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## **Scoping of regional benefit sharing in the Mekong Basin**

*The proposed benefit sharing approach is based on the 1995 Mekong Agreement that calls for optimising Mekong basin development, promoting interdependent sub-regional growth and cooperation, pursuing joint and/or basin-wide projects, and minimizing harmful effects.*

*The Basin Development Strategy is the means to promote cooperation towards these aims. The Strategy is updated at the end of MRC's five-year planning cycle that provides the opportunity for the Member Countries to collaboratively explore ways by which optimal and sustainable development may be achieved and regional cost and benefit sharing promoted.*

*The main mechanisms for regional benefit sharing are joint projects and national projects of basin-wide significance. The ongoing planning processes that identify and prioritize such projects are the joint exploration and assessment of alternative basin-wide development scenarios, the development and negotiation of deal structures, the application of MRC Procedures and guidelines, and studies to reduce knowledge gaps.*

*Prepared by:*

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3	0	Draft final Scoping Report based on national consultations and updating to 2015 knowledge	December 2015	AK

# Executive summary

## Summary of key points

<b>Development in the Mekong River Basin</b>	<b>Significant development</b> of the basin's water resources in Viet Nam and Thailand started in the 1960s, and is only recently accelerating in Cambodia and Laos. However, <b>development pressures are growing</b> and the need for cooperative development amongst all riparian countries has never been greater.
<b>The 1995 Mekong Agreement</b>	The Agreement provides a framework for cooperation with a central aim of <b>optimising sustainable development consistent with reasonable and equitable use between countries and minimising harmful effects</b> . It is also consistent with the 1997 UN Watercourses Convention which calls for "optimal and sustainable utilisation" of water resources.
<b>Principles of regional benefit sharing</b>	The principles of regional benefit sharing are established in the Agreement's commitments to <b>optimise mutual benefits and minimise harmful effects</b> , promote interdependent sub-regional growth and cooperation and pursue joint and/or basin-wide development projects.
<b>The means to promote regional benefit sharing</b>	<b>The Basin Development Strategy is the means to promote cooperation towards the above aims and principles.</b> The Strategy is the outcome of a five-year planning cycle that provides the opportunity for the Member Countries to collaboratively explore ways by which optimal and sustainable development may be achieved and regional benefit sharing promoted.
<b>Regional benefit sharing mechanisms</b>	<b>The two principle mechanisms</b> to promote regional benefit sharing in line with the 1995 Agreement are <b>national projects of basin-wide significance</b> , which create development opportunities elsewhere in the basin, and <b>joint projects</b> (involving two or more countries), which address issues and opportunities that one country alone could not do as effectively.  Both types of projects can increase regional benefits, reduce regional costs, minimize adverse transboundary impacts, and provide water security.
<b>Planning processes to promote regional benefit sharing</b>	Joint projects and national projects of basin-wide significance can already be found in the Mekong Basin and some more are planned, but much more needs to be done to increase basin-wide benefits and address challenges such as the management of large floods and the protection of environmental assets.  The planning processes that identify and prioritize joint projects and national projects of basin-wide significance are the <b>joint exploration and assessment</b> of alternative basin-wide development scenarios as well as other studies to reduce knowledge gaps, the development and <b>negotiation of deal structures</b> , and the

**application of MRC Procedures and best practice guidelines.**

*These planning processes are integrated in MRC's updated five-year planning cycle; their implementation has begun and will continue in the next planning cycle (2016-2020).*

**Adaptation of national plans**

*When the above **planning processes demonstrate significant added national benefits** arising from working collaboratively, **the countries will have a powerful incentive to adapt the current national plans.***

*The MRC facilitates this adaptation process through the preparation of basin-level sector strategies that are relevant to the major opportunities to optimize and share benefits, minimize transboundary impacts, and provide long-term water security.*

## Development in the Mekong River Basin

As one of the great rivers of the world, the Mekong River is closely linked with the culture and development of the countries through which it flows. For millennia the river's abundant resources have nurtured a unique and rich ecosystem as well as sustained the livelihoods of those living in the basin.

Development of water resources within the basin can be traced back to irrigation schemes constructed around Angkor Wat in the 12<sup>th</sup> century. Although it is believed that these systems started to fall into disuse by the 14<sup>th</sup> century, they and the temple complex itself bear testament to the ingenuity of these early engineers.

However, it is only in the last 125 years that significant changes to the landscape of the basin have occurred. Viet Nam began investing a century ago in improvements to navigation and drainage in the fertile areas of the Mekong delta. Since the late 1960s, significant national benefits have been created when large areas were brought under irrigation through the development of intensive canal systems and farmer-owned low-lift pumps. The Viet Nam delta is critical to the livelihoods and food security of millions of people. Hydropower development has also occurred in this period in Viet Nam's Central Highlands, upstream of Cambodia.

In Thailand's part of the basin, development also took off in the 1960s with many small and large dams constructed to capture the highly seasonal flows of Thailand's Mekong tributaries for irrigation and hydropower. However, only a small part of the agricultural lands is being irrigated in the wet



season and much less in the dry season. Since many years, the improvement of water security in Northeast Thailand has been a priority for the government to improve the less developed economic condition compared to other parts of the country.

Large-scale water resources development in Cambodia and Lao PDR is of more recent date. Lao PDR is making progress in developing its vast hydropower potential. Cambodia has commenced developing the largest remaining irrigated agricultural potential in the region, particular in the undeveloped Cambodian delta, linked to major investments in flood control, and elsewhere linked to hydropower development.



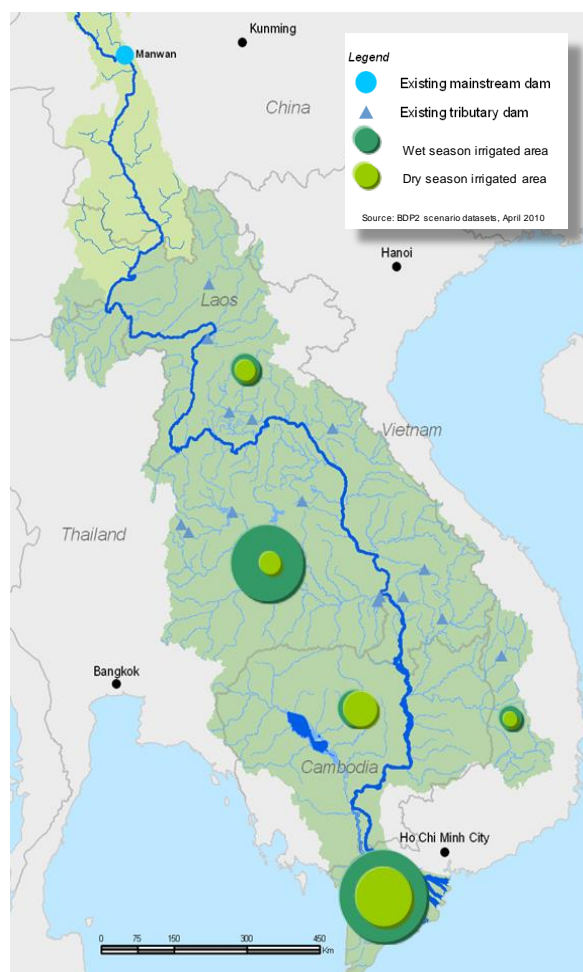
Nevertheless, following nearly 50 years of internationally sponsored planning efforts, by the end of the 20<sup>th</sup> century, these developments had not *significantly* impacted upon the flow regime of the Mekong River mainstream, but it had considerably reduced the basin's natural wetlands and biodiversity (for example by the year 2000 natural wetland losses amounted to 99% in Viet Nam, 96% in Thailand, 45% in Cambodia and 30% in Lao PDR).

However, by 2008, when the first cumulative impact assessments were undertaken by MRC, a different picture began to emerge.

Foremost is the development of large storages in the upper basin within China, which are of a magnitude to modify the low flow regime of the Mekong mainstream. It is now foreseen that ultimately all dry season consumptive demands on the river can potentially be met with the existing and planned storages in China and Lao PDR. This provides opportunities for less developed parts of the basin to capture potential benefits of these resources for relevant sectors and livelihood types and, in doing so, to more equitably share the benefits of the Mekong than was apparently the case in 2000.

Climate change, sea level rise, demographic changes, rising social demands and expectations for livelihoods and water, food and energy security, together with greater environmental awareness, will all undoubtedly shape the future development of the Mekong Basin. Each presents significant challenges for the riparian countries individually and collectively.

It is evident that each country is well aware of the potential benefits that the river's development could bring to their own economies and social development programmes. Equally, past planning efforts have highlighted also the threats that further uncoordinated development could bring

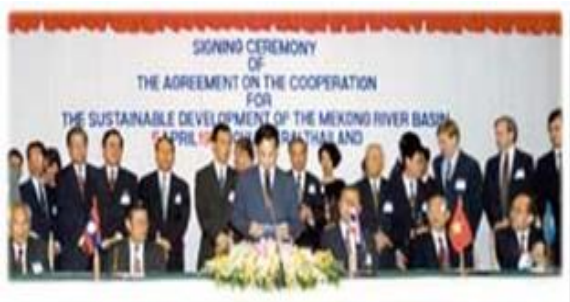


to both the river's ecosystem as well as to the development ambitions of individual countries. Even without water resources development in future, the water and related resources will be significantly affected by industrial activities (including sand mining), roads and other modes of transport expansion, urbanization, poverty reduction and others.

**The need for prudent and cooperative development to share these benefits amongst all riparian countries has never been greater.**

## Regional benefit sharing based on the 1995 Mekong Agreement

In 1945, at the end of the Second World War, the Mekong River was little understood. With support from the UN, a regional committee was established in 1947. The first report on flood control and river development was produced in 1952. In the ensuing 40 years, periods of conflict within the region led to a succession of interim institutional arrangements being taken up and plans prepared. It was not until the 1994 that negotiations could begin to establish a permanent arrangement.



The 1995 Mekong Agreement signalled the start of a new era of Mekong Cooperation. The Agreement is a comprehensive and country-owned treaty between the four independent nations sharing the Lower Mekong Basin.

The Agreement explicitly affirms the intent of the Member Countries *to cooperate in all fields of sustainable development, utilization, management and conservation of the water and related*

*resources of the Mekong River Basin ... in a manner to optimize the multiple-use and mutual benefits of all riparians and to minimize the harmful effects that might result from natural occurrences and man-made activities.* This is also consistent with the 1997 UN Watercourses Convention, especially article 5 which calls for “international watercourse shall be used and developed by watercourse States with a view to attaining **optimal and sustainable** utilization”.

The Agreement also aims to *promote or assist in the promotion of interdependent sub-regional growth and cooperation among the community of Mekong nations* and expresses a preference for **joint and/or basin-wide development projects** and basin programs, which are to be formulated through a basin development plan.

### MRC's Procedural Framework

- Procedures for Data and Information Exchange and Sharing (PDIES)
- Procedures for Notification, Prior Consultation and Agreement (PNPCA)
- Procedures for Water Use Monitoring (PWUM)
- Procedures for the Maintenance of Flows on the Mainstream (PMFM)
- Procedures for Water Quality (PWQ)

The Agreement mandates a rolling planning process (Article 2 et al) to determine joint actions by which to fulfil the goals of the Agreement and associated investment opportunities (Article 24B).

In addition, the Agreement sets out the principles governing its implementation and the manner in which national interests will be safeguarded. These principles are implemented through Rules of Procedure (see box). The Member Countries commit also to protect the

environment (Article 3) and, under Article 7, to make *every effort to avoid, minimize and mitigate harmful these effects*, for which a dispute resolution process is provided should harm arise (Article 8).

## Definition and principles of regional benefit sharing

As may be seen, regional benefit sharing lies at the heart of the 1995 Mekong Agreement. The principles of regional benefit sharing are established in the Agreement's commitments to optimise mutual benefits, promote interdependent sub-regional growth and cooperation and pursue joint and/or basin-wide development projects. The Agreement also commits the countries to minimise harmful effects.

In accordance with the Basin Development Strategy for 2011-2015, the MRC has completed two areas of work to assist Member Countries in seeking *options for sharing the potential benefits and risks of development*.

**National-to-local benefit sharing** mechanisms has been investigated by MRC's Initiative for Sustainable Hydropower with a focus on hydropower projects. Their findings clearly show that national-to-local benefit sharing has two components: project level *compensation* for those directly negatively impacted and *benefit sharing* for the wider community affected by the project. National laws and regulations of each country to varying degrees provide for these mechanisms, and both mechanisms are seen as important for the full realisation of benefits within each country.



**At the regional level**, benefit sharing in multiple sectors between countries has two dimensions in accordance with the 1995 Mekong Agreement. These are:

- (i) **Meeting the obligations** by each Member Country in the 1995 Mekong Agreement under Article 5 (*to utilize the waters of the Mekong River system in a reasonable and equitable manner in their respective territories*), Articles 3 and 7 (*to make every effort to avoid, minimize and mitigate harmful these effects*) and Article 8 (acknowledging *State responsibility for damages*). The 1995 Agreement does not provide for “compensation” other than Article 7 and 8;  
*whilst at the same time*
- (ii) Ensuring that all riparians **benefit from an optimally developed** and managed basin.

### Optimal and sustainable development of the basin

The maximisation of national socio-economic benefits derived from the Mekong River and its related natural resources, consistent with sustainable development and reasonable and equitable use of those resources, while adverse transboundary impacts are kept within acceptable limits.

Both these dimensions are reflected in the MRC's five-year strategic planning cycle, which underpins the Basin Development Strategy that will be updated at the end of each cycle. **The Basin Development Strategy is the means to promote cooperation towards the above aims and principles in the 1995 Mekong Agreement.** The Strategy is the outcome of a five-year planning cycle that provides the opportunity for the Member Countries to collaboratively explore ways by which optimal development may be achieved and regional benefit sharing promoted.

## Regional benefit sharing mechanisms

Regional benefit sharing is practiced in many international river basins throughout the world. It comes in various forms to suit the riparian countries, but is always founded on win-win outcomes for the participating countries. Joint investments (sharing costs and benefits) in major infrastructure (for multiple purposes from flood control and navigation to energy and irrigation) are central to achieving these outcomes. Without joint investments, the benefits of national projects to other riparians will be limited to those derived by default through national projects of basin-wide significance.

**The two principle mechanisms** to promote regional benefit sharing in line with the 1995 Agreement are **national projects of basin-wide significance**, which create development opportunities elsewhere in the basin, and **joint projects** (involving two or more countries), which address issues and opportunities that one country alone could not do as effectively. Their main characteristics are summarised in the table below.

	<b>NATIONAL PROJECTS of basin-wide significance</b>	<b>JOINT PROJECTS</b>
<b>Types</b>	Projects of one country that create opportunities elsewhere in the basin	Projects taken up jointly by two or more countries
<b>Nature</b>	National investments in infrastructure, non-infrastructure and/or enabling projects that expand the DOS and/or reduce risks and uncertainties.	Joint investments (infrastructure or non-infrastructure), joint studies (enabling) or production trading agreements (non-infrastructure)
<b>Examples</b>	<ul style="list-style-type: none"> <li>• Creation of inter-seasonal storage</li> <li>• Production trading (agriculture, aquaculture)</li> <li>• Improvement of navigation</li> <li>• Environmental management of floodplains and watersheds</li> </ul>	<ul style="list-style-type: none"> <li>• Management of transboundary floodplains (e.g. Cambodia-Viet Nam)</li> <li>• Projects with power selling agreements</li> <li>• Transnational park</li> <li>• Multi-purpose storage projects (for flood, drought, energy, navigation)</li> </ul>
<b>Benefits potentially accruing in</b>	National and joint projects made possible by an expanded DOS (see below)	The specific joint projects

The Basin Action Plan that supports the implementation of the Basin Development Strategy 2011-2015 notes that both types of projects can already be found in past and current projects within the National Indicative Plans 2011-2015. However, much more can and needs to be done to address future needs and challenges, such as water, food and energy security and adapting to climate change.

The challenge is to explore whether there are further opportunities to enhance the benefits to be gained, in line with the Member Countries commitment to achieve optimal and sustainable development and management of the Mekong Basin.

The following planning processes can provide the information to identify and prioritize joint projects and national projects of basin-wide significance.

## Planning processes to promote regional benefit sharing

### *Optimising regional benefits through basin-wide planning*

The basin-wide planning process adopted by the MRC provides the opportunity for the Member Countries to collaboratively explore ways for regional benefit sharing. The process follows a five-year planning cycle. In each cycle, the Basin Development Strategy is reviewed and updated in the light of



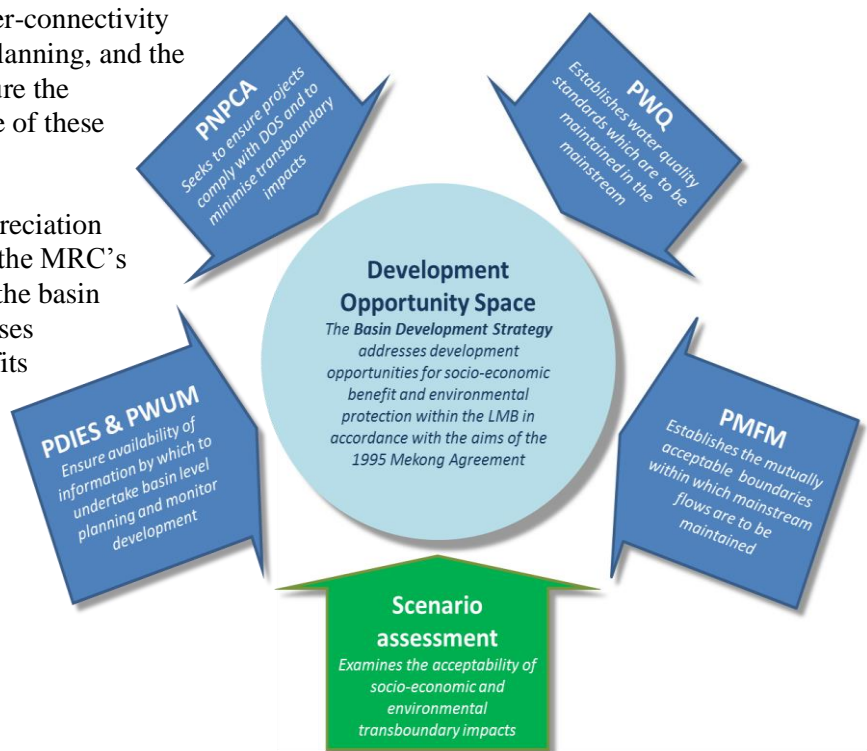
monitored State of the Basin, changes in national and regional policies and plans, and the findings of cumulative impact assessments of basin-wide development plans and scenarios.

In the first cycle of planning (2006-2010) under the MRC, these assessments led to the conceptualisation of a Development Opportunity Space (DOS). The DOS represents the potential for further development and is bounded by what the Member Countries

agree is an acceptable level of cumulative impacts on the basin's natural resources and social and environmental conditions within the basin.

This conceptualisation emphasises the inter-connectivity between the MRC Procedures and basin planning, and the need for a Joint Platform by which to ensure the relevance of the Procedures and coherence of these with the Basin Development Strategy.

The conceptualisation leads also to an appreciation that the DOS can be enlarged in line with the MRC's aim to optimally and sustainably develop the basin through cooperative planning that maximises economic, social and environmental benefits whilst minimising harmful effects. Joint projects and national projects with basin significance can contribute to expanding the DOS. And as demonstrated by the scenario assessments undertaken in 2009-2010, some nationally planned projects with greater adverse impacts than others reduce the DOS, notwithstanding the



substantial direct economic benefits they may individually create.

Expansion of the DOS, and therefore the benefits to be shared, can best be achieved through 1) joint exploration and assessment of alternative basin-wide development scenarios as well as other studies to reduce knowledge gap, 2) development and agreement of deal structures, and 3) the application of MRC Procedures and best practice guidelines.

### *Exploration and assessment of alternative basin-wide development scenarios*

The 2009-2010 cumulative impact assessment of the nationally planned water resources development of the basin countries indicates that these plans are not ‘optimal’ from a basin-wide perspective. Although they generate large incremental benefits, they do not address needs such as environmental and flood protection. The current plans may also not lead to a more equitable sharing of the benefits derived from the Mekong.

International experience suggests that joint management and development, with cost and benefit sharing deals, will be necessary if the people of the Mekong are to fulfill their aspirations and potential in a long-term balance with the river. In line with best international practice, the MRC has launched a new round of scenario assessments that will update the existing scenarios and assess new ones.

Currently, the 2009-2010 assessments are being updated under the ‘Council Study’ (Study on the sustainable management and development of the Mekong, including impacts of mainstream hydropower projects). The Council Study will provide the regional distribution of benefits, costs, impacts and risks of water resources development in 2007, 2020 (‘definite future’) and 2040 (‘currently planned future’), taking into account historical and exogenous development. It is anticipated that this assessment will re-confirm that the current national plans are not optimal and sustainable from a basin-wide and long-term perspective.

Therefore, the MRC has planned in its work plan for 2016-2020 a new round of alternative scenario assessments. First, a range of long-term exploratory scenarios (2060) will investigate future development needs within the basin in response to climate change, demographic changes, rising social demands and expectations for livelihoods and water, and the resulting demands for flood, food and environmental security. This will help the Member Countries to identify where the opportunities lie to work collaboratively in a manner that increases mutual benefits whilst reducing costs and providing water security.

Then, insights gained from these exploratory assessments will be used to formulate and assess alternative national development plans in the medium term (2030/2040) which will include further joint projects and national projects of basin-wide significance. The resulting regional distribution of benefits, costs, impacts and risks of the scenarios can be compared with those of the currently planned development. When alternative medium term development scenarios demonstrate significant added national benefits arising from working collaboratively, the countries will have a powerful incentive to adapt current national plans.

To assess these scenarios, the MRC has developed an indicator framework that builds on that used in 2009-2010 and includes measures of equity and the inter-dependence of regional growth that will underpin the evaluation of regional benefit sharing opportunities.

### *Deal structures for regional benefit sharing*

International examples suggest that, with the above assessment information at hand, basin countries will start discussing and developing a shared understanding of the development opportunities, trade-offs, cost and benefit sharing opportunities, acceptable transboundary impacts, controversial developments, and others. The MRC will need to facilitate this process, bringing two or more countries together to seek mutual benefit, moving beyond cooperation on knowledge acquisition towards transboundary cooperation on water resources development and management.

In this process, the DOS is used as a cooperation and negotiation space to explore mutually beneficial development opportunities, including (benefit and impact sharing) ‘deal structures’, which could be well beyond the infrastructure considered in the assessed scenarios (for example - navigation, trade, interconnected power grids, other transport, etc.). In the process, there are also likely to be opportunities for joint projects and joint and/or basin-wide development and cost and benefit sharing opportunities.

Deal structures (supplementary understandings or agreements) elaborate and enhance the basis for cooperation over and above that set out in the 1995 Mekong Agreement and related Procedures. They can be applied in two ways:

- ❑ **Firstly, through the agreement at a strategic level** of the inevitable trade-offs necessary to promote interdependent sub-regional growth (an aim of the 1995 Mekong Agreement). When viewed at basin-level, potential synergies and trade-offs can be identified that may serve both to increase each country’s benefits as well as to minimise transboundary harm. Examples might be in agreeing overall regional environmental management plans, watershed management projects, scheduling of irrigation, and further storage development, etc. The Basin Development Strategy provides the means to identify and prioritise medium and long term development opportunities based on the prior assessment of existing and potential future national development plans; and
- ❑ **Secondly, where appropriate, in making the most of development opportunities through undertaking joint projects.** In the regional context, these may equate to cost and benefit sharing through joint studies and investments. Examples might be in agreeing to a cross-border flood management plan for the Mekong, or transboundary power production, and joint investments underpinning these. In this case, deals are needed between the two or more countries directly involved, based on MoU, joint-working agreements, investment agreements, or treaties covering transboundary project investment, cost and benefit sharing arrangements.

The outcomes of the negotiations of deal structures will provide rationale for each country to consider whether to modify their national plans to greater mutual benefit. To facilitate the adaptation of national plans, basin-level sector and cross-cutting strategies will be prepared that are relevant to the major opportunities to optimize and share benefits, minimize transboundary impacts, and provide long-term water security.

### *Opportunity, not project endorsement*

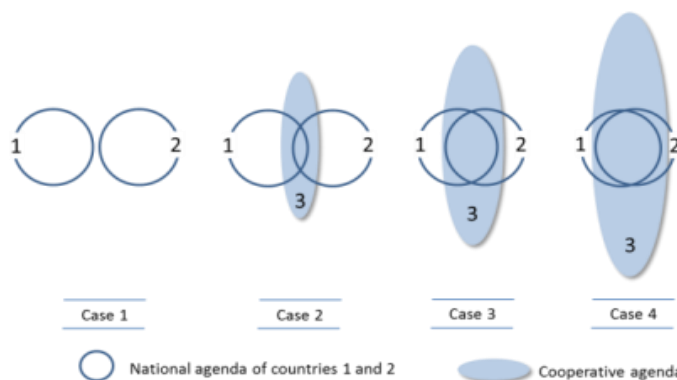
The above scenario assessment and subsequent negotiations of deal structures does not indicate approval of a national plan or project. For project approval, an opportunity needs to pass through

national planning and approval processes, and as appropriate through Procedures for Notification, Prior Consultation and Agreement (PNPCA) with other countries under the MRC cooperation framework. These national processes and the PNPCA are an opportunity to improve projects and minimise their harmful effects so that Article 8 (*State responsibility for damages*, see above) will not be invoked and more projects fit within the DOS.

To support project planning and approval processes, a range of best practice guidelines are being progressively developed as part of the Basin Development Strategy. The operational guidelines (or ‘helping hands’) already include: design guidance for proposed mainstream dams; guidelines for flood risk management; guidance on developing dangerous goods risk assessment for navigation safety; guidelines for fish-friendly irrigation development and operation; and technical guidelines to implement MRC Procedures.

### A cyclical process

The promotion of further benefit sharing opportunities is a cyclical process that includes analysis, negotiations and implementation, rather than a battery of efforts at the end of a linear process of benefit assessment. Therefore, the MRC has aligned the promotion of regional benefit sharing with its 5-year strategic planning cycle (see under *Optimising regional benefits through basin-wide planning*).



During each cycle the benefits of cooperation are progressively identified and secured. As this happens, national plans will converge, the cooperative agenda will grow, and each country will view the cooperative agenda to be part of their adapted national plan. The experience of successful cooperation can yield concrete benefits and build trust and relationships. This changes perceptions with regard to the potential benefits of cooperation, and to the feasibility of working cooperatively with the other basin countries.

**A shift:** Increasing transboundary cooperation and benefit sharing serves almost automatically to moving national sector planning towards basin-wide optimal and sustainable development, as well as regional integration as envisioned in the 1995 Mekong Agreement. In this process, MRC will further move from a platform where the Member Countries cooperate on knowledge creation while defending their national interests *to a vehicle where the Member Countries can come together to find new development and management opportunities to do jointly*. The latter will considerably increase the added value of MRC.

### Benefit sharing and water diplomacy: two sides of the same coin

From the basin perspective, national plans – by design developed to benefit specific countries – are always sub-optimal, and when implemented could not only fail to address longer term challenges of

water security but also yield tensions and potential conflicts in the immediate terms, a cause of concern of water diplomats. Yet tensions could not be resolved with conflict management alone. Optimizing and sharing benefits and costs through joint investment and projects need to be pursued to transcend tensions that result from uncoordinated development, while simultaneously meeting basin-wide needs such as flood protection, energy demand and environmental conservation.

To reach such deals not only require sound technical knowledge and assessment by water engineers and specialists, but also the negotiation and political skills of water diplomats, strategists and others. In this regard, the MRCS' proven capacity in the technical areas needs be complemented by trusted multilateral partners who could help move the regional benefit sharing agenda among the countries and securing the political will and commitment from their leaders.

## Implementation arrangements

As described above, the planning process to promote regional benefit sharing is ongoing. The process is driven by the MRC Member Countries, coordinated nationally by the NMC Secretariats, regionally by the MRC Secretariat and its partners, and implemented by national counterparts with widespread and effective consultation with stakeholders. The key steps are scheduled below.

### *Key steps to promoting regional benefit sharing*

Activity	2015	2016	2017	2018	2019
Update of the current assessment methodology report and complete data acquisition					
Develop strategic engagement and water diplomacy with decision makers					
Assess the current distribution of benefits against MRC Indicator Framework					
Assess the distribution of benefits under current future plans (2030/2040)					
Formulate a range exploratory long-term development scenarios (2060)					
Assess the exploratory long-term scenarios against MRC Indicator Framework					
Formulate a few alternative medium term plan scenarios in a very participatory fashion					
Assess the medium term alternative plan scenarios against MRC Indicator Framework					
Raise awareness of assessment results and potential deal structures					
Promote and facilitate discussions and negotiations of specific deals					
Facilitate the adaptation of the current national plans to capture benefits and address risks					

Update of the Basin Development Strategy including a new Basin Development Plan					
Stakeholder participation and strategic engagement					

For the new scenario assessment, a multi-disciplinary team of regional and international sector and thematic specialists will be established that will work together as ‘one team’ throughout the assessment. The work will be led by MRC’s planning unit, which will engage other units for sectoral and technical inputs. The involvement of other MRC units will further increase compared to the 2009-2010 scenario assessment. For example the unit responsible for communication and cooperation will need to play a prominent role in the communication activities identified in the work plan.

Basin-wide technical discussion, data sharing, and validation of approaches and information are done through the Regional Technical Working Group (RTWG) or succeeding Expert Group composing of senior technical staff from national planning and sector agencies. National, sub-basin and regional stakeholder forums and meetings are important in raising awareness, promoting shared understandings and providing broader feedback from civil society, private sector, and other regional organizations and institutes. Eventually, the benefit sharing deals are negotiated by senior government officials of the four Member Countries.

Given the broad scope of the distribution analysis, opportunities will be identified and seized for engaging relevant regional organizations in the assessment process. Steps will also be taken to ensure that the wider development community will be involved in the process. To this end, and to assure transparency at all stages, all relevant documents will be posted on the MRC web-site.

## This report

This report has been prepared to support the participatory assessment of regional benefit sharing opportunities and associated communication and engagement processes.

The report first reviews the international experience in benefit sharing and then uses the findings to scope transboundary benefit sharing within the Mekong context. It then identifies the main benefit sharing mechanisms and develops the approach and methodology for increasing the benefits from cooperation within the Mekong Basin. The report concludes with a work plan and implementation arrangements.

