the entire basin. Although there is no substantiated knowledge yet about the effects of increasing water temperature on fish populations and other species in the river and on its banks, or whether any effects will offer additional economic opportunities or destroy existing ones, it can be assumed that changes in the river's ecosystem are very likely to affect the overall ecological balance in the basin.

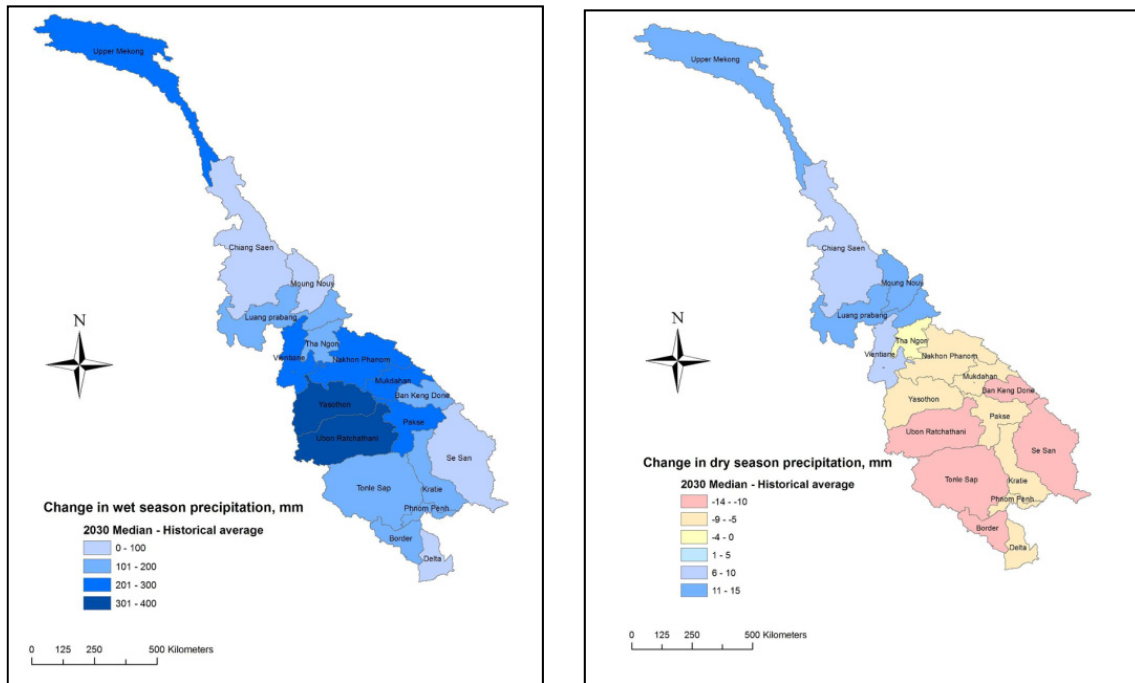


Figure 3.2 Spatial distribution of the projected change in precipitation during the wet and dry seasons in 2030 compared with historical (1951-2000) mean precipitation.

Source: Eastham et al. 2008: 26/27

However, the annual precipitation increase would be distributed extremely unevenly across the basin and across time: most of the increase is likely to occur in the wet season, while the dry season is expected to become even drier (see figure 3.2 for expected wet and dry season changes in precipitation). These changes in precipitation, together with increasing glacier melt in the upper stretches of the river, are expected to lead to increasing annual runoff of about 11 percent and thus an increased flood risk especially in downstream regions.

As a consequence of climate change, existing problems in the river basin – especially flood and drought, as well as salinity intrusion in the delta area – are expected to deteriorate. These consequences are expected to be particularly harmful in Thailand, which is prone to droughts; Laos, where an increasingly intense wet season further increase the risk of floods; Cambodia, which heavily depends on the flow of the Tonle Sap system for irrigation, agriculture, and fisheries and, moreover, suffers from floods; and Vietnam, where negative flow effects increase the threat of saltwater intrusion.

Floods are already a severe problem in the LMB, threatening livelihoods and causing significant economic losses. While relatively upstream Laos is mainly suffering from (flash) floods in the tributaries, further downstream areas in Cambodia and Vietnam are prone to long-lasting floods on the river’s mainstream. Recent years have seen severe floods, with floods in 2000 and 2002 being particularly harmful. In 2000 alone, 800 people lost their lives and direct damage of more than US\$ 400 million was caused, affecting more than 8 million people and their livelihoods (MRC 2002:2,

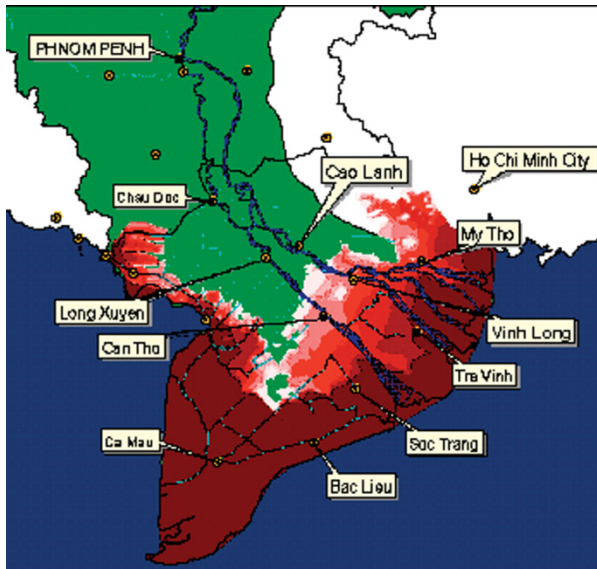


Figure 3.3: Map showing the area of saline intrusion in the Mekong Delta

Source: MRC 2005: 56

Plate and Insisiengmay 2005:99). Additional indirect damage related to the interruption of economic activity, decreased school attendance, destroyed infrastructure, increased waterborne diseases and other indirect or second-round effects must be added. Droughts, so far regionally limited, are an increasingly important problem as well (especially in Thailand, already prone to droughts and suffering from water shortages, but also in further downstream regions), likely to be intensified by changing precipitation and runoff patterns. Drought significantly influences agricultural opportunities in the basin. With agriculture being of extreme economic importance for most riparian communities and playing a tremendous role in ensuring food security, increasing drought intensity in the river basin could lead to setbacks in poverty alleviation and human development – despite important achievements made in the past few years.

Climate change consequences are particularly problematic in the delta region (Vietnam and – to a lesser extent – Cambodia). In addition to changes in the river flow and its flood and drought patterns, the delta faces increasing salinity intrusion from the South China Sea, which is caused by both sea-level rise and reduced water flow from upstream. Already, half the delta is affected every year. In figure 3.3, red indicates the area affected to date. Climate change is likely to severely intensify this problem.

Salinity severely threatens agriculture, fisheries, and aquaculture, and thus economic opportunities of local communities as well as the entire country. Vietnam depends heavily on the resources generated in the delta area, where 50 percent of the agricultural value of the country (including 80 percent of the entire rice production and 50 percent of the entire fisheries and aquaculture production are generated; Backer 2007, Osborne 2009). Further intensification of saltwater intrusion poses serious harm to the overall socioeconomic development opportunities of riparian communities and the entire country.

Fourth, climate change effects are likely to intensify existing collective-action problems among riparian states or lead to additional ones. Adaptation measures taken upstream, such as the shift from rainfed to irrigated agriculture or specific responses to extreme weather events, can alter downstream water availability or flow patterns. Therefore, it is of great importance to coordinate climate change adaptation measures across riparian states – ideally with the help of an RBO that is responsible for the joint management of the river basin.

3.3 Changes Beyond Climate – Human-Caused Changes in the River Basin

In addition to climate change, other changes in the basin can alter the river's flow, the basin's ecosystem, and the development opportunities of riparian communities. These changes include human-caused changes such as water diversion, hydropower development, or other large infrastructure schemes. Such human-caused changes in the river basin can alter the often fragile balance among the different users and riparian states in the river basin and thus trigger collective action problems that potentially lead to conflict and hinder socioeconomic development. Thus they must be taken into account when assessing the resilience in a river basin.

In the Mekong River Basin, hydropower schemes are currently the most decisive development. In China, many mainstream dams have been developed, with the Manwan Dam finished in 1992 already, followed by the Dashaoshan Dam in 2003, the Jinghong Dam in 2010, and the Xiaowan Dam about to be finished. Another 10 dams are currently under development (see figure 3.4). In the LMB, riparian states are also moving quickly to develop mainstream as well as tributary hydropower projects. In Laos, nine hydropower dams are being planned on the Mekong mainstream, plus two more in Cambodia (see figure 3.4). Many more dams on tributaries are under development as well, especially in Laos and, to a lesser extent, in Vietnam.

Future years are likely to see even more dam projects, notably since some riparian states in the LMB (especially Laos) perceive the development of large hydropower schemes as a convenient source of electricity to be exported to neighboring countries (mainly Thailand, but also China and Vietnam) to earn financial resources and thus promote growth and development.

Hydropower dams influence the river basin in various ways. Large infrastructure schemes influence the flow regime of the river, including the Mekong flood pulse, which has various effects on downstream water resources and fisheries. Especially in the dry season, reduced flow from upstream (because water is stored behind dams) can significantly deteriorate water availability downstream (with resulting droughts and salinity intrusion). Conversely, storing water upstream can benefit downstream areas by contributing to flood control. Changes in the river's flood pulse, and especially the storage of water, changes the sediment load of the river, potentially affecting agriculture and fisheries. Changes in water levels affect navigation by either further deteriorating navigation during the dry season or by improving navigability through navigation-oriented dam management.

