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Regional Benefit Sharing in the Mekong Basin

Draft scoping report

*Review of international experience and proposed
approach to regional distribution analysis*

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Basin Development Plan Programme

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Executive summary

Introduction

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 current BDP work programme under Outcome 2.3, to be implemented in close consultation with the National Mekong Committees.

The approach adopted for the assessment of regional benefit sharing opportunities comprises two distinct activities: (i) development of regional distribution analysis, which is mostly a technical activity to assess all current and potential future transboundary cost and benefit streams; and (ii) evaluation of potential benefit sharing mechanisms, which involves broader inputs, discussions and diplomacy. This scoping report primarily addresses the first of these two activities, ie. the development of regional distribution analysis, but also lays a foundation to the second.

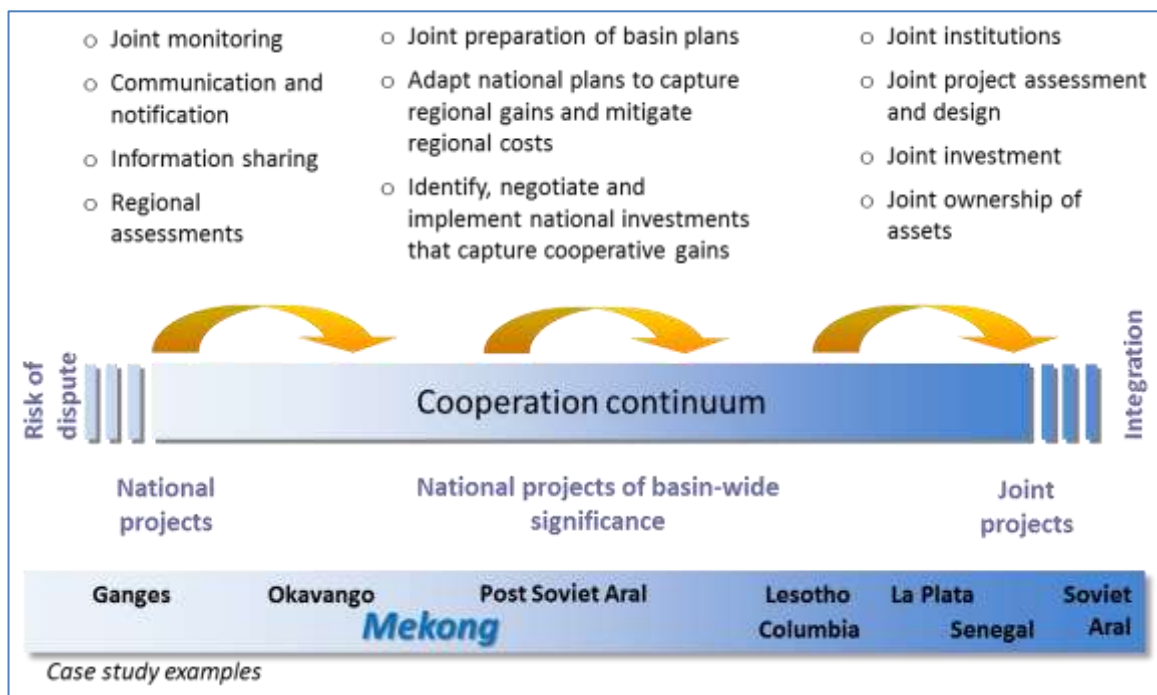
It is stressed from the outset that regional benefit sharing is NOT about one country sharing the ‘profits’ it makes from using water with other countries. Rather, regional benefit sharing is about increasing cooperation among basin countries with a view to increasing regional benefits for mutual gain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

International experience

The report starts with a review of eight case studies of examples of benefit sharing on international rivers around the world together with relevant recent international research.

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.

Illustration of a continuum of cooperation



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.

Research suggests also that generally riparian countries can achieve better overall outcomes through greater levels of cooperative development and management, over and above that which they could achieve independently. However, the level of cooperation aspired to (ie the position within the above *continuum of cooperation*) necessarily reflects the particular development circumstances of each basin and the willingness of each country to collaborate with its neighbours to mutual benefit.

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).

Other key lessons that emerge from the case

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

studies include the 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.

Regional benefit sharing in the Mekong context

The aspiration and commitment to *cooperate to achieve optimal and sustainable management and development of the Mekong River basin* is embodied in the 1995 Mekong Agreement. To this end, the MRC Member Countries have already advanced considerably along the path of coordinating development. In the above illustration of the cooperation continuum, the Mekong has been placed in between ‘National projects’ and ‘National projects of basin-wide significance’, as explained below.

Notably, the MRC member countries have already taken up in effect a first step of CRA through the assessment of basin-wide development scenarios that provided a **cumulative impact assessment of current and future national plans** (2010). Assessments have been made of the environmental social and economic benefits and costs of these plans accruing to each country (Type 1 and 2). However, whilst consideration is being given to extending the indicator framework to cover indirect benefits of an optimally developed and well managed river basin (Type 4), the key gap at present lies in how the overall costs of achieving optimal development may be identified, assessed and reduced (Type 3). Addressing this third area of benefits is central to regional distribution analysis as set out in this report.

The **Basin Development Strategy** (2011), which was founded on the insights gained from the scenario assessment, affirms as a strategic priority: “*seek options for sharing the potential benefits and risks of development*”, recognising the potential to move further towards optimal development of basin in an equitable, sustainable and mutually beneficial manner.

The **Basin Action Plan**, which sets out the basis for implementing the Basin Development Strategy, lays a further foundation to assessing the extent of regional benefit sharing by highlighting the value of *national projects of basin-wide significance* (which serve to expand the Development Opportunity Space and create development opportunities elsewhere within the basin) and *joint projects*¹ (projects involving two or more countries in addressing an opportunity more effectively than if the countries acted independently). These two types of projects give rise respectively to ***national benefits derived by default*** and the added ***national benefits derived from collaboration on joint projects***.

¹ In the Basin Action Plan, “joint projects” are referred to as “bilateral projects”. This report views that the term “joint project” is more appropriate in the light of the research terminology and the scope of such projects in the Mekong context.

The Basin Action Plan makes clear that there are already many national projects of basin-wide significance in place (infrastructure, non-structural and enabling) in place in the Mekong Basin by which *national benefits derived by default* may be generated through mechanisms such as: 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).

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
Impacts on natural resources, wetlands, etc
- Navigation
Inter-country transport benefits

Similarly, the Basin Action Plan identifies eight planned *joint projects* associated principally with the Cambodian-Viet Nam flood plains and the shared 3-S 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 one country in another. Drawing on the international case studies, in general three main types of *joint projects* are relevant in the Mekong context:

- **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 – 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.

In summary

Drawing together the foregoing, the principle means by which benefits may be shared are set out in the table overleaf.

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 the illustration in ‘International experience’). As an institution, the MRC already exhibits most

Principal mechanisms for benefit sharing in the Mekong

	National projects of basin-wide significance	Joint projects
Types of projects	Projects that serve to expand the DOS and create opportunities elsewhere in the basin	Projects taken up jointly by two or more countries
Nature of projects	Infrastructure and/or enabling, sometimes non-structural projects that expand the DOS and reduce risks and uncertainties	Joint studies, joint investments or production trading agreements
Benefits potentially accruing in	National and joint projects made possible by an expanded DOS	The specific joint projects

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.*

Approach and assessment methodology

The Basin Development Strategy calls for the MRCS 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 developments; and
- ❑ Investigate the opportunities that might exist for: (i) increasing national benefits derived by default from cooperation by coordinated national planning of projects of basin-wide significance and (ii) reducing the regional costs of moving towards optimal development through further joint projects.

The Cooperative Regional Assessment technique, with adaption for the circumstances of the MRC, is an appropriate approach to considering the benefits that are and can be derived from cooperation between countries. Adaption is needed primarily because a number of the

early steps of the CRA have already been undertaken with the earlier scenario assessment work, during which MRC established a set of indicators to support decision-taking. Thus, it is proposed to further progress the Mekong CRA in the following three main steps:

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 from cooperation on national projects of basin-wide significance and collaboration on joint projects. 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 assessment methodologies for regional distribution analysis will generally follow that already established and used for the previous scenario assessments (and as may be improved on the basis of new data and information that has become available since 2010).

The planned, new scenario assessment will fully support the implementation of the three Steps above², as follows.

Steps 1 and 2 will be supported by:

- ❑ **Review and updating of existing scenarios:** The existing scenarios from 2010 will be reviewed in the light of possible changes in national plans, additional assessment indicators, and new information. Focus will be given to the Baseline, Definite Future and Foreseeable Future.

Step 3 will be supported by:

- ❑ **Formulation and assessment of additional exploratory long-term sector scenarios:** in the context of plausible socio-economic and conditions in 2060, these scenarios will explore where opportunities lie in the future to optimise development and provide water-related security in an equitable manner through cooperation on national projects of basin-wide significance and collaboration on joint projects. The insights gained from this will guide the formulation of alternative medium-term plan scenarios.
- ❑ **Formulation and assessment of alternative medium-term plan scenarios:** these scenarios will represent possible adapted national plans that set the countries on the path of optimal development whilst maximizing medium term gains. They constitute the next important step in cooperative basin planning to increase regional benefits and mitigate regional costs.