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## Abbreviations and acronyms

AIP	: Agriculture and Irrigation Programme (of the MRC)
BAP	: Basin Action Plan
BDP	: Basin Development Plan
BDP2	: BDP Programme, phase 2 (2006 –10)
BDS	: (IWRM-based) Basin Development Strategy
CCAI	: Climate Change and Adaptation Initiative (of the MRC)
CPC	: Columbia Power Corporation (of the Columbia River basin)
CRA	: Cooperative Regional Assessments
DMP	: Drought Management Programme (of the MRC)
EP	: Environment Programme (of the MRC)
FMMP	: Flood Mitigation and Management Programme (of the MRC)
FP	: Fisheries Programme (of the MRC)
ICC	: Intergovernmental Coordination Committee (of the La Plata River basin)
ICWC	: Interstate Commission for Water Coordination (for the Aral Sea riparian states)
IKMP	: Information and Knowledge Management Programme (of the MRC)
IWRM	: Integrated Water Resources Management
ISH	: Initiative for Sustainable Hydropower (of the MRC)
JC	: Joint Committee (of the MRC)
JRC	: Joint Rivers Commission (between India and Bangladesh)
JTC	: Joint Technical Commission (of the Salto Grande Bi-national Project)
LMB	: Lower Mekong Basin
LNMC	: Lao National Mekong Committee
M&E	: Monitoring and evaluation
MIWRMP	: Mekong Integrated Water Resources Management Project (of the MRC)
MoU	: Memorandum of Understanding
MRC	: Mekong River Commission
MRCS	: Mekong River Commission Secretariat
MRC-SP	: MRC Strategic Plan 2011-15)
NIP	: National Indicative Plan (C-NIP: Cambodia, L-NIP: Lao PDR, T-NIP: Thailand, V-NIP Viet Nam)
NMC	: National Mekong Committee
NMCS	: National Mekong Committee Secretariat
NAP	: Navigation Programme (of the MRC)
OKACOM	: Okavango River Basin Water Commission
OMVS	: Organisation pour la Mise en Valeur du fleuve Sénégal
PNPCA	: Procedures for Notification, Prior Consultation and Agreement
PMFM	: Procedures for Maintenance of Flow on the Mainstream
PWUM	: Procedures for Water Use Monitoring
RAP	: Regional Action Plan
RBO	: River Basin Organization
RDA	: Regional distribution analysis
RSA	: Republic of South Africa
TCU	: Technical Coordination Unit (of the MRCS)
TNMC	: Thai National Mekong Committee
UMB	: Upper Mekong Basin
VNMC	: Viet Nam National Mekong Committee



# 1 Introduction

## 1.1 Background

### 1.1.1 Overview

In 2011, MRC Member Countries agreed through the high-level Council approval of the IWRM-based Basin Development Strategy that one of the Strategic Priorities is to “Seek options for sharing the potential benefits and risks of development”. The assessment of regional benefit sharing opportunities is also prioritized in the MRC Strategic Plan 2011-2015, and included within the BDP work programme under Outcome 2.3, to be implemented in close consultation with the National Mekong Committees.

It is stressed from the outset that regional benefit sharing is NOT about one country sharing the ‘profits’ it makes from using water with other countries. Rather regional benefit sharing is about increasing cooperation among basin countries with a view to increasing regional benefits for mutual gain of each country and minimising transboundary impacts and risks from using the basin’s water resources.

The assessment of regional benefit sharing opportunities is an important part of basin development planning and is being implemented by the BDP Programme in close consultation with the National Mekong Committees. The approach adopted for the assessment of regional benefit sharing opportunities comprises three distinct activities:

- ❑ Scoping of regional benefit sharing opportunities in the Mekong region, including the methodology for the identification of further benefit sharing opportunities;
- ❑ Development of a regional distribution analysis, which is mostly a technical activity to assess all current and potential future transboundary cost and benefit streams; and
- ❑ Evaluation of potential benefit sharing opportunities, which involves broader inputs, discussions and diplomacy.

**This scoping report addresses the first of these three activities above. The report lays the foundation for the following two steps. The first step is ongoing under the Council Study<sup>1</sup> and the second is planned in MRC’s work plan for 2016-2020.**

### 1.1.2 Context

- (i) *What has been done*

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<sup>1</sup> Study on the sustainable management and development of the Mekong river, including impacts of mainstream hydropower projects.

During 2009-2011 the BDP Programme facilitated the economic, social and environmental **assessment of basin-wide development scenarios**. The scenarios were based on the national plans of the four Lower Mekong Basin (LMB) countries (Cambodia, Lao PDR, Thailand and Viet Nam), taking into account the developments in upper part of the basin (China, Myanmar). Therefore, the scenario assessment can be regarded as a cumulative assessment of the transboundary impacts of the countries' development plans. The results demonstrate the considerable inter-play between irrigated agriculture, hydropower and other MRC sectors.

However, the results also demonstrated that the national plans are sub-optimal from a basin-wide perspective. Under these plans for instance, major environmental assets in the Mekong basin are currently not protected. Similarly, little protection against extreme floods is in place for the densely populated Mekong delta. **The results also indicate that the distribution of incremental benefits, impacts and risks may not be equitably distributed among the countries.**

Basin-wide stakeholder discussions on the scenario assessment results, followed by negotiations between senior government officials of the LMB countries, resulted in the adoption of the **IWRM-based Basin Development Strategy** in 2011. The Basin Development Strategy describes how synergies between the development goals can be exploited, trade-offs can be developed, and potential downsides avoided or mitigated by adhering to IWRM principles and addressing knowledge gaps. The Strategy provides the development opportunities and the strategic priority actions in order to move opportunities to implementation and sustainable development.

(ii) *What needs to be done*

One of the **Strategic Priorities** agreed to is to “Seek options for sharing the potential benefits and risks of development opportunities”, including “from additional dry season water for water supply, navigation, irrigation and other beneficial uses and from hydropower development”. This refers to developments on the tributaries and the Mekong mainstream. Furthermore, the Basin Development Strategy calls for the MRC Secretariat to “*support and facilitate negotiated solutions for sharing benefits and risks that are sensitive to the region, in compliance with MRC Procedures, and respectful of the development strategies and aspirations for regional cooperation of the parties*”.

Under the current 2011-2015 the BDP Programme, BDP are engaged in a number of activities which are relevant to the assessment of regional benefit distribution. These include:

- ❑ **Definition of social, environmental and economic development and management indicators for the Mekong Basin** – which will build on the scenario assessment indicators used previously to provide a comprehensive and integrated set of strategic and assessment indicators and monitoring parameters for MRC use;
- ❑ **Further scenario assessment** – which will review and update existing scenario assessments and consider alternative medium and long term scenarios to address the

shortcomings of the current national plans, and examine how the shortcomings of the current national plans (see above) can be met in the light of demographic changes, rising social demands, climate change among other factors. The aim of the assessment is to show where development and management opportunities lie in the future to optimize basin development to increase national benefits, minimize negative transboundary impacts, and provide water-related security in an equitable manner through cooperation;

- ❑ **Implementation of the National Indicative Plans (NIPs)** that implement the Basin Development Strategy in each LMB country through projects and activities with basin significance;
- ❑ **Addressing important knowledge gaps** (involving other MRC Programmes) – which will lead to improved assessment methodologies.

As has emerged during the preparation of this report, it is clearly very important to integrate the analysis of regional benefit distribution with these other ongoing activities.

### ***1.1.3 Rationale for the proposed assessment***

Previous scenario assessment results indicate that the benefits, impacts and risks might not be evenly distributed among the basin countries. Currently some countries are benefiting more than others in various sectors while in the future other countries might benefit more. Also, the national plans for water resources development are sub-optimal at the basin level. **This highlights the need for transboundary cooperation to reach mutually acceptable decisions for benefiting from the “shared Mekong River”.**

Since the adoption of the Basin Development Strategy, there has been an increasing discussion on the scope for regional benefit sharing opportunities. This is highlighted in the recent ‘BDP Story’ (January 2013) and echoed in various presentations at the Mekong2Rio Conference (May 2012). It is also identified as a milestone for the MRC Strategic Plan 2011-2015 and is included in a series of activities under Output 1.3 of the BDP 2011-2015 Inception Report.

Experience from other regions indicates that sooner or later joint management and development, with cost and benefit sharing deals, will be necessary if the people of the Mekong are to fulfill their aspirations and potential in a long-term balance with the river. Early action is possible due to MRC’s significant investment in data and knowledge that makes the LMB more prepared than most basins that have already reached such deals. The MRC is in the position now to identify joint and/or basin-wide development and cost and benefit sharing opportunities.

## **1.2 Process**

A pragmatic approach to the overall identification and review of regional benefit sharing mechanisms in the Mekong region has been developed in consultation with the MRC Member Countries. The main steps in this process are outlined below:

- ❑ **Review of international experience:** A summary of regional benefit sharing experience from other transboundary basins has been undertaken based on already assembled information by ISH and the BDP Programme;
- ❑ **Scoping of regional benefit sharing in the Mekong Basin,** including (i) the approach and methodology for identifying and creating benefit sharing opportunities in the LMB that are tuned to the conditions and needs in the Mekong Basin, and (ii) discussing the scope and nature of benefit sharing that is or may arise in the future;
- ❑ **Regional distribution analysis 1:** An assessment will be made and awareness raised of the considerable regional benefit sharing in the Mekong Basin that occurs as a result of existing, ongoing and planned development (and bilateral agreements);
- ❑ **Regional distribution analysis 2:** An assessment will be made of the opportunities that might exist for increasing regional benefits and reducing regional costs by coordinated national planning. The latter could include the development of joint investment projects that provide substantive benefits that can be shared. Possible transaction mechanisms to capture these opportunities will be identified;
- ❑ **Screening of potential benefit sharing opportunities:** Based on national and regional consultations on the results of the regional distribution analysis of transboundary benefit and cost streams, possible ‘transactional’ mechanisms will be identified that could maximize transboundary benefits and minimize or offset adverse transboundary impacts. The viability of identified opportunities will be screened on a number of criteria; and
- ❑ **Briefing of Ministers:** A Ministerial-level briefing paper with joint and/or basin-wide development and cost and benefit sharing opportunities for consideration in conjunction with the next MRC Summit and presentation to a GMS Ministerial Meeting.

**This scoping report addresses primarily the initial steps above of reviewing international experience and scoping of regional benefit sharing in the Mekong Basin.** It is anticipated that the regional distribution analysis 1 will be made under the Council Study. The remaining benefit sharing steps are planned for implementation in the MRC Strategic Plan 2016-2020.

### 1.3 Scope of assessments for the regional distribution analysis

Regional benefit sharing<sup>2</sup> activities need to cover all water related sectors and build on existing scenario assessments and the ongoing work facilitated by MRC’s Initiative on

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<sup>2</sup> Regional benefit sharing’ is used in in this report to generally in place of the longer ‘transboundary sharing of benefits, costs, impacts and risks.

Sustainable Hydropower (ISH) on benefit sharing at the local and national levels related to hydropower development on the Mekong tributaries<sup>3</sup>.

The scope of the assessments includes the transboundary benefits, costs, impacts and risks from existing, ongoing, planned national and regional development in all water-related sectors. The scope also includes any newly identified opportunities on the Mekong tributaries and mainstream to increase regional gains and reduce regional costs, including for example any plausible ‘joint projects’.

## 1.4 Structure of report

This report is presented in five Chapters, being this first Introduction Chapter and:

- ❑ Chapter 2, International experience: This chapter considers international experience in benefit sharing, drawing on a series of case studies. The findings from this are then drawn together into an overview of the range of possibilities that may be of relevance to transboundary benefit sharing in the Mekong Basin;
- ❑ Chapter 3, Regional benefit sharing in the Mekong context: This chapter draws on the international experience set out in the previous chapter and suggests the context of how regional benefit sharing within the Mekong Basin may be viewed. The chapter then considers the drivers (or “challenges”) for benefit sharing in the light of the commitments made in the 1995 Mekong Agreement and discusses the scope and nature of benefit sharing that is or may arise in the future;
- ❑ Chapter 4, Approach and assessment methodology: This chapter draws on the international experience in benefit sharing (Chapter 2) and the conditions, needs and opportunities for regional benefit sharing in the Mekong Basin (Chapter 3) to suggest an approach and methodology to assess the potential regional benefits of cooperation within the Mekong Basin and create benefit sharing opportunities (or deals); and
- ❑ Chapter 5, Implementation arrangements: This chapter summarizes how the regional distribution analysis and the promotion of further benefit sharing should be integrated with MRC activities. It then provides a work plan for the regional distribution analysis and associated communication activities. The chapter concludes with a summary of the implementation arrangements.

The report is supported with five Appendices covering (A) bibliography, (B) case studies of international benefit sharing, (C) proposed methodology for assessing transboundary benefits derived by default, (D) proposed methodology for assessing transboundary benefits derived from cooperation, and (E) assessment indicators.

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<sup>3</sup> Notwithstanding that regional benefit sharing between countries is by nature very different from benefit sharing within countries in terms of stakeholders, opportunities and mechanisms.

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## 2 International experience

*This chapter considers international experience in benefit sharing, drawing on a series of case studies. The findings from this are then drawn together into an overview of the range of possibilities that may be of relevance to transboundary benefit in the Mekong Basin.*

### 2.1 Overview of the case study reviews

#### 2.1.1 Introduction

There are many hundreds of international river basins around the world. In many instances, no formal arrangements have been agreed between the riparians and disputes, as and when they arise, can only be addressed through recourse to international water law. However, from the early part of the 20<sup>th</sup> century, many countries have increasingly recognised that ultimately a better path is to seek cooperative development and management of shared rivers with their fellow riparians.

Such cooperation is undertaken in many different ways, reflecting *inter alia* the history of relations between neighbouring countries, the hydrological circumstances of the river in question and the economic, social and environmental drivers in each country. In the case of the Mekong, this is well reflected in the recently published BDP Story<sup>4</sup>.

Eight case studies have been selected to illustrate the breadth of approaches adopted around the world. These studies, which can be found in Appendix B of this report, are intended to highlight the different responses in these basins to the challenge of sharing benefits and costs. They also highlight some key points that may contribute to the debate on how benefit sharing may be advanced in the Mekong. The eight basins reviewed are illustrated in

Figure 1.

**Figure 1 Location of river basin case studies**



<sup>4</sup> Mekong Basin Planning: The story behind the Basin Development Plan. MRC 2013.

### **2.1.2 Senegal basin**

The Senegal River basin comprises four countries (Senegal, Mauritania, Mali and Guinea), of which three (excluding Guinea) joined together as the Organisation pour la Mise en Valeur du fleuve Sénégal (OMVS) to promote mutually beneficial development.

Two large dams (for irrigation, hydropower and navigation) were constructed in the 1980's with joint ownership in equal share. Investment and operating costs are shared in proportion to a pre-determined estimate of benefits accruing to each country. Environmental and social costs/impacts, excluded from the initial assessment, have since arisen. Discussions to remedy this are ongoing. The expected benefits for each country from the projects have yet to be fully realised.

### **2.1.3 Columbia River basin**

The Columbia River basin is shared by Canada and the USA, with Canada being the upper riparian. USA extensively developed its part of the basin, with hydropower and flood protection, but saw that these benefits could be further enhanced if Canada provided additional storage to regulate flows from wet to dry season.

Under the 1964 Columbia River Treaty, the countries agreed that three new hydropower dams would be built in Canada and that USA would pay Canada 50% of the incremental power generated in the USA plus 50% of the flood damage reduction. Canada, which paid for and owned the new dams, also benefited from hydropower energy used in Canada and other direct uses.

Subsequently, the Columbia Basin Trust was set up in 1995 by the Provincial Government of British Columbia with an initial endowment of \$295 million to address the complaints of local communities impacted by the dams. A further \$250 million was invested by the Province dams' operating company. Fifty percent of the net profits of that company are paid to the Columbia Basin Trust for the benefit of the people of the Basin.

### **2.1.4 Lesotho Highlands Water Project**

Lesotho is a small country endowed with substantial water resources located in the middle of South Africa (RSA), a country severely short of water. A Treaty signed in 1986 allows for the development of five large dams in Lesotho and associated water transfers to demand centres in RSA, as well as to within Lesotho. The Treaty explicitly states that no person shall be worse off as a result of these developments and Lesotho has sought to ensure that affected communities receive benefits.

Under the Treaty, Lesotho paid for the construction of the hydropower facilities and RSA for the water transfer works. RSA pays royalties to Lesotho for water transferred and Lesotho benefits also from the sale of hydropower available after meeting its own energy requirements. Overall benefits are estimated to accrue 56% to Lesotho and 44% to RSA.

A Lesotho Highlands Development fund has been established to finance mitigation activities. However, notwithstanding the substantial boost to Lesotho's economy as a result of the project, the impacts on poverty reduction have been less than anticipated.

### **2.1.5 *Ganges Water Treaty***

The wide-ranging Indo-Bangladeshi Treaty of Friendship, Cooperation and Peace was signed in 1972, within which the two nations established a Joint River Commission to work for the common interests and sharing of water resources, especially those of the Ganges River.

In 1974, India commissioned the Farakka Barrage to divert flows from just within the border to flush the Hooghly River which serves Kolkata Port. A subsequent interim agreement in 1975 allowed India to operate the barrage's feeder canals for short periods, but India withdrew from further negotiations in 1976. At the urging of other nations and the UN, a dialogue was resumed, leading to a 5-year treaty on water sharing signed in 1977, which expired in 1982 without being renewed. Eventually a comprehensive bilateral treaty was signed in 1996, establishing a 30-year water-sharing arrangement which recognised Bangladesh's rights as the lower riparian.

Whilst the Treaty provides some water security for Bangladesh, both sides reportedly remain unhappy with the allocations made. The situation is further complicated by responsibility for water allocations from within India lying with individual State Governments. Also, the Treaty does not cover water quality which, with increasing development in India, is a source of concern to Bangladesh.

### **2.1.6 *La Plata Basin***

The La Plata River basin encompasses an area of 3.2 million km<sup>2</sup> and comprises the Parana, Paraguay and Uruguay River systems and the largest wetland in the world, the Pantanal. The Basin has five riparian states with a long history of cooperation in the watershed. Bolivia, Paraguay and Uruguay's agriculture economies depend on the basin, as do the industrial sectors of Argentina and Brazil. A MRC delegation visited La Plata Basin in 2010.

The La Plata River Basin Treaty, signed in 1969, is an umbrella treaty which provides a framework for joint management, development and preservation of the basin. Whilst policy direction is provided at ministerial level, a standing Intergovernmental Coordination Committee (ICC) is responsible for facilitating identification and prioritisation of cooperative projects and the technical and legal structure to see to their implementation. Subsequent multilateral and bilateral treaties have led to construction of 130 dams, including the Itaipu and the Yacureta.

Itaipu, one of the world's largest hydroelectric projects, was commissioned in 1973 jointly by Brazil and Paraguay, after five years of dispute over site ownership, and now supplies 26% of all of the electricity for Brazil and 78% for Paraguay. The two countries have since implemented two joint projects to address over-looked environmental issues.

A similar treaty was agreed in 1973 between Argentina and Paraguay to construct the 1973 Yacyreta hydroelectric dam downstream of Itaipu. Generated power is divided evenly between the two nations, but provision was made also for the sale of surplus power to a third party. However, the project has since operated at only two-thirds capacity due to social and environmental issues.

Hydrovia is the first multilateral economic investment joining all five riparian states together, for which discussions commenced in 1988, latterly under an Intergovernmental Commission. Hydrovia is a river transportation project involving dredging and straightening of the Paraná and Paraguay Rivers, including within the Pantanal wetlands. Despite numerous studies, consensus has been difficult to reach on resolving environmental concerns.

### ***2.1.7 Salto Grande Bi-National Project***

The Salto Grande Bi-National Project is another major project on the Uruguay River within the La Plata Basin, shared by Argentina and Uruguay. The 1938 Act between these countries confirmed a shared interest to develop the hydroelectric potential of the Uruguay River, using a Joint Technical Commission (JTC) to undertake studies on behalf of both Governments.

The JTC, created as an International Organization in 1946 under a MoU, received the go-ahead in 1974. A separate 1977 agreement between JTC and Argentina establishes JTC's legal status to operate in Argentina. The JTC is empowered to address all matters regarding the management and development of the Uruguay River to obtain maximum benefit for the Salto Grande project in the interests of both countries.

In common with other major La Plata projects, the capital and operational costs of the dam, powerhouse and associated works were shared equally by the two countries. It was further agreed that in the medium and long term each country is entitled to a 50% share of power generated.

Uruguay has no legislation for long term benefit sharing with affected communities, but in Argentina 14% of revenues is allocated directly to the provincial governments.

### ***2.1.8 Aral Sea Basin***

The Aral Sea Basin comprises most of the Kyrgyz Republic, all of Tajikistan, Turkmenistan, and Uzbekistan, and parts of Afghanistan and Kazakhstan. Tajikistan and Kyrgyzstan produce about 77% of the water, whereas water demand has been dominated by the downstream needs of agriculture, which accounts for more than 90% of total water use. Agricultural expansion and population growth during 1950-90 placed tremendous strain on the water resources of the region, leading to the Aral Sea losing more than half of its surface area with dire environmental consequences.

During the Soviet era, the power and irrigation facilities formed part of an integrated regional water and energy system under a centrally planned economy. Kyrgyzstan and

Tajikistan released most of their water through their hydropower dams in the wet season summer months for supplementary irrigation in the downstream countries. In the winter season, Kyrgyzstan and Tajikistan had insufficient stored water left to generate sufficient hydropower to meet their needs. To compensate the upstream countries, the downstream countries sent them oil, gas, and coal to operate their thermal power plants and natural gas systems for heating during the cold winter months. This exchange of water, power and fuel involved no financial transactions.

Following break-up of the Soviet Union, the five newly independent States agreed to maintain the previous sharing arrangements under an Interstate Agreement signed in 1992. They also agreed to establish the Interstate Commission for Water Coordination (ICWC) as the body responsible for defining annual allocations. However, during the early 1990s, with fuel prices rapidly rising and supplies from the downstream countries becoming erratic, Kyrgyzstan started to conserve water in the summer months and increase hydropower generation in the winter, causing in the downstream countries severe flooding and environmental damage in the winter and shortages of irrigation supplies in the summer.

Annual water and energy sharing agreements have since been negotiated for part of the Basin with the aim of broadening cooperation on water and energy management and trade-offs outside the water sector. Whilst experience and confidence is being gained using different mechanisms, there are still many controversial issues still to be addressed.

### **2.1.9 *Okavango Basin***

The Okavango River is the fourth longest river system in southern Africa, running 1,600 km from central Angola to the Kalahari Desert in northern Botswana, where the river terminates in an immense inland delta known as the Okavango Delta (the world's largest Ramsar site). Along its middle course, the Okavango forms part of the Angola-Namibia border. The river's resources remain largely unused, and its banks are only sparsely settled.

Both Namibia and Angola are looking to exploit the river to boost development in their own countries. Botswana, which uses the Delta for both tourism income and a water source, has said that it cannot afford to lose any more water. To deal with such issues, Angola, Namibia and Botswana signed an agreement in 1994 to form the Permanent Okavango River Basin Water Commission (OKACOM), to provide advice to the three countries about the best ways to share the Okavango River's resources.

An initial assessment conducted in 2005-2010 has been made for OKACOM of the environmental, social and economic consequences of a set of future long term development projections. At issue is how, in the face of rising demands, the economic benefits of using the water resources in the basin might be shared amongst the riparian countries so as to promote equity and sustainable resource use. A recent study, which is still under review by OKACOM, suggests that currently economic benefits of the river come from tourism generated income in downstream Botswana, whereas future developments will bring benefits to upstream countries with indirect costs falling on Botswana.

## 2.2 Main findings from the case studies

There are a number of common features that can be observed in the eight case studies. These are considered in this Section and include the (i) development drivers, responses and nature of collaboration, (ii) institutional arrangements, (iii) common features of success, and (iv) problems encountered. In addition this Section considers also the distinction between sharing water and sharing the benefits derived from a shared resource system.

### 2.2.1 *Summary of case study development drivers, responses and nature of collaboration*

The eight case studies illustrate that there are a number of central drivers leading to cooperation between riparian countries. As illustrated overleaf in Table 1, these drivers fall into three main types:

- ❑ **A scare water resource** for which it is desirable to establish a basis for sharing between countries in order for each country to move forward with its development with an assured right to utilise that resource;
- ❑ **A perceived opportunity** to develop and manage water resources in a better way that brings benefits to both countries by accelerating more development than would have otherwise been possible unilaterally; and
- ❑ **A combination of both** circumstances above.

The manner in which the riparians have responded to these drivers is also summarised in Table 1, both in terms of the development response and the nature of the collaboration agreed between the countries. In the eight case studies, five types of collaboration can be observed:

- ❑ **Fully integrated management by central authority** – applicable only in the case of Soviet-era Aral Sea prior to the individual republics being established and gaining sovereign rights of self-determination - the Soviet Government imposed a highly integrated water/food/energy system covering many infrastructure projects (dams, reservoirs, pumping stations, power plants, transmission lines) and managing institutions;
- ❑ **Integrated management of jointly owned assets** – where countries have chosen to jointly invest in and manage a project to mutual benefit, commonly in the case examples where the river in question is the border between two countries and involving a new dam, such as seen on the Senegal and La Plata Rivers;
- ❑ **Integrated management of separately owned assets** - where countries have agreed to cooperate to mutual benefit through a specified project for which ownership remains in the country of the project, but for which costs and benefits are shared according to a pre-agreed formula, such as seen in the Lesotho Highlands scheme and the Columbia River Project;

**Table 1 Summary of development drivers and responses seen in the case studies**

Case study	Development drivers	Development response
<b>Aral Sea Basin</b>	Six countries share basin with insufficient water to meet all needs	<i>In Soviet era, centrally managed barter of water, oil and gas between republics.</i> <i>Post-Soviet replaced by Commission with annual negotiation of allocations</i>
<b>Senegal Basin</b>	Mutual need to develop shared water resources to accelerate socio-economic development between three countries	<i>Created overall basin authority, joint ownership of dams, costs shared according to expected benefits</i>
<b>La Plata Basin</b>	Five countries sharing basin desiring to develop water resources to mutual benefit	<i>Standing inter-government committee oversees and coordinates framework agreement for specific projects</i>
<b>Salto Grande project</b>	Two La Plata countries see opportunity to develop hydropower on border river	<i>Bilateral commission manages jointly owned dam, costs shared proportionate to power received</i>
<b>Columbia Basin</b>	Development constraints in lower riparian could be better addressed by flow regulation in upper riparian	<i>Cooperation agreement establishes payment basis for regulated flows by lower to upper riparian</i>
<b>Lesotho Highlands</b>	Lower riparian needs assured water supplies and energy, upper riparian needs funds to develop economy	<i>Cooperation agreement establishes payment basis for water and energy supplied to lower riparian</i>
<b>Okavango Basin</b>	Three countries share scarce resource upon which the lower riparian is dependent for environmental and tourism purposes, upper riparians now wanting to develop	<i>Commission exploring avenues for cooperation through joint planning and investment within the basin as a whole taking into account comparative advantages</i>
<b>Ganges Basin</b>	Competing demands for water by upper and lower riparian	<i>Joint Commission negotiates and monitors periodic time-bound agreements for minimum flows allocated to lower riparian</i>

- ❑ **Framework agreement for cooperative development** – an agreement, normally administered by a transboundary organisation or commission, established with the intent of cooperating in management and development of a shared water resource to mutual benefit, which typically involves joint studies and knowledge sharing, and which may lead to joint projects in addition to mutually respectful sovereign developments (e.g. as formulated for the Okavango River basin); and
- ❑ **Framework agreement for independent development** – an agreement, again normally administered by a transboundary organisation or commission, which essentially establishes the water rights of each riparian but which has no aspiration for cooperative development in a manner that would optimise benefits gained from the resource system as a whole, such as seen in the Ganges River treaty between India and Bangladesh.

## 2.2.2 Summary of case study institutional arrangements

The case studies reveal a wide range of institutional arrangements are employed in the benefit sharing agreements. These may be characterised as follows in Table 2.

**Table 2 Institutional arrangements seen in the case studies**

Type	Function	Examples
Central basin management	<i>Overall control of the manner in which the basin is managed and water allocated</i>	▫ Aral Sea Basin during Soviet era
Joint ownership and management of individual transboundary projects	<i>Overall management of project through separate organisation established by riparians</i>	▫ Senegal Basin through OMVS ▫ Salto Grande through JTC
Separate ownership and management of individual transboundary projects	<i>Agreed distribution of responsibilities between parties with payments specified through bilateral agreement</i>	▫ Columbia Basin ▫ Lesotho Highlands
Central basin planning and monitoring	<i>Master planning of optimal basin development, with agreement to plan by all riparians, monitoring of plan outcomes etc.</i>	▫ Senegal Basin through OMVS ▫ La Plata Basin through ICC ▫ Aral Sea Basin post-Soviet era through ICWC
Central monitoring, technical review and information sharing	<i>Monitoring of basin status, assessment of riparian plans and facilitation of information exchange</i>	▫ Okavango Basin
Monitoring and conflict resolution	<i>Monitoring of water allocations and body to resolve disputes</i>	▫ Ganges River through Joint River Commission

As may be seen these arrangements span a range of functional responsibilities at the central level from overall control of basin management, through a centralised master planning function, to technical advice and monitoring and finally just monitoring and dispute resolution. This may be viewed as a continuum of choices, which is explored further below in Section 2.3.1 of this report.

At the project level, the case studies fall into two main categories, being (i) joint ownership of the key assets through a separately constituted asset operator and (ii) separate ownership of territorial assets operated collaboratively under the terms of an agreement or treaty.

## 2.2.3 Summary of common features of success as seen in the case studies

The case studies presented above encompass a wide range of approaches adopted in cooperating in the management of an international river.

The findings from these studies demonstrate that commonly transboundary benefit sharing is founded on the principal of a win-win outcome, underpinned by a legal framework appropriate to the circumstances and having a degree of flexibility to cope when those

circumstances change. The case studies also illustrate that, more often than not, benefit sharing is founded on investment in major new infrastructure. Recent research suggests that there exists a *continuum of cooperation* in international river basin management, ranging across simple water sharing, through joint planning and coordination of activities, joint investments and fully integrated basin management by a unitary body.

In most cases, this has led to the riparian States realising their development ambitions, but in some instances these have not been fully achieved yet. The common features of success are discussed below and problems encountered are set out in Section 2.2.4 thereafter.

(i) *A mutual benefit in the developments taken up*

It is evident that where riparian states recognise that development of a particular project will bring benefit to each of them then there is a shared incentive to make it work, providing that the magnitude of benefit is sufficient to be worth the effort.

This does not mean that necessarily equal benefits are taken by both parties, but it does imply that both parties consider the potential outcome is fair for them. Whereas the projects in La Plata Basin for instance are based on equal equity and benefits, in the Columbia Basin and Lesotho, the central investments were made by the upper riparian against an agreed “payment” process from the lower riparian.

Conversely, the Ganges Water Treaty has no economic incentives to bind the parties together, and most probably as a consequence, history has shown it to be a somewhat fragile accord that relies upon the maintenance of political good will and neighbourliness.

(ii) *A legal framework fit for purpose*

A wide range of agreements have been used to underpin benefit sharing agreements. La Plata has an overall Treaty binding all riparians together in a manner similar to the Mekong Agreement. This agreement also provides a framework within which there is scope for bilateral agreements for specific benefit sharing agreements. The Salto Grande is good example of the latter.

More commonly in the case examples, the Treaties were constructed for specific projects without the need for a higher protocol. Columbia, Senegal and Lesotho are all examples of these.

Whilst each of the above have broadly resulted in successful outcomes for the parties involved, the 1992 Aral Sea Interstate Agreement has proved to be less successful. This seems to be as a result of the Agreement not fully embracing all the trade-offs involved and ensuring all parties to the Agreement are benefitting at all times. Human nature is such that inevitably if the Agreement is weak and better opportunities arise, then those better opportunities will be followed.

#### 2.2.4 *Summary of problems encountered as seen in the case studies*

Most case studies suggest that concluding benefit sharing agreements took the parties **many years to reach**. Apart from the complexity in assessing and evaluating the costs and benefits of such arrangements, it has to be recognised that more often than not, **time is needed to build trust and willingness to cooperate** together. There have been many studies of how water sharing treaties have contributed to reducing conflict between nations, and unquestionably strong political support at the highest level is needed on each side to get agreements in place.