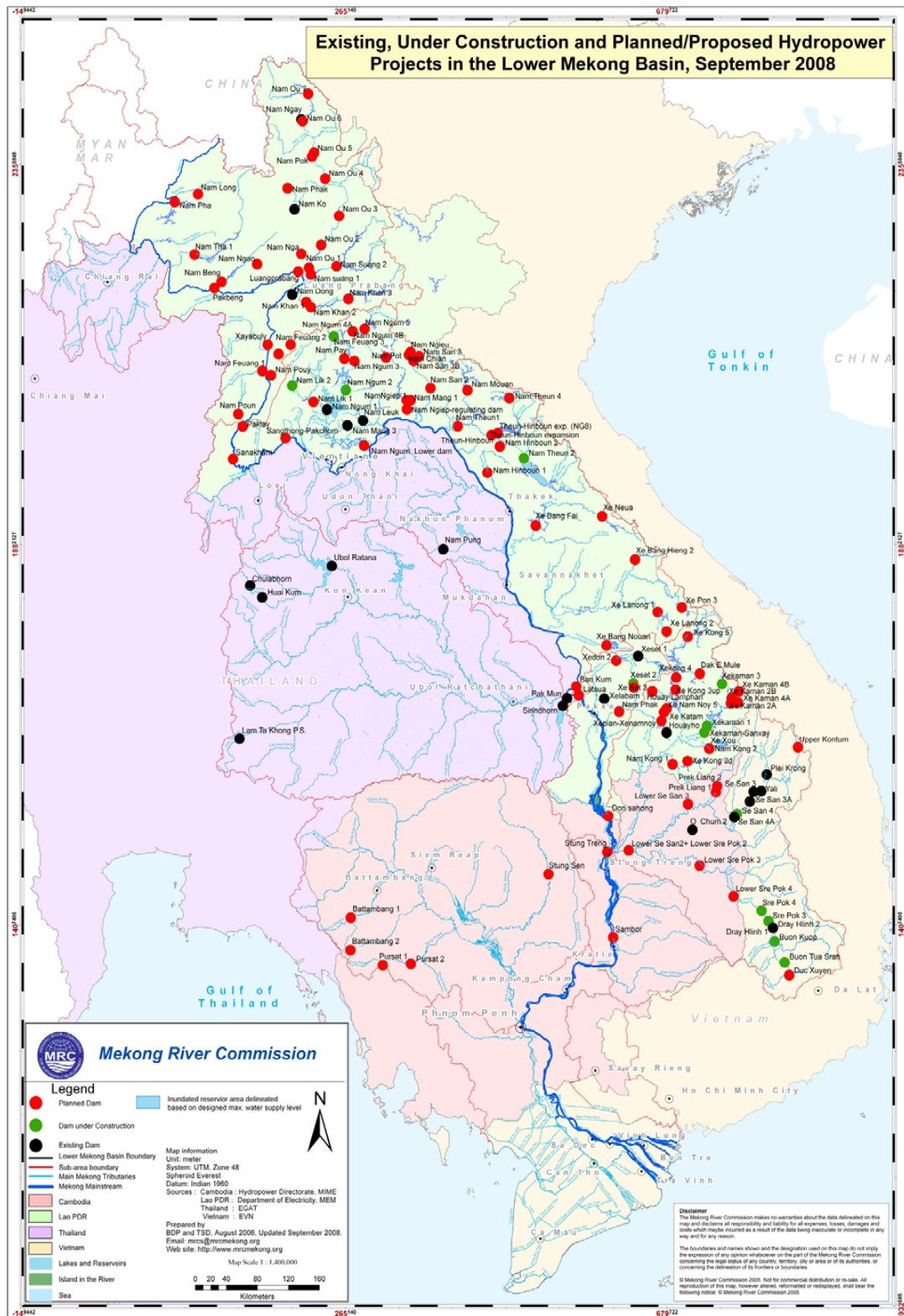


Figure 3.4: Map of existing, under-construction, and proposed hydropower projects in the Lower Mekong Basin
 Source: MRC 2009:5

Whether dams bring benefits to regions downstream or have negative effects on the opportunities for water use and water resources development of downstream areas depends on a variety of factors (namely, dam management) and can thus not yet be clearly mapped. It can, nevertheless, be assumed that the increasing development of hydropower in the river basin will lead to collective-action problems among riparian states, namely between upstream states, which benefit from the generation of electricity and are able to flush negative effects downstream, and downstream states, which suffer from potential negative consequences that could outweigh positive effects.

It is, therefore, of great importance to integrate hydropower development as a major factor of change in the Mekong River Basin into the joint management of the river basin and in institutionalized cooperation mechanisms. This integration requires acknowledging that, in addition to climate change, other developments challenge the basin and riparian communities' and states' development opportunities. This acknowledgment is of particular importance because nonclimate-related changes occur in the basin now, while climate change can be expected to add to them in the medium-term future. In combination with climate change, such development can then either intensify or counterbalance negative impacts – depending on the adaptation capacities of the riparian states and the management and dispute-resolution skills of joint initiatives such as the MRC.

In addition to climate change and hydropower development, the most challenging developments in the river basin at the moment, other factors of change are likely to influence the future of water resources use and protection as well as the cooperative management of shared water resources in the Mekong River Basin. The first factor is the large differences among riparian states in their socioeconomic development status,⁶ with Vietnam, and especially Thailand, having reached a relatively high level of economic, social, and human development, but with Laos and Cambodia still facing severe development challenges. Different levels of development most often come with different interests in the use and/or the protection of the river and its resources, thus increasing the likelihood of opposing interests and related collective-action problems.

The second factor is that the resulting differences in human, financial, and technical capacities pose a serious challenge to cooperation over shared water resources. This holds particularly true for climate-change adaptation, where actions to mitigate or to adapt to upcoming changes often require significant resources but are, at the same time, embedded in the overall development situation in the river basin. Regional river basin management, therefore, must provide a holistic and integrated approach that allows for dealing with the challenges likely to emerge even on the basis of different capacities in riparian states.

⁶ For instance, while the GNI per capita is as high as US\$3,400 in Thailand, the numbers in Cambodia and Laos are much lower, with US\$550 and US\$630 respectively (World Bank 2009: 14/15; data for 2007). Similarly, in Thailand, 9.8 percent of the national population lives below the poverty line; the number rises to 38.6 percent in Laos, and 47.0 percent in Cambodia (World Bank 2009: 64/65; data for 2007). Conversely, Cambodia, Laos, and especially Vietnam have experienced extremely rapid GDP growth in the past few years (with 8.3 percent, 6.0 percent, and 7.2 percent respectively for 2006–2007; World Bank 2009). These countries have significantly increased their economic development and made improvements in social development indicators as well, with the greatest improvements in Vietnam.

4. TREATY RESILIENCE IN THE MEKONG RIVER BASIN – THE 1995 AGREEMENT AND MRC PROCEDURES

This section focuses on the first two components of climate change resilience in the Mekong River Basin, the adaptation-relevant components in the IWT underlying institutionalized Mekong cooperation. It analyzes the 1995 Agreement and the different procedures developed by the MRC for different aspects of water resources management in the basin.

4.1 The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin (1995 Agreement) – The Foundations of Institutionalized Cooperation in the LMB

The 1995 Agreement lays the foundations of cooperation between Thailand, Laos, Cambodia, and Vietnam and formally establishes the MRC. It contains various provisions related to the use and the protection of the Mekong River and its resources. Although it does not explicitly refer to climate change, water variability, or other aspects of change in the river basin, its provisions can be applied to climate-change-induced developments in the basin.

The 1995 Agreement incorporates several principles of international water law as they have been defined in international agreements and conventions, namely the 1997 UN Convention on the Non-Navigational Use of International Watercourses, which has been signed by all MRC member states (though not by China, which openly rejected the Convention).⁷ Its most important principles include the obligation not to cause significant harm, the principle of prior notification, and the obligation to cooperate – all being of great importance in times of increasing water variability and change in the basin.

The most important provisions of the treaty are found in Art. 5, dealing with the reasonable and equitable use of water resources for both the mainstream (Art. 5b) and the tributaries (Art. 5a) and setting the framework conditions for notification, prior consultation, and agreement process requirements (PNPCA). For the Mekong mainstream, where alterations of the river have particularly significant consequences, MRC rules require prior notification at least of other MRC member states for planned projects (for intrabasin water diversions in the wet season), but possibly also prior agreement for interbasin diversions during the dry season (see table 4.1). For tributaries, requirements are less strict, with only notification to the MRCs joint committee (JC) being required for all water uses and diversions. These provisions are spelled out in more detail in section 4.2.

⁷ Although not yet formally adopted by the United Nations, the 1997 Convention had been under negotiation for a number of years and the principles incorporated in it were widely discussed in the academic as well as in the policy-making community. Thus, it could significantly influence the development of new agreements on transboundary river basins, such as the 1995 Agreement.

	dry season	wet season
inter-basin transfer	Prior agreement	Prior consultation
intra-basin transfer	Prior consultation	Prior notification

Table 4.1: Framework for Prior Notification, Prior Consultation, and Agreement

Art. 6 of the 1995 Agreement emphasizes the need for maintaining a minimum flow in the mainstream in order to ensure acceptable natural flows, maintain the ecological balance of the Tonle Sap, and prevent unnatural events in the river basin. This provision is of particular importance for climate change adaptation and, in particular, the adaptation to human-caused changes in the basin (notably hydropower schemes).

Furthermore, Art. 7 elaborates rules for preventing harmful effects from the use and development of the river and its resources and Art. 8 defines how member states can react to harmful developments in the river basin and how conflicts related to such developments can be solved.

Although not concerned with climate change or adaptation to emerging developments in the river basin and not containing any direct water allocation/sharing mechanisms, the 1995 Agreement provides a variety of provisions potentially applicable to the management of climate change consequences. These requirements can be regarded as relatively strict in their general content (with requirements for equitable and reasonable use, prior notification, and the maintenance of flow being defined), but at the same time very flexible given the possibility of spelling them out further for specific procedures. However, they largely concern only the Mekong mainstream and focus only on water use, leaving other sectors and issues potentially affected by climate change and other emerging challenges outside the management framework. Moreover, as Drieschova *et al.* (2008: 285) have argued, a great degree of flexibility often comes with a lack of enforcement and the 1995 Agreement must indeed be characterized as too vague to effectively ensure compliance of signatory states. The application of the 1995 Agreement provisions to the process of notification, prior consultation, and agreement will show whether this is the case for the MRC as well.

4.2 MRC Procedures – Refining Water Resources Use Principles

Based on the 1995 Agreement, procedures have been developed by the MRC to govern specific aspects of water resources use in the basin. These are the Procedures for Data and Information Exchange and Sharing (2001), the Procedures for Notification, Prior Consultation and Agreement (2003), the Procedures for the Maintenance of Flow in the Mainstream (2003), the Procedures for Water Use and Monitoring (2003) and the Procedures on Water Quality (approved at the MRC council meeting in December 2010).

With regard to adapting to change in the basin, the Procedures for Notification, Prior Consultation and Agreement (PNPCA) are among the most important achievements of the MRC (MRC 2003a).

In accordance with the 1995 Agreement and procedures, notification in the form of a formal submission to the MRC JC is required for intrabasin use and interbasin diversion on tributaries and intrabasin use during the wet season on the mainstream; prior consultation is required for interbasin diversions from the mainstream in the wet season, intrabasin use of the mainstream during the dry season and interbasin diversion of surplus quantity water during the dry season.

Prior consultation requires the submission of documents to the MRC JC (via the national Mekong committees (NMCs), the dissemination of these documents to other MRC member states, and the provision of additional information or field visits for other member states if requested. This process leads to a decision by the MRC JC whether to allow the requesting state to pursue the development project. Prior agreement in the form of a signed agreement by all MRC members is required for interbasin diversion plans from the mainstream during the dry season. These procedures can become of great importance with increasing water variability due to climate change. Similar to water allocation mechanisms that need to incorporate flexibility mechanisms in case of water variability (Drieschova *et. al.* 2008), such procedures provide significant resilience through treaty-like provisions (based on DeStefano *et. al.* 2010-criteria). Similarly, the Procedures for the Maintenance of Flow on the Mainstream (2003) elaborate Art. 6 of the 1995 Agreement and establish the required institutional mechanisms for implementing the provisions. The Procedures for Water Use and Monitoring (2003) provide a framework for effective implementation of intrabasin water use and interbasin water diversion monitoring. Water use monitoring consists of three components (physical equipment, technological procedures, and related institutional set-ups and personnel) and are operated by the JC, supported by Mekong River Commission Secretariate (MRCS) and the NMCs. Similarly to the Procedures for Data and Information Exchange and Sharing, these provisions present a prerequisite for effective transboundary water resources management in general and climate change adaptation work in particular.