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 and costs.

The updated development and management indicators build on the 42 indicators that were used for the assessment of the existing basin-wide development scenarios which cover the three dimensions of sustainability (economic, environmental, social). This set of indicators is being broadened into five dimensions (see box overleaf) to capture issues associated with climate change and with effective cooperation amongst Member Countries.

² Concept note: The broadening the current set of basin-wide development scenarios, BDP, Draft final, 26 Oct 2013

The analysis and discussions of the distribution of benefits and costs that will accrue to each of the countries in each of the 3 Steps of the CRA above will generate the information that decision makers need to discuss the impacts and risks of the considered scenarios, as well as the distribution of the benefits and costs amongst the MRC Member Countries.

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 existing 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.

Moreover, the results of these assessments 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.

Seven dimensions of the new MRC indicator framework

- Social dimension** *Reflecting the intent to promote social development and the well-being of all riparian States*
- Environment dimension** *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*
- Economic dimension** *Reflecting the intent to promote economic development and the well-being of all riparian States*
- Climate change dimension** *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*
- Cooperation dimension** *Reflecting the extent to which the Member Countries are effectively cooperating to mutual advantage*

Implementation arrangements and time period

A work plan for regional distribution analysis has been devised that fits in with the current plans for the further scenario work. The key stages in this work plan in terms of the three main steps for regional distribution analysis are:

- (i) **Scoping and preparing for regional distribution analysis:** These activities cover the preparatory steps to undertaking the regional distribution analysis, which should be concluded by the end of 2014, and which is proposed to include trialling of the regional distribution analysis on existing scenarios to help refine the analytical process.

- (ii) **Step 1 – Assessment of current distribution of benefits:** This will be conducted during the first three quarters of 2015, once the updated scenario for the Baseline condition is available, the data and new tools are assembled and the updated methodologies agreed.
- (iii) **Step 2 - Assessment of future distribution of benefits under existing plans:** This will be conducted together with Step 1 above. The focus is expected to be on reviewing an updated Definite Future Scenario and the Foreseeable Future Scenarios (2030).
- (iv) **Step 3 - Assessment of alternative distribution of benefits arising from new/revised projects and institutional/ funding arrangements:** This will be conducted in two parts. The first part will focus on the regional distribution analysis of the long term exploratory scenarios (2060), which will also be undertaken during 2015 in parallel with Steps 1 and 2 above.

The insights gained from the first part of Step 3 will be taken forward into the second part wherein alternative medium term plan scenarios will be formulated and assessed. This is expected to be completed by mid-2017, well in advance of updating the Basin Development Strategy for 2020 onwards.

Implementation arrangements, technical support requirements and coordination and consultation for regional distribution analysis are proposed in this report as being those planned for the scenario work stream under the leadership of BDP.

Next steps

The next steps are focussed on the further scoping and preparing for regional distribution analysis. The key aspects of this are highlighted below.

- Review of this draft scoping report for regional distribution analysis and discuss findings with RTWG, particularly with regard to producing an integrated Scoping report for Scenario Assessment and Regional Distribution Analysis; February 2014
- Preparation and review of a draft scoping report combining Scenario Assessment and Regional Distribution Analysis; March 2014
- Update and elaboration of scenario assessment indicators incorporating requirements for Regional Distribution Analysis; May 2014
- Trial regional distribution analysis on existing scenarios after recruiting and operationalizing the BDP scenario assessment team; June 2014

- | | | |
|--------------------------|--|---------------|
| <input type="checkbox"/> | Formulation of the Exploratory Long-term Sector Scenarios taking into consideration <i>inter alia</i> the outcome of the trial regional distribution analysis on existing scenarios; | October 2014 |
| <input type="checkbox"/> | Update of the current assessment methodology report incorporating regional distribution analysis; | October 2014 |
| <input type="checkbox"/> | Preparation and review of the final scoping report for scenario assessment and regional distribution analysis taking into consideration all of the above (September 2014); and | October 2014 |
| <input type="checkbox"/> | Completion of data acquisition and preparation of the required assessment tools (December 2014). | December 2014 |

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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

Identification and review of regional benefit sharing mechanisms
Regional distribution analysis
Scoping report

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.

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 mitigating 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 two distinct activities:

- ❑ Development of 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 mechanisms, which involves broader inputs, discussions and diplomacy.

This scoping report addresses the first of these two activities above, ie the development of regional distribution analysis.

1.1.2 Context

(i) What has been done

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 the development goals related to water, energy, food, environmental, flood and climate security, and how, through coordinated

national planning, benefits can be realized for all countries. **The results also indicate the distribution of incremental benefits, impacts and risks among the Member Countries and water related sectors within 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 MRCS 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 for in the context of optimising benefits gained from the river system; and
- ❑ **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.

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.

1.2 Process

A pragmatic approach to the overall identification and review of regional benefit sharing mechanisms in the Mekong region has been proposed. The main steps in this process are outlined below.

- ❑ **Review of international experience:** A summary of regional benefit sharing experience from other transboundary basins will be undertaken based on already assembled information by ISH and the BDP Programme.
- ❑ **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 mechanisms:** 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 mechanisms will be screened on a number of criteria.
- ❑ **Briefing of Ministers:** A Ministerial-level briefing paper for consideration in conjunction with the second MRC Summit (tentatively in April 2014) and presentation to a GMS Ministerial Meeting in August 2014.

This scoping report addresses primarily the initial steps above of reviewing international experience and conducting the regional distribution analyses. The approach to screening of potential benefit sharing mechanisms will be developed at a later stage in the light of the results of the results from the regional distribution analyses.

1.3 Scope of assessments for the regional distribution analysis

Regional benefit sharing³ activities need to cover all water related sectors and build on existing scenario assessments and the ongoing work facilitated by MRC's Initiative on Sustainable Hydropower (ISH) on benefit sharing at the local and national levels for hydropower development on the Mekong tributaries⁴.

The scope of the assessments includes the transboundary benefits, 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 six 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 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 River 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 set out in the previous Chapter and suggests how this may be applied to assess the regional benefits of cooperation within the Mekong River basin.
- ❑ **Chapter 5, Implementation arrangements:** This chapter discusses how the implementation of the regional distribution analysis should be integrated with parallel MRC activities, in particular with the next phase of scenario assessment. The chapter then provides a work plan for the regional distribution analysis and summarises implementation arrangements.
- ❑ **Chapter 6, Next steps:** This chapter sets out the near term next steps for the regional distribution analysis in line with the work plan proposed in Chapter 5.

³ 'Regional benefit sharing' is used in in this report to generally in place of the longer 'transboundary sharing of benefits, impacts and risks'

⁴ Notwithstanding that regional benefit sharing between countries is by nature very different from benefit sharing within countries in terms of stakeholders, opportunities and mechanisms

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.

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 20th 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 Story⁵.

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

⁵ 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 km² 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 2005-10 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
Aral Sea Basin	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>
Senegal Basin	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>
La Plata Basin	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>
Salto Grande project	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>
Columbia Basin	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>
Lesotho Highlands	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>
Okavango Basin	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>
Ganges Basin	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 (eg 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>	<ul style="list-style-type: none"> ▫ 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>	<ul style="list-style-type: none"> ▫ 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>	<ul style="list-style-type: none"> ▫ 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>	<ul style="list-style-type: none"> ▫ 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>	<ul style="list-style-type: none"> ▫ Okavango Basin
Monitoring and conflict resolution	<i>Monitoring of water allocations and body to resolve disputes</i>	<ul style="list-style-type: none"> ▫ 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. 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 20th 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.

(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 21st 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 that 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 Grey⁶ recognise that achieving international cooperation is always a long and complex journey, for which there is no single path and few

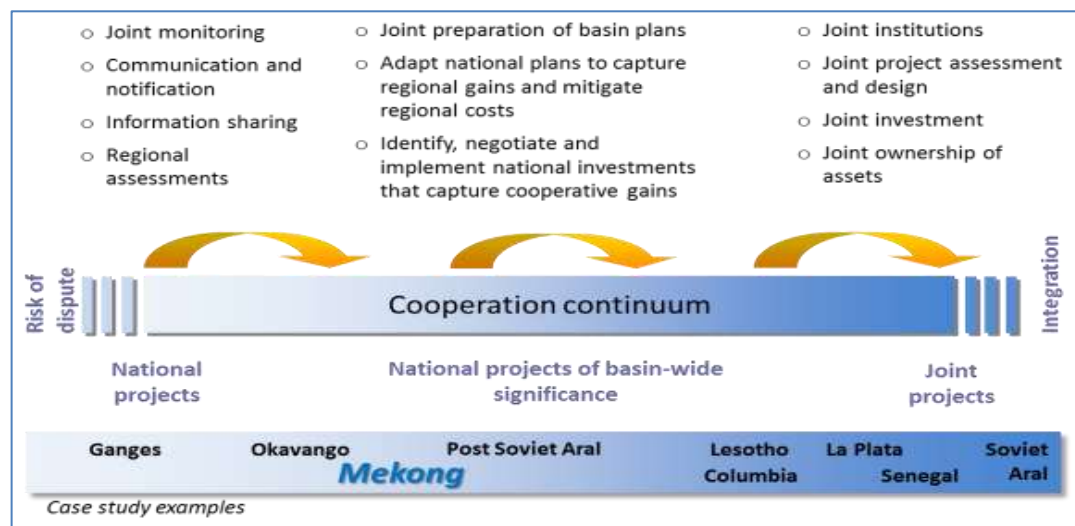
⁶ Cooperation on International Rivers, A Continuum for Securing and Sharing Benefits. Claudia W. Sadoff and David Grey. International Water Resources Association, Water International, Volume 30, Number 4, Pages 420–427, December 2005

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



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 (ie. 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).