Not all agreements have run smoothly however, and the case examples illustrate where things can go wrong.

##### *(i) Failure to factor in environmental and social costs*

The most common problem encountered in the case studies is that the social and environmental costs were not brought adequately into the agreements at the outset. It is to be recalled that many of the agreements were initiated in the latter part of the 20<sup>th</sup> century when, to be fair to the parties involved, awareness of these issues was much less than today.

Most of the early agreements were founded (it seems) solely on sharing the economic benefits of cooperative development. Equally (it seems), soon after the projects were completed the social and environmental impacts became apparent.

These issues were encountered in the Senegal basin and Aral Sea, necessitating lengthy further negotiations to rectify the situation. It is not clear yet whether these will achieve a mutually long term outcome. In the case of the Columbia Basin, no attempt was apparently made to adjust the agreement and the Province of British Columbia spent a further \$450 million rectifying the situation.

There is a need to factor social and environmental impacts into the negotiations from the outset along with the risk that weak national-local benefit sharing arrangements can diminish the intended outcome of the project. The case studies also reveal a wide-range of organisational structures and benefit sharing arrangements that are being employed. Arrangements vary according to circumstances and it is evident that there is no single formula for success.

##### *(iii) Weakness of internal benefit sharing mechanisms*

In some of the case studies, it seems that the need to mitigate social and environmental impacts was better anticipated. This was clearly the case in the Lesotho Highlands project and yet it is reported that the affected communities remain dissatisfied with the way they have been subsequently treated.

In this and most probably in other cases around the world, the problem reflects not so much on the transboundary agreement but with the effectiveness of internal benefit sharing arrangements. It is clear though that now in the 21<sup>st</sup> century, there is a high level of

expectation that such internal arrangements are put properly in place. Ultimately, the overall performance of a transboundary project may well be judged by many in this context.

*(iv) Inflexibility to deal with changing circumstances*

Inevitably transboundary benefit sharing agreements are founded on a prior assessment of the costs and benefits to all parties involved. In several of the case studies, the agreement was ultimately entered into on a 50:50 equity basis with the costs and benefits shared equally. In such cases, the risks are effectively also shared equally.

However, in some cases the ownership of the infrastructure is vested primarily in only one of the parties, with the other party agreeing to pay for water or energy at an agreed set of tariffs. Given that these projects are set up with an extremely long life time, it is inevitable that energy and other commodity prices will vary over time. Who negotiating deals in the 1970s and 1980s would have anticipated the current cost of energy prices?

It is evident that many of the problems faced in the Aral Sea case study relate to changing energy prices. In that case there was an implicit trade-off between water assigned to agriculture and water for hydropower. As the balance between these two values has widened, so have the tensions between the parties, leading to behaviours that undermine the overall agreement.

Thus, where the agreement is not founded on shared ownership and risk, the agreement must take into account changing commodity prices and, where appropriate, include a degree of flexibility to accommodate significant variability in these to all parties' mutual benefit.

### **2.2.5 *Sharing water or sharing benefits***

A common feature in most case studies is that the bilateral agreements are founded on the mutual sharing of an opportunity to create benefits to each party, primarily for territorial reasons, could not achieve alone. The basis for constructing the agreement is mostly around the principle of sharing benefits rather than allocating shared water to each party.

This is exemplified in the case study of the Okavango Basin. It is evident that if the upper riparians were to take the position that water available within their territory was theirs to use as they see fit, the downstream country, Botswana, would be severely disadvantaged (economically, socially and environmentally) by the collapse of the Delta ecosystem and the tourism revenues that this generates. At the same time, Botswana recognises that the upstream countries have a legitimate need to develop their countries, which in itself would bring benefits to Botswana through increased trade and reduced threats of conflict.

The option placed on the table, and which the countries are considering, is one founded on the understanding that the basin as a whole represents a shared resource and that the challenge is to develop an "optimal" solution that would create benefits at levels acceptable to each country. In this instance, the alternative of developing a solution based on individual country' programmes to utilise their share of the river would seemingly lead to a "sub-optimal" solution.

## 2.3 Relevance of international experience for the Mekong

The case studies demonstrate a wide range of circumstances that have caused countries to cooperate in different ways in the management and development of international rivers. In this Section, a conceptual framework is suggested within which the MRC and its member countries may consider how best to take forward sharing of benefits derived from cooperation in the light of international experience.

### 2.3.1 A continuum of cooperation

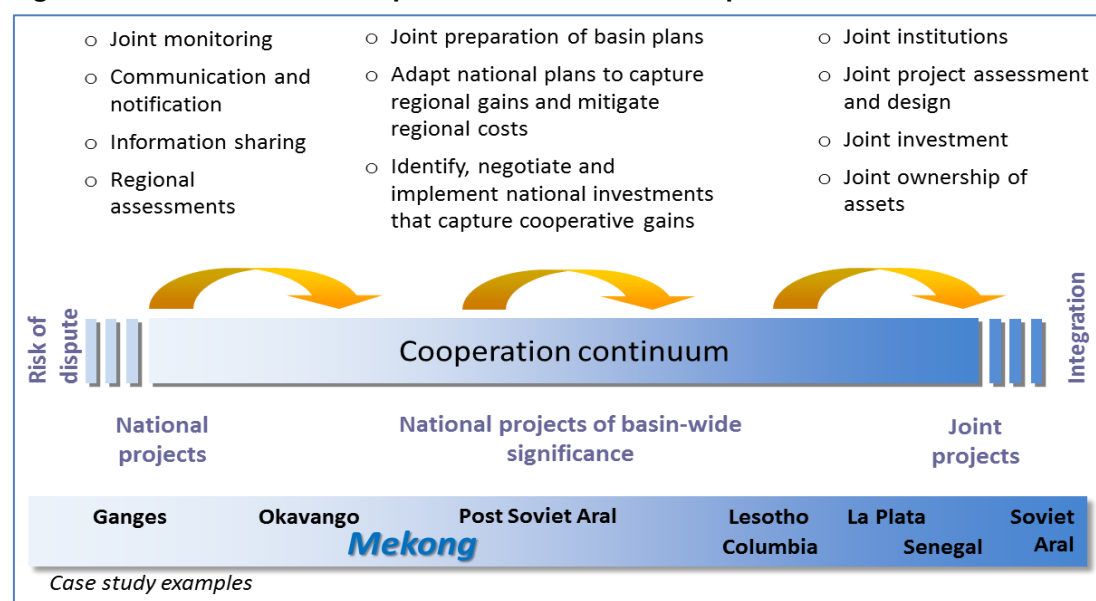
In their paper published in 2005, Sadoff and Grey<sup>5</sup> recognise that achieving international cooperation is always a long and complex journey, for which there is no single path and few short cuts. They argue that ultimately various modes of cooperation could be adopted, depending upon what is appropriate to achieving a particular goal.

The optimal type of cooperation will vary with hydrologic and investment opportunities, and with the consequent potential benefit-sharing mechanisms in each basin. In some basins, information sharing and basin-wide strategic assessments may be adequate to facilitate optimal cooperative management. In others, joint actions in river regulation, water storage, and drought and flood mitigation would yield significant net benefits over and above that which countries could create without cooperation.

Thus, a *continuum of cooperation* can be conceived as illustrated below in

Figure 1 (which provides also an indication of where the case studies in Section 2.1 might fall within the continuum).

**Figure 2 Illustration of the cooperation continuum concept**



<sup>5</sup> Cooperation on International Rivers, A Continuum for Securing and Sharing Benefits. Claudia W. Sadoff and David Grey. International Water Resources Association, Water International, Volume 30, Number 4, Pages 420–427, December 2005.

As illustrated above, the case studies can be viewed as falling into different positions within the continuum, reflecting the nature and extent of cooperation agreed between riparian countries. Three broad levels of cooperation can be observed:

- ❑ **National projects** – independent development within riparian states, founded on a MoU or treaty covering the basis by which access to water is shared between the states, often based on a regional assessment of appropriate shares and commonly supported by joint monitoring programmes and information exchange in the case of extreme hydrological events. The benefits gained by each state are determined by the actions taken in each state based on their share of the water. The Ganges water sharing treatment is a good example of this, wherein India and Bangladesh have agreed minimum flow releases to Bangladesh under a 30-year treaty.
- ❑ **National projects of basin-wide significance** – developments within riparian states benefit from developments elsewhere in the basin, enabling riparian states to increase their benefits beyond that which would otherwise have been considered mutually acceptable. National projects of basin-wide significance contribute to increasing the development potential of the basin through having positive impacts beyond the border of an individual country. This level of cooperation is usually founded, within a framework of a treaty or MoU, on joint preparation of basin plans in a manner that encourages riparian states to take advantage of developments (such as increased river regulation) in other states within their own national plans. The Okavango River basin has a treaty reflecting a commitment to shared benefits from the river and is developing a basin plan accordingly. The post-Soviet Aral Sea Basin treaty combines arrangements for water management and trade in energy to meet each state's needs.
- ❑ **Joint projects** – development of specific projects between two or more riparian states to address particular threats or opportunities that one riparian state alone could not achieve independently. As shown, many of the case examples illustrate joint actions commonly associated with the construction and operation of major new dams and the sharing of subsequent benefits (regulated flows, secure water supplies, hydropower etc.) according to the project agreement. The Lesotho and Columbia agreements both involve construction of dams in the territory of the upper riparian to serve the needs of the lower riparian. The La Plata and Senegal Basins go further with each involving joint ownership and management of a large dam on a border river to serve the needs of each riparian state. Management of the Soviet-era Aral Sea Basin was fully centrally-controlled to meet the water, energy and food needs of the five riparian Central Asian countries.

In principle, river basins to the right of the diagram have far greater facility to coordinate development and management of the basins' resources than those to the left. In theory at least, the further to the right therefore the greater the likelihood that the basin's potential is being optimally used, though this is by no means guaranteed, as the case studies suggest.

It is interesting to observe also that arrangements for the Aral Sea basin have moved from the extreme right (centrally planned economy determining all plans and operational rules) to

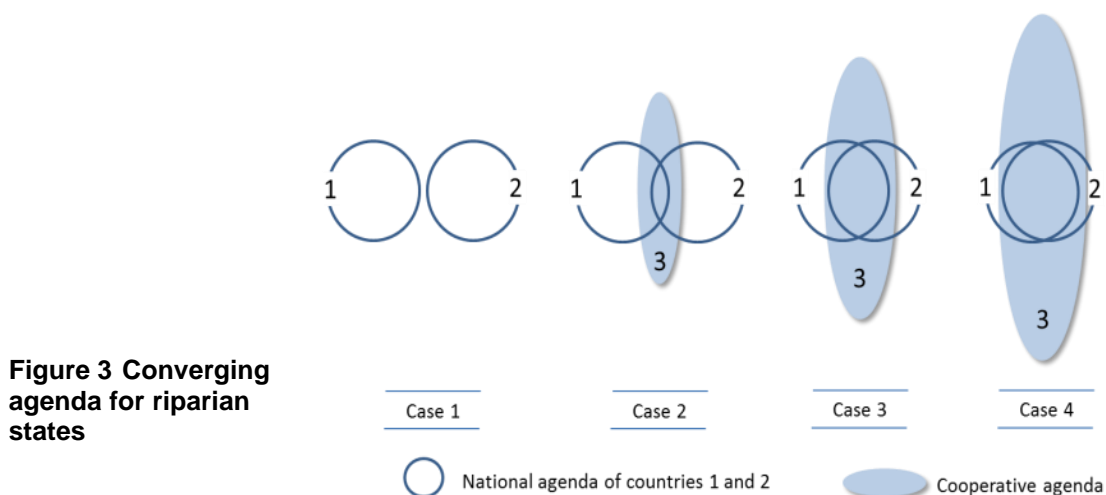
somewhere in the middle (jointly planned and administered) in the transition from the Soviet era to post-Soviet arrangements. The Mekong currently appears to be appropriately placed somewhere to the right of the Okavango (given the Mekong's agreed Basin Development Strategy and procedural framework), but to the left of the Aral Sea (given that the Aral has benefit sharing mechanisms already in place).

### 2.3.2 *Convergence towards a cooperative agenda*

In their paper, Sadoff and Grey further propose a framework by which to move from national agendas that are unilateral, to national agendas that incorporate significant cooperation, and to converge upon a shared cooperative agenda (i.e. a movement from left to right in the continuum diagram). They argue that the extent to which this will occur will be determined by each party's perception of the benefits it can secure from cooperation. *Convergence towards a cooperative agenda* will be facilitated by several important and practical steps as described by Sadoff and Grey below.

#### (i) *National agendas - converging toward cooperation*

Each sovereign country will have its own national agenda on an international river — this is obvious, rational, and legitimate. Thus, in a river basin shared by two states, there will be two separate national agendas (see Case 1 in Figure 3 below). If these two agendas overlap in some way, there will be a third cooperative agenda of some scale – from very limited to substantial (Cases 2 and 3).



As the benefits of this cooperation are progressively identified and secured, this third agenda may grow, with the two national agenda converging into a cooperative agenda for the two countries – each of which will still view the cooperative agenda to be their national agenda (Case 4). In Case 4, the emerging single cooperative agenda will need to provide benefits that exceed the sum of the two non-cooperative national agendas, and will thus have become the rational choice of each sovereign nation, with the growing cooperative agenda seen by each country as being part of its national plan.

Particularly in basins where there is sufficient water to meet future consumptive needs, the benefits to be gained from convergent national agenda may seem to be less strong. In these instances the rational choice may be somewhere within the middle of the four Cases illustrated in Figure 3, where greater emphasis is placed on cooperation to derive benefits from non-consumptive uses, such as flood control, power generation, environmental management and the like).

*(ii) Benefits of cooperation - looking beyond the river*

A first step in motivating cooperation is to recognize the widest possible range of potential benefits that cooperation could bring. There will be no cooperation if benefits are perceived to be not worth the costs of cooperation (Case 1 in Figure 3). It is noted that benefits are defined here to include economic, social, environmental, and political gains. Integrated, basin-wide resource management is increasingly recognized as the ultimate goal for ensuring the sustainability and productivity of river systems.

In the context of international rivers, efforts toward integrated management cannot be made without international cooperation. A useful framework for broadening the range of recognized benefits of cooperation proposed by Sadoff and Grey involves four types of cooperative benefits as illustrated in Table 3.

**Table 3 Generalised types of benefits of cooperation on international rivers**

Type	Brought about by	The challenge	The opportunities
Type 1 <b>Increasing benefits <u>to</u> the river</b>	Cooperation that enables better management of ecosystems, providing benefits to the river, and underpinning all other benefits that can be derived	Degraded water quality, watersheds, wetlands, and biodiversity	Improved water quality, river flow characteristics, soil conservation, biodiversity and overall sustainability
Type 2 <b>Increasing benefits <u>from</u> the river</b>	Efficient, cooperative management and development of shared rivers, yielding major benefits from the river, in increased food and energy production, for example	Increasing demands for water, sub-optimal water resources management and development	Improved water resources management for hydropower and agricultural production, flood-drought management, navigation, environmental conservation, water quality and recreation
Type 3 <b>Reducing costs <u>because of</u> the river</b>	Lessening of tensions because of cooperation, resulting in the reduction of costs because of the river, as tensions between co-riparian states will always be present, to a greater or lesser extent, and those tensions will generate costs.	Tense regional relations and political economy impacts	Policy shift to cooperation and development, away from dispute/conflict; from food (and energy) self-sufficiency to food (and energy) security; reduced dispute/conflict risk and military expenditure
Type 4 <b>Increasing benefits <u>beyond</u> the river</b>	Greater cooperation between states, even economic integration among states, generating benefits beyond the river.	Regional fragmentation	Integration of regional infrastructure, markets and trade

Source: *Cooperation on International Rivers, A Continuum for Securing and Sharing Benefits*. Claudia W. Sadoff and David Grey. *International Water Resources Association, Water International, Volume 30, Number 4, Pages 420–427, December 2005*

### 2.3.3 Cooperative regional assessment

The appropriate level of cooperation in a particular basin can be explored through cooperative regional assessment (CRA). The CRA process is one that involves considering the comparative advantage of different parts of the basin to meet the needs of all riparians and, through this, identifying potential undertakings (structural, non-structural or enabling) which would serve to increase the overall benefits each country obtains from the basin. Four types of benefits are often considered under CRA to ensure that a complete picture is available to decision takers (see box).

Cooperative Regional Assessment (CRA) is seen as flexible and powerful instrument to bring riparian countries together to identify the full range of options and choices that are available to optimise and share the benefits of cooperation<sup>6</sup>. The benefits identified by CRAs could then motivate countries to continue or intensify their cooperative efforts to capture those benefits. CRAs are strategic, highlighting the range of potential projects and benefits and the CRA process is underpinned by three elements: institutional strengthening, process design and transboundary analysis.

#### *Four types of benefits normally considered under Cooperative Regional Assessment*

**Type 1 - Benefits to the river:** A natural resource system consistent with the needs to protect, preserve, enhance and manage the environmental and aquatic conditions and maintenance of the ecological balance

**Type 2 - Benefits from the river:** Sustainable benefits within the basin for social and economic development and the well-being of all riparian States

**Type 3 - Reduced costs because of the river:** Reduction in cost of achieving optimal and sustainable development through cooperation in development and management of water and related natural resources

**Type 4 - Benefits beyond the river:** Added value to each nation from effective development and management of the shared river system

CRA may be viewed as a suitable process in the Mekong context of achieving a broad understanding of:

- ❑ Each of the national plans in the context of the overall basin development potential;
- ❑ The challenges and opportunities for cooperative management in the LMB;
- ❑ The cumulative costs and benefits of alternative basin-scale interventions;
- ❑ The potential distribution of costs and benefits under alternative benefit sharing scenarios; and
- ❑ The nature and scope for generating regional public goods through watershed management project(s).

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<sup>6</sup> The technique of CRA has been advocated for use in the Nile Basin.

There are three potential elements to the analytical phase of CRA, as outlined below:

- (i) Transboundary analysis of the basin system and associated livelihoods, examining challenges and opportunities for achieving greater benefits through coordinating and/or modifying nationally planned infrastructure (i.e. essentially without borders);
- (ii) Distribution analysis of costs and benefits that will accrue across countries under alternative basin-scale management interventions (i.e. essentially with borders). Where this distribution is skewed in favour of one or more countries, options for alternative basin-scale management interventions are to be examined; and
- (iii) Institutional analysis of differing levels of cooperation among the basin countries required by the alternative options presented for river basin watershed management interventions and their institutional implications.

#### 2.3.4 *Status of cooperative regional planning and assessment in the Mekong*

As described above, the Cooperative Regional Assessment technique is one that assumes no previous efforts to develop a cooperative agenda have been made. In the Mekong context, this is not the case as steps towards building cooperation between all riparians have been ongoing for many years, starting in effect with the 1952 report on LMB water resource development prepared by the Bureau for Flood Control under the UN Economic Commission for Asia and the Far East<sup>7</sup>.

In the modern era, since signature of the 1995 Mekong Agreement, efforts have been strengthened to build on the LMB countries renewed commitment *to optimize the multiple-use and mutual benefits of all riparians and to minimize the harmful effects that might result from natural occurrences and man-made activities*<sup>8</sup>. This has resulted in the establishment of a collaborative basin planning process facilitated by MRC's Basin Development Programme.

The basin planning process for the LMB follows a cycle established and agreed with the member countries (see Figure 4)<sup>9</sup>. As a result of the first cycle under the BDP Programme, the following key outcomes have been already achieved:

- An appreciation of the overall incremental cumulative benefits and impacts of individual country short, medium and long term plans, reported upon in the **Assessment of Basin-wide Development Scenarios** (MRC, 2010, final published in 2011);

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<sup>7</sup> See The BDP Story, the Story behind the Basin Development Plan, published by MRC in 2013, for the full history of cooperation between the Mekong countries on water resources development.

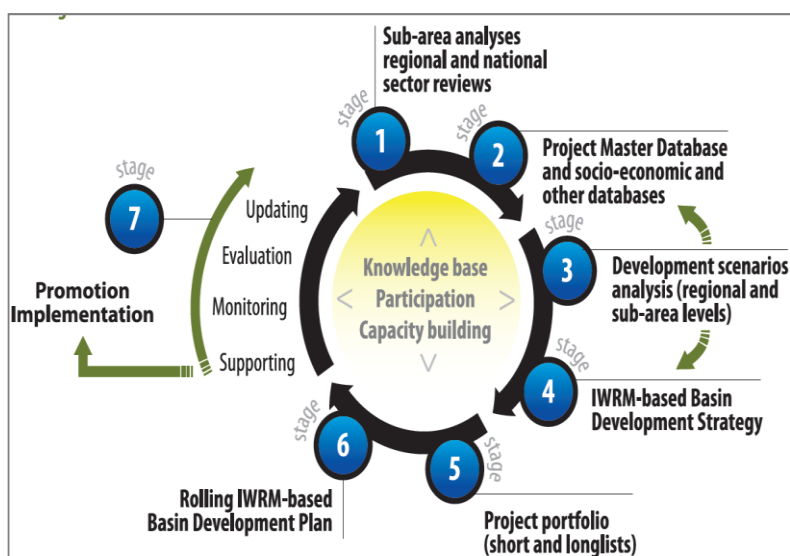
<sup>8</sup> Article 1 of the 1995 Mekong Agreement

<sup>9</sup> The planning cycle has been updated in the Basin Development Strategy 2016-2020, see Chapter 5

- The formulation of an **IWRM-based Basin Development Strategy**, approved by the MRC Council in January 2011, setting out a range of development opportunities and priorities for improving basin development and management; and

- The compilation of a **Basin Action Plan** (published by MRC in May 2013) made up of a Regional Action Plan and four National Indicative Plans addressing the strategic priorities of the Basin Development Strategy and as well as national responses to the Strategy.

**Figure 4 MRC's basin development planning cycle**



These achievements represent a substantial step forward in building cooperation in basin management and development and very much accord with the initial step under Cooperative Regional Assessment of *transboundary analysis*, which requires *the consolidation of national analyses and other relevant inputs to present a system-wide analysis of the basin's behaviour and associated livelihoods (physical and social), making use of all available information, with any major data gaps that cannot be immediately filled should be identified for future action.*

The challenge now is to move the process forward into the next stages of CRA of:

- Adding an assessment of the potential additional benefits of cooperation in basin development and management (and potential negative impacts and mitigation) in terms of the potential additional cross-border positive and negative impacts of basin scale interventions, including identification of opportunities for achieving greater benefits through coordinating and/or modifying interventions;
- Identifying from the above the greatest system-wide opportunities for high-impact cooperative basin management and their cumulative impacts in broad basin-scale terms, initially without consideration of national borders; and
- Thereafter, with national borders taken into account, selecting those system-wide opportunities which are politically acceptable and strategically attainable as a basis for optimising *the multiple-use and mutual benefits of all riparians and to minimize the harmful effects that might result from natural occurrences and man-made activities.*

### 3 Regional benefit sharing in the Mekong context

*This chapter draws on the international experience set out in the previous chapter and suggests the context of how regional benefit sharing within the Mekong Basin may be viewed. The chapter then considers the drivers (or “challenges”) for benefit sharing in the light of the commitments made in the 1995 Mekong Agreement and discusses the scope and nature of benefit sharing that is or may arise in the future. The Chapter commences with an overview of past development within the Mekong Basin to provide context to the later sections.*

#### 3.1 Development of the Mekong River System

As one of the great rivers of the world, the Mekong is closely linked with the culture and development of the countries through which it flows. For millennia the river’s abundant resources have nurtured a unique and rich ecosystem as well as sustained the livelihoods of those living in the basin.

Development of water resources within the basin can be traced back to irrigation schemes constructed around Angkor Wat in the 12<sup>th</sup> century at the height of the Khmer Empire. Although it is believed that these systems started to fall into disuse by the 14<sup>th</sup> century, they and the temple complex itself bear testament to the ingenuity of these early engineers.

However, it is only in the last 125 years that significant changes to the landscape of the basin have been brought about. As the downstream riparian, Viet Nam began investing a century ago in improvements to navigation and drainage in the fertile areas of the Mekong delta. Since the late 1960s, large areas were brought under irrigation through the development of intensive canal systems and farmer-owned low-lift pumps and the land has become amongst the most

**Figure 5 Mekong River Basin**



productive areas in the world with double-and even triple-cropping of rice, a wide range of tropical fruits, and extensive shrimp cultivation.

In Thailand's part of the basin, development also took off in the 1960s with many small and large dams constructed to capture the highly seasonal flows of Thailand's Mekong tributaries. However, only a small part of the agricultural lands is being irrigated in the wet season and much less in the dry season. Since many years, the improvement of water security in Northeast Thailand has been a priority for the government to improve the backward economic condition compared to other parts of the country.

Large-scale water resources development in Cambodia and Lao PDR is of more recent date. Lao PDR is making progress in developing its vast hydropower potential. Cambodia has commenced developing the largest remaining irrigated agricultural potential in the region, particular in the undeveloped Cambodian delta, linked to major investments in flood control, and elsewhere, linked to hydropower development.

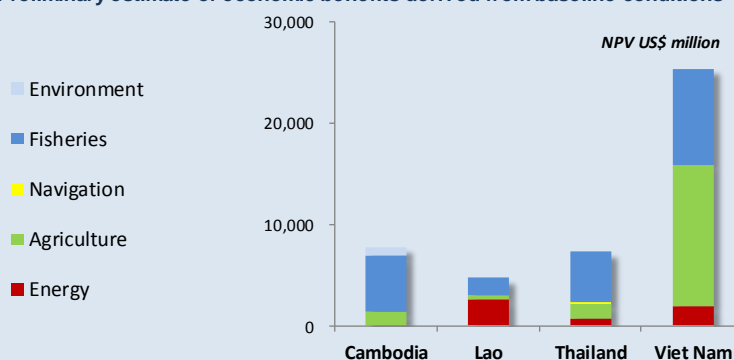
Nevertheless, following nearly 50 years of internationally sponsored planning efforts, by the end of the 20th century, these developments had yet to significantly impact on the flow regime of the Mekong mainstream. However, by the year 2000 the land and water resources developments had led to major changes in environmental, social and economic indicators. For example it was reported in 2003 that wetland losses amounted to 99% in Viet Nam, 96% in Thailand, 45% in Cambodia and 30% in Lao PDR<sup>10</sup>. Also a considerable part of the biodiversity has been lost and the number of threatened species increased from 327 in 1996 to 1,525 in 2014.

However, by 2008, when the first

#### Baseline conditions in year 2000

Key production statistics		Cambodia	Lao PDR	Thailand	Viet Nam
Hydropower production	GWh / yr	0	3,032	2,403	3,659
Irrigated agriculture production	'000 tonne/yr	1,905	871	5,406	19,834
Aquaculture production	'000 tonne/yr	127	78	100	1,663
Capture fisheries production	'000 tonne/yr	767	246	921	370
Flood damages	US\$M / yr	-26	-70	-67	-56
Wetland areas (forest, marsh & grassland)	'000ha	1,288	17	62	101

#### Preliminary estimate of economic benefits derived from baseline conditions



Source: BDP estimates from data abstracted from Cumulative Impact Assessment of Basin-wide Development Scenarios, published by MRC in 2011

<sup>10</sup> ICEM, 2003. Review of Protected Areas and Development in the Lower Mekong River Region

cumulative impact assessments were undertaken by MRC, a different picture began to emerge.

Foremost is the development of large storages in the upper basin within China, which are of a magnitude to permanently change the dry season flow regime of the Mekong mainstream, to the extent that ultimately all foreseen dry season consumptive demands on the river can be met with the existing and planned storages in China and Lao PDR. This opens the door for the riparian countries to further develop the Mekong's water resources and, in doing so, to more equitably share the benefits of these resources than was apparently the case in 2000 (see box).

Climate change, sea level rise, demographic changes, rising social demands and expectations for livelihoods and water, food and energy security, together with greater environmental awareness, will all undoubtedly shape the future development of the Mekong Basin. Each presents significant challenges for the riparian countries individually and collectively.

It is evident that each country is well aware of the potential benefits that river's development could bring to their own economies and social development programmes. Equally, past planning efforts have highlighted also the threats that further uncoordinated development could bring to both the river's ecosystem as well as to the development ambitions of individual countries.

**The need for prudent and cooperative development to share these benefits amongst all riparian countries has never been greater.**

### **3.2 The commitment to cooperate in development and management of the Mekong River**

The 1995 Mekong Agreement commences with a statement of intent that the Member States are *equally desirous of continuing to cooperate in a constructive and mutually beneficial manner for sustainable development, utilization, conservation and management of the Mekong River Basin water and related resources*. This intent is elaborated in the Preamble given in Chapter 1 of the Agreement, which:

- ❑ Recognises that the Mekong River Basin and the related natural resources and environment are natural assets of immense value to all the riparian countries for the economic and social well-being and living standards of their peoples;
- ❑ Reaffirms the determination to continue to cooperate and promote in a constructive and mutually beneficial manner in the sustainable development, utilization, conservation and management of the Mekong River Basin water and related resources for navigational and non-navigational purposes, for social and economic development and the well-being of all riparian States, consistent with the needs to protect, preserve, enhance and manage the environmental and aquatic conditions and maintenance of the ecological balance exceptional to this river basin; and

- Affirms [the intent] to promote or assist in the promotion of interdependent sub-regional growth and cooperation among the community of Mekong nations, taking into account the regional benefits that could be derived and/or detriments that could be avoided or mitigated from activities within the Mekong River Basin undertaken by this framework of cooperation.

Under Chapter 3 of the Agreement, the areas of cooperation between the Member Countries are defined in Article 1 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, hydro-power, navigation, flood control, fisheries, timber floating, recreation and tourism, in a manner to optimize the multiple-use and mutual benefits of all riparians and to minimize the harmful effects that might result from natural occurrences and man-made activities.***

Article 2 then establishes that with regard to Projects, Programs and Planning, the intent is to ***promote, support, cooperate and coordinate in the development of the full potential of sustainable benefits to all riparian States and the prevention of wasteful use of Mekong River Basin waters, with emphasis and preference on joint and/or basin-wide development projects and basin programs through the formulation of a basin development plan, that would be used to identify, categorize and prioritize the projects and programs to seek assistance for and to implement at the basin level.***

The Member States committed also committed in (Article 3) ***to protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin, and, under Article 7, to make every effort to avoid, minimize and mitigate harmful these effects,*** for which a dispute resolution process is provided should harm arise after the water use has been established (Article 8). The 1995 Agreement does not provide for “compensation” other than Article 7 and 8.

Article 26 of the 1995 Mekong Agreement requires the development of the ‘Rules for water utilisation and inter-basin diversions’ to promote the reasonable and equitable utilisation of the LMB, to maintain flows in the mainstream, and to share the data and information necessary for the implementation of the Agreement. These ‘Rules’ were subsequently developed as five ‘Procedures’ (see box), reflecting the intention to have a more *cooperative management* rather than *regulatory* approach to implement the Agreement.