Recently (October 2010), Laos submitted a notification on the Xayaboury Dam to the MRC, which has triggered the first PNPCA process. The MRC had six months to come to a joint decision, with the MRCS playing an important role in providing the knowledge, data, information, and capacity required for member states to come to informed decisions. However, during the JC meeting on April 21, 2011, the decision was postponed because of disagreement among MRC members (mainly Laos, insisting on the absence of transboundary impacts from the dam, and Vietnam, calling for a 10-year moratorium for all mainstream dam projects). Decision making has been referred to the Council, which meets later in 2011. So far, the PNPCA has demonstrated that MRC's rules and procedures for dealing with hydropower developments do play an important role in improving adaptiveness in the river basin. Although no final decision has been taken yet, MRC's contribution to building knowledge and understanding with regard to hydropower development and its respective ecological and socioeconomic consequences cannot be overestimated.

With regard to water quantity issues and the response to changes in the river flow, the Procedures for the Maintenance of Flow in the Mainstream (2003) are of great importance. These procedures aim at ensuring a minimum flow in the mainstream and preserving the specific flow patterns of the Tonle Sap. The Tonle Sap is not only an important ecosystem, but also a decisive source for Cambodia's development locally and nationally since it provides fertile agricultural land, fish and other aquatic resources, and navigation opportunities. Thus, these procedures are of particular importance with respect to managing future change there.

The mechanisms contained in the procedures described earlier can be considered as indirect or implicit allocation mechanisms (based on Drieschova *et. al.* 2008:288 and Cooley *et.al.* 2009: 15), However, they do not concern other climate-change-related developments (e.g. changes in water quality, water demand and use, or weather events), nor do they incorporate issues beyond water quantity that are related to human-caused changes in the basin (namely the consequences of hydropower dams).

Applying the climate change resilience framework developed by DeStefano *et. al.* (2010), it can be shown that in the LMB, at least three out of five resilience criteria are fulfilled through the 1995 Agreement and the different MRC procedures: The LMB has an IWT (the 1995 Agreement), it has conflict resolution mechanisms (through the 1995 Agreement and the MRC), and an RBO has been established. In addition, the MRC provides mechanisms for dealing with climatic extremes such as floods and droughts, indirectly fulfilling component no. 3 (variability management mechanisms). However, nearly all resilience criteria found in the LMB are related to the MRC as an RBO. That is, means for building resilience in the LMB largely depend on the water resources management mechanisms the MRC provides to its member states and thus go far beyond the 1995 Agreement. This situation indicates, again, the importance of instituting climate change adaptation mechanisms beyond treaty provisions. The following chapters therefore investigate climate change adaptation mechanisms within the MRC in more detail in order to better assess climate change resilience in the LMB.

5. THE MEKONG RIVER COMMISSION (MRC) – ASSESSING INSTITUTIONAL RESILIENCE

Cooperation in the Mekong River Basin emerged in the early 1950s, starting with initiatives such as the United Nations Economic Commission for Asia and the Far East's UN ECAFE's Bureau of Flood Control's engagement in transboundary cooperation in the LMB and the U.S. Bureau of Reclamation's initiative to boost economic development on the basis of regional integration. Cooperation was institutionalized in the form of the Mekong Committee (MC) in 1957, but remained weak because of overarching political and security problems. Following Cambodia's departure from the MC, an Interim Mekong Committee (IMC) was set up in 1978, indicating the commitment of riparian states to institutionalized cooperation over water resources management. After the end of the Cold War and the resolution of conflicts in mainland Southeast Asia, the MRC was established among its four downstream riparians as an organization for the joint and cooperative management of the Mekong River Basin.

With the signature of the 1995 Agreement, the four downstream riparians agreed to jointly work toward and “cooperate in all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River Basin” (Art. 1, 1995 Agreement), establishing the MRC as a permanent institutional body for coordinating and implementing cooperative water resources management efforts in the region.

The MRC, as established in 1995, is based on a threefold governance structure (see figure 5.1), consisting of a Council that determines the overall direction of water resources management on the ministerial level, a Joint Committee (JC) that operationalizes water resources governance into strategies, programs and projects, and a Secretariat (MRCs) that provides technical, administrative, and financial services for program

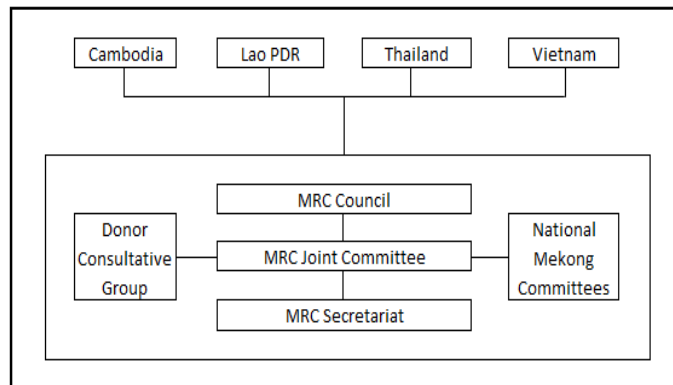


Figure 5.1: Governance Structure of the MRC

Source: Author.

and project implementation. The MRC Secretariate provides other functions that go beyond most RBO Secretariats' functions (Schmeier 2010). The MRC also has a Donor Consultative Group (CDG), responsible for the coordination of donor activities in the region and with a relatively strong informal influence within the institution, and a National Mekong Committee (NMC) in each member country, responsible for efficiently linking national water resources management policies with regional cooperation efforts. Since its establishment, the MRC has undergone some important changes, the most important ones being: (1) a five-year support program initiated by UNDP in 1997, introducing several organizational reform steps and strengthening MRC's capacity=building component; (2) an independent organizational, financial and institutional review initiated in 2007, identifying 38 problematic organizational issues for which action was recommended; (3) the 2nd

Strategic Plan, 2006-2010 (MRC 2006), which further focused the MRC's work on water resources activities and environmental protection; and (3) the 3rd Strategic Plan, 2011-2015, currently under development (MRC 2010a), initiating a functional and organizational reform of the MRC by shifting its focus on specific core functions that go hand in hand with decentralization efforts aiming at increasing the organization's effectiveness.

5.1 MRC's Institutional Design Characteristics and their Adaptation-Conduciveness

The following sections analyze MRC's institutional design characteristics identified as decisive for adaptation capacity, aiming at mapping whether and to what extent the MRC provides adaptation capacity for strengthening resilience in the LMB and avoiding the (re-)emergence of collective-action problems that are likely to hinder development and poverty alleviation.

5.1.1 MRC's Membership Structure – Including all Riparians in Adaptation Efforts

The MRC, like its predecessors the MC and the IMC, was established among the four downstream riparians: Thailand, Laos, Cambodia, and Vietnam. With China and Myanmar not participating in institutionalized river basin management, the MRC has to be classified as a noninclusive RBO. The lack of inclusion of upstream riparians has significant implications not only for the management of the basin's resources, but also for adaptation efforts.

The nonmembership of China has been regarded as a major impediment to effective water resources management in the Mekong River Basin (e.g. by Backer 2006, Hirsch and Jensen 2006, Goh 2007, Hensengerth 2009, Osborne 2009). This impediment concerns climate change adaptation as well as human-caused changes in the river basin. China, which is likely to face significant climate change impacts in its part of the basin, including increasing temperatures, melting glaciers, increasing run-off in some parts of the year, and severe droughts in others, will most likely implement adaptation measures to protect its own development interests. These measures could influence downstream water resources in various ways, including changes in the river flow, decreasing sediment transports, or changing flood and drought patterns. While these impacts could cause significant harm but could also provide benefits to downstream riparians, the noninclusion of China in joint river basin management and thus climate change adaptation strategies makes coordination and the achievement of joint benefits considerably more difficult. Similar effects are to be expected from infrastructure developments China is currently undertaking in the upstream stretches of the river. So far, China has constructed four dams on the Upper Mekong (the Dachaoshan, Jinghong, Manwan and Xiaowan Dams), with another 10 under development or in the planning stage. The effects to be expected from these dams are still not sufficiently evaluated (on the debate, refer to Lu *et. al.* 2008, Freeman 2009, Middleton *et. al.* 2009, Osborne 2009), but it is argued here that better coordination between China and its downstream co-riparians would certainly enhance the effectiveness of mitigating potential negative consequences and increasing potential joint benefits.

Various mechanisms for coordinating and cooperating with China have been established under the framework of the MRC, namely the annual Dialogue Partner Meeting and the Agreement on Data Sharing signed in 2002 (this agreement was extended in 2008, with China now providing historical

hydro-meteorological data in addition to daily data during the flood season. China has offered, but not yet implemented, year-round data sharing in the context of the 2010 MRC Summit in Hua Hin (refer to MRC 2010b). Although these mechanisms are important steps, fully integrated water resources management is not yet ensured. Supporting better coordination between the MRC and its nonmember riparians on the basis of increased political, economic, and technical links (including links beyond the management of water resources to include other issue areas) as well as joint programs and projects would thus be a major contribution external actors could make to strengthening the adaptation capacity of the MRC and its member states and thus promoting resilience in the basin.

5.1.2 MRC's Functional Scope – Ensuring IWRM Based on a Broad RBO Portfolio

Art. 1 of the 1995 Agreement outlines the MRC's functional scope by defining the areas of cooperation as “all fields of sustainable development, utilization, management and conservation of the water and related resources of the Mekong River Basin, including, but not limited to, irrigation, hydropower, navigation, flood control, fisheries, timber floating, recreation and tourism.” Based on the agreement, MRC's functional scope is extremely wide, making it a multi-issue RBO.

In the course of the organization's development, various issues have been integrated into its functional scope and different programs, projects, and initiatives have been established. Besides the Basin Development Programme (BDP), which is in charge of general basin development planning and aims at providing a platform for integrating different sectors and activities functional programs include: the Agriculture, Irrigation and Forestry Programme (AIFP), the Environment Programme (EP), the Fisheries Programme (FP), the Flood Management and Mitigation Programme (FMMP), and the Navigation Programme (NAP). In addition, two cross-cutting initiatives were set up recently, the Climate Change Adaptation Initiative (CCAI) and the Initiative on Sustainable Hydropower (ISH). The Mekong IWRM Project as a successor of the Water Utilization Programme (WUP) holds a similar position within MRC's functional and organizational structure. The work of these programs is supported by various administrative and technical support programs (namely the Information and Knowledge Management Programme (IKMP) and the Integrated Capacity Building Programme (ICBP) as well as sections responsible for financial, administrative, and donor relations issues).

This broad functional scope – especially in comparison with many other RBOs – has received criticism for being too little focused on the actual challenges in the river basin and too broad (both functionally and organizationally) to be sustained by member states with limited financial, human, and technical capacities. Conversely, a broad functional scope has allowed the MRC to constantly integrate arising challenges in the river basin into its work programs – as shown by the establishment of the CCAI and the ISH.