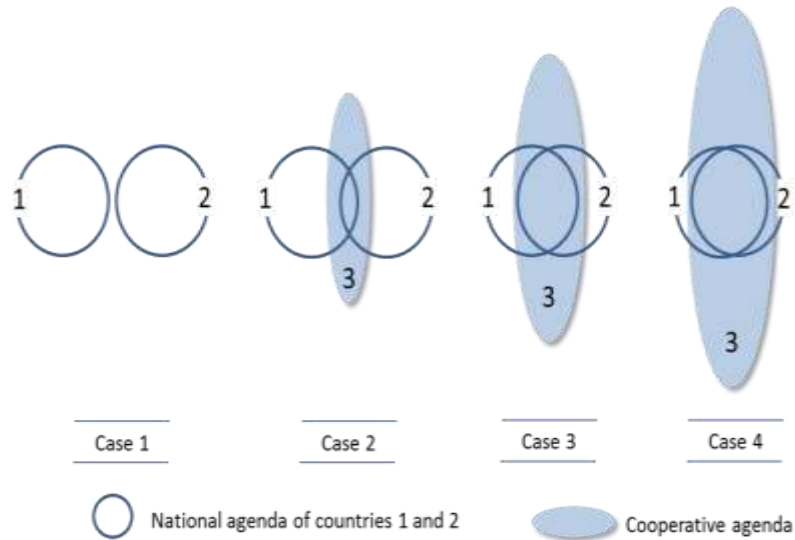


Figure 3 Converging agenda for riparian states

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 nations – 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 Increasing benefits <u>to</u> the river	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 Increasing benefits <u>from</u> the river	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 Reducing costs <u>because of</u> the river	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 Increasing benefits <u>beyond</u> the river	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

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 cooperation⁷. 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.

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

⁷ The technique of CRA has been advocated for use in the Nile Basin.

- ❑ 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).

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 (ie. 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 East⁸.

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*⁹. This has resulted in the establishment of a collaborative basin planning process facilitated by MRC's Basin Development Programme.

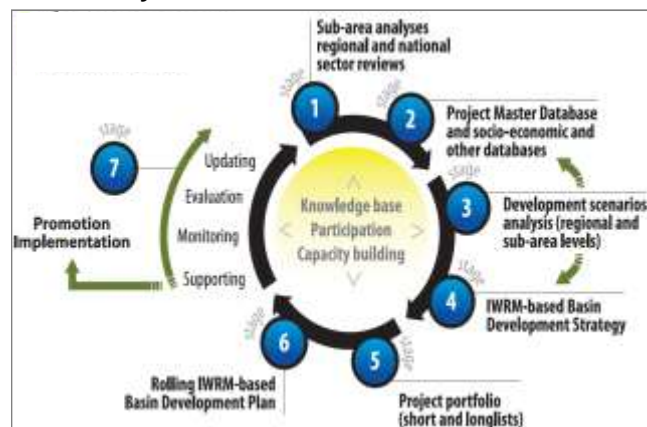
The basin planning process for the LMB follows a cycle established and agreed with the member countries (see Figure 4). As a result of the first cycle under the BDP Programme, the following key outcomes have been already achieved:

⁸ 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.

⁹ Article 1 of the 1995 Mekong Agreement

- 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);
- 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;
- 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 River 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.

3.1 The commitment to cooperate in development and management of the Mekong River

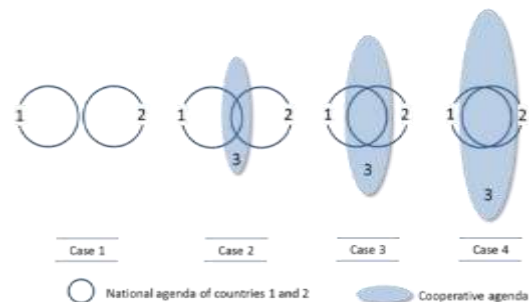
The 1995 Mekong Agreement commences with a statement of intent that the Member States are *equally desirous of continuing to cooperate in a constructive and mutually beneficial manner for sustainable development, utilization, conservation and management of the Mekong River Basin water and related resources*.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

In 2011, the MRC Council approved the 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 converging agenda for riparian states given earlier in Figure 3 (shown again here).



The BDS however set 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 projects¹⁰, shared by two or more countries, that will address issues that one country alone could not.

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 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.

3.2 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

¹⁰ In the Basin Action Plan, “joint projects” are referred to as “bilateral projects”. This report views that the term “joint project” is more appropriate in the light of the research terminology and the scope of such projects in the Mekong context.

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.

3.3 Scope of transboundary benefit sharing within the Mekong context

3.3.1 *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 Agreement¹¹).

(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 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 BDP's cumulative impact of basin-wide scenarios (to which others may be added in the future) as measured as arising in each country.

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.

¹¹ 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.

(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.

3.3.2 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 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. 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 current National Indicative Plans 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 (eg improving catchment 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 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 3-S 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 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.

(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 Development Opportunity Space** 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.

3.3.3 *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 overleaf.

Table 6 Principal mechanisms for benefit sharing in the Mekong

	National projects of basin-wide significance	Joint projects
Types of projects	Projects that serve to expand the Development Opportunity Space (DOS)	Projects taken up jointly by two or more countries
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 the Cambodia – Viet Nam flood plain to address development pressures in both countries and the impacts of climate and sea level change
Benefits potentially accruing in	National and joint projects made possible by an expanded DOS	The specific joint projects
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

4 Approach and assessment methodology

This chapter draws on the international experience in benefit sharing set out in the previous chapter and suggests how this may be applied to assess the regional benefits of cooperation within the Mekong River basin.

4.1 Assessment objectives

As noted in Chapter 1, the Basin Development Strategy calls for the MRCS 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 by coordinated national planning.

The scope of the assessments is to include the transboundary benefits, 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’.

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 scenario assessment work. In broad terms, these scenario assessments were on the cumulative impacts of the four 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:

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 3.3.2, 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. 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 River basin resources and the extent to which these are derived from cooperation already. The Scenario Assessment Report only considered incremental benefits (and costs) relative to the Baseline (BS) and Definite Future (DF) scenarios and thus ignored the considerable benefits already being gained from the river system within the BS and DF, skewing the distribution of overall net benefits being accrued to each country. The Step 1 assessment remedies this.

The Step 1 analyses then consider 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 majority of the basic data for Step 1 and 2 assessments are available from the preparatory work for the Scenario Assessment Report, and whilst a degree of “re-packaging” of the information is needed, the results obtained are expected to be fully consistent with the information presented in the Scenario Assessment Report.

The proposed methodology and assessment framework employed for undertaking Steps 1 and 2 is set out in Sections 4.3 and 4.4 of this report.

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 of these alternative arrangements will be undertaken under the parallel BDP activities for further scenario assessment¹² and other MRC Programme work, key aspects of which are highlighted below in Section 4.5 of this report.

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

- ❑ 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; 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 basin may be realised, firstly without consideration of national borders and, secondly, taking account national borders and preferences (such as energy, food and/or water security);

¹² The broadening the current set of basin-wide development scenarios, Concept Note (draft), BDP October 2013

- (ii) Formulation and assessment of alternative medium term plan scenarios (2030) 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 scenario and by the risks consequential to any significant remaining knowledge gaps.

4.3 Assessment methodology

4.3.1 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.