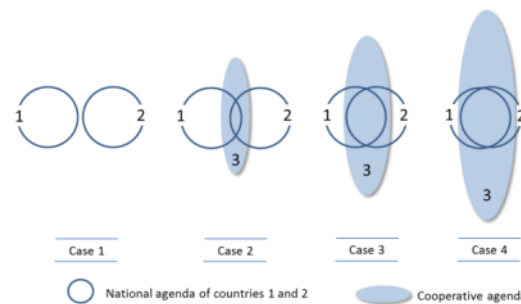
**Thus, in the 1995 Mekong Agreement the Member Countries committed to, ‘optimize and**

- MRC's Procedural Framework**
- Procedures for Data and
  - Information Exchange and Sharing **(PDIES)**
  - Procedures for Notification, Prior Consultation and Agreement **(PNPCA)**
  - Procedures for Water Use Monitoring **(PWUM)**
  - Procedures for the Maintenance of Flows on the Mainstream **(PMFM)**
  - Procedures for Water Quality **(PWQ)**

share’ as well as to ‘protect and minimize harm’<sup>11</sup>. MRC’s first IWRM-based Basin Development Strategy for the Lower Mekong Basin promoted cooperation towards these aims. The Strategy uses the Development Opportunity Space (DOS) as the conceptual model underpinning the planning process.

### 3.3 The Basin Development Strategy

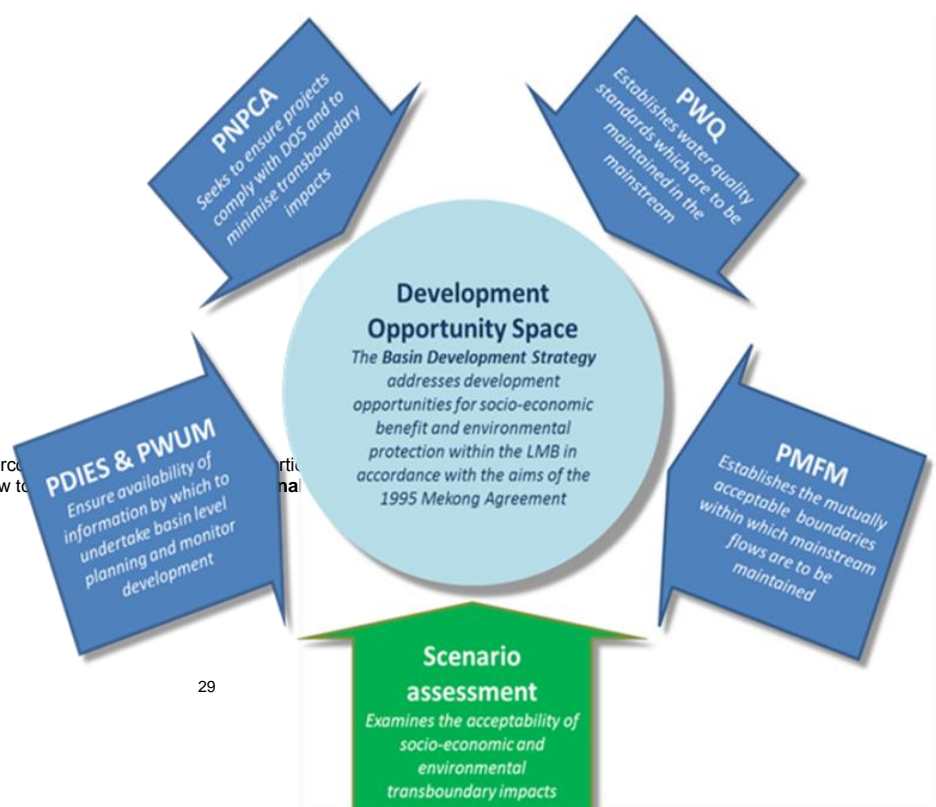
In 2011, the MRC Council approved the IWRM-based Basin Development Strategy (BDS), which was founded on understandings derived from the cumulative impact assessment of national plans principally relating to water supply, hydropower, irrigation and flood management. The assessment equates to Case 1 in the diagram of a converging agenda for riparian countries given earlier in Figure 3 (shown again here).



The BDS however sets an agenda to strengthen cooperation between the Member Countries primarily through strengthening the relationship between national and regional planning and investigating the opportunities for enhancing the benefits to be gained from cooperation. The recently published Basin Action Plan (2013) may be seen as a significant step along the path of promoting greater integration of planning efforts, notably including nationally identified projects of basin-wide significance that will enhance the development potential of the basin and also a number of joint projects, shared by two or more countries, that will address issues that one country alone could not (in the Basin Action Plan, “joint projects” are referred to as “bilateral projects”).

Thus, already there is practical demonstration of the move towards a Case 2 situation (as illustrated above) where a cooperative project agenda is emerging. At issue is the potential for exploring whether further moves to expand the

Figure 6 Conceptualisation of the Development Opportunity Space



<sup>11</sup> This is also consistent with the 1997 UN Watercourse Convention, which was developed by watercourse States with a view to ensuring the equitable and reasonable utilization of international watercourses for the benefit of all riparian States.

**cooperative agenda towards Cases 3 or 4 are merited. This report seeks to provide a basis for the Member Countries to consider how far cooperation might be extended.**

The preparation of the BDS has led to the conceptualisation of a Development Opportunity Space (DOS), representing the potential for further development within the limits of acceptable impacts on the basin's natural resources, on environmental conditions, and on existing resource users.

The DOS is bounded by what the Member Countries agree is an acceptable level of cumulative impacts on the basin's water resources and social and environmental conditions within the basin (as an outcome of basin-wide discussions of the impacts of alternative development scenarios). This conceptualisation of the DOS (see Figure 6) emphasises the inter-connectivity between the MRC Procedures (water flows, quality, use monitoring, data exchange and project consultation) and basin planning and the need for them to work coherently together. The DOS concept takes into account the reasonable and equitable use of water resources across the basin. Thus the boundary of the DOS is defined by compliance with MRC Procedures (PMFM, PWQ and PNPCA) and "acceptability" determined by basin-wide scenario assessment against agreed indicators.

Opportunities entering the DOS are those which the countries consider mutually acceptable following the cumulative impact assessment of scenarios reflecting foreseeable future national sectoral plans. The indicators employed for these assessments are those defined in the MRC Indicator Framework, which includes dimensions covering social, environmental and economic impacts and resilience to climate change, as well as compliance with MRC Procedures (the same indicators are used for State of Basin reporting as a means of validating assessment findings). Individual projects are subject to the MRC's Procedure for Notification, Prior Consultation and Agreement (PNPCA). When required under PNPCA, checks are made as to whether the project in question falls within the DOS.

The DOS is currently populated by those opportunities which have been determined to be mutually acceptable by the Member Countries on the basis of discussions of the results of the 2009-2010 cumulative impact assessment of nationally planned development. These opportunities were set out in the BDS 2011 and remain applicable in the updated BDS for 2016-2020, until new assessment results emerge. The new assessments are planned in the MRC Strategic Plan 2016-2020.

The above conceptualisation emphasises leads also to an appreciation that the DOS can be enlarged in line with the MRC's aim to optimally develop the basin through cooperative planning that maximises economic, social and environmental benefits whilst minimising unacceptable impacts, as envisioned in the 1995 Mekong Agreement. Joint and/or basin-wide development and cost and benefit sharing opportunities can contribute to expanding the DOS. And as demonstrated by the assessments undertaken in 2009-2010, some nationally planned projects have greater adverse impacts than others, reducing the DOS, notwithstanding the substantial direct economic benefits they may individually create.

### 3.4 Challenges in promoting strengthened cooperation

There has been much recent research into the value that cooperative transboundary river management can contribute to reducing tensions and disputes between neighbouring states. A cooperative agenda (joint development, mutual benefits, etc.) serves almost automatically to bringing countries together. In line with Article 2 of the 1995 Mekong Agreement, the MRC has been moving from a platform where the Member Countries cooperate seemingly only to defend their national interests to a vehicle where the Member Countries can come together to find new development and management opportunities to do jointly (the added value of MRC).

The general approach to investigating the regional distribution of benefits is proposed as one that broadly follows the approach discussed in Section 2.3 on building cooperation on international rivers (and particularly in Section 2.3.3), taking into account the achievements that MRC has already made in developing a collaborative planning framework as set out in Section 2.3.4.

The central objective is now seen to build on these achievements and to more fully address the intent of the 1995 Mekong Agreement of *promoting interdependent sub-regional growth and cooperation among the community of Mekong nations*, whilst seeking to realise the full potential of sustainable benefits from development of the resource system through effective collaboration. A key aim is therefore to investigate ways by which cooperation can bring added value to each country over and above that which could be achieved in its absence.

This aim may be seen as a “challenge” to each country to look for ways by which to achieve this added value from cooperation. This “challenge” can be broken down into four elements and be represented using the Sadoff and Grey categorisations of “to”, “from”, “because of” and “beyond” the river in terms relevant to the Mekong situation as shown below in Table 4.

**Table 4 Four types of benefit in promoting cooperation amongst MRC countries**

Type	Challenge(s) for the Mekong Basin
Type 1 Increasing benefits <u>to</u> the river	Effective and sustainable management of the natural resource system, consistent with the needs to protect, preserve, enhance and manage the environmental and aquatic conditions and maintenance of the ecological balance
Type 2 Increasing benefits <u>from</u> the river	Development of the full potential of sustainable benefits within the basin for social and economic development and the well-being of all riparian States
Type 3 Reducing costs <u>because of</u> the river	Reducing the overall costs of achieving optimal and sustainable development through cooperation in development and management of water and related natural resources of the Mekong river system
Type 4 Increasing benefits <u>beyond</u> the river	Added value to each nation from effective development and management of the Mekong River system

The manner by which these challenges may be addressed by each country depends upon the *cooperation strategy* they choose to adopt individually and collectively with their neighbours. In this context, a *cooperation strategy* may be viewed as one which determines where each country would like to be in the *cooperation continuum* (see Figure 2) and what practical steps should be taken to realise that ambition.

### 3.5 Scope of transboundary benefit sharing within the Mekong context

#### 3.5.1 Types of benefits arising from basin management and development

The 1995 Mekong Agreement provides for a wide range of ways by which benefits derived from cooperation may be shared. These may be characterised within the context of the four key challenges set out above in Table 4.

##### (i) Type 1 - Increasing benefits to the river

The natural resource system is a continuum throughout the basin, wherein interventions in one part of the basin may impact elsewhere in the basin. It is in each country's interest that the natural resource system is protected, preserved and enhanced within their territory and that this can best be achieved if a cooperative approach is adopted amongst all riparians to minimise harmful effects on each other (Article 3 of the Mekong Agreement<sup>12</sup>).

##### (ii) Type 2 - Increasing benefits from the river

A key intent of the 1995 Mekong Agreement as set out in Article 2 is the *development of the full potential of sustainable benefits to all riparian States* for social and economic development in each country. These benefits are

#### National benefits derived by default from cooperation

*National benefits derived by default from cooperation – The benefits (both positive and negative) that are made possible from developments in one country as a result of developments and/or management actions in one or more other countries*

The MRC Basin Action Plan refers to projects that create transboundary benefits by default as projects of basin-wide significance. These projects expand the Development Opportunity Space (as conceptualised and referred to in the Basin Development Strategy) and are ones which, whilst directed towards development within a single country, create opportunities elsewhere within the basin for further development.

#### National benefits derived from collaboration on joint projects

*National benefits derived from collaboration on joint projects – The benefits (both positive and negative) that arise from projects undertaken jointly by two or more countries to mutual overall benefit.*

The MRC Basin Action Plan refers to projects that create transboundary benefits derived from cooperation as bilateral joint projects. These projects represent a particularly significant category wherein development opportunities can be realised only through direct cooperation between countries. Joint projects can lead to both national investment projects and joint investment projects.

<sup>12</sup> Article 3. Protection of the Environment and Ecological Balance. To protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin.

viewed in the context of those sectors over which MRC has direct influence as set out in Article 1 of the Mekong Agreement. These benefits are generally those which have been assessed in the 2009-2020 cumulative impact of the national water resources development plans (to which others may be added in the future) as measured as arising in each country.

*(iii) Type 3 - Reducing costs because of the river*

By cooperating in basin management and development, each country has the potential to add value to that which each country could achieve in the absence of cooperation. This may occur by default or by proactive cooperation (see box on previous page for definitions). Whilst these benefits accrue and are accounted for within each country under Types 1 and 2 above, when separated out they nevertheless reflect the extent to which added value is being gained from cooperation within the basin.

*(iv) Type 4 - Increasing benefits beyond the river*

The water resources sector of each country does not act in isolation of other sectors. In many instances, it is difficult to distinguish the influences of, for example, water resources development, land use development and, say, poverty alleviation programmes on the livelihoods of rural and urban communities. Nevertheless, developments within the water resources sector will have wider impacts on each nation's performance than are conventionally attributed (as in Types 2 and 3 above). These may manifest, for example, as contributions to energy and food security, increased revenues contributing to better public services, and other such measures which contribute to a nation's well-being. An appreciation of these benefits will enhance the value attached to the water resources sector by those engaged in overall national development planning and decision-taking.

### 3.5.2 Mechanisms by which transboundary benefits arise

The Basin Development Strategy recognises three types of intervention by which benefits can be generated. These are illustrated in below.

**Table 5 Types of intervention by which transboundary benefits can be generated**

Intervention type	Examples
Infrastructure development	Hydropower, irrigation, flood protection and other water management structures implemented to enhance or sustain productive activities
Non-structural developments	Monitoring and warning systems that minimize damage to infrastructure, production and/or livelihoods as a result of extreme events or accidents
Enabling developments	Procedures governing the manner by which countries cooperate; knowledge acquisition, and management and capacity building that enhance the effectiveness of IWRM at basin and country levels

The Basin Action Plan further distinguishes each of the above intervention types by reference to the following.

(i) *National projects of basin-wide significance (creating transboundary benefits by default)*

National projects of basin-wide significance expand the DOS (as conceptualised and referred to in the Basin Development Strategy for 2011-2015). Whilst directed towards development within a single country, these projects create opportunities elsewhere within the basin for further development. A simple example of such a project is a tributary hydropower project which re-regulates a portion of the mainstream flow, enabling expansion of irrigation elsewhere without causing transgression of mainstream low flow requirements under PMFM.

The Basin Action Plan has identified over a third of all enabling projects in the National Indicative Plans (for 2011-2020) as being of basin-wide significance in so far as they are directed towards reducing knowledge gaps and better management of assets which may have transboundary impacts (e.g. improving watershed management, capture fisheries, hydropower planning, cost-benefit sharing, impacts of upstream developments, etc.). These projects, along with other planned infrastructure developments, represent a significant step towards enabling optimal and sustainable development of the basin.

(ii) *Joint projects (creating transboundary benefits derived from collaboration)*

Joint projects are viewed as projects taken up jointly by two or more countries under a specific agreement. They represent a particularly significant category wherein development opportunities can be realised only through direct cooperation between countries.

The Basin Action Plan has identified within the current National Indicative Plans eight joint projects associated principally with the Cambodian-Viet Nam flood plains and the shared 3S Basin. Other examples are hydropower projects where agreements have been made to provide power to another country, or as in the case of Xayaburi, where project investments are made by another country. Many of the case studies of other international river basins given in Chapter 2 of this report highlight the substantial benefits that can be gained from joint projects over and above what each country could achieve individually.

Drawing on the case studies highlighted in Chapter 2, there are a number ways in which two or more countries may seek to enter into project agreements to gain mutual added value:

- ❑ **Joint studies** leading to coordinated action (under a MoU, agreement or treaty as appropriate) in the respective countries to achieve a mutually beneficial outcome – management of the Cambodian-Viet Nam flood plains may in due course be an example of this;
- ❑ **Joint investment** under a specific agreement or treaty in a project in one country that brings benefits to both countries – as illustrated by the case studies, this often is the principal mechanism for regional benefit sharing and, in the Mekong context, an

example of this is the Xayaburi project where investments are made from Thailand for a project located in Lao PDR; and

- ❑ **Production trading agreements** where the investment is made by one country to sell produce to one or more other countries – examples of which are the various power-selling agreements already in force and planned.

(iii) *National projects (benefits accruing within each country)*

National projects are those taken up by each country which are not included in categories (i) and (ii) above. They fall into two sub-categories:

- ❑ **Projects which could be taken up without recourse to cooperation** – these are most commonly those that found within the Baseline developments as seen in the BDP's scenario assessment report, but also include other ongoing and future projects which have no transboundary impact; and
- ❑ **Projects which are made possible by enhancement of the DOS** as a result of projects of basin-wide significance within the country in question or in other parts of the basin, and which are deemed as generating benefits by default.

National projects of basin-wide significance will by definition expand the DOS. For joint projects and national projects a check will be made whether they comply with the DOS before they are included in the basin development plan of the BDS. The DOS, however, does not indicate approval of a national plan or project.

For project approval, an opportunity in the DOS needs to pass through national planning and approval processes and through Procedures for Notification, Prior Consultation and Agreement (PNPCA) with other countries under the MRC cooperation framework. These national processes and the PNPCA are an opportunity to improve projects and minimise their harmful effects, so that Article 8 (*State responsibility for damages*, see above) will not be invoked and more projects fit within the DOS.

### 3.5.3 *Conclusions on scope of transboundary benefit sharing within the Mekong context*

Drawing together the foregoing, the principle means by which benefits may be shared are set out below in Table 6.

**Table 6 Principal mechanisms for benefit sharing in the Mekong**

	National projects of basin-wide significance	Joint projects
<b>Types of projects</b>	<b>Projects that serve to expand the Development Opportunity Space (DOS)</b>	<b>Projects taken up jointly by two or more countries</b>
Nature of projects	Infrastructure and/or enabling, sometimes non-structural projects	Joint studies, joint investments or production trading agreements

Examples	Tributary hydropower contributing to re-regulation of mainstream flows	Coordinated development of transboundary flood plains (e.g. the Cambodia – Viet Nam flood plain to address development pressures in both countries and the impacts of climate and sea level change)
<b>Benefits potentially accruing in</b>	<b>National and joint projects made possible by an expanded DOS</b>	<b>The specific joint projects</b>
Examples	Irrigation expansion as a result of re-regulated mainstream flows Increased trade in agricultural products Environmental protection arising from implementation of environmental management plans Increased navigation arising from augmented low flows	Increased energy security from cross-border investment or trading agreements in hydropower Improved flood protection arising from integrated cross-border flood plain management plans and multi-purpose storage projects (for flood, drought, energy, navigation) upstream of the flood plains

Thus, in the Mekong context, regional benefit sharing may be seen as already a reality, with a range of ongoing and planned ‘national projects of basin-wide significance’ and ‘joint projects’, which places the Mekong near to the centre of continuum of cooperation (see Figure 2). But much more can and needs to be done to address future needs and challenges, such as water, food and energy security and adapting to climate change. As an institution, the MRC already exhibits most of the core river basin management functions required at this level of cooperation (information sharing, regional assessments, basin planning, joint monitoring etc.).

**The challenge now is to explore whether there are further opportunities to enhance the benefits to be gained in line with the Member Countries commitment to achieve optimal and sustainable management and development of the Mekong River basin through increased cooperation on national projects of basin-wide significance and by taking up more joint projects.**

## 4 Approach and assessment methodology

*This chapter draws on the international experience in benefit sharing (Chapter 2) and the conditions, needs and opportunities for regional benefit sharing in the Mekong Basin (Chapter 3) to suggest an approach and methodology to assess the potential regional benefits of cooperation within the Mekong Basin and create benefit sharing opportunities.*

### 4.1 Assessment objectives

As noted in Chapter 1, the Basin Development Strategy calls for the MRC Secretariat to “support and facilitate negotiated solutions for sharing benefits and risks that are sensitive to the region, in compliance with MRC Procedures, and respectful of the development strategies and aspirations for regional cooperation of the parties”. To this end, the regional distribution analysis is intended to:

- ❑ Raise awareness of the considerable regional benefit sharing in the Mekong Basin that occurs as a result of existing, ongoing and planned development (and bilateral agreements); and
- ❑ Investigate the opportunities that might exist for increasing regional benefits and reducing regional costs (while minimizing adverse transboundary impacts and risks) by coordinated national planning.

The scope of the assessments is to include the transboundary benefits, costs, impacts and risks from existing, ongoing, planned national and regional development in all water-related sectors, taking into the account the interplay between sectors. The scope also includes any newly identified opportunities on the Mekong tributaries and mainstream to increase regional gains and reduce regional costs, including national projects of basin-wide significance and any plausible ‘joint projects’.

### 4.2 Three step approach

The *Cooperative Regional Assessment* (CRA) technique described earlier in Section 2.3.3 is one that appears, with adaption for the circumstances of the MRC, to be an appropriate approach to considering the benefits that are and can be derived from cooperation between countries.

Adaption is needed primarily because, as described in Section 2.3 above, a number of the early steps of the CRA have already been undertaken with the earlier 2008-2009 scenario assessment work. In broad terms, these scenario assessments were on the cumulative impacts of the national development plans for hydropower and irrigation within the Mekong Basin (with consideration also of water supply and flood management).

Thus, it is proposed to further progress the Mekong CRA in the following three main steps, which will be followed by a major communication activity to raise awareness of the results of the distribution analysis, prepare and discuss deal structures for benefit sharing, and to negotiate an increased cooperative agenda.

**Step 1 Assessment of current distribution of benefits:**

- ☐ Total benefits each country is deriving from the river system
- ☐ National benefits derived by default from cooperation on projects of basin-wide significance
- ☐ National benefits derived from collaboration on joint projects

**Step 2 Assessment of future distribution of benefits under existing plans:**

- ☐ Total benefits each country would derive from the river system under these plans
- ☐ National benefits derived by default from cooperation on projects of basin-wide significance
- ☐ National benefits derived from collaboration on joint projects

**Step 3 Assessment of alternative distribution of benefits arising from new/revised projects and institutional/funding arrangements**

- ☐ Total benefits each country would derive from the river system under these plans
- ☐ National benefits derived by default from cooperation on projects of basin-wide significance
- ☐ National benefits derived from collaboration on joint projects

In each step above, the assessment considers the total benefits accruing to each country under current and future plans, as well as the transboundary benefits (a sub-set of total benefits) arising by default and from direct cooperation. In this context and as set out in Section 3.5.2, the terms *by default* and *from collaboration* may be viewed as arising respectively from *national projects of basin-wide significance* and *joint projects* as referred to in the Basin Action Plan.

In Step 3 the scenarios will simulate the longer-term opportunities to explore how the full potential of the Mekong Basin can be realised: firstly without consideration of national borders and preferences and, secondly, taking account national borders and preferences (such as energy, food and/or water security). Based on the insights gained, the potential for adapting current national development plans will be investigated also.

The logic behind the three steps above is as follows.

#### **4.2.1 Step 1 – Assessment of current distribution of benefits**

In Step 1, the current situation is assessed so that each country can better appreciate the overall benefits each is deriving from the Mekong Basin resources and the extent to which these are derived from cooperation already. The 2009-2010 assessment only considered incremental benefits (and costs) relative to the 2000 Baseline (BS) and Definite Future (DF)

scenarios and thus ignored the considerable impacts made and benefits already being gained from the river system within the BS and DF (Section 3.1)<sup>13</sup>. Therefore, the distribution of overall net benefits being accrued to each country may be skewed. The Step 1 assessment remedies this.

The regional distribution of the total benefits, costs, impacts and risks, as well as other information will be assessed. The Step 1 analyses then considers the extent to which current national net benefits are dependent upon actions being taken outside their countries. Unsurprisingly in the current situation, this primarily relates to hydropower energy exports.

#### ***4.2.2 Step 2 - Assessment of distribution of benefits under current future plans***

Step 2 follows a similar approach to Step 1 and considers how the situation changes with the 2030 Foreseeable Future (FF) scenario. The regional distribution of the total benefits, costs, impacts and risks will be assessed, as well as other information, such as major synergies and trade-offs and possible mitigation requirements.

The majority of the basic data for Step 1 and 2 assessments are available from the 2009-2010 scenario assessment, the 2014 review of these assessment findings, and subsequent activities aimed at closing the knowledge gap (see Section 4.6.1). Whilst a degree of “re-packaging” of the information is needed, the results obtained are expected to be consistent with the information presented in the 2011 Scenario Assessment Report<sup>14</sup>.

The proposed methodology and assessment framework employed for undertaking Steps 1 and 2 is set out in Sections 4.4 and 4.5 of this report. It is anticipated that Step 1 and Step 2 will be largely implemented under the Council Study (see Section 4.6).

#### ***4.2.3 Step 3 - Assessment of alternative distribution of benefits arising from new/revised projects and institutional/funding arrangements***

Step 3 is more challenging and requires identification first of a range of alternative projects and institutional/funding arrangements to be tested. The formulation and assessment of these alternative arrangements is described by the BDP Programme<sup>15</sup> and included the MRC Strategic Plan 2016-2020. Key aspects of which are highlighted below in Section 4.6 of this report.

It is envisaged that the formulation of alternative scenarios under Step 3 will take into account, inter alia:

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<sup>13</sup> The BDP Programme could use the water resources situation in 2000 as the development baseline as the purpose was the cumulative impact assessment of the national water resources development plans (and not whether these plans are a reasonable and equitable use of the basin's water resources).

<sup>14</sup> Cumulative impact assessment of basin-wide development scenarios, Basin Development Plan Programme Phase 2, Mekong River Commission. Main Report, April 2011.

<sup>15</sup> The broadening the current set of basin-wide development scenarios, Concept Note (draft), BDP, October 2013.

- ❑ The results of Steps 1 and 2 above which will highlight the extent to which benefits are being gained from cooperation;
- ❑ In line with the CRA technique, a consideration of the comparative advantage of each country within the basin for different types of benefit generation in the context of overall future social, economic and environmental needs within each country and in the basin as a whole;
- ❑ New information and data available to address knowledge gaps identified in the Basin Development Strategy, including, where complete, regional sector studies (i.e. the Delta Study and the Council Study); and
- ❑ Consideration of alternative institutional and financing mechanisms, such as a Mekong Development Fund.

Based on these and other considerations related to evolving national policies and development agenda, it is suggested that Step 3 assessments should follow the sequence below:

- (i) Formulation and assessment of exploratory long-term sector scenarios (2060) that explore the manner in which the full potential of the Mekong Basin may be realised sustainably, firstly without consideration of national borders and, secondly, taking account national borders and preferences (such as energy, food and/or water security);
- (ii) Formulation and assessment of 2 to 3 alternative medium term plan scenarios (2030/2040) that represent a pragmatic step towards an acceptable long term outcome from the long-term ambitions identified above, conditioned by institutional and financial capacity to implement the projects described in the scenarios, and by the risks consequential to any significant remaining knowledge gaps.

Implementation of this approach must be mindful of ongoing MRC activities, in particular addressing knowledge gaps (which will serve to enrich the assessment process) and the definition of social, environmental and economic development and management indicators for the Mekong Basin. These indicators will establish a unified set of strategic and assessment indicators, including those for regional distribution analysis of transboundary benefits, costs, impacts and risks.

### **4.3 Communication of benefits of transboundary cooperation**

The analysis and discussion of the regional distribution of benefits, costs, impact and risks in each of the 3 Steps of the CRA above will generate the information that decision makers need to discuss and develop a shared understanding of the development opportunities, synergies and trade-offs, cost and benefit sharing opportunities, acceptable transboundary impacts, controversial developments, and the reasonable and equitable use of the basin's water resources and others. The MRC will need to facilitate this process.

International examples suggest that, with such information at hand, basin countries will start discussing deal structures, which could be well beyond the infrastructure considered in the assessed scenarios (for example - navigation, trade, interconnected power grids, other transport, etc.). In the process, there are also likely to be opportunities for joint projects and joint investments in water and land related resources. Deal structures can take different forms as described in Section 4.7. **Thus in this process the DOS is used as a cooperation and negotiation space to explore mutually beneficial development opportunities.**

Moreover, the outcome of discussion the results of the assessments and the negotiation of deals structures will provide rationale for each country to consider whether to modify their national plans to greater mutual benefit. For example, when a development scenario in Step 3 demonstrates a better regional distribution of benefits and costs with higher national gains than the development scenarios in Step 2 (which are based on the current national plans), then this would be a powerful incentive for adaptation of the current plans. When this happens, national plans will converge, the cooperative agenda will grow and each country will view the cooperative agenda to be part of their adapted national plan.

To support the above policy and decision making process, a practical and focused communication strategy will need to be developed and implemented. This may start by identifying the opportunities to use the results of the regional distribution analysis to influence the policy process through various types of information material and actions tuned to the needs of the differing stakeholders. Consideration could be given to engage a well-placed multi-lateral organization in the strategic engagement of national decision makers in the negotiation and decision-making process.

## 4.4 Assessment methodology

### 4.4.1 Overview

As noted in Section 4.2 above, each of the three Steps set out for the regional distribution analysis requires three different assessments to be made:

- ☐ Total benefits each country is deriving from the river system;
- ☐ National benefits derived by default from cooperation on projects of basin-wide significance; and
- ☐ National benefits derived from collaboration on joint projects.

The methodology for each of these assessments will build on that employed during the previous scenario assessments in the manner described below. It is anticipated that the methodology will be updated under the Council Study.

### 4.4.2 *Total benefits each country is deriving from the river system*

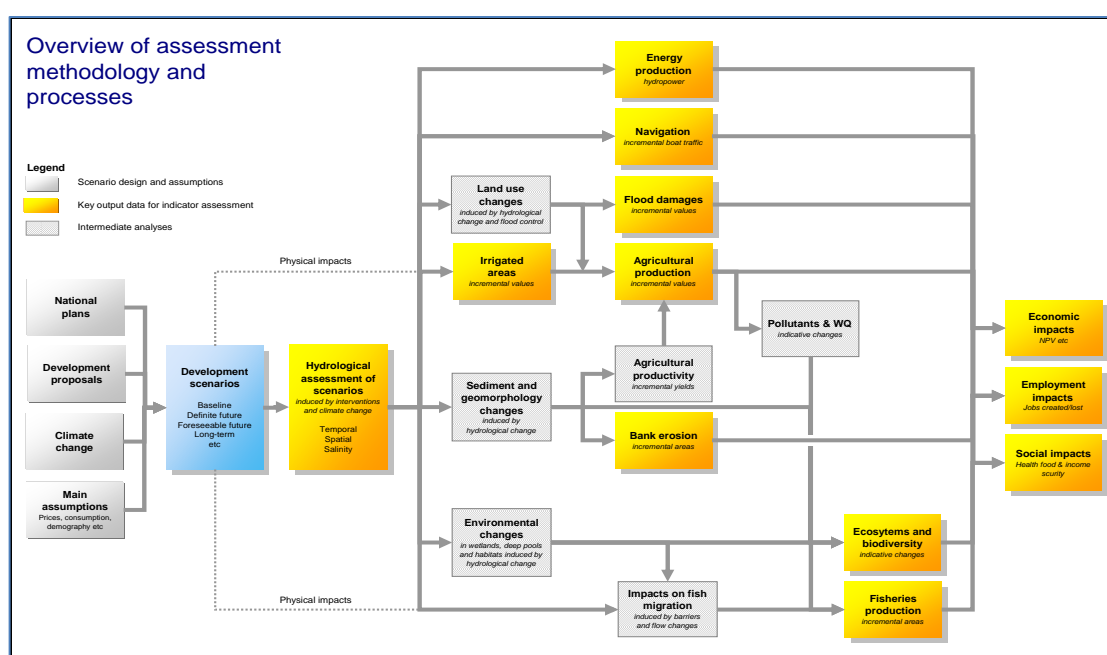
The methodology for assessing total benefits each country derives from the river system will generally follow that set out in the 2009 methodology statement for the assessment of basin-

wide scenarios<sup>16</sup>. This methodology follows a logical sequence as summarised in the flow chart of Figure 7 (taken from the 2009 methodology statement).