Recently, the MRC has initiated a reform process that will significantly alter its functional scope. The process aims at redefining MRC's tasks based on the challenges emerging in the basin and on the needs as well as capacities of its member states, thus moving from an implementation-oriented RBO to a coordination-oriented one (refer to Schmeier 2010). This reform goes hand in hand with refocusing the organization's scope on water resources management issues. These

water management issues (as summarized under core function 2), consist of data acquisition, exchange and monitoring tasks, analysis, modeling and assessment functions, the provision of planning support to member states, forecasting, warning and emergency response services, the implementation of MRC procedures, the promotion of dialogue and the reporting and dissemination of MRC's work.

5.1.3 Data and Information Sharing within the MRC

The legal basis for data and information exchange within the MRC is defined in the 1995 Agreement and in the rules of procedures of the main MRC organizational bodies. While Art. 30 of the 1995 Agreement mandates the MRC to “maintain databases of information,” the Rules of Procedures of the Council (MRC 1996) state that “MRCS shall maintain and provide annual and other reports on data, information and analysis.” This rule is spelled out further in the Procedures for Data and Information Exchange and Sharing (MRC 2001), which provides the legal and institutional framework for data and information exchange among MRC member countries, for making data available for public access, and for promoting overall cooperation among MRC members.

Based on these documents, several principles guide MRC data and information exchange policy: data and information exchange should be arranged in an efficient, equitable, reciprocal, and cost-effective manner; member states should provide data and information to MRCS on issues concerning water resources, topography, natural resources, agriculture, navigation, flood, infrastructure, urbanization, environment, administrative boundaries, socioeconomic development, and tourism; MRC should ensure standards for data exchange and define modalities for sharing; and an MRC Information System (MRC-IS) should be set up and maintained by MRCS.

Although not directly concerned with climate change or other adaptation efforts, the availability of data ensured by this system of data and information exchange maintained by the MRC ensures that the RBO and its member states are provided with the relevant information for developing, implementing, and monitoring climate change and other adaptation activities in a well-informed way. For instance, MRC's various databases and models, maintained by BDP and IKMP, but also – in a more issue-specific manner – by EP, FP and NAP, collect, analyze and provide important knowledge for mapping both the state of the basin and the changes likely to occur in the future, including consequences for the basin's ecology, its riparian communities, and its overall development.

While several shortcomings exist in the day-to-day implementation of data- and information-sharing mechanisms in the MRC (especially related to the exchange of data and information among member states and coordination among MRC programs possessing different data and information and different models), MRC's overall capacity in this field significantly contributes to strengthening resilience in the basin. Further development of these capacities, for example, through the enhancement of hydrological modeling and forecasting exercises, could further improve MRC's capacity to contribute to greater resilience in the basin.

5.1.4 MRC's Dispute-Resolution Mechanisms

Formally, Arts. 34 and 35 of the 1995 Agreement define MRC's dispute-resolution mechanisms: MRC is mandated to make "every effort to resolve the issue" (Art. 34), but no details are provided on how this is to be done in practice. In the case the solution of a specific issue fails, it can be referred to bilateral negotiations among riparians or a mutually agreed upon external party can be asked for assistance (Art. 35). Again, no further details are given how such process is to be organized. Overall, MRC's provisions for dispute resolution remain vague, which could be a major impediment for successful adaptation to upcoming challenges in the basin.

Experiences with collective-action problems in the LMB indeed indicate a lack of well-functioning and reliable dispute-resolution mechanisms. For instance, the establishment of an MRC-initiated mechanism to solve problems in the Se San River Basin, a tributary to the Mekong, largely failed and no agreement could be reached between Cambodia and Vietnam. The establishment of an alternative mechanism under the auspices of the Asian Development Bank (ADB) has not yet led to a better outcome, but has certainly further weakened MRC's role in mitigating collective-action problems related to the use of water resources in the Mekong River Basin.

Current change underway in the river basin, related to climate change as well as to recent hydropower developments, is likely to put to the test MRC's capacity to mitigate conflicts. For instance, Laos' plans for the Don Sahong Dam project have led to a significant conflict with Cambodia, which fears negative impacts on fisheries – a resource on which the country depends heavily for poverty alleviation and economic development. In 2007, Cambodia officially protested the project by sending an official letter to the Lao government and by raising the issue at the MRC council meeting. Although the issue was discussed, no solution could be found. Instead, Laos moved ahead with signing a project development agreement with an investor for further exploration of the project in 2008. This underlines the limited impact of the MRC when it comes to mitigating water resources related conflicts in the river basin and balancing the different interests of riparian states.

5.1.5 Ensuring Sustainable Financing for MRC's Climate Change Adaptation Activities

Generally, the MRC is relatively well equipped with financial resources: with an annual budget of US\$ 23 million in 2009 (MRC 2009c), the RBO possesses sufficient financial means for the various river basin management tasks, including the financing of adaptation measures.

Funding mechanisms are specified in the 1995 Agreement (Art. 14), but have been modified by a 2000 council decision toward key-based cost-sharing, accounting for the very different financial capacities of member states. Traditionally, cooperation in the Mekong River Basin has been funded by the international community and most of MRC's budget is still provided by donors. MRC member states themselves contribute only 45 percent of the organization's core budget, while donors fund the remaining 55 percent as well as the entire technical cooperation budget (covering program and project activities of the organization), amounting to a total of more than 90 percent of the overall MRC budget (MRC 2006:55).

Member states make their financial contributions on the basis of a cost-sharing key (adopted in 2000), which acknowledges the enormous differences in member states' financial capacities and thus setting Cambodia's and Laos' contributions much lower than Thailand's and Vietnam's. Over the long term, however, the organization hopes to move back to an equal cost-sharing mechanism that reflects the equality of member states in terms of ownership and commitment. Until then, assistance from development partners such as the World Bank, not only to the MRC itself but also to economically and thus financially weaker member states, is of great importance for the overall functioning of the RBO as well as for its capacity to adapt to upcoming changes in the basin.

Recently, the MRC has moved toward increasing riparian-based financing aimed at increasing the contributions of member states by 10 percent per year until 2014 (MRC 2006), while slowly decreasing donor contributions to the core budget (program funding will remain dependent on external contributions for a much longer period). This financial riparianization process is closely linked to the reform of MRC's functions described earlier, aimed at reducing the costs of MRC activities and transferring responsibilities to member states. While presenting a step in the right direction, it is important that MRC's functional and financial reforms do not come at the expense of adaptation activities or neglect necessary activities on all governance levels. International development partners can play an important role by providing knowledge and experience that raises the awareness for change in the basin and by providing the financial and technical resources riparian states require to react.

5.1.6 Linking MRC's Adaptation Work to Regional Initiatives

Climate change adaptation work of an RBO needs to be linked to activities at the member-state level as well as to other institutions in the region. Links to member states are examined in more detail in section 5.2. This section maps the embeddedness of MRC's work in general and its adaptation efforts in particular into the regional environment of mainland Southeast Asia.

Mainland Southeast Asia possesses a variety of more or less well institutionalized regional cooperation initiatives, with an even larger number of institutions active in the Mekong River Basin: Greater Mekong Subregion (GMS); the Golden Quadrangle; the Forum for Comprehensive Economic Development of Indochina, initiated by Japan; Thailand's Neighboring Countries Economic Development Cooperation Fund; the Association of Southeast Asian Nations' Mekong Basin Development Cooperation (ASEAN-MBDC); the Mekong-Ganga Cooperation Initiative; the Development Triangle between Laos, Thailand, and Vietnam (2000); the Lancang-Upper Mekong River Commercial Navigation Agreement Regime; the Ayewady–Chao Praya–Mekong Economic Cooperation Strategy; the Emerald Triangle Cooperation; and the Cambodia, Laos, Myanmar, Vietnam (CLMV) Initiative. However, such a dense network of regional cooperation initiatives does not necessarily indicate a high level of integration. Instead, the degree of institutionalization of these initiatives remains rather low and their effect on confidence building, the development of joint principles and norms, and the actual implementation of projects remains limited.

Among the organizations mentioned, ASEAN and GMS can be considered the most relevant. However, cooperation between MRC and these institutions remains weak. While the importance of cooperating with ASEAN has been acknowledged by MRC members for some years (MRC 2007:45), and a memorandum of understanding (MoU) has been signed between the two institutions, the implementation of a partnership and the development of joint activities is still

lacking. Similarly, the establishment of a partnership with ADB's GMS and the publication of a joint report on how to strengthen relations has not yet led to a mapping of roles and responsibilities required for successful cooperation or the implementation of specific projects. Strengthening these relations and creating joint benefits for all members in the Mekong River Basin would not only increase the overall water resources management effectiveness in the basin, but would also contribute to the success of adaptation efforts in which ASEAN and GMS are involved.

Moreover, strengthening cooperation with knowledge institutions and epistemic community actors in the region could strengthen MRC's adaptation capacity. While various more or less formalized mechanisms exist for integrating the public as well as international NGOs into river basin management (e.g. stakeholder consultations on program strategies or on the hydropower-related Strategic Environmental Assessments (SEAs), their implementation is lacking and their outcomes are limited to the publication of reports after each meeting.

5.2 Linking MRC's Adaptation Activities to the Member States

Linking to different governance levels in a river basin is a significant challenge of joint river basin management (Schmeier 2010). When adapting to climate change or other developments in a river basin, additional challenges can occur. Actions taken at different governance levels in member states and at the regional level can either work together or counter each other. Thus, it is important to link RBO-level and national-level activities. The following sections focus on the national-regional link and introduce climate-change-related activities in Cambodia and Laos, the countries most in need of external support, and investigate the links between their national efforts and the MRC.

Cambodia, being extremely vulnerable to climate change as well as the consequences of human-caused change such as hydropower schemes further upstream, has implemented various adaptation capacities during the past few years. In 2006, the National Adaptation Program of Action to Climate Change (NAPA) was developed, focusing on four key activities (1) understanding climate change consequences and related hazards, (2) understanding and developing mechanisms to cope with hazards, (3) better coordinating existing programs and institutional arrangements related to climate change, and (4) developing new adaptation activities to be undertaken (Royal Government of Cambodia 2006:2). To implement these measures, various governmental bodies have been established (including the National Climate Change Committee and the National Climate Change Office), with additional bodies being responsible for specific hazards (e.g. the National Committee for Disaster Management). A large number of donors (e.g. ADB, Australia, GEF, Japan, UNDP, World Bank) support adaptation activities in Cambodia, most often focusing on the increasing vulnerability to floods. Donor harmonization and alignment with national strategies, however, remains a challenge.

So far, successful implementation of climate change adaptation projects remains limited, mainly because Cambodia lacks adequate scientific information on the main hazards (floods, droughts, consequences of human-caused developments, namely hydropower schemes – both in Cambodia and in upstream countries). The limited information and data available is often fragmented among national authorities (and donors), lacks regular updates, and is poorly disseminated. Moreover, early warning and forecasting systems do not always function efficiently, nor is the warning information disseminated to local communities. Improving technical capacities, building human and

financial capacity, especially in flood and drought management, and mainstreaming existing strategies and policies on adaptation to climate change and other challenges are key steps to strengthening the country's resilience to changes to come. Given the dependence of Cambodia on upstream water resources development and upstream-induced change, transboundary action and an integration of the different adaptation strategies throughout the basin are of particular importance.