4.3.2 *Total benefits each country is deriving from the river system*

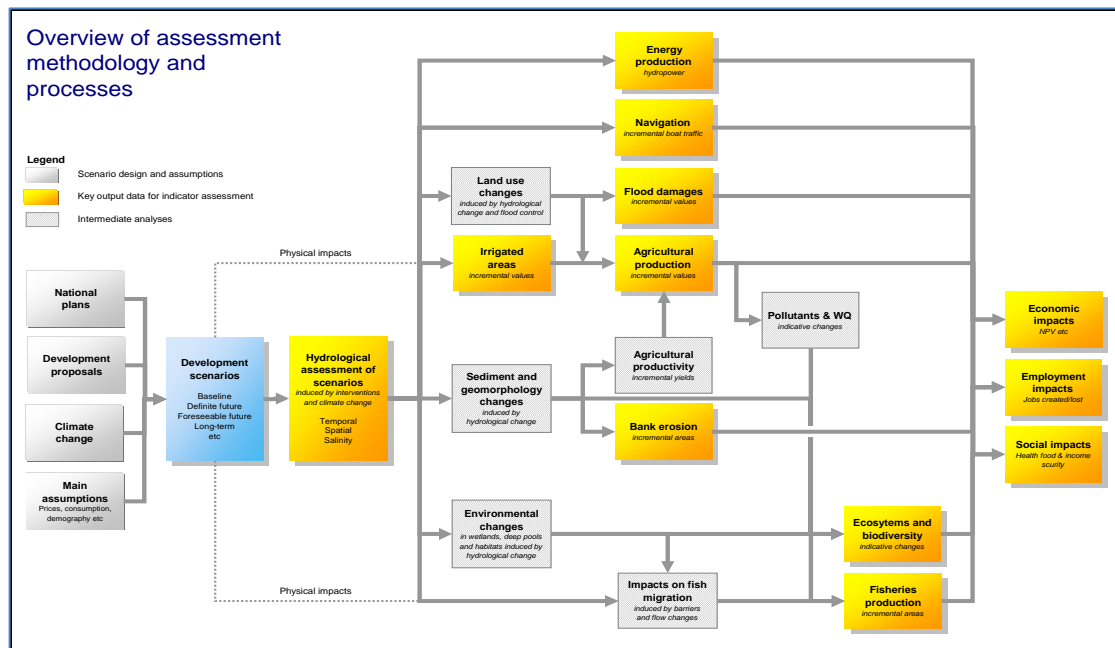
The methodology for assessing total benefits each country derives from the river system will generally follow that set out in the 2009 methodology statement for the assessment of basin-wide scenarios¹³. This methodology follows a logical sequence as summarised in the flow chart overleaf (taken from the 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 2009-10 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. Therefore, whilst the assessment approach remains similar, the computation is founded on an estimate of:
 - 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.

¹³ 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

Figure 5 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 represented “natural flow” conditions and that these provided a baseline for environmental assessment. Thus, in general, environmental impacts (benefits and costs) will be considered neutral for the Baseline and continue to be assessed incrementally relative to the Baseline.

- (ii) As noted in Section 4.5, the MRC is 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.

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 4.5.3, consultations facilitated by BDP are ongoing to define a set of social, environmental and economic development and management indicators for the Mekong Basin. A hierarchy of indicators, underpinned by a comprehensive set of

monitoring parameters, is being established. *Inter alia*, this activity will reconsider the assessment indicators each country would like to collectively employ in future scenario assessment work. It is anticipated that agreement should be reached on these by mid-2014.

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.

4.3.3 *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 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.

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
Impacts on natural resources, wetlands, etc
- Navigation
Inter-country transport benefits

Transboundary benefits by default are a subset of the total benefits each country is deriving from the river system. They are a result of acceptable¹⁴ developments over and above the Baseline conditions which depend upon activities in another country. The means by which

¹⁴ In this context, "acceptable" means that the developments fall within the Development Opportunity Space and are compliant with MRC Procedures

these benefits and costs may be identified and assessed is set out in Appendix C of this report.

4.3.4 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 3.3.2, 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 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.

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.

4.4 Assessment framework

4.4.1 Overall requirements for Regional Distribution Analysis

An assessment framework is required for Regional Distribution Analysis against which assessments can be made of the benefits and costs of alternative development scenarios arising 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 3.2 of this report. However, as may be recalled, the BDP has already developed a scenario assessment framework, which is currently under review under the activity described in Section 4.5.4.

It is appropriate that MRC indicator framework described in Section 4.5.3 should be allowed to evolve through a consultative process (due to be completed in mid-2014). At the same time, it is equally **appropriate that the requirements for regional distribution analysis are incorporated within this evolving MRC framework.**

To this end an assessment has been made of the indicators required for four key challenge areas and how they may be merged with the overall MRC framework. This is presented overleaf in Table 7.

The current version of the draft Strategic Indicators under consideration for the MRC indicator framework is presented in Appendix E of this report. This is structured in seven dimensions to which strategic indicators are provisionally assigned (subject to further consultation). Appendix E also provides an illustration of how each strategic indicator may be measured. These “measures” equate to the “assessment indicators”. Further work is needed to elaborate how, in turn, these “assessment indicators” will be measured, but in most cases this can draw from the experience gained in BDP’s assessment of basin-wide scenarios. The current draft MRC strategic indicators as given in Appendix E are summarised below in Table 8. The relevance of the strategic indicators to each of the four key benefit types for the Mekong is highlighted in Table 8 also.

Table 8 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, providing “Benefits derived from cooperation” is adequately addressed in the MRC indicator framework.

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 scenario assessment indicators in principle address incremental changes to the baseline condition Indicators for Type 1 should therefore be the BDP assessment indicators, amended as may be needed as a result of their work on 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 BDP assessment indicators were developed to provide a triple-bottom line assessment of social and economic conditions. 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 ad costs only). Indicators for Type 2 should therefore be the BDP assessment indicators, amended as may be needed as a result of their work on the MRC indicator framework.
Type 3 Reducing costs <u>because of</u> the river	<i>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</i>	Indicators reflecting the degree of and benefits gained from inter-dependent regional growth are not included within the BDP assessment indicators and need to be added (see Section 4.5.3 and Appendix E of this report)
Type 4 Increasing benefits <u>beyond</u> 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 BDP assessment framework on the assumption that these have bearing on the assessment of alternative development scenarios and strategies. In practice, the ongoing development of the MRC indicators is revealing that additional indicators may be required.

Table 8 Current draft MRC strategic indicators

Dimension	Strategic indicators	Relevance to ...
Social Dimension		
<i>Reflecting the intent to promote social development and the well-being of all riparian State</i>	<ul style="list-style-type: none"> ▫ Condition of livelihoods ▫ Employment in MRC sectors 	<i>Types 2 and 4 and possibly 3 also</i>
Environmental dimension		
<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"> ▫ Water flow conditions in mainstream ▫ Water quality conditions in mainstream ▫ Status of environmental assets 	<i>Type 1 mainly and possibly 4 also</i>
Economic dimension		
<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"> ▫ Economic performance of MRC sectors ▫ Contribution to national economy 	<i>Types 2 and 4</i>
Climate change		
<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"> ▫ Greenhouse gas emissions ▫ Vulnerability to climate change 	<i>Types 2 and 4</i>
Cooperation		
<i>Reflecting the intent to promote cooperation among the community of Mekong nations</i>	<ul style="list-style-type: none"> ▫ Equity of benefits derived from the Mekong River system ▫ Benefits derived from cooperation ▫ Self-finance of the MRC ▫ Level of information sharing and participation 	<i>All Types</i>

4.4.2 Indicators for assessing benefits from cooperation

The proposed assessment indicators for evaluating the inter-dependence of regional growth are set out below in Table 9, which is abstracted from Appendix E of this report.

The 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 the final strategic indicator seeks to highlight the proportion of benefits derived from cooperation in comparison to the total net economic value of all MRC sectors.

Table 9 Proposed indicators for assessing the benefits derived from cooperation

Strategic indicator	Assessment indicators	Measured by ...
Benefits derived from cooperation	Benefits by default (from national projects of basin-wide significance)	<i>Levels of engagement: Number and value of national projects of basin-wide significance</i>
		<i>Total net economic value in one country attributable enabled by developments in other countries</i>
		<i>Total net economic value of cross-border trade in non-energy products</i>
	Benefits derived from collaboration (joint projects)	<i>Levels of engagement: Number and value of joint projects</i>
		<i>Total net economic value in one country attributable to joint projects</i>
	Degree of inter-dependence	<i>Proportion of benefits derived from cooperation to total net economic value of all MRC sectors</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
- Fisheries
- Hydropower
- Recreation and tourism
- Navigation
- Watershed management
- Flood control
- Environmental management

4.5 Relevant parallel MRC activities

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

4.5.1 *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. 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.

4.5.2 *National benefit sharing mechanisms*

Under ISH a study is being 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 ISH13 are anticipated to be useful to regional benefit sharing through promoting best practice in distributing the benefits from cross-border cooperation within each country.

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.

4.5.3 *Definition of social, environmental and economic development and management indicators for the Mekong Basin*

With the support of the BDP Programme, consultations are being undertaken to define a set of social, environmental and economic development and management indicators for the Mekong Basin. The concepts for this have been put forward in a MRC Indicator Framework Scoping Report (BDP, March 2013) and include establishment of a hierarchy of indicators (see illustration below), underpinned by a comprehensive set of monitoring parameters that will provide an evidenced-based approach to quantifying the indicators.