For the purposes of the regional distribution analysis, the key changes to the above methodology are proposed to be:

- (i) Whereas the 2009-2010 assessments focussed on the incremental benefits and costs relative to the Baseline (and Definite Future) Scenario, the regional distribution analysis needs to determine the total benefits (and costs) each country is deriving from the river system, including those from early development (Section 3.1). Therefore, whilst the assessment approach remains similar, the computation is founded on an estimate of the Baseline benefits and costs plus incremental benefits and costs associated with the scenario in question - in principle the same data can be used, but further analysis is required to determine some elements of the Baseline conditions, particularly with respect to historical investments, impacts and benefits.

**Figure 7 Flow chart for scenario assessment process**



It may be noted that with respect to environmental conditions, a key assumption in 2009 was that the Baseline with the 1985-2000 hydrology and the 2000 infrastructure represented “natural flow” conditions and that these provided a baseline for environmental assessment. Early water resources development (before 2000) may not have significantly changed the flow regime in the Mekong mainstream, but it has led to major changes in environmental, social and economic indicators, particularly in

<sup>16</sup> Technical Note: Economic, environmental and social impact assessment of basin-wide water resources development scenarios, Assessment methodology, Basin Development Plan Programme, Phase 2, October, 2009

those parts of the countries where the water resources development started early (Section 3.1).

Therefore the development baseline for this distribution analysis should be the pre-significant development situation, say 1900, as used by the Biological Resources Team of the Council Study. Otherwise the Member Countries cannot consider: 1) the full regional distribution of the total benefits, costs, impacts and risks of water resources development; 2) total economic benefits that each country derives from the Mekong river system, and 3) whether the nationally planned water resources development is reasonable and equitable water use.

In addition to modelling with the DSF, the impact assessment of this early development can be based on existing observations, studies and assessments of historical changes in land use, development of (irrigated) agriculture, flood control structures, wetland areas, biodiversity capture fisheries, etc.

- (ii) As noted in Section 4.6, the MRC and other organizations are currently engaged in addressing a number of important knowledge gaps. The outcome of this work will enable refinement of the 2009 assessment methodology in the areas where new information is available about the causes of change to mainstream flow conditions and the impacts these changes have on economic, social and environmental conditions.

Perhaps the greatest improvements in assessments may be made possible with respect to social impacts (with the expected availability of a new socio-economic spatial database) and in fisheries (arising from new data being collected), but improvements may be possible also in impacts of sediment flow changes, evaluation of ecosystem services, impacts of flooding and in the climate change arena. Also, progress is being made on the assessment of exogenous development on the Mekong's water resources<sup>17</sup>.

Many of the activities related to addressing these knowledge gaps are ongoing and some will not be completed until 2017. The assessment methodology for regional distribution analysis will need to be continually responsive to new information as it becomes available.

- (iii) As noted in Section 4.6.3, consultations facilitated by BDP are defining a set of social, environmental and economic development and management indicators for the Mekong Basin (the MRC Indicator Framework). The framework provides a hierarchy of indicators, underpinned by a comprehensive set of monitoring parameters. *Inter alia*, this activity reconsiders the assessment indicators each country would like to collectively employ in future scenario assessment work. Thus the methodology for assessment of scenarios (including for the regional distribution analysis) will need to be adapted to conform with any new assessment indicators agreed by the countries.

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<sup>17</sup> Even without water resources development in future, the water and related resources will be significantly affected by industrial activities (including sand mining), roads, urbanization, poverty reduction and others.

- (iv) Figure 8 provides an example of the evolution of the distribution of the economic benefits that each country derives from the Mekong river system. It is based on the results of the 2009-2010 scenario assessment, together with estimates of the benefits and costs of historical developments (pre 2000). It shows that in the year 2000, most investments in water resources development in the Mekong Basin were made by Viet Nam and Thailand. This resulted in large economic benefits, particularly in Viet Nam. Currently, Lao PDR and to a lesser extent Cambodia are benefitting of increased investments, in particular for hydropower development. By 2030, Lao PDR has considerably increased its economic benefits from the river as a result of large investments in hydropower development, but Viet Nam remains the main beneficiary of the Mekong river system. It can be expected that addressing longer term needs, such as flood protection and climate change adaptation will further change the 2030 distribution of the economic benefits derived from the river.

#### 4.4.3 *National benefits derived by default from cooperation on projects of basin-wide significance*

National benefits derived by default are defined earlier in this report as being those benefits (both positive and negative) that are made possible from developments in one country as a result of developments and/or management actions ('projects of basin-wide significance') in one or more other countries.

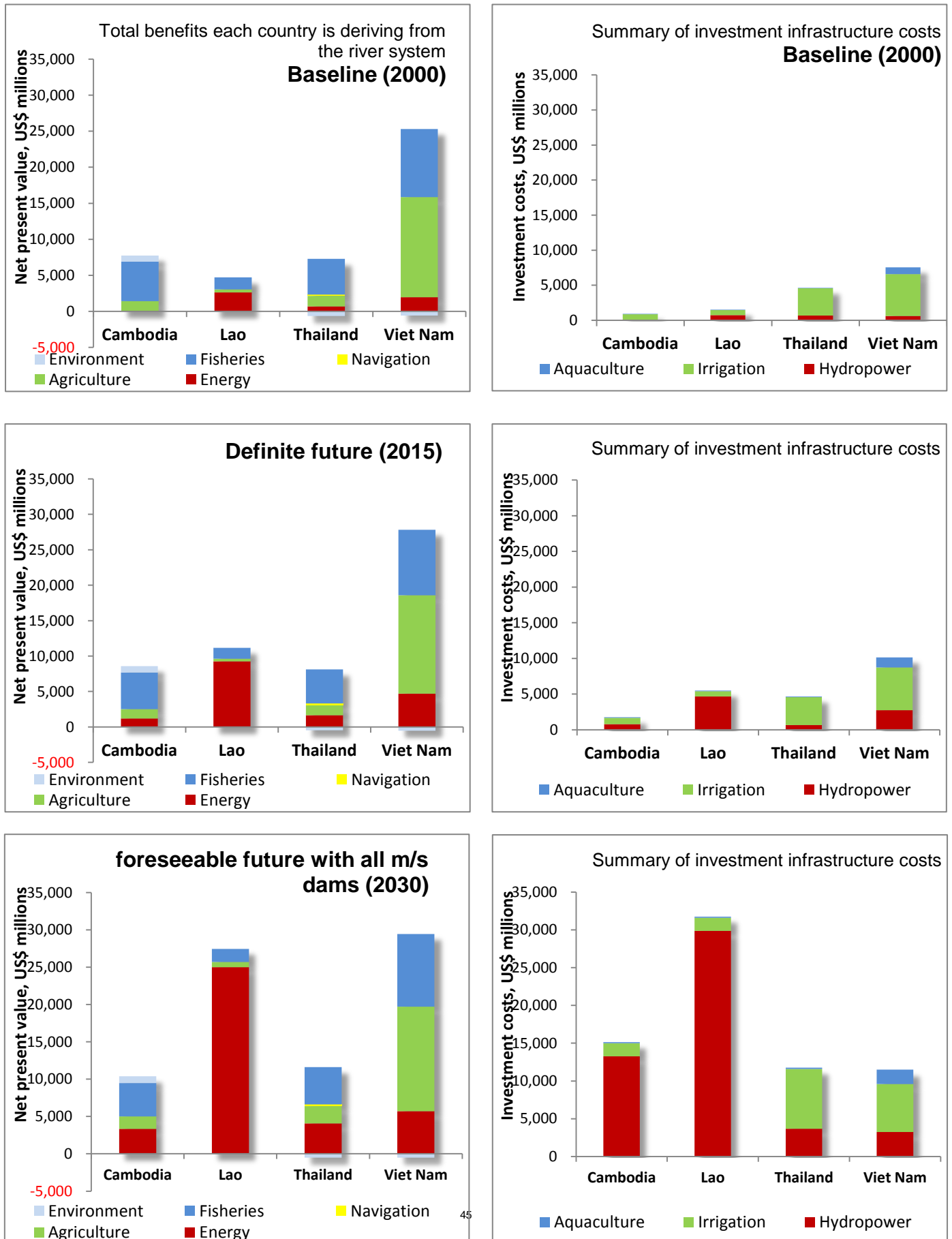
It is argued in this report that the principle means by which benefits (and costs) derived by default from cooperation across national boundaries are through re-regulation of mainstream flows, production trading, environmental management and navigation, each of which involves the movement of water, goods and services from one part of the basin to another (see box).

Re-regulation of mainstream flows affects principally irrigation potential, flood impacts and salinity control. Production trading is anticipated to be mainly in the energy sector, but could include other MRC sectors such as agricultural produce, aquaculture and fisheries produce. Environmental management for now relates primarily to the impacts on natural resources, wetlands, etc. of developments in one country on another, but could in the future be seen as measures taken to preserve environmental assets which impact upon the development potential elsewhere within the basin. This would include watershed management (and reforestation) projects to prevent early sedimentation of storage reservoirs on the tributaries. Navigation primarily relates to the benefits gained from inter-country river transport.

##### **Principal mechanisms by which benefits and costs of development cross national boundaries in the Mekong Basin**

- Re-regulation of mainstream flows  
Affecting irrigation potential, flood impacts, salinity control, etc.
- Production trading  
Principally energy, but could include agricultural produce, aquaculture and fisheries produce etc.
- Environmental management and watershed management (reforestation)  
Impacts on natural resources, wetlands, etc.
- Navigation  
Inter-country transport benefits

**Figure 8 Economic benefits derived from the Mekong river system and investment costs.**



Transboundary benefits by default are a subset of the total benefits each country is deriving from the river system. They are a result of acceptable<sup>18</sup> developments over and above the Baseline conditions which depend upon activities in another country. The means by which these benefits and costs may be identified and assessed is set out in Appendix C of this report.

#### **4.4.4 *National benefits derived from collaboration on joint projects***

National benefits derived from collaboration are defined earlier in this report as being those benefits (both positive and negative) that arise from projects undertaken jointly by two or more countries to mutual overall benefit.

Drawing on the discussion in Section 3.5.2, there are a number ways in which two or more countries may seek to enter into project agreements to gain mutual added value:

- ❑ **Joint studies** leading to coordinated action (under a MoU, agreement or treaty as appropriate) in the respective countries to achieve a mutually beneficial outcome – management of the Cambodian-Viet Nam flood plains may in due course be an example of this;
- ❑ **Joint investment** under a specific agreement or treaty in a project in one country that brings benefits to both countries. Examples of this are the joint investments made through MRC in flood forecasting and navigation aids, as well as the Xayaburi hydropower project where investments are being made from Thailand for a project in Lao PDR. It can be envisioned that the improvement of water security in the Mekong (and in particular the protection of the Mekong delta against large floods) will lead to joint projects; and
- ❑ **Production trading agreements** where the investment is made by one country to sell produce to one or more other countries – examples of which are the various power-selling agreements already in force and planned.

Once again, transboundary benefits derived from cooperation are a subset of the total benefits each country is deriving from the river system. They are a result of specific initiatives taken up on a bilateral basis in a manner deemed acceptable by the MRC as a whole. The underlying methodology for assessing cross-border benefits arising from joint projects is set in Appendix D of this report, together with a description of how this may be applied to each of the three categories above.

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<sup>18</sup> In this context, “acceptable” means that the developments fall within the Development Opportunity Space and are compliant with MRC Procedures.

## 4.5 Assessment framework

### 4.5.1 Overall requirements for regional distribution analysis

An assessment framework is required for regional distribution analysis against which assessments can be made of the benefits, costs, impacts and risks of alternative development scenarios as well as the transboundary benefits derived from cooperation.

In principle, the assessment framework should be structured to reflect the four key challenge areas for the Mekong as set out in Section 3.4 of this report. However, as may be recalled, the BDP had already developed a scenario assessment framework in 2009, which has been used to develop the broader MRC Indicator Framework for monitoring, assessments and state of the basin reporting (see Section 4.6.3).

At the same time, it is equally **appropriate that the requirements for regional distribution analysis are incorporated within the MRC Indicator Framework**. To this end an assessment has been made of the indicators required for the four key challenge (and benefit) areas, and how they may be merged with the overall MRC Indicator Framework. This is presented in Table 7.

**Table 7 Analysis of indicator requirements for regional distribution analysis in line with the four benefit types**

Type	Challenge(s) for the Mekong Basin	Assessment framework requirements
Type 1 Increasing benefits <u>to</u> the river	<i>Effective and sustainable management of the natural resource system, consistent with the needs to protect, preserve, enhance and manage the environmental and aquatic conditions and maintenance of the ecological balance</i>	In so far as the Baseline Scenario represents “natural conditions”, the 2009 scenario assessment indicators in principle address incremental changes to the baseline condition  Indicators for Type 1 are therefore covered by the MRC Indicator Framework.
Type 2 Increasing benefits <u>from</u> the river	<i>Development of the full potential of sustainable benefits within the basin for social and economic development and the well-being of all riparian States</i>	The 2009 scenario assessment indicators were developed to provide a triple-bottom line assessment of social and economic conditions. <b>The key difference for regional distribution analysis is that these assessments need to reflect the total benefits and costs included within the baseline, plus the incremental benefits of difference scenarios (the previous BDP assessments focused on incremental benefits and costs only).</b>  Indicators for Type 2 can therefore be covered by the MRC Indicator Framework.
Type 3 Reducing costs <u>because</u>	<i>Reducing the overall costs of achieving optimal and sustainable development</i>	<b>Indicators reflecting the degree of and benefits gained from cooperation and</b>

<u>of</u> the river	<i>through cooperation in development and management of water and related natural resources of the Mekong river system</i>	<b>inter-dependent regional growth were not included within the 2009 scenario assessment indicators and are now added in the MRC Indicator Framework (see Section 4.6.3 and Appendix E of this report)</b>
Type 4 Increasing benefits <b>beyond</b> the river	<i>Added value to each nation from effective development and management of the Mekong River system</i>	In principle these should be covered by the 2009 assessment indicators on the assumption that these have bearing on the assessment of alternative development scenarios and strategies.  In practice, the development of the MRC Indicator Framework revealed that additional indicators may be required.

In the process of preparing this report, the strategic indicator “Benefits derived from cooperation” has been added to the MRC Indicator Framework with the following supporting assessment indicators:

- ☐ Number and economic value of the incremental national benefits from projects of basin-wide significance in other countries;
- ☐ Number and investments costs and incremental national benefits of joint projects;
- ☐ Number and value of projects submitted and improved under PNPCA; and
- ☐ Degree on inter-dependence: Proportion of benefits derived from cooperation to total net economic value of all MRC sectors.

These indicators seek to highlight the net economic value to each country derived by default (from national projects of basin-wide significance) and from collaboration (joint projects), and the levels of engagement expressed in terms of the number and value of both categories of project. In addition, an indicator that seeks to highlight the degree of interdependent regional growth has been added.

The current version of the draft strategic and assessment indicators of the MRC Indicator Framework (9 June 2015) is presented in Appendix E of this report. This is structured in five dimensions to which strategic indicators and supporting assessment indicators and monitoring parameters are assigned. The strategic indicators are agreed by the Member Countries, while the assessment indicators can be tuned to the scope and nature of the assessment at hand.

The relevance of the agreed strategic indicators to each of the four key benefit types for the Mekong Basin is highlighted in Table 8. The table demonstrates that, as currently drafted, the emerging MRC Indicator Framework is fully consistent with the concept of addressing the four key benefit types, and that the regional distribution analysis can be effectively undertaken within this framework.

**Table 8 Agreed MRC strategic indicators**

Dimension	Strategic indicators	Relevance to ...
<b>Social Dimension</b>		
<i>Reflecting the intent to promote social development and the well-being of all riparian State</i>	<ul style="list-style-type: none"> <li>Living conditions and well being</li> <li>Employment in MRC sectors</li> </ul>	<i>Types 2 and 4 and possibly 3 also</i>
<b>Environmental dimension</b>		
<i>Reflecting the need to protect, preserve, enhance and manage the environmental and aquatic conditions and maintenance of the ecological balance exceptional to this river basin</i>	<ul style="list-style-type: none"> <li>Water flow conditions in mainstream</li> <li>Water quality conditions in mainstream</li> <li>Status of environmental assets</li> </ul>	<i>Type 1 mainly and possibly 4 also</i>
<b>Economic dimension</b>		
<i>Reflecting the intent to promote national economic development and poverty reduction and the well-being of all riparian States</i>	<ul style="list-style-type: none"> <li>Economic performance of MRC sectors</li> <li>Contribution to national economy</li> </ul>	<i>Types 2 and 4</i>
<b>Climate change</b>		
<i>Recognising that this has great bearing on the long term sustainable development, utilization, conservation and management of the Mekong River Basin water and related resources for navigational and non-navigational purposes</i>	<ul style="list-style-type: none"> <li>Greenhouse gas emissions</li> <li>Adaptation to climate change</li> </ul>	<i>Types 2 and 4</i>
<b>Cooperation</b>		
<i>Reflecting the intent to promote cooperation among the community of Mekong nations</i>	<ul style="list-style-type: none"> <li>Equity of benefits derived from the Mekong River system</li> <li>Benefits derived from cooperation</li> <li>Self-finance of the MRC</li> </ul>	<i>All Types</i>

The scope of all assessments using these indicators is intended to cover all MRC areas of cooperation, as defined by the 1995 Mekong Agreement under Article 1. However, it has been noted that *timber floating* appears no longer to be an activity that is of particular relevance to the MRC, whilst on the other hand, watershed management (as affects run-off and sediment flows) and environmental management (as affects water quality and ecological assets) are both areas which have received considerable attention under MRC Programmes.

Accordingly it is anticipated that the scope of the regional distribution analysis should be modified (see box).

**Proposed sectoral coverage of the regional distribution analysis**

- Irrigation
- Hydropower
- Navigation
- Flood control
- Fisheries
- Recreation and tourism
- Watershed management
- Environmental management

## 4.6 Relevant parallel MRC activities

Under the Basin Action Plan, a number of important actions have been taken up within MRC that have bearing on the regional distribution analysis and the identification of further benefit sharing opportunities. These activities have relevance to the approach and methodology adopted for the regional distribution analysis and are therefore summarised below.

### 4.6.1 Addressing important knowledge gaps

These actions include a broad range of data collection and study exercises to address important knowledge gaps identified in the Basin Development Strategy (see box). These knowledge gaps and related assumptions generally have limited the depth to which scenarios could be previously assessed, leaving questions over whether some interventions embedded in the development scenarios would be acceptable.

Addressing these gaps is important as is also building a better understanding of how the broader economic, social and environmental landscapes within the basin will change in the future in response to developments outside the water resources sector (exogenous development). These steps together will undoubtedly improve the quality of basin plans as well as increase awareness of the potential value to be derived for inter-connected regional and national development.

The regional distribution analysis will seek to make use of the best available information when assessing benefits and costs of alternative development scenarios.

#### Key areas where greater understanding is needed

- **Fisheries:** current wild fisheries yield and fish migration;
- **Social:** dependency and resilience to changes, and pro-active approaches to mitigate impacts;
- **Sediment:** improved sediment monitoring and assessment of natural and human-made activities;
- **Ecosystem:** baseline that shows how the different functional units of the ecosystem interact and function;
- **Flood related impacts** upstream of Kratie: more detailed modelling tools to assess impacts and mitigation measures;
- **Flood plain management:** Structural and non-structural options to address increasing flooding problems due to the combined impact of climate change, sea level rise, and floodplain development; and
- **Climate change data:** more information on extreme events and long-term changes on the basin's hydrology, agriculture and ecology.

#### Five dimensions of the new MRC Indicator framework

- |                                   |  |
|-----------------------------------|--|
| ▫ <b>Economic dimension</b>       | <i>Performance of water and related sectors and contribution to riparian economies</i>                     |
| ▫ <b>Social dimension</b>         | <i>Conditions of livelihoods and employment</i>  |
| ▫ <b>Environment dimension</b>    | <i>Status of water flows, quality, sediments and environmental assets</i>                                  |
| ▫ <b>Climate change dimension</b> | <i>Climate change trends, vulnerability and adaption</i>   |
| ▫ <b>Cooperation dimension</b>    | <i>Benefits derived from the Mekong river basin and from cooperation in its development and management</i> |

#### 4.6.2 National benefit sharing mechanisms

Under ISH a study has been made of benefit-sharing options for hydropower on Mekong tributaries leading to development of guidance on best practice. This important work on national benefit sharing mechanisms is a separate exercise to that on regional benefit sharing mechanisms, primarily because national benefit sharing is something that can be determined through sovereign decision of each country without recourse to transboundary agreement.

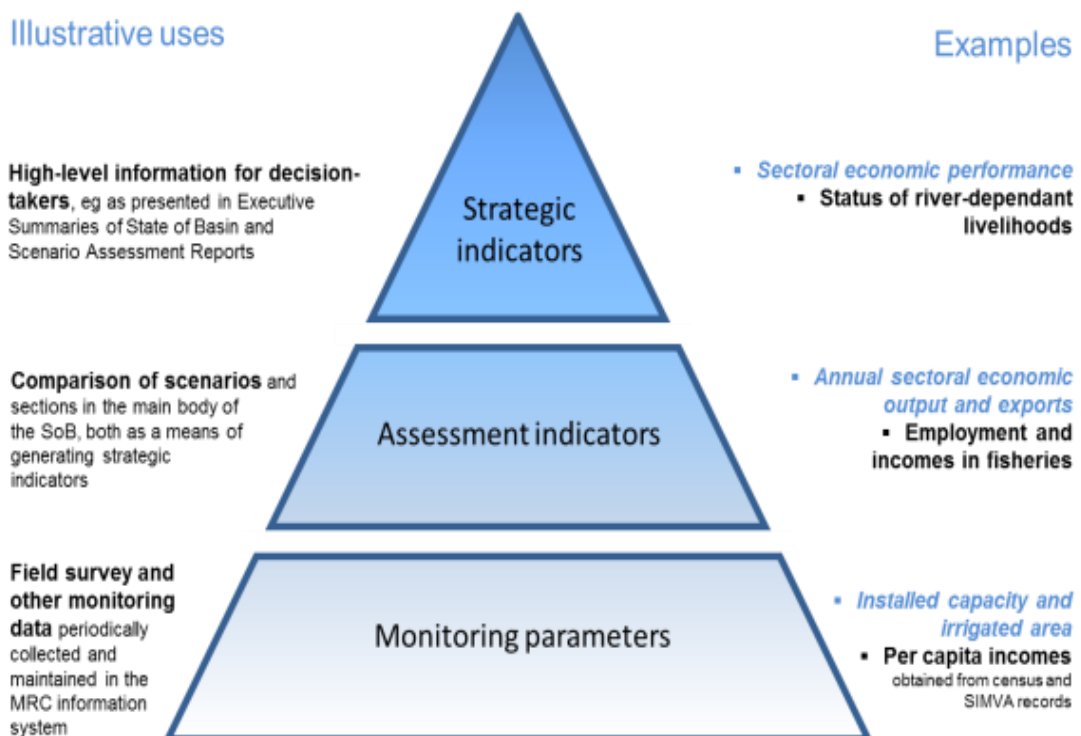
Nevertheless, as illustrated in Section 2.2.4 of this report, the perceived value to an individual country of transboundary projects can be greatly diminished if the benefits accruing to that country from the project are not fully realised as a result of weaknesses in internal benefit sharing with, for instance, affected communities.

Thus the outputs from the ISH study will be useful to regional benefit sharing through promoting best practice in distributing the benefits from cross-border cooperation within each country.

#### 4.6.3 Definition of social, environmental and economic development and management indicators for the Mekong Basin

With the support of the BDP Programme, consultations have been undertaken to develop a hierarchy of strategic and assessment indicators that are underpinned by a wide range of monitoring indicators, covering the five dimensions of sustainability (see Box). The concepts for this have been put forward in a MRC Indicator Framework Scoping Report (BDP, March 2013) and subsequently developed into the draft MRC Indicator Framework for managing the Mekong Basin (June 2015).

**Figure 9 Illustration of a hierarchy of indicators**



**At the highest level, strategic indicators** are agreed by the Member Countries to provide policy level decision takers with a concise set of information relating to the development and management conditions within the basin. Sixteen strategic indicators are set within the dimensions of social, environmental, economic, climate change and governance issues to provide a full and integrated picture of how the cooperation between countries through the MRC is benefiting and impacting upon the basin and each country.

**At the second level, 66 assessment indicators** are selected to provide more detailed information and to support the quantification of the strategic indicators. **Assessment indicators will also provide the basis for comparing development scenarios and assessing large projects.** The strategic and assessment indicators are listed in Appendix E of this report.

**At the lowest level, 252 monitoring parameters** are identified to support the quantification of the assessment and strategic indicators, and to provide the foundation to other technical studies called for by the MRC Joint Committee. Monitoring data should be viewed as a shared-resource for all MRC data-users and, as such, must be stored on the MRC Information System.

The current MRC Indicator Framework (June 2015) is the result of a two-year process of consultation and debate with the countries to ensure that the framework fully reflects the high-level issues that are important to the countries individually and collectively. It includes the indicators that are needed to evaluate benefits and impacts derived from cross-border cooperation.

#### **4.6.4 Further scenario assessment**

The BDP has developed the “Concept Note on broadening of the current set of basin-wide development scenarios”<sup>19</sup> which sets out a rationale and agenda for undertaking further scenario formulation and assessment to underpin future updates of the Basin Development Strategy. **The Concept Note highlights that the existing basin-wide development scenarios will be reviewed and used to prepare a regional distribution analysis of benefits, costs, impacts and risks.**

Scenarios explore plausible outcomes in the future. Scenarios are developed for different purposes, including:

- ☐ The assessment of long-term consequences of existing, under-construction and planned or potential development, positive and negative;
- ☐ The exploration of synergies and trade-offs between sectors of the economy, including opportunities for regional benefit sharing;

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<sup>19</sup> The broadening the current set of basin-wide development scenarios, Concept note, BDP October 2013

- ❑ The exploration of large uncertainties and risks, including possible big shifts in society, politics, economics or technology; and
- ❑ The creation of awareness of alternatives or to potential future situations.

Scenario assessments with quantified results provide decision makers with solid information about the future, for discussion and debate – based on science and not perceptions. Recently, the MRC Countries have decided to review and update the existing basin-wide scenarios and to formulate and assess some additional scenarios

*(i) The review of the existing scenarios*

The existing basin-wide development scenarios represent the national water resources development plans of the basin countries. The scenarios were formulated and assessed in 2009-2010 with support from the BDP Programme. The purpose was to provide a basin-wide cumulative impact assessment of the national water resources development plans of the basin countries. The results form part of the information that was used to prepare and negotiate the IWRM-based Basin Development Strategy (for 2011-2015).

The review during 2014 largely validates the 2009-2010 scenario assessment results. They indicate that the national plans can capture the considerable scope for further water resources development in the basin that can address some national needs and regional demands. However, the 2014 review reaffirms that the plans are sub-optimal from a basin-wide perspective as they do not address the identified long-term water security needs in the BDS, and therefore miss the joint development opportunities that could be realised.

*(ii) The updating of the existing scenarios*

The updating of the existing scenarios is planned under the Council Study during 2015-2016. The main objectives of the MRC Council Study<sup>20</sup> are to: (i) further understand the environment, social and economic consequences (positive and negative) of water resources development; (ii) enhance the BDP process to support the member countries in the sustainable development of the basin; and (iii) promote capacity building, raise awareness and build trust.

The Council Study builds on previous MRC studies such as the Integrated Basin Flow Management (IBFM) study (2004-2007), the Social and Environmental Assessment (SEA) of LMB mainstream dams (2009-2010), and the BDP2 scenario assessment of ongoing and planned developments (2009-2011). Furthermore, the ongoing Delta Study will assess the impacts of planned mainstream dams on the delta.

The Council Study will mainly concentrate on transboundary issues, including the regional distribution of benefits, costs, impacts and risks of basin developments. Nevertheless, social

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<sup>20</sup> The full title of the MRC Council Study is: "Study on the sustainable management and development of the Mekong River, including impacts of mainstream hydropower projects"

and economic impacts outside these locations will also be evaluated if they are relevant to the regional distribution analysis. This will also require the temporal scope of the study to include the assessment of past, ongoing and planned water resource developments. In addition, long-term challenges such climate change adaptation and environmental protection will be addressed in the Council Study.

Under the Council Study the following basin-wide cumulative development scenarios will be formulated and assessed:

	Development scenario	Time horizon	Primary interventions
1	<b>Early development scenario</b>	Up to 2007	Water resources infrastructure developed in the Lower Mekong Basin up to 2007
2	<b>Definite future scenario</b>	Definite future up to 2020	Early scenario plus water resources infrastructure developed, under construction and planned in the Lower Mekong Basin between 2007 and 2020
3	<b>Planned development scenario</b> with climate change sub-scenarios	Planned future up to 2040	Definite Future plus infrastructure planned for implementation in the Lower Mekong Basin between 2020 and 2040

Each formulated scenario has a basin-wide scope and is composed of developments in six water-related thematic areas: irrigation, agriculture (including fisheries and aquaculture), hydropower, flood protection, navigation, and domestic and industrial water use. The baselines used in the assessment are:

- ❑ **Hydrological** – a 24 year time series from 1985 – 2008 of hydro-meteorological data (rainfall, evaporation, boundary water levels etc.) broadly representative of historic natural flow conditions and now referred to as the **reference period**; and
- ❑ **Impact conditions** – related to cumulative impacts of development in the “modern era”, i.e. since the early 1900’s. Early development may not have significantly changed the flow regime in the Mekong mainstream, but it has led to major changes in environmental, social and economic indicators, particularly in those parts of the countries where the water resources development started early.

**The results of the Council Study will mostly cover the requirements of Step 1 and Step 2 of the regional distribution analysis as proposed in Section 4.2 of this report.** Amongst other things, the Council Study will provide the regional distribution of benefits, costs, impacts and risks from 1900 to 2040. With this information, the member countries can discuss with more confidence (i) whether the current distribution is reasonable, equitable and fair, (ii) whether the currently planned development leads to a more equitable distribution, (iii) whether the currently planned development leads towards improved water security and sustainable development, and (iv) where the greatest impacts and risks lie in each country in 2020 and 2040 and whether they can be mitigated and managed, respectively.

(iii) *The formulation and assessment of additional scenarios*

The results of the Council Study will be useful for the exploration of alternative development pathways to address Strategic Priority No. 5 of the Basin Development Strategy 2016-2020 (Outcome 2 of the MRC SP 2016-2020). This will include the formulation and assessment of additional scenarios in two categories:

- ❑ Exploratory Long-term Sector Scenarios (2060); and
- ❑ Alternative Medium-term Plan Scenarios (2030/2040).

The Mekong region is changing fast, driven by economic growth in all basin countries and regional integration, see for example BDP's report on development trends and future outlook<sup>21</sup>. As a result, the Mekong basin's water landscape will change dramatically in the longer term in response to increasing demands for water, energy and food security (similar to what has occurred in more developed river basins in the western world).

In the context of a few plausible socio-economic conditions in 2060, the Exploratory Long-term Sector Scenarios will explore where opportunities lie in the future to optimize development and provide water-related security in an equitable manner through cooperation. The insights gained from this will guide the formulation of Alternative Medium-term Plan Scenarios.