In Laos, climate change adaptation strategies have been developed only recently, culminating in its 2009 NAPA (Lao PDR 2009). Laos' NAPA focuses on the expansion of irrigation systems to respond to changes in flood and drought patterns, the establishment of district-level disaster management committees, and an improvement in early-warning systems and information dissemination mechanisms (Lao PDR 2009:41–42). On the institutional side, a climate change focal point has been established within the Department of Environment at the Water Resources and Environment Administration (WREA) and a National Steering Committee on Climate Change was established in 2008 under the chairmanship of the prime minister. In addition, the National Disaster Management Office is in charge of disaster prevention activities, including coordination with the various line agencies. Various donors, namely ADB, Australia, UNDP and the World Bank, have supported these efforts.

As in Cambodia, implementation of projects remains limited in Laos, mainly due to capacity problems. Laos continues to lack basic knowledge on climate change consequences and the impacts of more severe weather events, and technical and human capacities for generating such knowledge are limited. For instance, most meteorological stations remain manually operated and have a limited efficiency, climate change or flood forecasting models and flood warning systems are of limited quality, and dissemination to the public is weak. Increasing the human, technical, and financial capacities in all fields of data and information management (for climate change as well as other emerging challenges) and the transformation of such knowledge into consistent strategies that are efficiently implemented is the main requirement for building resilience in the country. This data flow must include transboundary components as well.

These brief descriptions of adaptation strategies in Cambodia and Laos show that strengthening their capacities is a necessary condition for building resilience in the river basin. Given the transboundary nature of the river, such activities require coordination at the basin-level – a task for which the MRC has been established.

In the MRC, the main organizational bodies ensuring the linkages between the RBO and its member states are the national Mekong committees (NMCs). The committees are administered by the national water resources agencies or environment ministries in the respective countries, and their role is to link the MRC and its programs and projects to national line agencies and their work. Based on these structures, the MRC exhibits a specific way of linking the RBO to its member states. Only a few other RBOs, such as the Lake Victoria Basin Commission (LVBC) with its national focal points, OCTA with its permanent national commissions, or the OMVS with its *cellules nationales*, have similar national coordination bodies in place and operational.

Although it can be argued that establishing specific bodies to ensure the coordination of the work at different governance levels is an important contribution to ensuring water resources management effectiveness, linkages between the different governance levels in the Mekong River

Basin remain weak with regard to general water resources management and the NMCs are often criticized for playing an insufficiently effective role. This weakness has been acknowledged by the MRC in an independent organizational review (MRC 2007). It is, therefore, of great importance to strengthen the linkages between the governance levels by clarifying the roles and responsibilities of each governance levels (at which the core functions process currently aims), building up capacities within the NMCs and the national line agencies to execute their responsibilities, and intensifying coordination between the MRC and its member states (down to the local levels) for each specific issue prone to change. International donors and their projects aimed at strengthening technical and institutional capacity within the MRC and in its member states can thereby provide important help.

6. MRC PROGRAMS AND PROJECTS TO COPE WITH CHANGE

As a response to challenges emerging in the Mekong River Basin, the MRC has established various programs and initiatives specifically focusing on the most pressing issues – climate change, flood management, and hydropower development. The following sections investigate these programs' work and their contribution to the overall adaptation capacity of the organization.

6.1 The Climate Change Adaptation Initiative (CCAI)

6.1.1 Overview

The Climate Change Adaptation Initiative (CCAI) was established at the twentieth meeting of the JC as a regional initiative to support MRC member countries in planning and implementing climate change adaptation work. Its work is based on a vision of an “economically prosperous, socially just and environmentally sound Mekong River Basin responsive and adapting to the challenges induced by climate change” (MRC 2009a:6). To reach this vision, CCAI's goal is defined as climate change adaptation planning and implementation “guided by improved strategies and plans at various levels and in priority locations throughout the Lower Mekong Basin” (MRC 2009a:16). The goal is to be achieved on the basis of four activities and related outcomes: (1) adaptation planning and implementation, (2) improved capacity to manage and adapt to climate change, (3) strategies and plans for adaptation, and (4) regional cooperation, exchange, and learning.

Riparian people have been identified as the ultimate beneficiaries of CCAI's work, especially since the communities along the river banks are particularly vulnerable to climate change and related risks from floods and droughts (MRC 2009a:10). Moreover, all sectors have been identified as threatened by climate change and thus benefiting from CCAI activities, with agriculture, forestry, hydropower, navigation, fisheries, as well as household and industrial water use all being vulnerable to changes in water availability and water quality related to climate change. This focus on ultimate beneficiaries indicates that the link between climate change adaptation work and overall poverty reduction and socioeconomic development strategies has been acknowledged and considerably guides MRC's work in climate change adaptation.

To manage CCAI, a steering committee was set up and met for the first time in July 2010. Its role is to facilitate cooperation and coordination of activities of riparian countries to address the challenges of adaptation to climate change. Responsibilities have been defined in great detail, which indicates an increasing awareness within MRC that roles and responsibilities of organizational bodies must be spelled out to effectively implement projects, increase accountability, and establish monitoring mechanisms. It consists of permanent members from each of the MRC member states (two nominated by line agencies and one representative of NMC), MRC EP, and representatives from development partners funding the CCAI as well as nonpermanent/ad-hoc members nominated by NMCs or EP based on necessity. It is chaired by a representative of the country sharing MRC JC in the respective year.

Day-to-day work of the CCAI is to be coordinated and assisted by the MRC Office of Climate Change and Adaptation (OCCA), which provides secretarial and administrative services as well as technical assistance related to the implementation of CCAI projects. In addition, a number of

institutional mechanisms and bodies have been established and/or are integrated in CCAI's work, including the Mekong Panel of Climate Change (MPCC), national climate change focal points and the line agencies, the NMCs, national experts from member states, and various implementing partners as well as donors. The MPCC is expected to provide scientific guidance on climate change adaptation in the LMB, mainly by producing an analysis of the status of climate change and adaptation results in the basin every three years, which can be used as a benchmark for monitoring implementation success. National line agencies are involved via their climate change offices and climate change focal points through which they participate in the planning, implementation, and monitoring of CCAI activities. The NMCs are supposed to play a critical role in CCAI implementation as well, mainly through NMCs' EP coordinators. In addition, national experts from the member states will be involved in CCAI work, mainly through participating in preparation and review work, capacity building activities, and policy advice. It is expected that these experts will be closely linked with MPCC. It is also envisaged that CCAI will establish MoUs with implementing partners (agencies working on climate change and adaptation in the LMB, either through existing projects or based on specific technical capacity and with a strong history of collaboration with MRC), which will be integrated into CCAI's management structure. Similarly, donors will be integrated in the CCAI structure, mainly through their participation in CCAI meetings, to ensure donor alignment and harmonization. All these actors are expected to join into the CCAI Regional Task Force, responsible for the design of activities within CCAI, the evaluation of progress, and the proposal of changes and adjustments in CCAI projects to improve performance.

Although, a detailed layout of an initiative's institutional and implementation structure is an important prerequisite for its effectiveness, an institutional set-up as complex as CCAI's faces the risk of either not being implemented adequately or generating an overload of meetings and administrative work, distracting human, financial and technical resources from what CCAI actually plans to do, that is, realizing climate change adaptation projects in the LMB.

6.1.2 Implementation

MRC CCAI is planned to be a long-term endeavor, with at least three project cycles envisaged. The first project cycle, following the intermediate phase from project planning to implementation (2009–2010), starts in 2011, being linked to the 3rd Strategic Plan 2011–2015. It will be followed by two more phases (2016–2020 and 2021–2025), linked to MRC strategic planning cycles.

The intermediate phase (2009-2010) set up institutional and management arrangements, developed tools, and established operational systems for monitoring, built partnerships and identified pilot areas and demonstration sites, and conducted related activities. The three main phases of CCAI will focus on the adaptation process itself, starting with pilot areas and then, after monitoring and reviewing implementation, replication in other parts of the LMB (MRC 2009a:29).

The *CCAI Framework Document* (MRC 2009a) develops a detailed implementation strategy for CCAI activities for the first two phases, including a work plan outlining the sequencing of implementation activities (annual work plans will be prepared for each calendar year).

In the intermediate phase (2009–2010), activities focus on six aspects of climate change adaptation (work on adaptation planning has not yet started, although it was envisaged in CCAI's work program for the intermediate phase).

1. Initialization of **priority activities**, namely the design of a CCAI communication strategy, scoping of the strategy, capacity building activities, and the organization of a first MPCC meeting.
2. Identification of pilots and the definition of **demonstration activities**, including initial implementation of adaptation planning activities.
3. **Development of methods** and tools, focusing on data acquisition and the establishment of assessment tools.
4. **Establishment of partnerships**, including the set-up of MPCC and the organization of a networking seminar.
5. Development of a **monitoring and evaluation system**, namely the development of a set of indicators for the monitoring framework and the definition of baselines.
6. Establishment of **institutional and management arrangements**, including the establishment of OCCA, the definition of a CCAI funding strategy and financial planning.

Phase I of CCAI (2011–2015) includes the following implementation activities:

1. **Establishment and operation of demonstration site activities** (including evaluation and analysis of lessons learned).⁸
2. Basin-wide transboundary or sector-specific **assessments of adaptation activities** and analysis of lessons learned.
3. Preparation of **policy guidance materials** from pilots for selected sectors or regarding transboundary issues (including documentation of planning tools).
4. Provision of **training activities** at demonstration sites and to government agencies (development of training materials, exchange visits, technical workshops, and awareness raising).
5. Organization of **CCAI events** (climate change and adaptation forums in 2012 and 2015, including high-level round-tables).
6. **Monitoring and evaluation** (reports on climate change and adaptation in Mekong River Basin in 2012 and 2015).
7. **Review of CCAI** achievements in Phase I and development of Phase II by the end of 2014, including securing of funding.

In the first two phases of CCAI, several reports are planned, namely the “Status of Climate Change and Adaptation in the Mekong Basin Report” (produced by MPCC every three years), an annual performance assessment report, and six monthly progress reports prepared by OCCA on implementation achievements, leading to updates in the annual work plan if appropriate. Although

⁸ In this work program, demonstration sites play an important role. So far, demonstration sites have been chosen in all four member countries based on criteria such as changes in water availability and quality, increasing flood or drought risks, changes in local economies or disruptions to livelihoods (Prey Veng Province in Cambodia, Savanakhath Province in Lao PDR, Nam Young Sub-Basin in Thailand (although still in the process of consultations) and Kien Gian Province in Vietnam have been selected).

such reports are indeed important for monitoring implementation activities and increasing knowledge about climate change and adaptation in the basin, there is the risk of the work becoming report driven and neglecting implementation on the ground – as other MRC programs have been criticized for doing in recent years.

CCAI's budget has been set up for the Intermediate Phase and Phase I, targeting an overall amount of US\$ 15 million (MRC 2009a:33). Although not specified in detail, it has been determined which outcomes will receive what share of the budget, with outcome 1, focusing on the specific implementation of adaptation projects, receiving 43 percent of this budget, while outcome 2 (capacity building) receives 19 percent of the budget, outcome 3 (policy framework development) 15 percent, and outcome 4 (coordination and management) 13 percent (MRC 2009a:34).