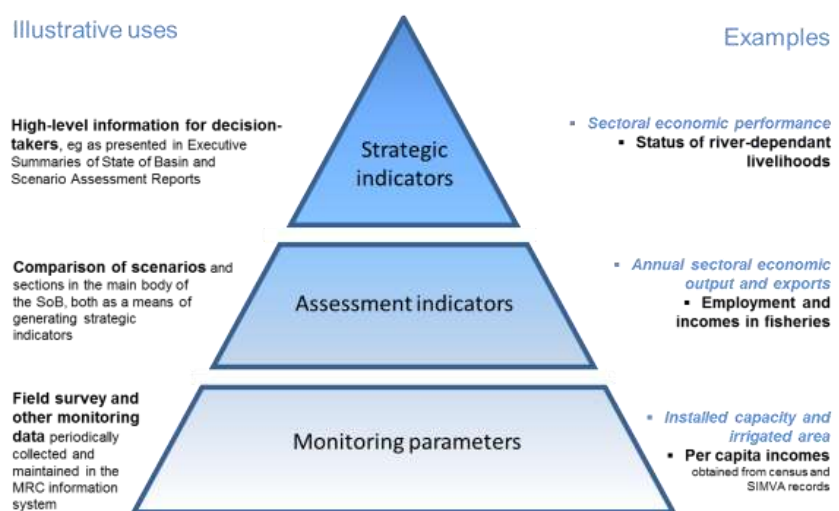
At the highest level, strategic indicators will be established to provide policy level decision takers with a concise set of information relating to the development and management conditions within the basin. It is envisaged that these strategic indicators will be set within

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, assessment indicators are required 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.**

At the lowest level, monitoring parameters will be identified to serve the above purposes and to provide the foundation to other technical studies called for by the MRC Joint Committee, either through the MRC Programmes or as may otherwise be required. 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 MRC Indicator Framework Scoping Report stresses that the determination of the components of the indicator framework should be subject to a 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 is anticipated that agreement should be reached on strategic and assessment level indicators by mid-2014.



Clearly, to investigate the regional distribution of benefits requires agreement on a set of indicators by which to evaluate benefits and impacts derived from cross-border cooperation (and this Scoping Report proposes these in the context of international experience).

However, it may be appreciated that ultimately, whatever indicators are agreed for regional distribution analysis, they should be merged with those that are being identified as development and management indicators for the Mekong Basin (as well as those used for scenario assessment in the future).

4.5.4 Further scenario assessment

The BDP has developed a Concept Note on broadening the current set of basin-wide development scenarios¹⁵ 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 and costs.**

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

- the assessment of long-term consequences of 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;
- 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 and updating of 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 2008-2010 with support from the Basin Development Programme (BDP). 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 current IWRM-based Basin Development Strategy.

¹⁵ The broadening the current set of basin-wide development scenarios, Concept note, BDP October 2013

The existing scenarios will be reviewed in the light of possible changes in national plans, additional assessment indicators, and new information. The review will be used to prepare an initial regional distribution analysis of benefits and costs, which will be an important input to BDP's regional benefit sharing work. The updating of the assessment of the existing scenarios will be implemented under the Council Study. The recent TOR of the Council Study provides a leading role to the BDP Programme for the cumulative impact assessment of nationally planned development.

(ii) The formulation and assessment of additional scenarios

The additional scenarios fall in two categories:

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

The Mekong region is changing fast, driven by economic growth in all basin countries and regional integration. 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 and 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 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 existing basin-wide development scenarios (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.

Thus the additional scenarios will build on the existing basin-wide development scenarios. They constitute the next important step in cooperative basin planning: to increase regional benefits and mitigate regional costs. The general approach and methodology for the updating of the existing scenarios and the assessment of the additional scenarios will be broadly similar to that applied for the assessment of the existing scenarios.

(iii) The process

The scenario development process will be driven by the MRC Member Countries, coordinated by the NMC Secretariats, and supported by MRC Programmes and their national counterparts with widespread and effective consultation with stakeholders. The whole process enhances governance around water resources management and builds bridges from engineering and science to stakeholders and decision makers, as described in this note.

The review of the existing basin-wide development scenarios, and the preparation of the related regional distribution analysis, can be finalized in 2014. The updating of the assessment of the existing scenarios will be completed in August 2015 in accordance with the timeline of the Council Study. The results of the assessment of additional scenarios will become available during 2016-2017 and will feed into the preparation of the next edition of the Basin Development Strategy.

The scenarios will be assessed in 2015-2017 and the assessment results will be used for the used for:

- The evaluation of regional benefit sharing opportunities;
- Informing future editions of national water-related plans; and
- Informing the Basin Development Strategy 2021-2025.

5 Implementation arrangements

This chapter discusses how the implementation of the regional distribution analysis should be integrated with parallel MRC activities, in particular with the next phase of scenario assessment. The chapter then provides a work plan for the regional distribution analysis and summarises implementation arrangements.

5.1 Integration with parallel MRC activities

Section 4.5 of this report highlights the relevance to regional distribution analysis of parallel MRC activities. Central to this are the plans to broaden the current set of basin-wide development scenarios and conduct further exploratory analyses of long term (2060) scenarios prior to considering possible modifications to medium term (2030) national plans. The Scoping Report¹⁶ for this is currently under consideration, and the roadmap for scenario assessment from that report is summarised overleaf in Figure 6.

As may be seen in Figure 6, the scenario assessment report already anticipates the integration of the scenario assessment activities with those of regional distribution analysis. The key areas of overlap are highlighted in Figure 6. These are summarised below.

(i) Review and update of existing basin-wide development scenarios

Scenario road map activity	Relevance to regional distribution analysis
Activity 2 - Review of existing basin-wide development scenarios	<i>These activities are conducted initially on the 2010 scenarios taking into account any new information on existing and planned developments, plus any new information available on impacts from addressing knowledge gaps.</i>
Activity 3 - Review and update of the existing scenario assessment indicators	<i>During the course of these activities it is appropriate to identify and access data required for regional distribution analysis.</i>
Activity 4 - Preliminary identification of additional data requirements	<i>In addition, opportunity may be taken to develop and trial the tools required for regional distribution analysis, together with reporting formats</i>
Activity 12 - Formulate the scenario(s) for the cumulative assessment (based on thematic scenarios)	<i>The trial results of the regional distribution analysis may provide useful insights to the formulation of the new scenarios</i>

¹⁶ The broadening the current set of basin-wide development scenarios, Concept Note (draft), BDP October 2013

Figure 6 Roadmap as currently proposed for scenario assessment

Activity	Progress	Responsible party	2013		2014				2015				2016				2017			
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Review and update of existing basin-wide development scenarios																				
1	Review of existing national plans in the relevant thematic areas and describe water resources developments	Draft: Nov 2013 Final: Feb 2014	MRC thematic teams BDP team																	
2	Review of existing basin-wide development scenarios	Draft: Nov 2013 Final: Mar 2014	MRC thematic teams BDP team																	
3	Review and update of the existing scenario assessment indicators	Draft: Nov 2013 Final: May 2014	BDP team MRC Programmes																	
4	Preliminary identification of additional data requirements	January 2014	MRC thematic teams																	
5	Finalization of the inception report of the Council Study	Draft: Dec 2013 Final: Mar 2014	OCEO with all MRC Programmes																	
6	Validation of reviews and inception report by RTWG	January 2014	OCEO																	
7	Collection, storing and analysis of additional data requirements	Jan-Dec 2014	MRC thematic teams																	
8	Updating and preparation of DSF models	Ongoing	IKMP																	
9	Formulate the thematic scenarios	June 2014	MRC thematic teams																	
10	Validation by RTWG of thematic scenarios and data and detailed methodologies for assessment	July 2014	OCEO																	
11	Conduct the thematic assessments (see TOR of Council Study) with periodic review and validation by the RTWG	Jul 2014-Jun 2015	MRC thematic teams																	
12	Formulate the scenario(s) for the cumulative assessment (based on thematic scenarios)	August 2014	BDP team																	
13	Conduct the cumulative hydrological assessment	Oct-Nov 2014	IKMP BDP team																	
14	Conduct the cumulative environmental assessment	Jan-Jul 2015	BDP team																	
15	Conduct the cumulative economic assessment	Jan-Jul 2015	BDP team																	
16	Conduct the social assessment	Jan-Jul 2015	BDP team																	
17	Analyze the regional distribution of benefits and costs	August 2015	BDP team																	
18	Prepare the cumulative assessment report	Aug-Sep 2015	BDP team																	
19	Periodic national consultations and periodic review and validation by the RTWG	Jul 2014-Oct 2015	BDP team																	
Formulation and assessment of the additional scenarios																				
1	Finalize the concept note on the broadening of the current set of scenarios	Nov 2013	BDP team																	
2	Review of existing national plans in the relevant thematic areas and describe water resources developments	Draft: Nov 2013 Final: Feb 2014	MRC thematic teams BDP team																	
3	Review of existing basin-wide development scenarios	Draft: Nov 2013 Final: Mar 2014	MRC thematic teams BDP team																	
4	Review update of the existing scenario assessment indicators	Draft: Nov 2013 Final: May 2014	BDP team MRC Programmes																	
5	Preliminary identification of additional data requirements	Jan 2014	MRC thematic teams																	
6	Preparation of the draft scoping report	Draft: Feb 2013	BDP team																	
7	Discussion of scoping report at the national and regional levels (RTWG)	Mar 2014	BDP team																	
8	Prepare TORs for BDP scenario assessment team	Draft: Jan 2014 Final: Feb 2014	BDP team																	
9	Recruit and operationalize the BDP scenario assessment team	Feb-May 2014	BDP team																	
10	Coordinate with other MRC Progs. on the implementation of the Exploratory Long-term Sector Scenarios	Ongoing	BDP team and MRC Programmes																	
11	Formulate the Exploratory Long-term Sector Scenarios	Jan-Jul 2014	BDP team and MRC Programmes																	
12	Preparation of the final scoping report	July 2014	BDP team & scenario assessment team																	
13	National and regional consultations and validation of scoping report by the RTWG	Aug 2014	BDP team																	
14	Update of the current assessment methodology report	Jun-Sep 2014	Scenario assessment team																	
15	Complete data acquisition, and prepare required tools	Jul-Dec 2014	BDP team & scenario assessment team																	
16	Hydrological assessment of the Exploratory Long-term Sector Scenarios	Aug-Dec 2014	IKMP BDP team																	
17	Conduct the environmental, social and economic assessment of the Exploratory Long-term Sector Scenarios	Jan-Dec 2015	Scenario assessment team & MRC Progs.																	
18	Periodic consultations at the national and regional levels and validations by RTWG	Sep 2014-Dec 2015	BDP team																	
19	Formulate Alternative Medium-term Plan Scenarios in a very participatory fashion	Sept 2015 – Mar 2016	BDP team																	
20	Hydrological assessment of the Alternative Medium-term Plan Scenarios	Apr-Jul 2016	IKMP BDP team																	
21	Fully assess the Alternative Medium-term Plan Scenarios based on scenario assessment framework	Jul 2016-Jun 2017	Scenario assessment team & BDP team																	
22	Conduct a regional distribution analysis of benefits and costs	Jul-Aug 2017	BDP team																	
23	Present assessment results in formats required by different stakeholders	Continuous	BDP team																	