The Alternative Medium-term Plan Scenarios will represent possible adapted national plans that set the countries on the path of optimal and sustainable development whilst maximizing medium term gains. The scenarios will consider the regional distribution of benefits and costs, which then can be compared with the regional distribution analysis of the "Planned development scenario" in the Council Study (which are based on the current national plans). The results of these assessments will provide rationale for each country to consider whether to modify their national plans to greater mutual benefit.

## 4.7 Deal structures for regional benefit sharing

Deal structures can elaborate and enhance the basis for cooperation over and above that set out in the 1995 Mekong Agreement and related Procedures. They can be applied in two ways:

- ❑ Through the agreement at a strategic level of the inevitable trade-offs necessary to promote interdependent sub-regional growth (an aim of the 1995 Mekong Agreement); and

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<sup>21</sup> Development trends and future outlook in the Lower Mekong Basin Countries. Working Document, MRC Basin Development Plan Programme, October 2015.

- Where appropriate, in making the most of development opportunities through undertaking joint projects.

Some deals may flow from existing information, and some from new understandings gained from ongoing studies and assessments. Deal can be concluded in all four benefit areas discussed in Section 3.5.1.

#### 4.7.1 *Strategic level deals*

At the strategic level, where the focus is primarily on projects of basin-wide significance, the Basin Development Strategy (BDS) provides the means to identify and prioritise medium and long term development opportunities based on the prior assessment of existing and potential future national development plans.

When viewed at basin-level, potential synergies and trade-offs can be identified that may serve both to increase each country's benefits as well as to minimise transboundary harm. Examples might be in agreeing overall regional environmental management plans, watershed management projects, scheduling of irrigation, and further storage development, etc. Deals will be needed between countries to capture these potential gains to mutual benefit.

The ways by which to determine the most appropriate and mutually acceptable forms of strategic level deals need to be explored with the Member Countries. These may vary according to circumstances. Preliminary examples of possible different approaches are illustrated below:

##### *(i) Deals through the Basin Development Strategy*

The BDS is a key instrument in MRC's mandate for basin-wide planning, which is endorsed by the MRC Joint Committee and approved on behalf of the Member Countries by the MRC Council at ministerial level. Whilst strategic priorities and actions set out in the BDS may not be legally binding under international law, at minimum they nevertheless should provide clear guidance of the intent of the Member Countries with respect to how the basin may be developed and managed in the future.

The BDS would therefore be an appropriate mechanism (deal structure) to promote active coordination of development between countries in circumstances where cooperation may be considered desirable but non-critical. An example might be the balancing of long term rises in dry season consumptive demands against increases elsewhere in the basin of reservoir storage.

##### *(ii) Deals through the MRC Procedures*

The principles underpinning the MRC Procedures are established under the 1995 MRC Agreement, an international treaty, which is binding upon the Member Countries. The implementation of the Procedures is undertaken in accordance with Technical Guidelines approved in the same manner as the BDS. The Guidelines provide for them to be amended where found mutually required and agreed.

As illustrated in Figure 6 in Section 3.3, the preparation of the BDS has led to the conceptualisation of a Development Opportunity Space (DOS), representing the potential for further development within the limits of acceptable impacts on the basin's natural resources, on environmental conditions and on existing resource users. This conceptualisation emphasises the inter-connectivity between the MRC Procedures and basin planning and the need for a Joint Platform by which to ensure the relevance of the Procedures and coherence of these with the BDS.

The conceptualisation leads also to an appreciation that the DOS can be enlarged in line with the MRC's aim to optimally develop the basin through cooperative planning that maximises economic, social and environmental benefits whilst minimising unacceptable impacts. In principle, and if found desirable by all Member Countries, there is therefore scope to expand development opportunities through amendment of the MRC Procedures and/or their Technical Guidelines.

An early example may be the adjustment of the PMFM to take better account of, for instance, flow regime changes brought about by the new storages in China or of adaptation requirements as may emerge from current investigations of climate change requirements. However, all MRC Procedures and Guidelines should be periodically reviewed through the Joint Platform to ensure they are serving the collective best interests of the Member Countries.

*(iii) Deals through additional protocols*

Finally, where appropriate at the strategic level, there is always the opportunity for the Member Countries to enter into additional protocols where particular critical issues are considered better addressed through specific agreements outside of the BDS or other provisions within the 1995 Mekong Agreement.

Taking this route may be justified if the Member Countries believe that their individual and collective interests are better served by entering into a supplementary agreement with binding commitments upon each country. An example might be the establishment of conservation areas protecting specific sites of scientific interest within the Mekong river system.

#### **4.7.2 Project level deals**

Joint projects provide a further opportunity to leverage the benefits of cooperation. In the regional context, these may equate to cost sharing through joint studies and investments. Examples might be in agreeing a cross-border flood management plan for the Mekong flood plains, transboundary power production and joint investments underpinning these.

In this case, deals are needed between the two or more countries directly involved, based on different types of agreement as may be appropriate to the circumstances. The main options available include:

- ❑ **Memorandum of Understanding (MoU)** – The simplest form of bilateral agreement to coordinate actions in two or more countries, these may be found appropriate for joint studies where costs are borne individually by each country;
- ❑ **Joint-working agreements** – A more rigorous form of bilateral agreement where studies and or development works are undertaken on a shared-cost basis, requiring a higher level of accountability of use of funds amongst the countries involved;
- ❑ **Investment agreements** – In instances where joint projects involve sharing both development costs and the benefits arising from the project, a detailed contract agreement is required setting out the terms of the relationship between the investors, implementers, operators and beneficiaries; and
- ❑ **Treaties** – treaties between countries may be required in the event that joint project(s) are envisaged that would have bearing on the sovereignty of the participating countries, examples of which may be where the land on which a project is located is to be jointly administered, or where the countries involved wish to provide an umbrella agreement to a strategic framework of interdependent projects.

## 4.8 Creating opportunities for deal-making

### 4.8.1 *Ongoing initiatives*

By its nature, deal making within the MRC is an ongoing process which dates back to 1957 and the establishment of the first Mekong Committee. In the modern era, negotiation and agreement of the 1995 Mekong Agreement signalled the first major “deal” between the Member Countries, which provides the current framework for cooperation on the development and management of the Mekong river system. More recently, adoption in 2011 of the Basin Development Strategy establishes a convergent agenda and platform upon which to further strengthen cooperation in line with the aims of the 1995 Mekong Agreement.

In accordance with the Basin Action Plan (the basis by which the Basin Development Strategy is being implemented), a number of opportunities are being created by which to identify further opportunities for benefit sharing and potential deals. The most obvious of these are:

- ❑ The updating of the Basin Development Strategy, which inter alia, will establish the priorities and actions required for basin development and management during the period 2016-20;
- ❑ The updating of the National Indicative Plan for 2016-2020, which provides opportunities to promote joint projects and national projects of basin-wide significance;
- ❑ The assessments of further basin-wide scenarios as described in Section 4.6, which will explore long term trends and opportunities and, from these, consider the possibilities for promoting increased benefit sharing through adaption of medium term national plans;

- ❑ Other current studies and initiatives being taken up under the Basin Development Strategy, including the examination of transboundary issues and opportunities for flood plain management;
- ❑ The recent establishment of a Joint Platform to maintain oversight of the MRC Procedures and their coherence with evolving basin planning, management and development requirements; and
- ❑ The ongoing development of hydropower projects involving cross-border energy supply, navigation projects to open up trade links, and cross-border trade in agricultural, fisheries and aquaculture products.

MRC will continue to promote dialogue between Member Countries in each of these areas to identify benefit sharing opportunities. In parallel, MRC will initiate discussions and awareness raising of the relevance and potential of deal structures.

#### **4.8.2 *Benefit sharing and water diplomacy: two sides of the same coin***

From the basin perspective, national plans – by design developed to benefit specific countries – are always sub-optimal, and when implemented could not only fail to address longer term challenges of water security but also yield tensions and potential conflicts in the immediate terms, a cause of concern of water diplomats. Yet tensions could not be resolved with conflict management alone. Optimizing and sharing benefits and costs through joint investment and projects need to be pursued to transcend tensions that result from uncoordinated development, while simultaneously meeting basin-wide needs such as flood protection, energy demand and environmental conservation.

To reach such deals not only require sound technical knowledge and assessment by water engineers and specialists, but also the negotiation and political skills of water diplomats, strategists and others. In this regard, the MRCS' proven capacity in the technical areas needs be complemented by trusted multilateral partners who could help move the regional benefit sharing agenda among the countries and securing the political will and commitment from their leaders.

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## 5 Implementation arrangements

*This chapter first summarizes how the implementation of the regional distribution analysis and the promotion of further benefit sharing should be integrated with MRC activities. It then provides a work plan for the regional distribution analysis and associated communication activities. The chapter concludes with a summary of the implementation arrangements.*

### 5.1 Integration with parallel MRC activities

Section 4.6 of this report highlights the relevance to regional distribution analysis of parallel MRC activities. Central to this are the updating of the formulation and assessment of the existing 2009-2010 development scenarios under the Council Study, and the formulation and assessment of additional scenarios in the next planning cycle (2016-2020). The scoping of the formulation and assessment of scenarios under the Council Study (March 2015) and the MRC Strategic Plan (2016-2020) already anticipate the integration of the scenario assessment activities with those of the regional distribution analysis.

Looking into the future, the regional distribution analysis and the promotion of further benefit sharing opportunities should be aligned to the 5-year MRC strategic planning cycle (Figure 10).

**Figure 10 Refreshed MRC strategic planning cycle**

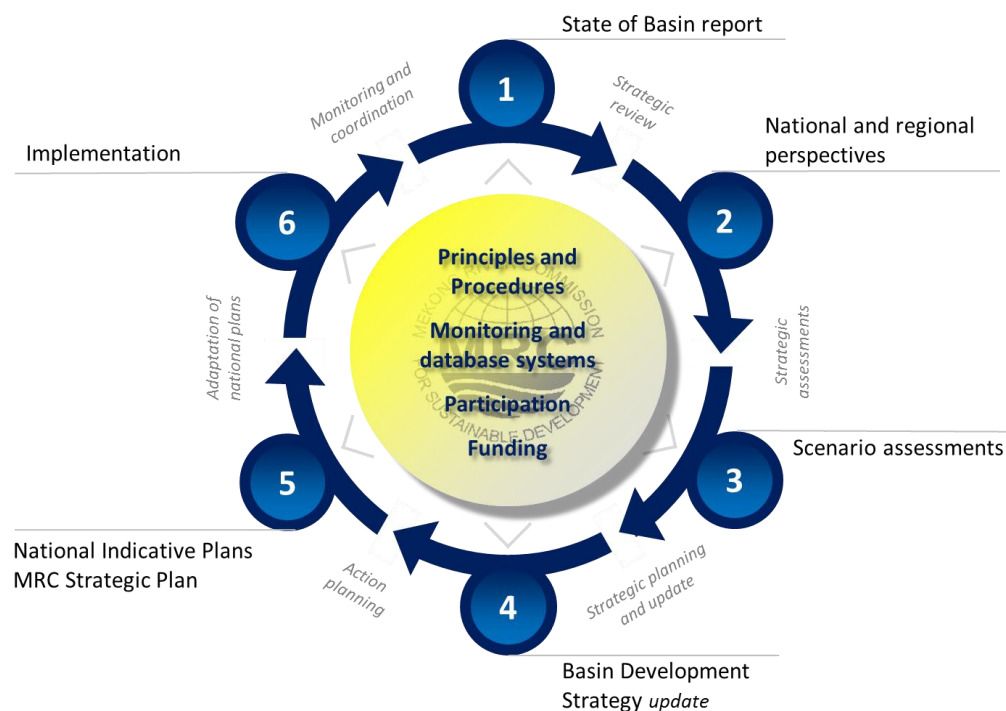


Figure 10 shows that transboundary water cooperation is a cyclical process that every five years goes through an updating of the state of basin report (to measure the effectivity of the Basin Development Strategy), a review of national and regional policies and plans, new scenario assessments (if needed), the updating of the Basin Development Strategy (BDS) for the next planning cycle, and the implementation of the BDS through the NIPs and MRC SP. Regional distribution analysis (benefit assessment) and the promotion of further benefit sharing opportunities is part of these cyclical activities, rather than a battery of efforts at the end of a linear process of benefit assessment.

## 5.2 Work plan

Based on the discussions with staff responsible for the Council Study, the BDS and the MRC SP, the proposed work plan for regional distribution analysis and the promotion of further benefit sharing opportunities is set out in Table 9 below. The work plan is presented in six parts as summarised below.

**Table 9 Road map to optimize and share benefits of cooperation in the Mekong basin**

Activities		Time line
<b>1</b>	<b>Preparatory activities</b>	<b>Jan-Jun 2016</b>
1.1	Collect relevant documents and databases	
1.2	Recruit and operationalize the BDP scenario assessment team	
1.3	Review and update the existing assessment methodologies and tools, if needed	
1.4	Identify additional data requirements	
1.5	Collaborate with trusted multilateral development partner in supporting strategic engagement and water diplomacy with decision makers on cost and benefit sharing	
1.6	Initiate the assessment process with the RTWG and national consultations	
<b>2</b>	<b>Assessment of current distribution of benefits</b>	<b>Jul-Dec 2016</b>
2.1	Review the results of the Council Study, Delta Study, ISH hydropower impact and risk assessment, and others	
2.2	Assess the regional distribution of benefits, costs, impacts and risks of basin development as of present (taking the pre 2000 development into account)	
2.3	Assess the transboundary benefits and costs	
<b>3</b>	<b>Assessment of distribution of benefits under current future plans (2030/2040)</b>	<b>Jul-Dec 2016</b>
3.1	Review the results of the Council Study, Delta study, ISH hydropower impact and risk assessment, and others	
3.2	Assess the regional distribution of benefits, costs, impacts and risks of basin development with the implementation of the currently planned development	
3.3	Assess the transboundary benefits and costs	
3.4	Discuss 2.2, 2.3, 3.2, 3.3 with the RTWG and conduct national and regional consultations	
<b>4</b>	<b>Assessment of alternative distribution of benefits (2030/2040)</b>	<b>Oct 2016-Mar 2018</b>
4.1	Formulate the exploratory long-term scenarios (2060)	
4.2	Conduct hydrological assessment of exploratory long-term scenarios	
4.3	Conduct the environmental, social and economic assessment of the exploratory long-term scenarios	
4.4	Formulate a few alternative plan scenarios in a very participatory fashion	
4.5	Conduct hydrological assessment of alternative plan scenarios	
4.6	Fully assess the alternative plan scenarios based on the MRC Indicator Framework	
4.7	Conduct a regional distribution analysis of benefits, costs, impacts and risks of basin development for the alternative plan scenarios	
4.8	Assess the transboundary benefits and costs	

4.9	Validate (interim) results periodically with the RTWG (or relevant Expert Group) and conduct national and regional consultations	
<b>5</b>	<b>Communication of benefits of transboundary cooperation</b>	<b>Jan-Mar 2019</b>
5.1	Prepare a communication strategy and information material for different stakeholder groups	
5.1	Raise awareness of the opportunities to increase regional benefits, reduce regional costs, minimize transboundary impacts and provide water security, and assemble feed back	
5.2	Prepare and discuss deal structures at the strategic and project levels with a working group of senior technical staff	
5.3	Discuss and promote deal structures at the strategic and decision making levels using the strategic engagement of regional organizations and others	
5.5	Prepare a Ministerial-level briefing paper for consideration at a MRC Summit and presentation to a GMS Ministerial Meeting	
<b>6</b>	<b>Adaptation of national plans</b>	<b>Jan 2019-Dec 2020</b>
6.1	Prepare and update regional sector and cross cutting strategies	
6.2	Facilitate the adaptation of national plans	
6.3	Provide inputs to the update of the Basin Development Strategy, including a new Basin Development Plan	

*(i) Preparatory activities*

These activities will cover the preparatory steps to undertaking the regional distribution analysis. This starts with the review of relevant documents and databases and ensuring that relevant ongoing activities, such as the Council Study, will cover the requirements of the regional distribution analysis, such as the assessment of the impacts of historical development and exogenous development.

Arrangements will be made to re-establish the MRC/BDP multi-disciplinary scenario assessment team, which will also conduct the cumulative assessment under the Council Study. That team would be assembled in the third quarter of 2016, and will assist with identifying and assembling additional data requirements and updating the overall scenario assessment methodologies where needed to fully cover the requirements of the regional distribution analysis.

The preparatory work will conclude by the end of the second quarter of 2016, following the completion of the data assembly and the establishment of new and updated assessment tools as may be required. At this stage, new tools are expected to relate to the increasing opportunities for spatial analysis arising from the broadened scenarios and additional information and data from the MRC Secretariat. New spreadsheet tools will also be needed to manipulate data for the assessments.

In parallel, the stakeholder engagement process will be set up based on the experience gained during earlier assessments. National consultations will be held and a meeting with the RTWG will be organized to discuss and agree on the process and the updated methodologies and new tools. Collaboration will be sought with a trusted multilateral development partner in supporting strategic engagement and water diplomacy with decision makers on cost and benefit sharing.

*(ii) Step 1 – Assessment of current distribution of benefits*

This Step is planned to be largely undertaken under the Council Study. The latter will formulate the basin-wide and cumulative 2007 and 2020 development scenarios and assess those against the indicators of the MRC Indicator Framework to produce a regional distribution of the total benefits, costs, impacts and risks, as well as other information, such as possible mitigation requirements (see Section 4.6.4).

It is anticipated that the Council Study will be completed mid-2016. Its results will be reviewed in the second half of 2016 and improved wherever needed to suit the requirements of the regional distribution analysis. For example, additional work will be needed to better determine the transboundary benefits derived from cooperation. The transboundary benefits are a subset of the total benefits each country is deriving from the river system (see Section 4.4).

*(iii) Step 2 - Assessment of distribution of benefits under current future plans*

Also this Step is planned to be largely undertaken under the Council Study. The latter will formulate and assess the basin-wide and cumulative 2040 development scenario, which is based on the current plans for water resources development of the basin countries. The Step 2 regional distribution analysis will be conducted together with Step 1 above and includes similar activities to produce a regional distribution of the total benefits, costs, impacts and risks, as well as other information, such as major synergies and trade-offs and possible mitigation requirements.

National consultations will be organized and the results of Step 1 and 2 will be discussed with and validated by the RTWG (or relevant Expert Group).

*(iv) Step 3 - Assessment of alternative distribution of benefits arising from new/revised projects and institutional/ funding arrangements*

The Step 3 regional distribution analysis will be conducted in two parts (see Section 4.6.4). This first part of Step 3 will focus on the formulation and assessment of the regional distribution analysis of the long term exploratory sector scenarios (2060) that explore where opportunities lie in the future to optimize development and provide water-related security in an equitable manner through cooperation. The formulation of scenarios will commence in parallel with Step 1 and Step 2 above and the assessment will be completed in the beginning of third quarter of 2017.

The insights gained from the first part of Step 3 will be taken forward into the second part wherein medium term alternative plan scenarios will be formulated and assessed during the second half of 2017 and first half of 2018. The results of analysing these alternative scenarios will be available well in time to contribute to basin-wide discussions in the run-up to updating the Basin Development Strategy covering the period from for 2020 onwards.

As in all other Steps above, extensive consultation efforts are needed during Step 3 to ensure that each country's views, requirements and concerns are fully reflected in the manner in which the scenarios are formulated and analysed and the results are presented for national use.

*(v) Communication of benefits of transboundary cooperation*

In parallel with the above assessments, a communication strategy will be developed, which identifies and schedules the actions that use the results of the regional distribution analysis to influence the policy process through various types of information material and activities tuned to the needs of the various stakeholder groups. The information material, such as awareness raising messages and media articles, scientific papers, policy briefs, and others, will be developed together with the RTWG.

In 2018 this information material will be used in basin-wide discussions with stakeholders to increase awareness and discuss the opportunities to increase regional benefits, minimize adverse transboundary impacts, and provide long-term water security through cooperation in the Mekong Basin, and the related transboundary benefits. The feedback from stakeholders will be used to prepare and negotiate possible deal structures with a working group of heads of departments for consideration of national decision-makers. The outcomes will be used to prepare a Ministerial-level briefing paper for consideration of a MRC Summit of Prime Ministers and/or a GMS Ministerial Meeting.

Given the broad scope of the distribution analysis, opportunities will be identified and seized for engaging relevant regional organizations in the assessment process. Steps will also be taken to ensure that the wider development community will be involved in the process. To this end, and to assure transparency at all stages, all relevant documents will be posted on the MRC web-site.

*(vi) Adaptation of national plans*

The results of the above assessments, discussions and decisions will provide rationale for each country to consider whether to modify their national plans to greater mutual benefit (Section 4.3). To facilitate the adaptation of national plans and to harmonize regional and national planning, basin-level sector and cross-cutting strategies will be prepared during 2018-2019 that are relevant to the major opportunities to optimize and share benefits, minimize transboundary impacts, and provide long-term water security.

The results will be used to update the Basin Development Strategy for 2021-2020. With all the above information at hand, it should be possible to replace the current Section 4.1 of the BDS on development opportunities with a more informative Basin Development Plan.

### **5.3 Implementation responsibilities**

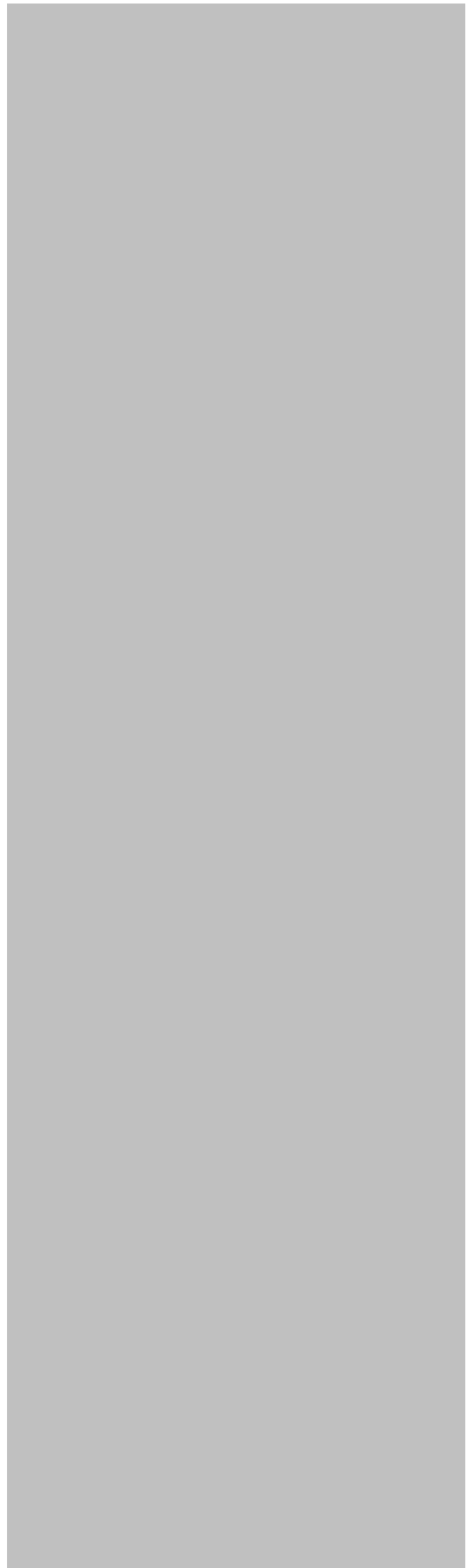
The regional distribution and communication process will build on the experience gained during the formulation and assessment of the existing scenarios in 2009-2010, which has been considered generally effective and appreciated by those involved. The process will be driven by the MRC Member Countries, coordinated nationally by the NMC Secretariats and regionally by the MRC Secretariat and its partners, and implemented by national counterparts with widespread and effective consultation with stakeholders.

A multi-disciplinary team of regional and international sector and thematic specialists will be established for the new scenario assessments. They will work together as ‘one team’

throughout the assessment. The work will be led by MRC's planning unit, which will engage other units for sectoral and technical inputs. The involvement of other MRC units will further increase compared to the 2009-2010 scenario assessment. For example the unit responsible for communication and cooperation will need to play a prominent role in the communication activities identified in the above work plan (see Table 9).

Basin-wide technical discussion, data sharing, and validation of approaches and information are done through the Regional Technical Working Group (RTWG) or succeeding Expert Group composing of senior technical staff from planning and water related line/implementing agencies. National, sub-basin area and regional stakeholder forums and meetings are important in raising awareness, promoting shared understandings and providing broader feedback from civil society, private sector, and other regional organizations and institutes. Eventually, the benefit sharing deals are negotiated by senior government officials of the four Member Countries.

## 6 Appendices



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## Appendix A Bibliography

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## Appendix A Bibliography

### A.1 Global experience in transboundary benefit sharing

Practical Approaches to Transboundary Water Benefit Sharing – Halla Qaddumi (July 2008), Working Paper 292, Overseas Development Institute, [www.odi.org.uk/resources/download/1929.pdf](http://www.odi.org.uk/resources/download/1929.pdf)

Benefit Sharing in International Rivers: Findings from the Senegal River Basin, the Columbia River Basin and the Lesotho Highlands Water Project – Yu, Winston Nov. 2008), World Bank, Africa Region (Report 46456) , [www.worldbank.org/countries/africa/publications](http://www.worldbank.org/countries/africa/publications) and reports/publications and research

Getting Transboundary Water Right: Theory and Practice for Effective Cooperation – Jagerskog A, Zeitoun M (2009), Report No. 25, SIWI Stockholm, [www.siw.org/reports/report\\_25\\_Transboundary\\_Waters](http://www.siw.org/reports/report_25_Transboundary_Waters)

Sharing Benefits, Risks and Impacts Related to Mekong water-related Development. Note for Discussion. MRC/BDP, March 2010.

Beyond the river: the benefits of cooperation on international rivers. Claudia W. Sadoff and David Grey, 2002. Elsevier Water Policy 4 (2002) 389-403.

Cooperation on International Rivers, a Continuum for Securing and Sharing Benefits. Claudia W. Sadoff and David Grey, 2005. International Water Resources Association, Water International, Volume 30, Number 4, Pages 420-427.

### A.2 National-to-local benefit sharing in the Mekong Basin

Introducing Local Benefit Sharing around large dams in West Africa – Larry J. M. Hass (Feb. 2009), International Institute for Environment and Development, [www.cmsdata.iucn.org/downloads/benefitsharingiied\\_pacoeng.pdf](http://www.cmsdata.iucn.org/downloads/benefitsharingiied_pacoeng.pdf)

Knowledge Base on Benefit Sharing, in 5 Volumes. MRC Initiative on Sustainable Hydropower. May 2011

Guidance Notes, templates and national reports with an assessment of benefit sharing options for hydropower on Mekong tributaries. MRC Initiative on Sustainable Hydropower. November 2012.

Regional Synthesis Paper for Activity ISH13 – Benefit sharing options for hydropower on Mekong tributaries evaluated and reported by 2013. Main paper, Draft Final, June 2013. MRC Initiative on Sustainable Hydropower (ISH).

### A.3 Strategic planning documents

IWRM-based Basin Development Strategy. January 2011 and draft Basin Development Strategy for 2016-2020. MRC.

1995 Mekong Agreement and other legal documents of MRC.

MRC Strategic Plan 2011-2015 and draft MRC SP 2016-2020.

A Strategic Review of the Basin Development Plan. Report of the International Team of the Panel of Experts. October 2010.

#### **A.4 Scenario assessments**

Scoping and Planning of the Assessment of Basin-wide Development Scenarios. Technical Note. Version: 3. January 12, 2009.

Assessment of Basin-wide Development Scenarios. Main Report. April 2011.

Assessment of Basin-wide Development Scenarios. Technical Note 1. Scoping and Planning of the Assessment of Development Scenarios. March 2009.

Assessment of Basin-wide Development Scenarios. Technical Note 2. Assessment Methodologies. October 2009.

Assessment of Basin-wide Development Scenarios. Technical Note 3. Assessment of Flow Changes. February 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 4. Impacts on River Morphology. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 5. Impacts on Water Quality. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 6. Power Benefits. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 7. Agricultural Impacts. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 8. Impacts of Changes in Salinity Intrusion. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 9. Impacts on Wetlands and Biodiversity. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 10. Impacts on the Tonle Sap Ecosystem. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 11. Impacts on Fisheries. June 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 12. Social Impacts. July 2010.

Assessment of Basin-wide Development Scenarios. Technical Note 13. Economic Benefits and Costs. June 2010.

Planning Approaches for Water Resources Development in the Lower Mekong Basin, Portland State University, June 2011.

A Strategic Environmental Assessment (SEA) of hydropower on the Mekong Mainstream, ICEM, Australia October 2010.

## **A.5 Fisheries reports**

Distribution and Ecology of Some Important Riverine Fish Species of the Mekong River Basin, MRC 2004.

The Upstream Dry-season Migrations of some important Fish Species in The Lower Mekong, MRC 2002.

Monitoring river fishers along the Mekong River in Lao PDR, MRC2005.

Traditional Fisheries and Fish Ecology on the Mekong River at Khone Waterfalls in Southern Laos, MRC 1995.

Assessment Methods for Mekong Fisheries, MRC 2001.

Freshwater Fisheries of Cambodia: Dai (Bagnet ) Fisheries, MRC 1995.

Analysis of the Cambodian Bagnet ("Dai") Fishery Data, MRC 2001.

Sesan River Fisheries Monitoring in Ratanakiri Province ,Northeast Cambodia: Before and After the Construction of the Yali Falls Dam, MRC 2005.

Monitoring of fish markets in Vientiane and Luang Prabang Province, Lao PDR, using log books 2004-2005.

Consumption and the yield of fish and other aquatic animals from the Lower Mekong Basin. Technical Paper 16, MRC 2007.

## **A.6 Other reports**

Development trends and future outlook in the Lower Mekong Basin Countries. Working Document, MRC Basin Development Plan Programme, October 2015.

MRC Indicator Framework for managing the Mekong Basin, 2<sup>nd</sup> draft report, MRC Basin Development Plan Programme, May 2015.

Review of 2010 Scenario Assessment Findings. Draft report, MRC Basin Development Plan Programme, October 2015.

The Council Study, Study on the sustainable management and development of the Mekong River, including impacts of mainstream hydropower projects. Scoping of the formulation and assessment of development scenarios. Concept Note, Cumulative Assessment Team in consultation with Thematic Teams and Discipline Teams, 3 March 2015.

MRC Council Study, Cumulative impact assessment of water resource development scenarios, Approach and methodology. MRC Basin Development Plan Programme, October 2015.

Basin Action Plan. MRC Basin Development Plan Programme, April 2013.

The broadening the current set of basin-wide development scenarios. Concept report, Draft final, 26 October 2013. MRC Basin Development Plan Programme

The BDP Story. Mekong Basin Planning, the Story Behind the Basin Development Plan. 2013

BDP 2011-20152 Inception Report. December 2012.

High Level Study Visit to the Columbia River Basin. Back-to-Office report. June 2008.

Hydropower Sector Review for the Joint Basin Planning Process. March 2009.

Regional Irrigation Sector Review for the Joint Basin Planning Process. March 2009.

Second regional Stakeholder Forum on the Basin development Plan – Unfolding Perspectives and Options for Sustainable Water Resources Development in the Mekong River Basin. Forum Proceedings. October 2009.