Funding has already been provided by the Australian Agency for International Development AusAid, which supported the formulation of the *CCAI Framework Document* and a climate change forum in February 2009 and will fund parts of the basin-wide climate change assessment under output 1 as well as parts of the climate change policy planning, targeting US\$ 1 million for the first step of CCAI's work (MRC 2009a:34). In addition, AusAid has committed US\$ 2.5 million for further work of the CCAI. Germany, Finland, and Sweden have recently indicated their willingness to contribute to CCAI's budget. However, despite increasing donor commitments, a significant funding gap remains (calculated at US\$ 9.5 million in October 2009; MRC 2009a: 34). The table below summarizes donor contributions and commitments to CCAI.

Since MRC CCAI is still in its preparatory or intermediate phase, achievements cannot be evaluated nor can the appropriateness of the project phases suggested in the *Framework Document* (MRC 2009a) be assessed. However, it is generally assumed that a detailed implementation plan based on specific timelines facilitates implementation and thus increases project effectiveness.

To monitor implementation achievements, MRC CCAI foresees a monitoring and reporting framework based on three levels of review: (1) the state of climate change and adaptation in the basin (impact level), (2) the impact of CCAI on adaptation in the basin (better referred to as outcome level), and (3) the progress and performance of CCAI (outcome level). For each level, specific indicators have been developed (MRC 2009a:44 ff.) and will be further refined during implementation. Coordination with MRC's overall monitoring system, the performance management system (PMS), is planned, though not spelled out in detail by CCAI. However, a close link between program-specific monitoring within CCAI and the overall organizational monitoring on the basis of the PMS is of great importance for ensuring effective climate change adaptation, especially since an issue of such high cross-cutting and cross-sector relevance as climate change needs to be closely linked to work in other MRC programs.

Table 6.1: Summary of Donor Contributions and Commitments to CCAI

Donor	Project	Time	Description	Amount
Australia	Support MRC's BDP (including CCAI)	Since 2008	Create development scenarios to assess the potential and constraints of possible water resource use options across the Mekong Basin, partly included in CCAI work plan).	US\$ 450,000
Australia	Support MRC's CCAI	2008–2012	Support knowledge building and improvement of MRC's capacity to adapt to climate change.	\$A 4 million
Denmark	Support MRC for countering climate change	Since 2010	Funding to counter effects of climate change to help Cambodia, Laos, Thailand, and Vietnam when working together to mitigate effects of changes in weather patterns; help CCAI develop and test strategies to help local communities to adapt to climate change (e.g. drought and salinity resistant crops, enhanced flood preparedness techniques, resilience in water supply); training to government agencies in mitigation measures, for basin-wide scientific forum on climate change issues.	US\$1 million
Finland	Contribution to MRC's IKMP	2007–2010	Support IKMP in basin development issues, especially data use, information and decision support tools, exchange of data on water resources, hydrology and meteorology (e.g. management of high quality and integrated MRC-IS databases), including climate change-related data	€ 6.73 million
Finland	Basin development planning through MRC's IKMP	2008–2012	Support the IKMP, with specific emphasis on its relation to basin development planning to allow for exchange and sharing of data on water resources, hydrology, and meteorology as well as all other resources required to implement the work of the MRC's programs, such as management of high quality and integrated MRC-IS databases, and the capacity to analyze and interpret data.	€6.728 million
Germany	Contribution to MRC's climate change work	Upcoming	n/a	n/a

Based on the acknowledgement that climate change adaptation is a cross-cutting issue, MRC CCAI aims at engaging with all MRC programs and initiatives. For instance, MRC CCAI aims at closely collaborating with BDP to integrate climate change scenarios into overall BDP scenarios or with IKMP to develop modeling capacity in the LMB that can help member states assess climate change consequences and develop reliable data sets as well as provide information and data on climate change to programs managing sectors or issues affected by climate change, such as the

Fisheries and the Agriculture, Irrigation and Forestry Program, or the Initiative on Sustainable Hydropower (for a more detailed description of collaboration possibilities between MRC CCAI and other MRC programs refer to MRC 2009a:14–15 and Annex 9). Coordination is mainly based on MRC's program coordination meeting that takes place more or less regularly and brings together heads and chief technical advisors CTAs of MRCS programs to exchange information and coordinate their work. In practice, however, cooperation between MRC CCAI and MRC programs is still limited, due to a general lack of interprogram coordination and information exchange within the MRC. For instance, program coordination meetings are not held regularly and rarely go beyond information exchange or discussion of administrative concerns, losing the overall perspective on potential areas of collaboration between the programs. An overall improvement of coordination mechanisms within MRCS is therefore an important prerequisite for a successful coordination between CCAI and other MRC programs.

MRC CCAI also hopes to engage a number of actors in member states and at the regional level, to build a partnership approach. Four groups of actors cooperating with MRC CCAI OCCA have been identified: (1) state actors in MRC member states, namely the line agencies concerned, the NMCs, and local governments; (2) technical and scientific experts such as CCAI national experts and the Mekong Panel on Climate Change (MPCC); (3) core implementing partners such as technical organizations involved in climate change related projects; and (4) the donor community supporting CCAI with technical and financial means.

CCAI plans to engage with nonmember Mekong riparians, Myanmar and China. Especially China, as the most upstream riparian, is of great importance for water resources governance and climate change adaptation in the basin, mainly because its water resources development projects significantly influence water resources downstream. CCAI builds on the existing partnership structure between the MRC and its upstream neighbors, namely the annual dialogue partner meetings and the 2002 Agreement on Data Sharing between China and the MRC. Mapping out cooperation opportunities with China is, however, still under development, with no new results achieved so far.

This situation provides an interesting starting point for donor engagement. Especially donors working both in China and in MRC countries could play an important role in promoting cooperation and data and information exchange, significantly increasing CCAI's long-term effectiveness and thus the overall resilience of the LMB to climate change. Moreover, specific projects providing new funding and knowledge to the MRC could be of interest for China as carrots for more cooperation on climate change adaptation leading to a more cooperative relationship in general.

CCAI also plans to hold regular meeting with stakeholders, as was begun at the Regional Forum on the MRC CCAI (February 2009): That forum discussed various climate change related aspects, such as newly emerging challenges related to water and climate change, national adaptation strategies, and existing donor projects, as well as experiences from other river basins (Danube, Murray-Darling, and Rhine), with 150 representatives of stakeholders in the region. Such meetings not only allow for sharing experiences and knowledge among stakeholders, but also provide important coordination mechanisms for actors engaged in climate change mitigation in the LMB – on the national, regional, provincial as well as local levels.

6.2 The Flood Management and Mitigation Programme (FMMP)

As shown in section 3, floods are one of the main hazards in the LMB, and are likely to increase in intensity, duration, and severity in future years, mainly due to climate change impacts. Floods often have extremely costly consequences for riparian communities, not only in the loss of lives and livelihoods, but also in reducing economic development opportunities by destroying infrastructure, reducing economic activities, harming businesses, and triggering waterborne diseases. Conversely, floods provide benefits to the region by creating fertile flood plains, transporting sediments from upstream regions, and maintaining an ecosystem dependent on the natural change in river flow over the year. Flood management is, therefore, an important component of overall river basin management and the ability to respond to extreme events – most likely to be intensified by climate change, but possibly mitigated through large infrastructure schemes if managed appropriately – is a key component of adaptation.

6.2.1 Overview

MRC's Flood Management and Mitigation Programme (FMMP) was established in 2002,⁹ based on the approval of the Flood Management and Mitigation Strategy (MRC 2002) developed on request of the MRC council at its meeting in October 2002. Its strategic goal is stated as “people’s suffering and economic losses due to floods are prevented, minimized, or mitigated, while preserving the environmental benefits of floods” (MRC 2002: 1).

MRC FMMP consists of five components, each focusing on a specific objective:

1. The **Regional Flood Management and Mitigation Center** (RFMMC) has the objective to maintain important flood-related data, knowledge, and tools; produce regional flood forecasts; and provide tools for impact analysis. For the first six years of its existence, a budget of US\$ 14.3 million was suggested by the MRC (MRC 2002:21), of which the vast majority was provided by international donors.
2. The **structural measures component** of FMMP aims at reducing vulnerability to floods through structural interventions, namely by establishing guidelines for all member states on the design, risks, and operation of such measures (including flood-proofing measures to reduce people’s vulnerability to floods). So far, implementation has been piloted in focal areas in all four MRC member states.¹⁰
3. The **transboundary issues component** focuses on the mediation of transboundary flood impacts through the establishment of mediation and coordination mechanisms and development of formalized rules for the resolution of flood-related transboundary problems. This is to be achieved through the generation of relevant information,

⁹ The history of joint flood management and, especially, forecasting is much longer in the LMB: Following severe floods in 1966, member states of the MC established a forecasting system, which was operational in the early 1970s. Further improvements were made in the late 1970s, following a devastating flood in 1978. FMMP is thus built on a history of cooperation among LMB riparian states in the field of flood management, acknowledging the benefits of joint efforts in managing and mitigating the floods of a transboundary river.

¹⁰ Focal areas are Kratie Province, the Bassac River and parts of the left-bank Mekong mainstream in Cambodia, Bokeo Province and the Lower Se Bang Fai Basin in Laos, the Lower Nam Mae Kok Basin in Chiang Rai Province in Thailand, and the Upper Se San Basin, the Plain of Reeds and the Long Xuyen Quadrangle in Vietnam.

including the identification of transboundary flood issues, the development of best-practices guidelines, awareness raising and capacity building mechanisms, and the clarification of dispute-settlement mechanisms within MRC.

4. The **emergency management component** has the task to strengthen emergency management capacities in the member states, namely by raising awareness and providing education and training programs, reviewing existing and producing new manuals, and providing training as required in the member states.

Finally, the **land use management component** aims at improving land management in the LMB to prevent or mitigate floods. This improved management includes improved risk assessment methodologies (based on improved data and techniques such as GIS-based land use planning, digital elevation models, and other georeferenced data), flood prevention, and flood mitigation means.

6.2.2 Implementation

One of the most important components of the FMMP is the Regional Flood Management Center (RFMMC), established in 2005 in Phnom Penh. It has the task of providing and maintaining flood-related analytical tools, data, and knowledge at the national and regional levels. To forecast floods in the basin and provide management advice to national governments and the MRC, the RFMMC produces regional flood forecasts, disseminates them across the region, and develops risk assessment and impact analysis tools.

Today, FMMP provides significant flood forecasting services: Based on data from 23 measuring stations in the LMB, seven-day river monitoring and flow forecasting is provided during the dry season and daily forecasts during the wet season. These forecasting products are used by the NMCs, national line agencies, national disaster management committees, news media, nongovernmental organizations (NGOs), and international actors for their work in the basin. It can thus be presumed that the existence of a flood forecasting infrastructure and the related acquisition, analysis, and dissemination of data contributes significantly to adaptation and increasing resilience in the river basins, especially with regard to climate change-induced water variability and extreme events such as floods and droughts.