Scenario road map activity	Relevance to regional distribution analysis
Activity 14 - Conduct the cumulative environmental assessment	<i>These activities equate to undertaking Steps 1 and 2 of the regional distribution analysis, Step 1 being on the current situation as represented by the Baseline (and any updates thereof) and Step 2</i>
Activity 15 - Conduct the cumulative economic assessment	
Activity 16 - Conduct the social assessment	
Activity 17 - Analyze the regional distribution of benefits and costs	
Activity 18 - Prepare the cumulative assessment report	

(ii) *Formulation and assessment of the additional scenarios*

Scenario road map activity	Relevance to regional distribution analysis
Activity 3 - Review of existing basin-wide development scenarios	<i>These activities are conducted initially on the 2010 scenarios taking into account any new information on existing and planned developments, plus any new information available on impacts from addressing knowledge gaps.</i>
Activity 4 - Review update of the existing scenario assessment indicators	
Activity 5 - Preliminary identification of additional data requirements	
Activity 6 - Preparation of the draft scoping report	<i>It is recommended that the scoping of the work on additional scenarios is merged with that for regional distribution analysis, given the overlaps between these two activities</i>
Activity 8 - Prepare TORs for BDP scenario assessment team	<i>These ToR necessarily should include the requirements to undertake regional distribution analysis</i>
Activity 9 - Recruit and operationalize the BDP scenario assessment team	
Activity 11 - Formulate the Exploratory Long-term Sector Scenarios	<i>The trial results of the regional distribution analysis may provide useful insights to the formulation of the exploratory scenarios.</i>
Activity 12 - Preparation of the final scoping report	<i>The testing of the regional distribution analysis under Activities 3-5 above will also provide valuable insights to finalizing the Scoping report, updating assessment methodologies, data acquisition requirements and new tools.</i>
Activity 14 - Update of the current assessment methodology report	
Activity 15 - Complete data acquisition, and prepare required tools	
Activity 17 - Conduct the environmental, social and economic assessment of the Exploratory Long-term Sector Scenarios	
Activity 19 - Formulate Alternative	<i>These activities equate to undertaking the second part of</i>

Scenario road map activity	Relevance to regional distribution analysis
Medium-term Plan Scenarios in a very participatory fashion	<i>Step 3 of the regional distribution analysis, by considering the possible adaption of national plans in the light of insights gained from the investigation of exploratory scenarios.</i>
Activity 21 - Fully assess the Alternative Medium-term Plan Scenarios based on scenario assessment framework	
Activity 22 - Conduct a regional distribution analysis of benefits and costs	

5.2 Work plan

Based on the discussions in Section 5.1 above, the proposed work plan for regional distribution analysis is set out in Figure 7 overleaf. The work plan is presented in four parts as summarised below.

(i) Scoping and preparing for regional distribution analysis

These activities cover the preparatory steps to undertaking the regional distribution analysis. This report and, if accepted, the subsequent version(s) are merged with the required Scoping Report for the broadening of the current set of basin-wide development scenarios, to be finalised by the third quarter of 2014.

In parallel with the finalisation of the Scoping Report, arrangements are made to establish the Scenario Assessment team, who would also conduct the regional distribution analysis. That team would be assembled in the second quarter of 2014, and would assist with identifying and assembling additional data requirements, testing the regional distribution analysis methodologies and updating the overall scenario assessment methodologies. The insights gained from testing the regional distribution analysis methodologies (to be conducted using previous defined and assessed scenarios, could contribute to the definition of the long-term exploratory scenarios.

The preparatory work would conclude by the end of 2014, 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 Programmes. New spreadsheet tools will also be needed to manipulate data for the assessments.

Figure 7 Work plan for regional distribution analysis

Activity	Relevant scenario activities	Responsible party	'13		2014				2015				2016				2017			
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Scoping and preparing for regional distribution analysis																				
■ Prepare draft Scoping Report for the regional distribution analysis																				
■ Discuss findings with RTWG																				
■ Trial regional distribution analysis on existing scenarios	Activity 3	BDP team																		
■ Review update of the existing scenario assessment indicators incorporating requirements for regional distribution analysis	Activity 3, 4	BDP team MRC Programmes																		
■ Preliminary identification of additional data requirements	Activity 4, 5	MRC thematic teams																		
■ Preparation of combined draft scoping report (scenario plus regional distribution analysis)	Activity 6	BDP team																		
■ Discussion of scoping report at the national and regional levels (RTWG)	Activity 7	BDP team																		
■ Prepare TORs for BDP scenario assessment team	Activity 8	BDP team																		
■ Recruit and operationalize the BDP scenario assessment team	Activity 9	BDP team																		
■ Formulate the Exploratory Long-term Sector Scenarios	Activity 11	BDP team and MRC Programmes																		
■ Preparation of the final scoping report for scenario assessment and regional distribution analysis	Activity 12	BDP team & scenario assessment team																		
■ National and regional consultations and validation of scoping report by the RTWG	Activity 13	BDP team																		
■ Update of the current assessment methodology report and incorporate regional distribution analysis	Activity 14	Scenario assessment team																		
■ Complete data acquisition, and prepare required tools	Activity 15	BDP team & scenario assessment team																		
Step 1 – Assessment of current distribution of benefits																				
■ Conduct the cumulative hydrological assessment		IKMP BDP team																		
■ Conduct the cumulative impact assessment	Activity 14, 15, 16	BDP team																		
■ Analyze the regional distribution of benefits and costs	Activity 17	BDP team																		
■ Prepare the cumulative assessment report	Activity 18	BDP team																		
■ Periodic national consultations and periodic review and validation by the RTWG	Activity 19	BDP team																		
■ Periodic national and regional consultations and RTWG	Activity 18	BDP team																		
Step 2 - Assessment of distribution of benefits under current future plans																				
■ Conduct the cumulative hydrological assessment		IKMP BDP team																		
■ Conduct the cumulative impact assessment	Activity 14, 15, 16	BDP team																		
■ Analyze the regional distribution of benefits and costs	Activity 17	BDP team																		
■ Prepare the cumulative assessment report	Activity 18	BDP team																		
■ Periodic national consultations and periodic review and validation by the RTWG	Activity 19	BDP team																		
■ Periodic national and regional consultations and RTWG	Activity 18	BDP team																		
Step 3 - Assessment of alternative distribution of benefits arising from new/revised projects and institutional/ funding arrangements																				
■ Hydrological assessment of the Exploratory Long-term Sector Scenarios	Activity 16	IKMP BDP team																		
■ Conduct the environmental, social and economic assessment of the Exploratory Long-term Sector Scenarios	Activity 17	Scenario assessment team & MRC Progs.																		
■ Periodic national and regional consultations and RTWG	Activity 18	BDP team																		
■ Formulate Alternative Medium-term Plan Scenarios in a very participatory fashion	Activity 19	BDP team																		
■ Hydrological assessment of the Alternative Medium-term Plan Scenarios	Activity 20	IKMP BDP team																		
■ Fully assess the Alternative Medium-term Plan Scenarios based on scenario assessment framework	Activity 21	Scenario assessment team & BDP team																		
■ Conduct a regional distribution analysis of benefits and costs	Activity 22	BDP team																		

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

The first formal Step in the regional in the regional distribution analysis will be conducted during the first three quarters of 2015, once the updated scenario for the Baseline condition is available, the data and new tools are assembled and the updated methodologies agreed.