State of the Basin Report 2010. April 2010 (coordinated by EP and prepared by all MRC Programmes).

Third Regional Stakeholder Forum on the Basin Development Plan - Decoding the development scenarios and strategy for basin development: What does the future hold? Forum Proceedings. 29-30 July 2010.

Working Towards an IWRM-Based Basin Development Strategy for the Lower Mekong Basin. March 2011.

Mekong Basin planning: the story behind the Basin Development Plan. November 2011.

Planning Atlas. December 2011.

The 'Development Space' for the IWRM-based Basin Development Strategy. Which Scenario, or Parts of a Scenario, can now be within the Development Space? May 2010.

The 'Development Opportunity Space' for the IWRM-based Basin Development Strategy – an 'Information note' for the Stakeholder Forum. July 2010.

IKMP Discharge and Sediment Monitoring Program Review Recommendations and Data Analysis. May 2012.



## **Appendix B Case studies of international benefit sharing**

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## Appendix B Case studies of international benefit sharing

### B.1 Introduction

There are many hundreds of international river basins around the world. For instance, Bangladesh alone shares 54 common rivers with India and China is the upper riparian in some 15 international basins. In many instances, no formal arrangements have been agreed between the riparians and any disputes can only have recourse to international water law. However, from the early part of the 20<sup>th</sup> century, many countries have increasingly recognised that ultimately a better path is to seek cooperative development and management of shared rivers with their fellow riparians.

Such cooperation is undertaken in many different ways, reflecting the history of relations between neighbouring countries, the hydrological circumstances of the river in question and the economic, social and environmental drivers in each country. In the case of the Mekong, this is well reflected in the recently published BDP Story<sup>22</sup>.

Eight case studies have been selected to illustrate the breadth of approaches adopted from around the world. The case studies are not intended as exhaustive and detailed studies of each basin (this can be found in the referenced literature). Instead, the studies are intended to highlight the different responses in these basins to sharing benefits and costs, as well as some key points that may contribute to the debate on how benefit sharing may be advanced in the Mekong. The cases studied are drawn together and further discussed in Chapter 2 of this report.



*Map courtesy of Wikipedia*

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<sup>22</sup> Mekong Basin Planning: The story behind the Basin Development Plan. MRC 2013

## B.2 Senegal basin

### *Hydrological context*

The Senegal River basin comprises four countries (Senegal, Mauritania, Mali and Guinea) in West Africa.

The Senegal's headwaters originate in Guinea and the river flows west first along the Mali-Mauritanian border, then later a small part of the Guinea-Mali frontier and thereafter the Senegal-Mali border. The Senegal River further flows through semi-arid land in the north of Senegal, forming the border with Mauritania and into the Atlantic.

The Senegal River has a drainage basin of 270,000 km<sup>2</sup>, a mean flow of 680 m<sup>3</sup>/s and an annual discharge of 21.5 km<sup>3</sup>.

### *Development context*

With a population of approximately 12 million in the basin and GDP/capita ranging between US\$1,000 to US\$2000 (2012 data), the countries faced severe hardship. Cycles of drought, degradation of natural resources, crops and impoverishment was leading to high levels of emigration by young people. Furthermore, saline intrusion had reached nearly 250km upstream, making the land unsuitable for cultivation.

A clear need had emerged for developing the water resources of the Senegal River to bring about much needed development.

### *Issues and needs*

Mali, Mauritania and Senegal agreed in 1972 to unite their efforts to control the availability of water and seek means of a rational and coordinated use of resources in the basin. They established the *Organisation pour la Mise en Valeur du fleuve Sénégal* (OMVS - or Organization for the Development of the Senegal River) with the purpose of achieve food self-sufficiency within the basin and the sub-region, securing and improving people's incomes, preserving the balance of ecosystems in the basin, reducing economic vulnerability to climatic and external factors and accelerating the economic development of member states. This agreement was underpinned by the stated common will of the member states and shared ideals of solidarity, sharing, equity and culture of peace.

In 2003 the Agreement was refreshed and broadened to bring in concepts of sustainability, institutional strengthening and, in 2006, Guinea joined the OMVS.

Through the Agreement, two large dams have been constructed: the multi-purpose Manantali Dam in Mali and the Maka-Diama dam on the Mauritania-Senegal border, near the outlet to the sea, preventing access of salt water upstream.

### *Legal and institutional arrangements*

Under the Convention of 11 March 1972 amended, OMVS is responsible to the Conference of Heads of State and Government, the supreme body that sets policy for cooperation and development of the organization.



Map courtesy of Wikipedia

In addition to the Conference, the restructured organization has five permanent bodies: (i) the Council of Ministers, which sets the policy and agree the plans for the development of the Senegal River; (ii) the High Commission, which is the executive organ of the Organization; (iii) the Management Company Energy Manantali (SOGEM); (iv) the Manager and Operations Diama Dam (SOGED); and (v) the Company's Management and Operation of the navigation (SOGENAV). Both SOGEM and SOGED are inter-state public companies.

### ***Benefit sharing mechanisms***

The two large dams have been implemented under joint-ownership in equal share. Investment and operating costs are shared in proportion to a pre-determined estimate of benefits accruing to each country in irrigation, hydropower and navigation.

Negotiation of these proportions was not easy and reflected a degree of mistrust between the countries over what would be fair. At the outset, environmental and social costs/impacts were excluded, although discussions on bringing these into the equation have started and are ongoing.

### ***Results after cooperation***

In the 20 years since the dams were built in the 1980's, the expected benefits for each country have yet to be fully realised. Environmental and social challenges have arisen as a result of changes in the basin-ecosystem brought about by the dams.

### ***Potential relevance to Mekong***

The OMVS was created in response to a shared need between three countries to improve water resource management.

The basis for cost-sharing was hard to agree and flawed in so far as anticipated benefits have not been fully realised and environmental and social costs/impacts were initially over-looked.

Nevertheless, imperfect as arrangements may be, the three countries have realised through cooperation, benefits which otherwise each would not have been able to individually (albeit at a slower rate of accrual than anticipated, which may not necessarily be a consequence of the form of agreement but in the manner the countries have chosen to implement it).

## **B.3 Columbia River basin**

### ***Hydrological context***

The Columbia River basin is shared by Canada (15% of the land area, but contributing 38% of the flow) and the USA, with Canada as the upper riparian. The basin covers some 673,000 km<sup>2</sup>, from its headwaters in British Columbia, Canada, to its mouth at Astoria in the United States.

The average annual flow for the Columbia River in Oregon is 5,500m<sup>3</sup>/s approximately. The river's annual discharge rate fluctuates with precipitation and ranges from 3,400m<sup>3</sup>/s in a low water year to 7,400m<sup>3</sup>/s in a high water year. The current total annual withdrawal from the mainstream of the Columbia River during the growing season is about 5.8 km<sup>3</sup>.

### **Development context**

Some 50 years ago, severe flooding and growing energy demands led the USA to extensively develop its part of the basin. Recognising the shared nature of the basin, the governments of Canada and USA agreed in 1944 to begin studying the potential for joint development of dams in the basin. Planning efforts were slow until a 1948 Columbia River flood caused extensive damage and completely destroying Vanport, the second largest city in Oregon.

After dams were constructed along the river for flood control and power production, the flow regime of the river changed. Records kept since 1878 show that flows were much higher in the spring and lower in winter before dam construction. In addition, the velocity of the water moving down the river was significantly greater before dam construction began in the 1930s. In 1917, Washington adopted a water code to help manage water allocations from surface water bodies in the state, including the Columbia River.



### **Issues and needs**

The USA viewed hydropower as the primary benefit of these developments and recognised that this could be further enhanced if Canada provided the means to regulate flows emanating from the upper catchment. Whilst the need for additional energy in Canada was less at the time, an agreement was reached that involved construction of three new dams in Canada. These dams provided hydropower power and other direct uses for Canada, whilst at the same time regulating flows in the USA increasing power production and reducing flood damage there.

### **Legal and institutional arrangements**

The increased interest in flood protection and the growing need for power development initiated 11 years of discussion and alternative proposals for construction of dams in Canada. In 1959, the governments issued a report that recommended principles for negotiating an agreement and apportioning the costs and benefits. Formal negotiations were concluded and the Treaty was signed in 1961 by both Governments.

The treaty was not implemented, however, until over three years later due to difficulties in creating arrangements for funding the construction of the Canadian dams and marketing the electrical power owed to Canada which was surplus to Canadian needs during the early treaty years. A treaty protocol was signed in 1964 that limited or clarified many treaty provisions, defined rights and obligations between the British Columbia and Canadian governments, and allowed for the sale of the Canadian Entitlement to downstream US power benefits. Instruments of ratification were exchanged and the treaty was implemented in 1964.

### ***Benefit sharing mechanisms***

Following these lengthy assessment and negotiation, the agreement between the two countries reflected a degree of pragmatism driven by the USA's wish to be on good terms with its riparian neighbour. Under the Columbia River Treaty signed in 1964, it was agreed that USA would pay Canada the value equivalent to 50% of the incremental power generated in the USA plus 50% of the flood damage reduction.

### ***Results after cooperation***

Notwithstanding the significant gains in the USA, many of the local communities within Canada received little benefit from the dam whilst experiencing most of the impacts. Subsequently in 1995, the Columbia Basin Trust (funded by the Provincial Government of British Columbia with an initial endowment of \$295 million) was established to fund the necessary mitigation measures to address the various social and environmental issues that had arisen. Subsequently the Province invested a further \$250 million to the Columbia Power Corporation (CPC), the Columbia Basin Trust's Joint Venture Partner in power projects in the Basin. Fifty per cent of the net profits go to the Columbia Basin Trust for the benefit of the people of the Basin.

### ***Potential relevance to Mekong***

Development of the benefit sharing agreement was initiated by the lower riparian, recognising that partnership with the upper riparian would bring significant benefits to the lower, and was achieved by striking a deal acceptable to the upper riparian.

The agreement establishes no joint ownership of the infrastructure but requires the parties to cooperate in management of the river to mutual benefit.

The initial basis for payment under the agreement ignored environmental and social impacts since evidently these were not considered important at the time by the upper riparian. Subsequently, these had to be addressed by the upper riparian at its own cost, as a result of the inflexibility of the original agreement.

## **B.4 Lesotho Highlands Water Project**

### ***Hydrological context***

The Senqu/Orange river rises in the mountain region of Lesotho, traversing in a generally western direction nearly 2000 km to the Atlantic Ocean in South Africa and being joined half way by the Vaal river coming in from the north-east. Although the mountain region of Lesotho constitutes only 5% of the the total catchment of the Senqu/Orange river, it provides about 50% of the total catchment run-off.

Water is a resource that Lesotho has in relative abundance. Lesotho's water resources far exceeds its possible future requirements, even allowing for possible future irrigation projects and for general development and improvement of living standards. The average total available water in Lesotho is about 150m<sup>3</sup>/s and current national consumption is not more that 2m<sup>3</sup>/s.

The topography of the region allowed for the possibility of developing a hydro-power generation in Lesotho in conjunction with the the provision of water supplies to the RSA.

## **Development context**

The Kingdom of Lesotho, is a landlocked country and enclave, completely surrounded by its only neighbouring country, South Africa. It is just over 30,000 km<sup>2</sup> in size and has a population slightly over two million. With a GDP per capita of US\$ 2,126 (153<sup>rd</sup> in the world), about 40% of the population live below the international poverty line of US \$1.25 a day (2009 data).

In contrast, the Republic of South Africa has an area of 1,219,090 km<sup>2</sup> with nearly 2,800 km of coastline. It is the 25<sup>th</sup> largest country in the world by land area, and with close to 53 million people, is the world's 24<sup>th</sup> most populous nation. South Africa is ranked as an upper-middle income economy by the World Bank and the largest and most developed in Africa, and the 28<sup>th</sup> largest in the world. However, notwithstanding it has the 5<sup>th</sup> highest GDP per capita in Africa (at US\$ 11,281), poverty and inequality remain widespread, with about a quarter of the population unemployed and living on less than US\$1.25 a day.



Map courtesy of Wikipedia

## **Issues and needs**

Lesotho is a small country endowed with substantial water resources located in the middle of South Africa. In contrast, South Africa (RSA) is severely short of water. The Lesotho Highlands Water Project (LHWP) was identified more than 50 years ago as the least cost effective water resource exploitation to benefit both the peoples of the Kingdom of Lesotho (Lesotho) and the Republic of South Africa (RSA).

A treaty was signed in 1986 whereby RSA can benefit from use of these waters. The Treaty allows for the development of five large dams on the Vaal and Orange Rivers in Lesotho and associated water transfers to demand centres in RSA's urban and industrial areas, as well as to meet requirements within Lesotho. The Treaty explicitly states that no person shall be worse off as a result of these developments and Lesotho has actively pursued ensuring that affected communities receive benefits.

The purpose of the project is to provide Lesotho with a source of income in exchange for the provision of water to the central Gauteng province where the majority of industrial and mining activity occurs in South Africa, as well as to generate hydroelectric power for Lesotho (currently almost 100% of Lesotho's requirements).

In addition the project is intended to promote the general development of the remote and underdeveloped mountain regions of Lesotho, while ensuring that of Lesotho, while ensuring that comprehensive are taken to counteract any adverse effects which the Project might have on the local population and their environment

## **Legal and institutional arrangements**

The Treaty is a contractual agreement governing the design, construction, operation, and maintenance of the Project, as well as the export of water to South Africa. It was designed to allow for the disparity in economic development of the countries involved. Two teams (one from RSA and one from Lesotho)

drafted the text. They comprised of legal experts, senior government officials, specialist consultants and engineers.

Importantly, the Treaty defines the responsibilities of each country as concerns payment for the Project. Over time, six protocols, three of which were envisaged in the Treaty, were added. These covered (i) the royalty manual, setting out the details of how the royalties due to Lesotho should be calculated, (ii) the effect of the project on the SACU revenue due to Lesotho, (iii) cost apportionment between Lesotho and South Africa, (iv) supplementary arrangements, including cost related payments, concessionary finance, insurance and the point at which royalty payment to Lesotho would start, (v) how taxation in Lesotho would apply to the project, and (at a later stage) changes to the name of the Joint Permanent Technical Commission to the Lesotho Highlands Water Commission (LHWC), endorsing its responsibility for the project and changed roles of other parties.

Since 1986 the treaty has not required any major adjustments, nor has it been necessary to make use of the dispute arbitration mechanism as set out in the document.

### ***Benefit sharing mechanisms***

The Treaty sets out cost sharing whereby RSA pays for the transfer of water and Lesotho for the hydropower and related costs. RSA pays royalties to Lesotho for water transferred and Lesotho benefits also from the sale of hydropower available after meeting its own energy requirements. Overall benefits are estimated to accrue 56% to Lesotho and 44% to RSA.

### ***Results after cooperation***

The anticipated benefits to RSA have been broadly realised. A Lesotho Highlands Development fund has been established to finance mitigation activities in Lesotho. However, notwithstanding the substantial boost to Lesotho's economy as a result of the project, the impacts on poverty reduction have been less than anticipated.

Nevertheless, some view that the project has had an important impact on Lesotho's infrastructure, as hundreds of kilometres of engineered paved roads were built in order to improve access to the different construction sites, and, together with engineered unpaved 'feeder' roads around the dams, continue to provide much improved communication for many villages in the mountainous interior.

### ***Potential relevance to Mekong***

The Lesotho Highlands Water Project was created in response to a shared recognition of the opportunity to improve water resource management and improve the economy of both countries involved.

The Treaty is founded on a cost-sharing principle with pre-agreed royalties paid for the water and power transferred from the upper to lower riparian.

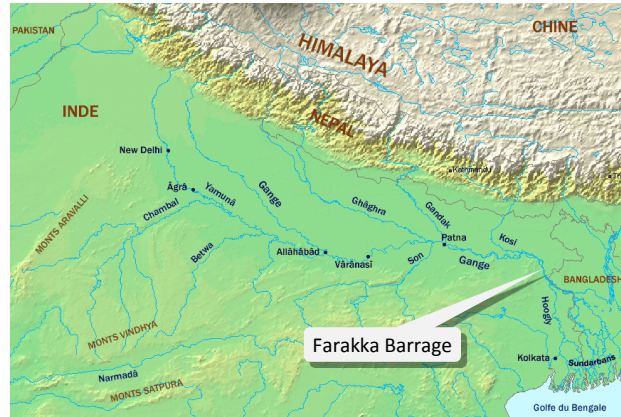
The Project has contributed significantly to the economy of Lesotho and water security in RSA. However, despite best intentions, benefits to the local communities within Lesotho are reportedly less than expected, reflecting not so much on the international agreement but instead of internal benefit sharing mechanisms within Lesotho.

## B.5 Ganges Water Treaty

### *Hydrological context*

The Ganges is the second largest river in the world by discharge. The 2,525 km river rises in the western Himalayas in the Indian state of Uttarakhand, and flows south and east through the Gangetic Plain of North India into Bangladesh, where it empties into the Bay of Bengal.

The Ganges basin covers parts of four countries, India, Nepal, China, and Bangladesh. The Ganges basin, including the delta but not the Brahmaputra or Meghna basins, is about 1,080,000 km<sup>2</sup> of which 80% is in India, 13% in Nepal, 4% in Bangladesh and 3% in China (3%). Within India, the Ganges flows through eleven Indian states.



Map courtesy of Wikipedia

Shortly before entering Bangladesh, the Ganges begins to form distributary branches, the first of which becomes the Hooghly River. In 1974, India constructed to divert some water into the Hooghly to keep it and the downstream port of Kolkata relatively silt-free.

The average annual discharges of the Ganges is about 16,650 m<sup>3</sup>/s, rising to about 38,000 m<sup>3</sup>/s when joined by the Brahmaputra and Meghna. Below the border with Bangladesh, the maximum peak discharge of the Ganges has exceeded 70,000 m<sup>3</sup>/s, whilst the minimum recorded at the same place was about 180 m<sup>3</sup>/s in 1997.

After entering Bangladesh, the main branch of the Ganges is known as the Padma River until it is joined by the Jamuna River, the largest distributary of the Brahmaputra River, which descends from Assam and Northeast India. Further downstream, the Ganges is fed by the Meghna River, the second-largest distributary of the Brahmaputra, and takes on the Meghna's name as it enters the Meghna estuary. Fanning out into the 350 km wide Ganges Delta, it finally empties into the Bay of Bengal. A total of 54 rivers flow into Bangladesh from India.

### *Development context*

The Ganges basin is the most heavily populated river basin in the world, with over 400 million people and a population density of about 390 /km<sup>2</sup>. About one third of the total population of Bangladesh and about 50% of the Indian population live in the the Ganges basin. Poverty is widespread in both countries with GDP/capita in 2012 in India being US\$ 3,843 and Bangladesh US\$ 1,963, ranking them 134<sup>th</sup> and 157<sup>th</sup> in the world respectively (out of 188 listed by IMF).

Both countries have extensive rural populations which are heavily dependent on agriculture. In India, individual States abstract water from the Ganges for irrigation purposes, which is insufficient to meet their full demands in the low flow season. In Bangladesh, the Southwest Region commanded by the Ganges similarly is water short, particularly as groundwater supplies in this area are extensively polluted with arsenic. Bangladesh has long aspired to construct its own barrage on the Ganges to serve this area for agricultural and environmental purposes. However, Bangladesh cannot reasonably proceed without an assured low flows supply.

### ***Issues and needs***

A wide-ranging Indo-Bangladeshi Treaty of Friendship, Cooperation and Peace was signed in 1972, within which the two nations established a Joint River Commission to work for the common interests and sharing of water resources, irrigation, floods and cyclones control. The sharing of the Ganges' waters is a long-standing issue between the two countries, and which has remained a subject of conflict for almost 35 years, with several bilateral agreements and rounds of talks failing to produce results.

In May 1974, a joint declaration was issued to resolve the water-sharing issue before the Farakka Barrage began operation and this was followed by an interim agreement in 1975 to allow India to operate feeder canals of the barrage for short periods. However, India withdrew from further negotiations in 1976, and it was only at the urging of other nations and the UN, that a dialogue was resumed, leading to a 5-year treaty on water-sharing signed in 1977, which expired in 1982 without being renewed.

### ***Legal and institutional arrangements***

A comprehensive bilateral treaty was nevertheless signed in 1996, establishing a 30-year water-sharing arrangement and recognising Bangladesh's rights as the lower riparian. This Treaty enables the two countries to cooperate in harnessing the Ganges waters and also permits the construction of barrages and irrigation projects in Bangladesh. The terms of the Treaty are administered through a Joint Rivers Commission (JRC).

### ***Benefit sharing mechanisms***

The Ganges Water Treaty provides Bangladesh with a measure of assurance of minimum flows during the dry season. The Treaty offers no other benefit sharing mechanism.

### ***Results after cooperation***

Whilst the Treaty provides some water security for Bangladesh, both sides reportedly remain unhappy with the allocations made. The situation is further complicated by responsibility for water allocations from within India lying with State Governments rather than with the Federal Government (which signed the Treaty with Bangladesh).

A further source of concern is that the Treaty does not address water quality issues and, with increasing development in India, pollution is seen by some in Bangladesh a significant threat.

Bangladesh and India share 54 common rivers, but thus far the Ganges is the only one with a water sharing treaty.

### ***Potential relevance to Mekong***

The Ganges Water Treaty is a Government to Government time-limited agreement on water allocations between two countries on a river with insufficient dry season flows to meet the full demands of both nations.

The Treaty relies ultimately upon political goodwill between the countries as there are no economic incentives upon the part of the upper riparian to sustain the agreement.

## B.6 La Plata Basin

### *Hydrological context*

The La Plata River basin encompasses an area of 3.2 million km<sup>2</sup> and covers parts of Argentina, Brazil, Bolivia, Paraguay and Uruguay. It is one of the largest river basins on Earth. A MRC delegation visited La Plata Basin in 2010<sup>23</sup>.

The basin comprises the Parana, Paraguay and Uruguay River systems and the largest wetland in the world, the Pantanal. The Parana River is larger than the Mekong but has similar morphologic, climatic and socio-economic characteristics. The basin as a whole has a mean annual precipitation of 1,100 mm ranging from desert zones in the Upper Bermejo river basin to sub-tropical regions in the Upper Paraguay River. Mean annual discharge of the entire system is about 690km<sup>3</sup>.



Map courtesy of Wikipedia

### *Development context*

The economic development of the upper basin has been hindered by limited natural resources. Paraguay and adjacent parts of Brazil and Argentina are virtually devoid of mineral deposits. Industry, therefore, is limited to processing agricultural products or gathering forest products. Cattle grazing and small-scale farming of food crops support most of the rural population, with successful plantations found along the Alto Paraná. The lower basin also has been a traditional region of livestock production, together with cotton, flax and corn along the Argentine shore of the Paraná. Uruguay has attempted to diversify its agriculture, but nearly all of the land area is still used for grazing.

A major impediment to economic development in the upper part of the basin is poor navigation, with access generally limited to vessels with shallow drafts. Elsewhere, navigation can be maintained in many areas only by constant dredging and renovation of port facilities. The value of these river systems as commercial arteries, therefore, is concentrated on the lower reaches.

Economic development of the river systems, such as irrigation or hydroelectric power, is difficult to achieve. The swamps of the Pantanal and the Chaco have long made agriculture a virtual impossibility in these areas. The more recent and progressive development of hydroelectric power has nevertheless begun to stimulate development of industry and agriculture.

Whilst the economies of Argentina, Brazil and Uruguay are mid-ranking (GDP/cap varies between \$11,800 and \$17,900), the economies of Bolivia (\$5,040 GDP/cap) and Paraguay (\$6,050 GDP/cap) place them at 124<sup>th</sup> and 115<sup>th</sup> respectively in the world on this measure.

### *Issues and needs*

Bolivia, Paraguay and Uruguay's agriculture economies are heavily dependent upon the basin as do the industrial sectors of Argentina and Brazil. The Parana, Paraguay and Uruguay rivers define the borders

<sup>23</sup> MRC Study Visit report, MRC ISH, December 2010

between countries and represent a shared resource by which to stimulate economic growth. At the same time, the condition of the Pantanal, the largest wetland in the world, requires protection.

### ***Legal and institutional arrangements***

The Basin's riparian states have a history of cooperation and joint management of the watershed. The La Plata River Basin Treaty, signed in 1969 by all five countries, is an umbrella treaty which provides a framework for joint management, development and preservation of the basin. Under the Treaty, the foreign ministers of each State provide policy direction and a standing Intergovernmental Coordination Committee is responsible for ongoing administration. Basin States agree to identify and prioritize cooperative projects, and to provide the technical and legal structure to see to their implementation. The ICC is a facilitator of these processes and provides a range of support and enabling tools to the member States.

Subsequent multilateral and bilateral treaties outline the specifics of economic investment, hydroelectric development and transportation enhancement and have led to construction of 130 dams, including the Itaipu and the Yacureta.

### ***Benefit sharing mechanisms***

Benefit sharing mechanisms are set out in the specific project agreements that have been signed within the framework of the river basin treaty. In general the mechanisms agreed reflect the shared nature of the resource, the levels of investment and the benefits gained for each country involved. Ownership of joint projects has been on an equal basis between the countries involved, including in one case where intensive efforts were required to resolve ownership of the project site, resulting in the site being declared as neutral territory.

### ***Results after cooperation***

Itaipu, amongst the world's largest hydroelectric projects, was commissioned under a bilateral agreement between Paraguay and Brazil in 1973, after five years of dispute over site ownership. The shared cost of the project was US\$15 billion and it now supplies 26% of all of the electricity for Brazil and 78% for Paraguay. Subsequently, building on the success of these negotiations, the two countries implemented two joint projects to address over-looked environmental issues.

In contrast, the 1973 Yacyreta Treaty between Argentina and Paraguay to construct a hydroelectric dam downstream of Itaipu has not been seen as successful. Although the treaty was similar to Itaipu's (generated power to be divided evenly between the two nations), it also allowed either country to sell power surpluses to a third party, a contingency which complicated the construction. However, the project has operated at only two-thirds capacity due to environmental concerns and local communities have been inadequately compensated.

Hydrovia is the first multilateral economic investment joining all five riparian states together, for which discussions commenced in 1988, latterly taken up by an Intergovernmental Commission. Hydrovia is a river transportation project involving dredging and straightening major portions of the Paraná and the Paraguay, including within the Pantanal wetlands, where biodiversity could be strongly affected. Despite numerous studies, consensus has been difficult to reach.

### ***Potential relevance to Mekong***

The La Plata River Basin Treaty has many features common with the 1995 Mekong Agreement. The Treaty anticipates and allows that bilateral projects involving a sub-set of riparian states are taken up under separate agreements within the overall framework of the Treaty.

Since 1969, the quantity of joint economic ventures in the La Plata Basin has allowed for increased cooperation between the riparian nations when many times conflict could have arisen and diminished the mutual benefits the states now gained. This has been testament to the riparian states entering into negotiations with the intent of cooperation, instead of letting conflict create stronger counter-positions.

A number of significant hydropower projects have been taken up on border' rivers, Whilst bilateral agreements on shared rivers were founded on a 50:50 share of the power generated, latterly some disputes have arisen over the tariffs paid when one country cedes part of its share to the other. As in other basins, failure to address environmental and social issues at the outset of joint project agreements leads to sub-optimal project performance in the long term.

## **B.7 Salto Grande Bi-National Project**

### ***Hydrological context***

The Salto Grande Bi-National project is a major project on the Uruguay River within the La Plata Basin, shared by Argentina and Uruguay. The construction of the 65m high dam began in 1974 and was completed in 1979.

Power is generated by fourteen Kaplan turbines, totalling the installed capacity to 1,890 MW. The dam passes approximately 64,000 cumecs and the reservoir has a total area of 783 km<sup>2</sup>, with storage of 5.0km<sup>3</sup>.

### ***Development context***

The 1938 Act between these countries established under Article 5 the common interest of both for the development of the hydroelectric potential of the Uruguay River, for which purpose it was agreed to create a Joint Technical Commission (JTC) to undertake studies on behalf of both Governments. The Commission was created in 1946 but it was not until 1974, following signature of the La Plata River Basin Treaty in 1969, that the Governments enacted a Procedural Agreement to implement the 1946 MOU.



Map courtesy of Google Maps

### ***Issues and needs***

As described under Section B.6 above, Uruguay's agriculture economy is heavily dependent upon the basin as is the industrial sector of Argentina. The Uruguay River defines the border between countries and represents a shared resource by which to stimulate economic growth.

### ***Legal and institutional arrangements***

The MoU establishes that both States recognise the legal authority of the JTC to act publicly and privately in the development of its objectives. The Agreement further recognises the JTC an International Organization and as such has the legal authority to meet its objectives. A separate 1977 agreement

between JCT and Argentina establishes that "JTC shall be a legal person in the Argentine Republic and shall have the authority to enter contracts, acquire goods and dispose of them".

The countries also agreed that the JTC should have an equal number of Delegates from each country and that the JTC shall address all matters regarding the use, storage and diversion of the waters of the Uruguay River. The stated objective of the JTC is "to obtain maximum benefit from the natural conditions offered by the Uruguay river rapids in the area of Salto Grande for the economic, industrial and social development of both countries to improve navigation, produce energy and facilitate road linkages as well as any other purposes that, without reducing the others, could contribute to said common benefit".

### ***Benefit sharing mechanisms***

The MoU defined "common works" as the dam, powerhouse and associated equipment, the lateral dykes, the road and railway international bridge and related navigation and electrical connection works. In common with other major La Plata projects, capital and operational costs of these common works were shared equally by the two countries.

Other non-common works were paid by the respective countries, and involved access roads, transmission lines, new population centres, highways and land expropriations. It was further agreed that, whilst the distribution of energy would be unequal for the first four years with Argentina entitled to 83% of that generated, from 1995 each State will normally be entitled to a 50% share.

### ***Results after cooperation***

Uruguay has no legislation for long term benefit sharing with affected communities, but in Argentina 14% of revenues is allocated directly to the provincial governments. A WCD report has noted in 2000 that local expectations amongst those resettled were not fully met on both sides of the river.

### ***Potential relevance to Mekong***

The Salto Grande project provides a successful example of a bilateral project undertaken within the wider framework of a basin treaty amongst five nations. The project is on a shared river and based on an equal share of investment and benefits, save that some compensatory measures were adopted in the early revenues as a result of negotiation.

The JCT managing the project was granted full legal status as an international body and may provide a useful example of how such institutions may be established.

## **B.8 Aral Sea Basin**

### ***Hydrological context***

The Aral Sea Basin comprises most of the Kyrgyz Republic, all of Tajikistan, Turkmenistan, and Uzbekistan, and parts of Afghanistan and Kazakhstan. The Aral Sea extends over 690,000km<sup>2</sup>. The Aral Sea Basin is formed by two of the largest rivers of Central Asia — The Amu Darya and the Syr Darya. The source of the Amu Darya is largely in Tajikistan, with a few watercourses originating in north-eastern Afghanistan. The Syr Darya originates mainly in Kyrgyzstan. The Aral Sea Basin has three distinct ecological zones: the mountains, the deserts, and the Aral Sea with its deltas. The Tian Shan and Pamir mountains in the south and southwest are characterized by high altitudes with peaks over 7,000m and by an average annual high precipitation ranging from 800 to 1,600mm/year. The lowland deserts of Karakum and Kyzylkum cover

most of the basin area, and are characterized by low precipitation (under 100 mm/year) and high evaporation rates.