FMMP implementation has, from the beginning, integrated various stakeholders in the river basin and can be considered one of MRC's issue-areas in which public participation is the furthest developed. The Annual Mekong Flood Forum serves as a platform for bringing together stakeholders from throughout the LMB to discuss issues of flood management, forecasting, dissemination, prevention, and mitigation. The 2009 Annual Flood Forum focused on how to combine IWRM concepts with flood management and mitigation efforts. Discussions focused on data management and collection tools, the development of flood risk management plans, potential transboundary flood impacts, and the ongoing development of a regional flash flood warning system.

Moreover, cooperation with technical experts and academics is particularly strong in FMMP and a community of experts has been established that contributes up-to-date knowledge and data to MRC's flood management and mitigation work. For instance, in 2002, an expert meeting held by the MRC brought together scientists focused on flood management to review existing flood

warning mechanisms in the LMB and to develop recommendations for improvement. The inclusion of epistemic communities is an important contribution to effective climate change adaptation, especially since science-policy linkages are so tight in this issue-area.

Since its establishment in 2002, FMMP has received substantial donor support, mainly from Germany and the Netherlands (see table 6.2).

certain issue areas (as to be expected with climate change). For instance, already several parallel structures exist, such as the ADB project Preparing the GMS Flood and Drought Risk Management and Mitigation Project (ADB 2008), which set up structures that operate in parallel to the GMS and the MRC as well as interact with them and use representatives of these institutions in yet additional institutional mechanisms, such as the Regional Coordination Committee (RCC) and the different national steering committees for the project (ADB 2008:4).

Overall, FMMP, however, is an extremely important contribution to river basin management in the Mekong River Basin, helping to protect riparian communities and states from flood damage and thus strengthening their economic development opportunities. Even with certain challenges remaining – especially related to data exchange and data processing – the contributions FMMP makes to strengthening resilience in the river basin cannot be overestimated. Indeed, the program can be regarded as a particularly successful case of adaptive river basin management, providing considerable benefits to the riparians.

Table 6.2: Summary of Donor Contributions to FMMP

Donor	Project	Time	Description	Amount
ADB	Preparing the GMS Flood and Drought Risk Management and Mitigation Project	Since 2008	Aims at improving the abilities of communities in Cambodia, Laos, Thailand, and Vietnam to prepare for and respond to floods and droughts and their negative impacts. Although a GMS project rather than an MRC project, there is close collaboration with MRC FMMP (e.g. for training and capacity building activities).	US\$ 2.5 million
Germany	Flood Prevention and Disaster Risk Management in the Lower Mekong Basin Phase I (Contribution to MRC's FMMP)	2004–2007	Support to FMMP for components 4 ^a (strengthening capacities for disaster mgt. and works to ensure the improvement of existing emergency mgt. mechanisms through capacity building, knowledge and public awareness at different local levels) and 5 (aims at improving land management techniques through flood probability maps and assessment techniques, improved land use planning), implemented through GTZ	€3.0 million
Germany	Flood Prevention and Disaster Risk Management in the Lower Mekong Basin Phase II (Contribution to MRC's FMMP)	2008–2010	Support to FMMP for components 4 (aims at strengthening capacities for disaster management and works to ensure the improvement of existing emergency management mechanisms through capacity building, knowledge and public awareness at different local levels) and 5 (aims at improving land management techniques through flood probability maps and assessment techniques, improved land use planning), implemented through GTZ	€3.0 million
Netherlands	Support for MRC Flood Programme	since 2004	Enhance flood preparedness, improve information and knowledge on floods, sustainably manage river basin, establish a Regional Flood Management and Mitigation Centre in Phnom Penh, Cambodia, structural measures (through the Asian Development Bank), mediation.	US\$ 12.7 million

Note: a. See five programmatic components of FMMP listed in section 6.2.1.

As it is the case with many donors engaged in a specific issue area, institutional overlaps have been established and are likely to worsen with the increasing interest of international actors in

Integrating Drought Risks into MRC’s and FMMP’s Work – The Drought Management Program

Droughts are a significant hazard in the LMB. Although causing less immediate damage through the loss of lives and livestock than floods, their long-term impact on the socioeconomic development of riparian communities is significant. As a reaction to severe droughts in the LMB in 2004 and 2005, the establishment of a drought management program was suggested in MRC’s 2nd Strategic Plan 2006–2010 (MRC 2006). More recently, the 3rd Strategic Plan again points out the importance of drought management in the LMB (MRC 2010a:17), referring to significant losses due to droughts and the urgent need to develop drought forecasting and drought risk reduction mechanisms.

The main objective of drought management within the MRC is “to establish effective drought awareness, preparedness, planning and management mechanisms in the LMB supported by the best available tools and know how, and facilitating and supporting the implementation of high priority national and regional programs and multi-purpose projects” (MRC 2007). The program focuses on four dimensions of drought management: (1) drought forecasting and early warning, (2) drought impact assessment, (3) drought preparedness/mitigation, and (4) drought management on the political level. Each of these dimensions constitutes one component of the drought management program. Because of the strong linkages between flood and drought management with regard to data and information needs, it was decided to integrate the Drought Management Program into FMMP and to build on existing institutional mechanisms and working procedures.

However, implementation of drought management activities in the LMB is still lacking. No appropriate structures for drought management been established within FMMP nor has a work plan and a time frame been developed. One reason for this lack of success is the limited capacity on both the national and the regional levels (refer to Hundertmark 2008): On the national level, especially Cambodia and Laos face significant shortcomings, while Thailand possesses strong drought research and adaptation capacities, and Vietnam has been catching up in the past few years with regard to drought analysis, forecasting, and mitigation. In Cambodia, capacity problems affecting water resources management and climate change adaptation in general impede successful drought management, namely limited human and technical capacities, inadequate or insufficient coordination between line agencies, and the limited functioning of meteorological and hydrological technologies. Similar findings hold true for Laos as well. In addition, in Laos a lack of awareness for drought risks can be identified, with drought risks ranking extremely low on the political agenda and their impacts rarely being considered in general development planning (Hundertmark 2008:283–4). Moreover, financial resources for drought management – from MRC member states or international donors – are still lacking.

6.3 The Initiative on Sustainable Hydropower (ISH)

As described in section 3.3, hydropower is among the most pressing challenges the Mekong River Basin is facing and requires well-coordinated regional management to maximize joint benefits and mitigate negative consequences related to large dam projects. The MRC has, therefore, developed

its Initiative on Sustainable Hydropower (ISH), responsible for coordinating all efforts related to the management of hydropower issues in the river basin.

6.3.1 Overview

Established in 2009, the ISH has the task to develop, commission, coordinate, and disseminate projects and studies related to the analysis of the potential consequences of hydropower developments and their mitigation. This includes studies on the effects of dams on fish migration, the development of design standards for navigation locks, and the establishment of environmental impact assessment approaches. Moreover, the ISH supports the PNPCA in the river basin, ensuring that dam projects are developed according to regional norms and rules and in a cooperative way to prevent harm to other riparian states.

ISH is structured around four components. These are:

1. **Management and communications**, encompassing general management work for the program, but including communication and public participation mechanisms as well.
2. **Capacity building and knowledge base support**, intended to promote knowledge sharing and capacity building within the MRCS, NMCs and line agencies, regulatory bodies, and other stakeholders.
3. **Regional planning support**, focusing on integrating sustainable hydropower considerations in the strategic and regional planning processes of MRC members, with a particular emphasis on SEAs.
4. **Sustainability assessment and financing**, consisting of the development of a hydropower sustainability assessment tool and the provision of assistance to line agencies, developers, and stakeholders to apply such tool.

The results the ISH aims to achieve and the goals it has set for its work can be summarized as follows:

1. Extending SEAs to subbasin levels and significant tributaries in which hydropower projects are considered.
2. Expanding knowledge on hydropower to provide sustainability assessments for existing and proposed projects.
3. Improving baseline and operational data for planning and monitoring hydropower projects and for use by all MRC programs, dam developers and operators, and national line agencies.
4. Developing and providing technical assistance to regulatory agencies and developers on environmental and social safeguards and best practices.
5. Assessing the multipurpose functionality of existing and proposed dams and providing guidance on the sustainable management of reservoir watersheds.
6. Scoping potentials and incentives for small hydro projects and developing sustainability considerations for such projects.
7. Identifying benefit-sharing mechanisms at different governance levels in the river basin.

8. Expanding the use of sustainability assessment tools for informing policy planning and design and operation practices.
9. Evaluating and disseminating experience on innovative financing mechanisms for sustainable hydropower development and operation.

ISH can thus be seen as a truly cross-cutting effort to deal with the expected or visible consequences of hydropower dam development in the Mekong River Basin, aiming at mitigating the negative effects hydropower projects can produce and increasing the benefits they might provide to riparian communities and states. It therefore constitutes an important component of MRC's adaptation capacity.

6.3.2 Implementation

ISH implementation is closely coordinated with other MRC programs and projects and most of its work is set up in a cross-cutting manner and in cooperation or coordination with programs such as BDP, EP, FP, or NAP. MRC's work on hydropower complies with IWRM requirements regarding the integration of various sectors into management and mitigation or adaptation efforts.

Among the most important components of ISH's work are the strategic impact assessments (SEAs). During a 14-month process, the impacts of potential or planned hydropower dams on the Mekong mainstream were assessed, including issue areas such as environmental consequences, fisheries, wetlands, and economic and social development opportunities. The SEA concluded that mainstream hydropower projects should be deferred for 10 years due to the uncertainties regarding the extent and the irreversibility of the consequences of such developments for the river system. While these results are being reviewed by the member states, it seems unlikely that a moratorium of hydropower developments, as called for by many NGOs and, most recently, Vietnam, on the mainstream will take place. Nevertheless, the SEAs have made an important contribution to strengthening knowledge and raising awareness on hydropower development projects in the mainstream, and providing important inputs for the ongoing PNPCA on the Xayaboury Dam.

In the context of ISH's work, cooperation with stakeholders within and beyond the basin is an important component. The main mechanisms are regional multi-stakeholder consultations, as were held in September 2008 on the formulation of ISH's program, mandate, and functions, as well as various issue- or country- specific events, such as the "Mekong Mainstream Dams: People's Voices Across Borders" meeting and the "Dam Affected People's Forum," both held in late 2008, or the specific "National Workshop on Understanding Fisheries and Livelihoods in Cambodia and the Proposed Don Sahong Dam" meeting held in Cambodia in mid-2009.

ISH also cooperates with regional organizations such as the ADB and the World Wildlife Fund (WWF) to assess the environmental consequences of hydropower projects and develop hydropower sustainability assessment tools.

Although tools for assessing potential hydropower consequences are relatively far advanced and methodologically sound, their application to actual decision-making processes among policy makers in the river basin remains limited.

7. CONCLUSION

Climate change, as well as infrastructure changes, currently mainly related to the development of large hydropower projects, cause severe challenges for the Mekong River Basin. They do, however, also provide opportunities for more intensive regional cooperation to manage shared resources and generate joint benefits for riparian countries. Whether such opportunities can be used, depends on the resilience in the river basin, which, in turn, depends on the adaptation capacity of river basin management institutions. Strengthening their adaptation capacity is therefore of great importance.