The Step 1 regional distribution analysis will be conducted in parallel and integrated with the overall scenario assessment process.

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

The Step 2 regional distribution analysis will be conducted together with Step 1 above. The focus is expected to be on reviewing an updated Definite Future Scenario, the Foreseeable Future Scenarios (2030) and the Long Term Scenario (2060).

(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. The first part will also be undertaken during 2015 in parallel with Steps 1 and 2 above. This first part of Step 3 will focus on the regional distribution analysis of the long term exploratory sector scenarios (2060) as will have been defined during the preparatory steps above.

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. The results of analysing these alternative scenarios will be available for the countries to consider by the second quarter of 2017, well in time to contribute to 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.

5.3 Implementation responsibilities

The proposed process will build on the experience gained during the formulation and assessment of the existing scenarios in 2008-2010, which has been considered generally effective and appreciated by those involved. The scenario development and regional distribution analysis processes will be driven by the MRC Member Countries, coordinated by the NMC Secretariats, and implemented by MRC Programmes and their national counterparts with widespread and effective consultation with stakeholders.

A multi-disciplinary team of regional and international sector and thematic specialists will be established that will together as 'one team' throughout the assessment. The technical engagement of MRC Programmes will involvement of MRC Programmes will further increase compared to the 2008-2010 scenario assessment. Most of the actual implementation activities will be the responsibility of the BDP team (regional and national), other MRC

Programmes, and the multi-disciplinary scenario assessment team. Table 10 shows the distribution of implementation responsibilities and tasks specifically related to regional distribution analysis (for further details of the overall responsibilities for scenario assessment, see the Concept Note for broadening the scenario assessment).

Table 10 Distribution of responsibilities and tasks for regional distribution analysis

Actor	Responsibility	Tasks
Regional BDP team	Managerial and technical direction and supervision	<ul style="list-style-type: none"> ▫ Establishment of the scenario assessment team ▫ Review of the existing scenarios ▫ Regional stakeholder engagement ▫ Preparation of summary reports tuned to needs of different stakeholder ▫ Preparation of the scenario and regional distribution analysis scoping and work planning report ▫ Preparation of the main report(s) of the scenario assessment and regional distribution analysis ▫ Organisation of supporting training events
National BDP teams with support from the NMCSs	Mobilisation and coordination of national stakeholders	<ul style="list-style-type: none"> ▫ Identification of national experts and consultants ▫ Data collection with support from the Regional BDP team ▫ Management of national support to the scenario assessment team ▫ Review of (interim) assessment results ▫ National stakeholder engagement ▫ Translation of reports ▫ Development of consolidated national positions and capacity for regional consultations and negotiations
Scenario assessment team	Scenario formulation and assessment	<ul style="list-style-type: none"> ▫ Review of scoping report ▫ Preparation of the methodology report ▫ Data analysis ▫ Updating of the existing basin-wide development scenarios (including regional distribution analysis) ▫ Assessment of the additional basin-wide development scenarios (including regional distribution analysis) ▫ Preparation of the technical reports with scenario assessment results (including regional distribution analysis)
MRC Programmes: IKMP	Hydrological assessment	<ul style="list-style-type: none"> ▫ Hydrological assessment of scenarios ▫ Assessment of compliance of scenarios with the PMFM
Other MRC Programmes: FMMP, CCAI, EP, ISH, others	Technical support and implementation of Exploratory Long-term Sector Scenarios	<ul style="list-style-type: none"> ▫ Supporting the preparation of the scoping and methodology report ▫ Supporting the basin-wide scenario assessment in area of specialization (including regional distribution analysis)
Regional Technical Working Group (RTWG)	Technical validation of all aspects of the scenario formulation and assessment	<ul style="list-style-type: none"> ▫ Supporting data and information collection ▫ Technical review and validation of the approaches, methodologies, tools, data, and interim and final results

5.4 Technical assistance requirements

The requirements for technical assistance support for regional distribution analysis are expected to be met by those required to support the further assessment of the scenarios. These requirements will be fully elaborated in the combined Scoping Report for the scenario assessment and regional distribution analysis.

At this stage, it is envisaged that the technical assistance support requirements will be similar to that employed during 2008-2010 for the previous round of scenario assessment. In addition to these, it is envisaged that the opportunity to conduct more in-depth spatial analyses will arise as a result of the ongoing work within MRC to address knowledge gaps. Thus, it is anticipated that the technical support stream should be strengthened in this area with a spatial/land use planner and GIS expert.

5.5 Coordination and consultation

In line with the plans for scenario assessment, the following stakeholder engagement mechanisms are proposed also for the regional distribution analysis:

- ❑ The designated MRC Programmes provide technical advice and inputs to the formulation and assessment of the additional scenarios. In addition, some MRC Programmes will lead the formulation and assessment of Exploratory Long-term Sector Scenarios in collaboration with their national (sector and thematic) counterparts or working groups. The management of the MRC Secretariat will provide managerial guidance;
- ❑ A Regional Technical Working Group drawing members from line agencies, RBOs, institutes, academia, as well as experts from the MRC Programmes, will regularly review and endorse the technical validity of the approaches, methodologies, tools, data and results;
- ❑ A range of National Consultations with experts, policy makers and other stakeholders will discuss national interests and positions at critical stages of the scenario formulation and assessment process;
- ❑ Regional Meetings of senior government officials from the water sector as well as broader planning, policy and foreign affairs will discuss interim and final assessment results and build consensus on development opportunities, risks and uncertainties;
- ❑ Regional Forums with a broad range of stakeholders (including representatives from NGOs and communities) will discuss a wide range of stakeholder views and elicit feedback and suggestions on key issues;
- ❑ The BDP Independent Panel of Experts will periodically review and quality-assure the processes, results and products of the scenario assessment;

- The Joint Committee will provide strategic direction to the process and endorse the scope of the scenarios, the assessment indicators, and the assessment results.

Given the broader scope of the extended set of scenarios, 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.

6 Next steps

This chapter sets out the near term next steps for the regional distribution analysis in line with the work plan proposed in Chapter 5.

In accordance with the work plan set out in Figure 7 in Section 5.2 of this report, the next steps are focussed on the further scoping and preparing for regional distribution analysis. The key aspects of this are highlighted below.

- ❑ **Review of this draft scoping report** for regional distribution analysis and discuss findings with RTWG, particularly with regard to producing an integrated Scoping report for Scenario Assessment and Regional Distribution Analysis;
- ❑ **Review update of the existing scenario assessment indicators** incorporating requirements for regional distribution analysis and elaboration of these to provide a full assessment framework for scenario assessment including regional distribution analysis;
- ❑ **Preparation and review of a draft scoping report** combining Scenario Assessment and Regional Distribution Analysis and including a preliminary identification of additional data requirements, TORs for BDP scenario assessment team;
- ❑ **Trial regional distribution analysis on existing scenarios** after recruiting and operationalizing the BDP scenario assessment team;
- ❑ **Formulation of the Exploratory Long-term Sector Scenarios** taking into consideration inter alia the outcome of the trial regional distribution analysis on existing scenarios;
- ❑ Update of the current assessment methodology report incorporating regional distribution analysis;
- ❑ **Preparation and review of the final scoping report** for scenario assessment and regional distribution analysis taking into consideration all of the above; and
- ❑ **Completion of data acquisition** and preparation of the required assessment tools.

The timetable and responsibilities associated with the above steps are as set out in Figure 7. The final scoping report should be completed by September 2014 and the data assembly and new tools by the end of 2014.

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Appendices

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Appendix A Bibliography

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Appendix A Bibliography

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Appendix B Case studies of international benefit sharing

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Appendix B Case studies of international benefit

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 20th 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 Story¹⁷.

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.



¹⁷ 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 km², a mean flow of 680 m³/s and an annual discharge of 21.5 km³.

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 km², 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 5,500m³/s approximately. The river's annual discharge rate fluctuates with precipitation and ranges from 3,400m³/s in a low water year to 7,400m³/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 km³.

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.