Tajikistan and Kyrgyzstan produce about 77% of the water in the Aral Sea Basin. Historically, water demand has been dominated by the downstream needs of agriculture, which accounts for more than 90% of total water use.

### **Development context**

Agricultural expansion and population growth during 1950-90 placed tremendous strain on the water resources of the region, with the basin's population growing from 13 million to over 40 million people and irrigated lands from 4.5 to over 8 million ha. As a result, the Aral Sea lost more than half of its surface area and two thirds of its volume with dire environmental consequences.

### **Issues and needs**

During the Soviet period, the power and irrigation facilities of the major rivers in the basin formed part of an integrated water and energy system. Being at the head of the catchment and equipped with large dams, Kyrgyzstan and Tajikistan released most of their water in the wet season summer months for supplementary irrigation in the downstream countries, generating hydroelectric power in the process.

In the dry winter season, Kyrgyzstan and Tajikistan, having released most of their stored water in the summer season, could not generate sufficient hydropower to meet their needs. To compensate, the downstream countries sent oil, gas, and coal were to Kyrgyzstan and Tajikistan to operate their combined heat and power plants and natural gas systems. This exchange of water, power and fuel all took place in the context of a centrally planned economy and involved no money exchanged.

### **Legal and institutional arrangements**

Following break-up of the Soviet Union, the five newly independent Aral Sea Basin countries agreed to maintain the water sharing and water distribution rules established during the Soviet times. An Interstate Agreement was signed 1992, expressing the principles of co-operation, management, utilization, and protection of water resources throughout the basin and the need for joint action.

The five countries also agreed to establish the Interstate Commission for Water Coordination (ICWC) as the body responsible for defining allocations and that the two existing RBOs for the Amu Darya and the Syr Darya should become part of the ICWC.

### **Benefit sharing mechanisms**

However, during the early 1990s, in the absence of a centrally planned “barter” system, arrangements started to break down. With fuel prices rapidly rising and supplies from the downstream countries



becoming erratic, Kyrgyzstan started to conserve water in the summer months and increase hydropower generation in the winter. This led to excessive releases in the winter months which, due to the frozen rivers, caused flooding and severe environmental damage in the downstream countries in the winter and shortages of irrigation supplies in the summer. A hiatus was eventually reached when the summer rains failed and agricultural production in the lower riparians was badly affected.

Subsequently, annual water and energy sharing agreements have been negotiated between the Syr Darya Basin countries to spell out fuel and power transfers between the countries and reservoir releases. The aim has been to broaden cooperation on water and energy management to increase the scope and range of trade-offs outside water alone. Measures to improve water and energy management and interstate cooperation have been formulated including: (a) improving operating rules of reservoirs, (b) better mechanisms for the downstream users to produce more timely and accurate requests for water, and (c) streamlining the process of agreements on power and fuel exchanges to stabilize fuel supplies to Kyrgyzstan.

### ***Results after cooperation***

The broader picture shows experience and confidence is being gained using different mechanisms, but there are still many controversial issues. Consequently, the prevailing view around 2000 was the mechanisms for interstate cooperation need to be considered as transitional, and be adapted over time to constantly evolving political and economic circumstances.

### ***Potential relevance to Mekong***

The competition for a scarce resource and the environmental consequences to the Aral Sea of over-exploitation of those resources underscores the need for a holistic approach to basin management.

The transition from a centrally planned system under the Soviet Union to five independent States and the problems that arose as a result illustrates well the importance of fostering cooperation through a coordinating body with appropriate powers agreed by all affected riparians.

The solution to managing the water equitably has involved significant trade-offs outside the water sector, but that these are more difficult to achieve in the absence of comprehensive and binding legal agreements encompassing these trade-offs.

## **B.9 Okavango Basin**

### ***Hydrological context***

The Okavango River is the fourth longest river system in southern Africa, running 1,600 km from central Angola, where it is known as the Kubango, to the Kalahari Desert in northern Botswana, where the river terminates in an immense inland delta known as the Okavango Delta. Along its middle course, the Okavango forms part of the Angola-Namibia border. The delta region, less than half of which is swamp year-round, covers an area of about 16,800 km<sup>2</sup>.

### ***Development context***

The river's resources remain largely unused, and its banks are only sparsely settled. The delta has been designated as a Wetland of International Importance under the Ramsar Convention and is the world's largest Ramsar site. The Moremi Wildlife Reserve, a national park, extends over a quarter of the delta and

is teeming with wildlife. In 2013, the delta has been declared as one of the Seven Natural Wonders of Africa.

Whilst the economy of Botswana (GDP \$15,700/cap) has grown considerably from its rich mineral resources and more recently tourism, those of Namibia (GDP \$7,800/cap) and Angola (GDP \$6,090/cap) are far less developed. Both the latter countries are keen to develop their economies and improve the livelihoods of their peoples.

### ***Issues and needs***

Botswana and Namibia are generally water stressed countries needing more water than they have. Namibia has proposed a project to build a 250 km pipeline to divert water from the river into Namibia to help relieve drought. However, Botswana uses the Okavango Delta for both tourism income and a water source, and believes that any changes in the flow may result in significant impacts in the Delta.



Map courtesy of OKACOM

Botswana has estimated that 97% of the water in the river is lost through evaporation, so the country cannot afford to lose any more. Namibia has said that it will only divert 0.5% of the river's flow, and that it is entitled to any water that flows through its country.

### ***Legal and institutional arrangements***

To deal with such issues, Angola, Namibia and Botswana signed an agreement in 1994 to form the Permanent Okavango River Basin Water Commission (OKACOM), to provide advice to the three countries about the best ways to share the Okavango River's resources. The agreement commits the member states to promote coordinated and environmentally sustainable regional water resources development, while addressing the legitimate social and economic needs of each of the riparian states. The role of OKACOM is to anticipate and reduce unintended, unacceptable and often unnecessary impacts that occur due to uncoordinated resource development.

### ***Benefit sharing mechanisms***

The prospects for future changes in the demand and use of the water resource in the Basin are considerable. A detailed study undertaken by OKACOM in 2005-2010 undertook an initial assessment of how the environmental, social and economic consequences of a set of future projections for how these factors will play out over the long-term.

At issue is how, in the face of rising demands, the economic benefits of using the water resources in the basin might be shared amongst the riparian countries so as to promote equity and sustainable resource use.

### ***Results after cooperation***

The OKACOM study suggests that the water resources of the Okavango are finite and any further exploitation will result in some ecosystem degradation. The current distribution of economic benefits of the river is heavily skewed in favour of the tourism generated income in downstream Botswana. As water resource development increases, benefits will tend to accrue upstream with the indirect costs of that

development paid downstream. Given the comparative advantage for the region in the tourism and wildlife sector, a combination of tourism, small run-of-river hydropower and improved water supply and sanitation to basin cities and communities has been suggested as the best alternative for the basin as a whole.

### ***Potential relevance to Mekong***

Whilst OKACOM and the riparian countries are continuing to consider how to move forward on these issues, these issues highlight *two key questions* as follows:

- ❑ In the absence of an established water-sharing mechanism, how much of each country's current and potential benefits should each country be willing to forego in order to avoid future conflicts, and on what basis?
- ❑ Could the situation be improved and all countries ultimately achieve a better outcome by maximising overall benefits from the basin through joint planning and better sharing these benefits through joint the investment?

The former choice implies that each country views that they have a historical "share" of the water which each country will seek to maximise internally. However, if the latter course is adopted, then this would emphasise an approach founded on a shared water resource overall, which would be developed and managed cooperatively to mutual and potentially optimal advantage.

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## **Appendix C Proposed methodology for assessing transboundary benefits derived by default**

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## Appendix C Proposed methodology for assessing transboundary benefits derived by default

*This Appendix elaborates on the general approach and methodology for regional distribution analysis, and elaborates the proposed assessment methodology for assessing transboundary benefits derived by default.*

### C.1 Overview

Transboundary benefits by default are defined earlier in this report as being those benefits (both positive and negative) that are made possible from developments in one country as a result of developments and/or management actions in one or more other countries.

It is argued that the principle means by which benefits (and costs) derived from cooperation across national boundaries are through re-regulation of mainstream flows, production trading, environmental management and navigation, each of which involves the movement of water, goods and services from one part of the basin to another.

Re-regulation of mainstream flows affects principally irrigation potential, flood impacts and salinity control. Production trading is anticipated to be mainly in the energy sector, but could include other MRC sectors such as agricultural produce, aquaculture and fisheries produce. Environmental management for now relates primarily to the impacts on natural resources, wetlands, etc of developments in one country on another, but could in the future be seen as measures taken to preserve key environmental assets which impact upon the development potential elsewhere within the basin. Navigation primarily relates to the benefits gained from inter-country river transport.

The following sections elaborate how the regional distribution analysis will seek to assess transboundary benefits by default.

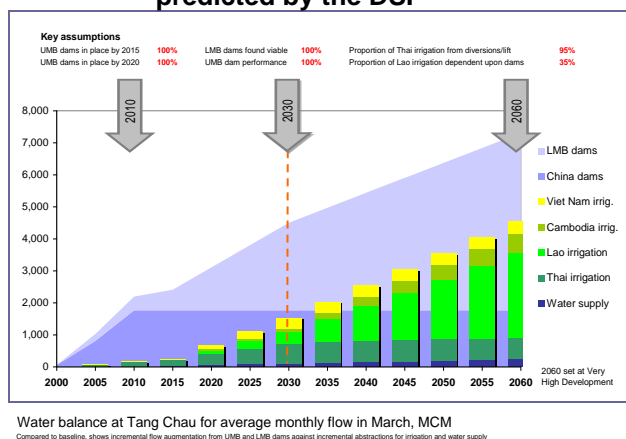
### C.2 Benefits shared through re-regulation of mainstream flows

The construction of reservoirs (commonly in the Mekong Basin for hydropower purposes) contributes to re-regulation of mainstream flows, with predicted increases in dry season flow and reductions in wet season flood peaks. The degree of re-regulation depends upon the manner in which the reservoir operated, which generally is sub-optimal in this regard due to the competing needs of energy production.

Predictions have been made previously of the extent of mainstream re-regulation caused by new reservoirs as modelled in the DSF, with the results given in the Scenario Assessment Report. The overall effect is illustrated overleaf in Error! Reference source not found. 11, which is taken from the Scenario assessment Report.

Reservoir developments prior to year 2000 are deemed part of the Baseline Condition, which is considered to be representative of natural flow conditions. Other evidence confirms that, up to 2000, no significant trends in mainstream flows can be deduced, suggesting that developments prior to 2000 have had insignificant impact on mainstream flows.

**Figure 11 Water balances at Tang Chau predicted by the DSF**



Under current and future plans, significant reservoir construction is planned in the short, medium and long terms. Whilst in the Baseline condition (2000) total storage was equivalent to only 2% of the mean annual runoff of the Mekong (MAR), the presence of the new dams in China adds 5% MAR and, together with 26 other ongoing projects in the LMB will raise total storage to 10% MAR by 2015 under the Definite Future Scenario. Under future plans for increased hydropower in the LMB, total storage is expected to reach approximately 15% by 2030 and ultimately could rise to over 22% MAR in the very long term.

As may be seen from the chart above, incremental dry season flows (enabling expansion of irrigated agriculture and increased control of salinity intrusion in the Delta), will be initially as a result of new reservoirs in the UMB, but that from approximately 2015 onwards, the proportion of incremental dry season flows from LMB tributary storages will greatly increase (the proposed mainstream dams being run-of-the-river and consequently little overall impact on re-regulation).

### C.2.1 Irrigated agriculture and aquaculture

The post-2000 reservoir developments are predicted to collectively enable the expansion of irrigation throughout the LMB in line with national development plans without causing a reduction in the historic pattern of observed dry season flows as required under Article 6 of the 1995 Mekong Agreement.

Thus, to varying degrees each country will benefit from reservoir construction through increased agricultural production (and indeed from increased aquaculture too, as this is dependent upon freshwater abstractions). These increases in national production cannot be attributed to any particular reservoirs, but are made possible by the cumulative impact of reservoir construction (as illustrated in Error! Reference source not found. 11 above). They can therefore be considered as transboundary benefits derived by default.

### C.2.2 Salinity reduction

The magnitude of dry season flows entering Viet Nam has significant bearing on the extent to which saline waters intrude into the delta each year. Increased flows resulting from re-regulation will reduce the extent of intrusion, increasing the potential productivity of the Mekong delta. As with irrigation above, the magnitude of changes in extent of saline intrusion is a consequence of cumulative changes and again may considered as transboundary benefits derived by default.

The relationship between flows and salinity intrusion is modelled by the DSF and related agricultural productivity changes have been estimated for different scenarios in the Scenario Assessment Report.

### C.2.3 Flood reduction

Re-regulation of flows due to reservoir storage involves the storage of wet season flows for release in the dry season. Since wet season flows are of a much greater magnitude than dry season flows, the amount stored in this way represents a much smaller proportion of flood flows than of dry season flows. Consequently the impacts on flooding are generally much less than the impacts on irrigation potential. Furthermore, peak flooding is determined by rainfall characteristics and the reality is that most significant floods emanate from Lao PDR, rather than from China where the greatest storage has been installed so far.

Nevertheless, the cumulative impact of re-regulation has measurable impact on flooding extent and duration (and hence flood damages) and can too be considered as transboundary benefit derived by default.

#### ***C.2.4 Costs associated with reservoir construction***

Whilst re-regulation of mainstream flows from the wet to the dry season enables the positive benefits above to be realised, there are nevertheless potential downsides which have been identified and estimated in the Scenario Assessment Report.

These downsides arise primarily through three mechanisms: the obstruction caused by dams to passage of wild fish (offset in some regards and to some degree by increase in reservoir fisheries) and to sediment and nutrient flows; the change in flow regime affecting the condition of environmental assets and bio-diversity conditions; and the consequential impacts of all of these on river-dependent livelihoods, particularly those whom are poor and vulnerable to such changes.

These are complex phenomena and in many cases difficult to evaluate in detail. Many of the identified knowledge gaps in the Basin Development Strategy relate to these phenomena and the Basin Action Plan sets out an agenda to address them. Nevertheless, the Scenario Assessment Report has made initial estimates of these downsides, in some cases quantified in others by reference to direction of change and severity.

### **C.3 Benefits shared through production trading**

Transboundary production trading potentially includes trading in energy supplies as well as agricultural, aquaculture and fisheries produce, being the main productive sectors within the identified MRC sectors in the 1995 Mekong Agreement.

In general, energy trading requires specific agreements between the supplier and recipient and in many respects these may be considered as early evidence of benefits derived from cooperation rather than by default. These are therefore considered further under Section D.2.2 in Appendix D of this report.

Whilst preliminary estimates have been made in the Scenario Assessment Report of the value of energy imported and exported in the different scenarios, no attempt has been made thus far (under MRC/BDP) to evaluate the extent to which agricultural, aquaculture and fisheries produce is traded between countries, notwithstanding anecdotal evidence that this does occur. Since such trade is expected not to be covered by specific agreements, it is reasoned that these should be considered as transboundary benefits arising by default.

A review will be conducted of available national data on produce imports/exports to determine first whether this represents a significant element of transboundary cooperation and whether sufficient data is available to establish transboundary trading of produce from within the Basin.

#### **C.4 Benefits shared through environmental management**

Whilst significant efforts have been made to evaluate the environmental downsides arising from new developments (Section C.2 above), little attention has been given to proactive measures to improve management of environmental conditions. In principle, should such measures be taken up in one country, it is likely that they may have positive benefits elsewhere within the basin as a consequence of improved bio-diversity conditions, appropriate sediment flows, reduced pollution threats and the like. In general, as and when taken up, these measures should therefore be deemed potentially as giving rise to transboundary benefits by default.

Under the BDP's concept for broadening and deepening the scenarios, efforts are expected to be made in the coming years to identifying "environmental scenarios" that would address, mitigate and /or improve environmental management in the basin. Consideration may be given to various activities within the current National Indicative Plans which are intended to improve environmental conditions, such as the wide-scale catchment and forestry management projects ongoing and planned in Lao PDR.

The basis for assessing the benefits shared through environmental management cannot be established until this further scenario work has been undertaken.

#### **C.5 Inter-country transport benefits**

The Mekong River has long been an important transport corridor for a variety of boats conveying both passengers and goods. However, the potential to develop the river for increased ship sizes is constrained by a number of practical considerations, such as the presence of deep bedrock in upstream stretches, its great width in other places resulting in very shallow reaches and the clearance levels of some mainstream bridges.

The MRC's Navigation Programme will be preparing a Regional Master Plan for Intermodal Waterborne Transportation (which will feed into BDP's concept plan for additional scenarios). This will investigate potential scenarios for the short, medium and long term, taking into account the existing physical limitations and investigating the potentials for increased navigation transport as a result of increased dry season water levels derived from hydropower and flood protection schemes.

For now, the Scenario Assessment report has made a preliminary evaluation of the value of benefits derived from mainstream navigation as a result of planned developments under the different scenarios, which are considered as transboundary benefits arising by default.

## **Appendix D Proposed methodology for assessing transboundary benefits derived from collaboration through joint projects**

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## Appendix D Proposed methodology for assessing transboundary benefits derived from collaboration through joint projects

*This Appendix elaborates on the general approach and methodology for regional distribution analysis, and elaborates the proposed assessment methodology for assessing transboundary benefits derived from collaboration through joint projects.*

### D.1 Overview

Transboundary benefits derived from collaboration through joint projects are defined earlier in this report as being those benefits (both positive and negative) that arise from projects undertaken jointly by two or more countries to mutual overall benefit.

Drawing on the case studies highlighted in Chapter 2, there are a number ways in which two or more countries may seek to enter into project agreements to gain mutual added value:

- ❑ **Joint studies** leading to coordinated action (under a MoU, agreement or treaty as appropriate) in the respective countries to achieve a mutually beneficial outcome – management of the Cambodian-Viet Nam flood plains may in due course be an example of this;
- ❑ **Joint investment** under a specific agreement or treaty in a project in one country that brings benefits to both countries –examples of this are the joint investments made through MRC in flood forecasting and navigation aids, as well as the Xayaburi project where investments are being made from Thailand for a project in located in Lao PDR; and
- ❑ **Production trading agreements** where the investment is made by one country to sell produce to one or more other countries – examples of which are the various power-selling agreements already in force and planned.

The underlying methodology for assessing cross-border benefits arising from joint projects is set out below, followed by a description of how this may be applied to each of the three categories above.

### D.2 Underlying methodology

#### D.2.1 Hydropower projects

Currently the predominant form of transboundary benefits derived from cooperation is in hydropower projects. An assessment was made of current and future hydropower projects for the Scenario Assessment Report, with data drawn from the hydropower database established at MRC Secretariat. The hydropower database has recently been updated by ISH to take account of new project data (including tariff arrangements) which have become available since 2009 when the original database was constructed. It is proposed to make use of the updated database, particularly as for the regional distribution analysis the main area of interest is in production trading, which is where most of the updates have been made.

The database provides fields describing dam characteristics including costs and which countries are contributing to those costs. The database also includes information on power generated and to which country(ies) the power is allocated, and at what tariff rates.

The basis for evaluating transboundary benefits of power trading is illustrated here in Error! Reference source not found. 12.

As shown, Country A establishes a hydropower facility which provides energy to its domestic market as well as to Country B. The economic value of the energy delivered to its domestic market is valued at the value of the best alternative source of energy in Country A (which may be gas-fired for instance). The added value to Country A of energy exported is valued at the tariff rate, which is a negotiated price with Country B.

For Country B, the value of the energy imported is again based on the value of the best alternative source of energy in this case in Country B (which may be coal-fired for instance), less the cost of buying that energy at the agreed tariff rate from Country A. It may be noted that the overall value of the energy generated in Country A is the sum of the best alternative sources of the energy allocated to Country A and Country B, and that the negotiated tariff trade price falls out as it is added in one case and subtracted in the other.

These principles will be adopted in re-assessing the value of transboundary benefits arising from hydropower for the regional distribution analysis, using the latest data provided by ISH in the form of the updated hydropower database.

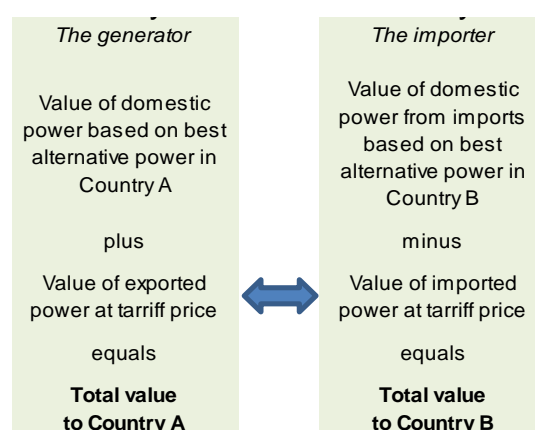
### D.2.2 Benefits of other production trading

As noted in Section C.3, transboundary production trading potentially includes trading also in agricultural, aquaculture and fisheries produce, being the main productive sectors within the identified MRC sectors in the 1995 Mekong Agreement. As also noted, it is understood that thus far within the basin, such benefits as may currently arise are through informal trading arrangements viewed as happening by default.

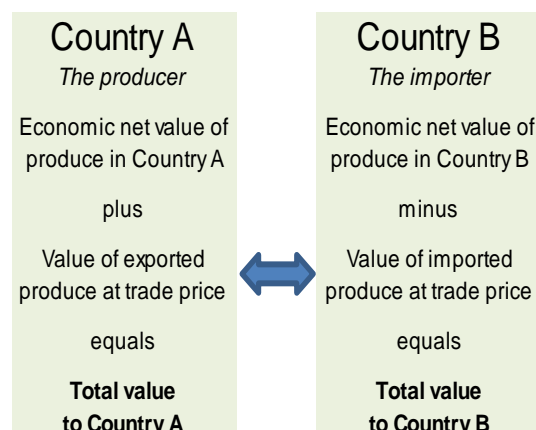
Should the review proposed in Section C.3 reveal that this trading to be of significant value in the context of overall evaluation of benefit sharing, then the methodology for evaluating these benefits would follow a similar approach to that described above for hydropower. This is illustrated in Error! Reference source not found. 13.

In this instance, the economic net value is determined using a conventional approach of benefits less production costs set at economic values. Again, the trade price affects

**Figure 12 Methodology for hydropower trading benefit assessment**



**Figure 13 Methodology for other production trading benefit assessment**



the values of exports and imports, but not the overall economic value of the goods or produce.

Should, under future basin development plans, produce trading become a more formalised inter-governmental strategic arrangement recognising the comparative advantage of one location over another location within the basin to produce agricultural, aquaculture and fisheries products, then it may then be relevant to consider such trading as giving rise to transboundary benefits derived from cooperation, rather than as otherwise by default.

### **D.3 Treatment of different benefit sharing arrangements derived from collaboration through joint projects**

#### *D.3.1 Joint studies leading to coordinated action*

It is understood that there are no projects within the baseline that fall under this category. The most evident in current plans is the cooperative management of the Cambodian-Viet Nam flood plains as highlighted in the Basin Development Strategy and included within the Cambodia and Viet Nam National Indicative Plans.

However, the flood management scenarios assessed in the Scenario Assessment Report did not address such a comprehensive arrangement such as indicated by the proposed studies. BDP envisage under their Concept Note for alternative scenarios that this should be addressed in the future. Given the wide potential benefits to be gained from collaboration on flood plain management, the assessment of these benefits requires that further scenario studies are required in line the BDP alternative scenarios.

Similarly any other collaborative projects that may emerge from the alternative scenario assessments require further study and evaluation prior to being brought into the assessment of transboundary benefits derived from cooperation.

#### *D.3.2 Joint investment under a specific agreement or treaty*

At present, the principal joint investment projects are those identified in the updated hydropower database, of which Xayaburi is the only ongoing one. At present the updated hydropower database shows no others planned as joint investments<sup>24</sup>.

In the case of hydropower, the assessment of benefits arising from cooperation in joint projects will based on the information available in the hydropower database. Any other joint investments will require prior studies to have been made in order for them to be included in the regional distribution analysis.

#### *D.3.3 Production trading agreements*

Again in the case of hydropower, the assessment of benefits arising from cooperation in energy trading projects will based on the information available in the updated hydropower database, using the methodology given above in Section D.2.1. Currently the database identifies 43 no. current and planned hydropower projects involving export of energy.

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<sup>24</sup> This needs to be reviewed as the hydropower database may need updating to reflect planned transboundary investments (Xayaburi for instance being shown as investment from Lao, not as understood from Thailand).

Any other production trading projects as may be identified, will be treated on a case-by-case basis using the methodology in set out Section D.2.2.

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## **Appendix E   Assessment indicators**

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## Appendix E Assessment indicators

### E.1 Preamble

Given overleaf is a table showing the agreed MRC strategic indicators and supporting assessment indicators of the MRC Indicator Framework. The purpose of the MRC Indicator Framework is to provide a unified and integrated approach to assessing the impacts (positive and negative) of current and proposed developments and the management actions needed within the Mekong Basin to achieve the development aims of the 1995 Mekong Agreement.

The MRC Indicator Framework is structured as a hierarchy of indicators within the five dimensions of social, environment, economic, climate change and cooperation. Within these five dimensions, a hierarchy of 16 strategic indicators, 64 assessment indicators and 252 supporting monitoring parameters has been established.

Strategic indicators will inform high-level decision-makers and stakeholders on key issues related to the development and management of the Mekong Basin. The assessment indicators are intended to provide the basis for quantifying the strategic indicators and to provide planners with the basis for evaluating alternative development scenarios. The monitoring parameters are intended to provide the basis for relevant and quality assured data sets from which assessment and strategic indicators can be quantified and to support MRC's other technical studies and assessments.

The indicator framework is being used as the basis for:

- 1) State of the Basin reporting;
- 2) Assessment of basin-wide development plans, scenarios and projects;
- 3) Collection and sharing of data and information needed for MRC activities agreed in the MRC Strategic Plan and enabled by the improved implementation of the Procedures for Data and Information Exchange and Sharing, PDIES); and
- 4) Decentralization and strengthening of primary data collection at the national level.

Furthermore, agreeing on a set of key indicators is also seen as the first step towards defining longer term management objectives for the Mekong Basin, and the means to achieve them through a future Basin Development and Management Strategy.

## **E.2      Summary of MRC strategic and assessment indicators**

Dimension / strategic indicators	Assessment indicators
<b>Social Dimension</b>	
<b>Living conditions and well being</b>	<ul style="list-style-type: none"> <li>Demographic features</li> <li>Level of resilience at household level</li> <li>Level of resilience at community level</li> <li>Level of resilience for floods and droughts</li> </ul>
<b>Employment in MRC sectors</b>	<ul style="list-style-type: none"> <li>Proportion of population engaged in MRC sector activities</li> <li>Proportion of people engaged in MRC sectors vulnerable to change</li> </ul>
<b>Overall social condition</b>	<ul style="list-style-type: none"> <li>Weighted score of all social indicators</li> </ul>
<b>Environmental dimension</b>	
<b>Water flow conditions in mainstream</b>	<ul style="list-style-type: none"> <li>Dry season flows - Compliance with PMFM</li> <li>Flood season peak flows - Compliance with PMFM</li> <li>Tonle Sap reverse flows - Compliance with PMFM</li> <li>Timing of onset of wet season flows</li> <li>Annual flooding</li> </ul>
<b>Water quality and sediment conditions in mainstream</b>	<ul style="list-style-type: none"> <li>Mainstream water quality - Compliance with PWQ</li> <li>Sediment transport in the mainstream</li> <li>Salinity intrusion in the delta</li> </ul>
<b>Status of environmental assets</b>	<ul style="list-style-type: none"> <li>Wetland area</li> <li>River channel condition and habitats</li> <li>River bank erosion risk</li> <li>Fish and other aquatic biodiversity</li> <li>Ecologically significant areas (environmental hot spots)</li> </ul>
<b>Overall env. condition</b>	<ul style="list-style-type: none"> <li>Weighted score of all environmental indicators</li> </ul>
<b>Economic dimension</b>	
<b>Economic performance of MRC sectors</b>	<ul style="list-style-type: none"> <li>Economic value of irrigated agriculture:</li> <li>Economic value of recession rice agriculture</li> <li>Economic value of lowland rainfed agriculture</li> <li>Economic value of savings in the cost of domestic power supply</li> <li>Economic value of hydropower production</li> <li>Economic value of mainstream navigation</li> <li>Economic value of sand mining</li> <li>Economic value of flood damage</li> <li>Economic value of capture fisheries</li> <li>Economic value of reservoir fisheries</li> <li>Economic value of aquaculture</li> <li>Economic value of river bank gardens</li> <li>Economic value of upland forestry</li> <li>Economic value of expenditure on tourism and recreation</li> <li>Economic value of flooded forests</li> <li>Economic value of productive activities in in areas affected by salinity intrusion</li> <li>Economic value of assets in locations affected by river bank erosion</li> <li>Economic value of wetlands and key habitat and conservation areas</li> </ul>
<b>Contribution to basin economy</b>	<ul style="list-style-type: none"> <li>Proportion of MRC sectors contribution to overall GDP</li> <li>Food security: Percent of basin food grain demand met from basin resources</li> <li>Food security: Percent of basin protein demand met from basin resources</li> <li>Energy security: Percent basin demand met from HEP (in-country and imported from within basin)</li> <li>Economic value of investment in MRC sectors</li> </ul>
<b>Total econ. benefits</b>	<ul style="list-style-type: none"> <li>Aggregate net economic value from above</li> </ul>

Dimension / strategic indicators	Assessment indicators
<b>Climate change</b>	
<b>Greenhouse gas</b>	<ul style="list-style-type: none"> <li>Greenhouse gas emissions (all MRC sectors)</li> </ul>
<b>Climate change trend and extreme</b>	<ul style="list-style-type: none"> <li>Annual Greenhouse Gas Index</li> <li>Occurrence of extremes</li> <li>Changes in temperatures</li> <li>Changes in rainfall patterns</li> </ul>
<b>Adaptation to climate change</b>	<p><i>Policy and institutional response:</i></p> <ul style="list-style-type: none"> <li>Level of mainstreaming climate change adaptation into policies and strategies</li> <li>Budget for climate change adaptation</li> </ul> <p><i>Adaptation response:</i></p> <ul style="list-style-type: none"> <li>Total flood protected area</li> <li>Total irrigation area</li> <li>Total water storage</li> <li>Coverage of disaster warning system</li> <li>Number of people vulnerable to climate change</li> </ul>
<b>Cooperation dimension</b>	
<b>Equity of benefits from the Mekong River system</b>	<ul style="list-style-type: none"> <li>Overall social condition</li> <li>Overall environmental condition</li> <li>Total economic benefits</li> </ul>
<b>Benefits derived from cooperation</b>	<ul style="list-style-type: none"> <li>Number and economic value of the incremental national benefits from projects of basin-wide significance in other countries</li> <li>Number and investments costs and incremental national benefits of joint projects</li> <li>Number and value of projects submitted and improved under PNPCA</li> <li>Degree on inter-dependence: Proportion of benefits derived from cooperation to total net economic value of all MRC sectors</li> </ul>
<b>Self-finance of the MRC</b>	<ul style="list-style-type: none"> <li>Proportion of MRC budget (Core + Programme) funded by national contribution during current period</li> <li>Ratio of Associated Project Budget to MRC budget during current period</li> </ul>

END