As table 7.1 shows, the MRC possesses a number of institutional design factors conducive to adaptation to climate change and human-caused developments in the basin, based on its procedures, its IWRM-compliant functional scope, its highly developed data and information sharing mechanisms, and its funding structure. However, room for improvement remains, especially in the organization's membership structure, its dispute-resolution mechanisms, and its linkages to other governance levels (both national and regional). These areas provide starting points for further enhancing the organization's adaptation capacity and thus the basin's resilience to change.

Table 7.1: Factors for Resilience in the Mekong River Basin and within the MRC

Variable	Relevance for Adaptation	Characteristics in the MRC
Treaty provisions	Treaty provisions set the basis of institutionalized cooperation and adaptation and thus constitute a necessary, though not a sufficient, condition for resilience	1995 Agreement has no reference to water allocation, adaptation, or change, but clearly defines general rules for water resources use and management applicable to changes in the basin
Additional legal provisions	Additional provisions regarding water allocation, water resources use and protection etc., can further strengthen treaty provisions and provide additional legal mechanisms for water resources and change management	MRC possesses highly developed procedures for water resources management and clearly defined mechanisms, applicable to adaptation to change in the basin
Membership structure	Integrated river basin management and adaptation to change requires the inclusion of all (relevant) riparians – if not in the RBO, through coordination and cooperation mechanisms	MRC has a noninclusive membership structure; nonmembership of China is a significant impediment for successful adaptation; thus need better coordination with China
Functional scope	Integrated river basin management and the inclusion of adaptation measures across sectors requires functional scope beyond single issue	MRC is multi-issue RBO, ensuring IWRM by including all relevant issues in the basin (including openness for new issues emerging due to change in the basin)
Data and info sharing	Data and information sharing is a prerequisite for adaptive river basin management and for more general long-term sustainable cooperation	MRC does have well-developed data and information sharing mechanisms (including climate change and hydropower data), room for improvement remains (especially in data use and in climate modeling)
Dispute resolution	Dispute-resolution mechanisms are decisive for maintaining long-term cooperation, especially in times of exogenous and endogenous change	MRC struggles with persistent problems with dispute-resolution mechanisms (regarding their legal definition and their application to conflicts in the basin)
Financing	(Adaptive) river basin management requires long-term sustainable funding and funding mechanisms ensuring the compliance of member states	MRC possesses sufficient financing means, but issues remain related to sustainability, alignment, and harmonization
Regional embeddedness	Coordinated adaptation across actors in the broader region and cooperation with other activities in the basin strengthens resilience and reduces inefficiencies	MRC has only limited regional embeddedness and limited cooperation with other institutions (especially ASEAN and GMS)
Linkages to members	Successful adaptation in a river basin requires efficient linkages among adaptation measures at different governance levels	MRC has only limited linkages to member states with organizational deficiencies, need to improve linkages among governance levels

8. LESSONS LEARNED FOR THE WORLD BANK

As the previous sections have shown, building resilience in an international river basin requires tremendous effort and establishing the required level of adaptation capacity within an RBO requires substantial financial, technical, and human capacity. Because RBOs in the developing world often lack such capacities or have various shortcomings, international donors such as the World Bank have an important role to play in supporting these organizations. The following is an overview of starting points for donor engagement in general and World Bank support in particular for strengthening the adaptation capacity in RBOs.

First, it must be noted that river basin management decisions – including the decision to take joint action on climate change or other challenges emerging in a river basin – are made exclusively by riparian states. As experience from various river basins show, such decisions are often related to a number of difficulties and politically contested issues, mostly related to the transboundary nature of watercourses. Nevertheless, it is of great importance to support both national and regional institutions in managing river basins and adapting to change with efforts distributed among different governance levels depending on the specific political circumstances in each river basin.

In this context, international donors have often initiated the signature of IWTs and the establishment of institutionalized river basin management mechanisms (The World Bank, for instance, made important contributions to the signature of the Indus Treaty and the establishment of the Permanent Indus Commission [PIC] and is highly involved in the establishment of sustainable management mechanisms in the Nile Basin with the Nile Basin Initiative [NBI]; similarly, UNDP has supported the establishment of the MRC; and regional institutions, such as SADC, have contributed considerably to the establishment of RBOs, such as Permanent Okavango River Basin Water Commission [OKACOM] or Orange-Senqu River Commission [ORASECOM] in their regions). It is, thereby, important to help riparian states from the beginning of institutionalized cooperation to integrate mechanisms for dealing with change that might occur in the future.

During the course of their development, RBOs often contribute to the signature of additional principles and rules for water resources and river basin management (as, for instance, in the form of the MRC Procedures). Donors can help strengthen resilience by promoting the development of such mechanisms (as the World Bank has done with its support to MRC's Water Utilization Programme WUP). This support should include the provision of financial means as well as the strengthening of technical and human capacity in the basin.

As this paper has shown, the membership structure of an RBO – even if it excludes important players – must be regarded as a given, at least short term. Although the structure provides little room for direct donor engagement, promoting cooperation among all riparians in the river basin and the coordination of the RBO's work with nonmember-states is a meaningful entry point for donor engagement. Donor organizations that maintain good relations with all actors involved (as in the case of the World Bank with China) can play an important role in strengthening IWRM across all actors in the basin and ensuring that adaptation efforts are well aligned among all basin countries to create joint benefits instead of negative externalities related to unilateral action.

Although the functional scope of an RBO itself provides little room for external involvement and the issues included in an RBO's mandate are designated by its member states, donors can play an important role in ensuring that tasks foreseen by member states are actually implemented through programs and projects. This role includes providing financial resources and support to acquire and establish the human and technical capacities required for successful implementation of resilience-strengthening projects within the scope of the organization. The Mekong IWRM Project is a good starting point for such capacity strengthening; it helps build the capacity to effectively implement what the organization intends in its functional scope. Moreover, supporting reform processes to clarify an RBO's mandate and functions can be a significant contribution to river basin management effectiveness – especially in times of change.

MRC's core functions process provides a useful entry point for additional donor engagement, especially since institutional reform processes tend not to be sufficiently funded by donors, often due to earmarking and project-specific funding. The MRC lacks financial resources that can be designated to its reform process and is considering setting up new financing mechanisms, such as a trust fund, that would allow more flexibility.

Data and information management – identified as a key prerequisite for successful adaptation work – is costly, requiring financial, human, and technical resources for data acquisition, forecasting, storage, analysis and dissemination. Joint data and information management is often the easiest starting point for transboundary cooperation, creating a number of benefits to riparian states without necessarily involving politically contested issues. However, in many RBOs in the developing world, financial, technical, and human capacity is insufficient to provide adequate data management. Even the MRC, a relatively well-funded RBO, is struggling to acquire sufficient financial resources to maintain and extend its data and information exchange work. Donor engagement is thus of particular importance in this area. Moreover, effective data and information exchange depends on the availability of knowledge and technology, often insufficiently developed. Donors can make an important contribution to equipping an RBO and its member states with these resources. Although the Mekong IWRM Project of the World Bank is an important step forward in this regard, further action (especially with regard to data acquisition, early warning systems, and forecasting models and their dissemination), as well as better alignment of the efforts of different donors, could significantly improve the resilience in the Mekong River Basin.

Dispute settlement, a weak point within the MRC, threatens to decrease the river basin's otherwise relatively high resilience to change. Similar problems are found in other river basins. International donors should engage in the establishment, promotion, and maintenance of dispute-settlement mechanisms. So far, the engagement of international donors in resolving water-related disputes in international river basins has proven highly successful (as shown by the World Bank's engagement in the Indus River Basin and UNDP's involvement in overcoming severe conflicts in the Mekong River Basin in the early 1990s). Building on these experiences, the World Bank has a role to play in promoting the peaceful settlement of water- and change-related conflicts and can provide value added in the establishment of well-defined, easily applicable, and sustainably functioning dispute-resolution mechanisms.

The linkages between regional and national river basin management and adaptation projects are particularly challenging. Regardless of which model riparian states chose to link national and regional efforts (e.g., specific organizational bodies, working group structures, focal points), it is

important to ensure that river basin management activities in all policy areas are sufficiently linked across governance levels, ensuring that additional benefits based on economies of scales can be achieved while inefficiencies due to overlaps are avoided. The strategy of international donors matters: their support to river basin management at the national or regional level significantly influences the distribution of power among governance levels – especially in river basins with limited technical, financial, and human capacities. Although river basin management in general and adaptation measures in particular indeed require the strengthening of capacities at the national level, a singular focus on member states risks weakening regional institutions, thus reducing the potential benefits cooperative management provides.

While the coordination of adaptation efforts across regional institutions in a river basin is of great importance for strengthening resilience, its implementation is often weak, as with the MRC, as well as for a number of other RBOs in various regions of the world. Donors maintaining good relations with regional initiatives can play an important role in better linking activities related to climate change adaptation or the mitigation of other changes in a river basin. An example is the World Bank's Mekong IWRM Project, which works with the MRC, but also includes other regional actors such as ADPC. Similarly, the World Bank's engagement with ASEAN, especially in the field of disaster risk management, provides a promising starting point for further cooperation.

With regard to the specific programs and initiatives established by the MRC to deal with upcoming changes in the river basin, various fields of action for donor engagement can be identified beyond the provision of financial resources. For instance, with regard to the institutional set up of new initiatives such as CCAI and ISH, donors can play an important role in promoting institutional structures and providing advice on how to prevent duplications and institutional inefficiencies (particularly relevant for the CCAI, described in section 6.1.1.).

The success of specialized initiatives and programs, especially in river basins in the developing world, depends on the availability of not only financial but also technical and human resources. Especially in the fields of weather, flood, drought, or climate change forecasting and analysis, the availability of technology and knowledge is crucial not only for the success of river basin management and adaptation, but also for the maintenance and improvement of overall development opportunities for populations depending on resources in the river basin and/or being vulnerable to extreme weather or other natural events. (For a detailed analysis of which sectors can particularly benefit from improved forecasting methods, refer to World Bank 2008b. Although focused on Eastern Europe and Central Asia, this study provides important findings for other regions as well). It should be the role of international development partners and banks to provide the needed technology and to facilitate investments. The World Bank, with its experience in water management and its broad array of financing and investment mechanisms, has an important role to play. While it is moving ahead in the Mekong River Basin by strengthening early warning systems in Laos (refer to World Bank 2010a), opportunities exist for additional engagement.

CCAI, FMMP, and ISH all aim at better integrating stakeholders in the Mekong River Basin into river basin management activities in general and adaptation efforts in particular. Stakeholder meetings and forums as well as specific events to discuss country- or sector-specific concerns play a particularly important role in bringing together actors from the region and establishing a joint perception of challenges and solutions. International donors such as the World Bank should not

only participate in such meetings, but also provide support to these fora and to the dissemination of related information.

Overall, it has been found that there is no single blueprint for assisting river basin riparian states and their respective RBOs in managing change in river basins. Nevertheless, the most appropriate approaches to supporting adaptive management and strengthening resilience, aside from the provision of financial means, seem to be flexible support of coordination of different governance levels, coordination of all important actors in the river basin and the overall region, data and information management mechanisms, and functioning dispute-settlement instruments. Support of these mechanisms ultimately benefits riparian populations and their socioeconomic development.

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