Map courtesy of US Dept. of Ecology

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 150m³/s and current national consumption is not more that 2m³/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 km² in size and has a population slightly over two million. With a GDP per capita of US\$ 2,126 (153rd 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 km² with nearly 2,800 km of coastline. It is the 25th largest country in the world by land area, and with close to 53 million people, is the world's 24th 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 28th largest in the world. However, notwithstanding it has the 5th 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 km² 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 m³/s, rising to about 38,000 m³/s when joined by the Brahmaputra and Meghna. Below the border with Bangladesh, the maximum peak discharge of the Ganges has exceeded 70,000 m³/s, whilst the minimum recorded at the same place was about 180 m³/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 /km². 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 134th and 157th 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 km² 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 2010¹⁸.

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 690km³.



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 124th and 115th 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

¹⁸ 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 km², with storage of 5.0km³.

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 690,000km². 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



Map courtesy of World Bank

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 km².

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 2005-10 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 given in Chapter 4, 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.

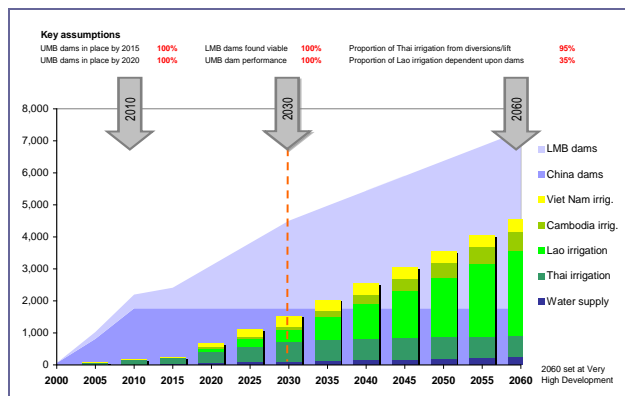
C.2 Benefits shared through re-regulation of mainstream flows

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 Figure 8, 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 8 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 Figure 8 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 be 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 biodiversity 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 given in Chapter 4, 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 MRCS. 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.

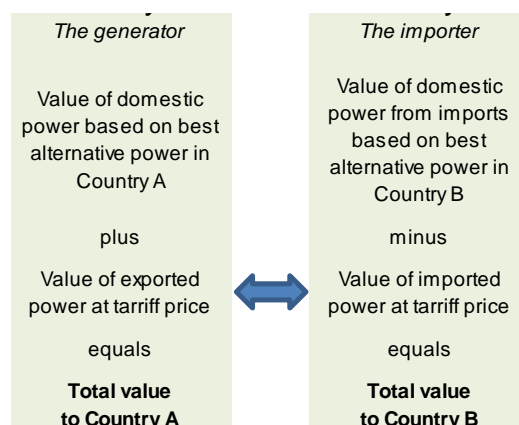
The database provides fields describing dam characteristics including costs and which countries are contributing to those costs. The database also includes information on power generated and to which country(ies) the power is allocated, and at what tariff rates.

The basis for evaluating transboundary benefits of power trading is illustrated here in Figure 9.

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.

Figure 9 Methodology for hydropower trading benefit assessment



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.

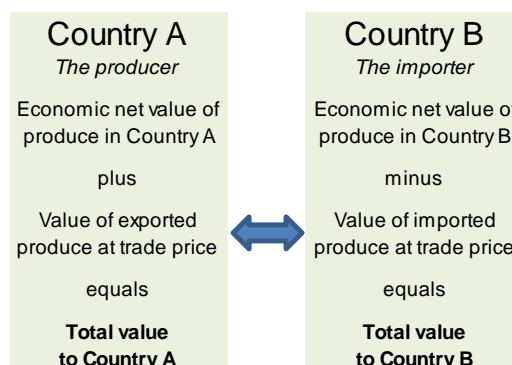
D.2.2 Benefits of other production trading

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 Figure 10.

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 the values of exports and imports, but not the overall economic value of the goods or produce.

Figure 10 Methodology for other production trading benefit assessment



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 investments¹⁹.

In the case of hydropower, the assessment of benefits arising from cooperation in joint projects will be 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 be 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.

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.

¹⁹ 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).

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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 emerging MRC strategic indicators and how they may be measured. This forms part of the ongoing work by BDP relating to the Definition of social, environmental and economic development and management indicators for the Mekong Basin²⁰.

The “measurements” effectively equate to “assessment indicators”, which themselves have yet to be further elaborated on how they, in turn, should be measured. It may be noted that many of the “measurements” are directly related to the assessment indicators employed by BDP in their earlier assessment of basin-wide scenarios. *“Measurements” shown in red italic text* are however new ones which will require further elaboration.

This ongoing work has been informed by preliminary work undertaken for this Scoping Report and the proposed specific requirements for Region Distribution Analysis have been included under the dimension of “Inter-dependence of regional growth”.

²⁰ Definition of social, environmental and economic development and management indicators for the Mekong Basin, Supplementary note on Proposed list of dimensions and strategic indicators, Basin Development Plan Programme, Draft, 29 October 2013

E.2 Emerging MRC strategic indicators and means of measurement

Dimension and scope	Strategic indicators	Measured by
Social Dimension		
<p><i>Reflecting the intent to promote social development and the well-being of all riparian State</i></p> <p><i>As measured in:</i></p> <ul style="list-style-type: none"> ▫ <i>Areas directly impacted by developments in the MRC areas of cooperation (including reservoir areas, relevant wetland areas)</i> ▫ <i>Areas adjacent to the mainstream where socio-economic activities are influenced by flow and environmental conditions within the mainstream</i> 	<p>Condition of livelihoods</p>	<p>Aggregate benefits: No. of people affected vulnerable to changes</p> <p>Livelihoods: Severity of impact on health, food and income security</p>
	<p>Employment in MRC sectors</p>	<p>Aggregate benefits: No. of jobs generated</p>
Environmental dimension		
<p><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></p> <p><i>As measured in:</i></p> <ul style="list-style-type: none"> ▫ <i>Areas directly impacted by projects in the MRC areas of cooperation</i> ▫ <i>Wetland areas influenced by flow and environmental conditions within the mainstream</i> 	<p>Water flow conditions in mainstream</p>	<p>Maintenance of dry season flows (PMFM): Compliance</p> <p>Maintenance of flood season peak flows (PMFM): Compliance</p> <p>Maintenance of Tonle Sap reverse flows (PMFM): Compliance</p>
	<p>Water quality conditions in mainstream</p>	<p>Maintenance of mainstream water quality (PWQ): Subjective ranking</p> <p>Salinity intrusion: Area within delta within threshold level of salinity</p>
	<p>Status of environmental assets</p>	<p>Wetland ecosystems: Area of wetlands (forest, marshes, wetland)</p> <p>Biodiversity conservation: Status of river channel habitats</p> <p>Biodiversity conservation: Flagship species</p> <p>Biodiversity conservation: Unaffected environmental hot spots</p> <p>Biodiversity conservation: Biodiversity condition</p> <p>River bank erosion: Area at risk to erosion</p>

Dimension and scope	Strategic indicators	Measured by
<p>Economic dimension</p> <p><i>Reflecting the intent to promote national economic development and poverty reduction and the well-being of all riparian States</i></p> <p><i>As measured in:</i></p> <ul style="list-style-type: none"> ▫ <i>Areas directly impacted by projects in the MRC areas of cooperation</i> ▫ <i>Trade and transportation benefits in the MRC areas of cooperation across the Basin's boundary</i> 	<p>Economic performance of MRC sectors</p> <hr/> <p>Contribution to national economy</p>	<p>Irrigated agriculture: Net economic value</p> <p>Hydropower: Net economic value from generation</p> <p>Hydropower: Net economic value from purchased</p> <p>Navigation: Net economic value</p> <p>Flood damage prevention: Net economic value of flood damage</p> <p>Capture fisheries and aquaculture: Net economic value of capture fish</p> <p><i>Capture fisheries and aquaculture: Net economic value of aquaculture</i></p> <p>Tonle Sap forests: Net economic value</p> <p>Salinity intrusion: Net economic value</p> <p>River bank erosion: Net economic value</p> <p>Biodiversity conservation: Incremental net economic value of habitat areas</p> <hr/> <p><i>Proportion of MRC sectors economic value to overall GDP</i></p> <p>Increased food security: Percent of national food grain and protein demand met from basin resources</p> <p>Increased energy security: Percent national demand met from HEP (in-country and imported from within basin)</p>
<p>Climate change</p> <p><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></p> <ul style="list-style-type: none"> ▫ <i>As relevant to all MRC areas of cooperation within the limits of the Basin</i> 	<p>Greenhouse gas emissions</p> <p>Vulnerability to climate change</p>	<p><i>Greenhouse gas emissions</i></p> <hr/> <p><i>Projected change in value of assets vulnerable to climate change</i></p> <p><i>No. of people earning below \$1/day vulnerable to climate change</i></p> <p><i>Adaptive capacity</i></p>

Dimension and scope	Strategic indicators	Measured by
Cooperation		
<p><i>Reflecting the intent to promote cooperation among the community of Mekong nations</i></p> <ul style="list-style-type: none"> ▫ <i>As relate to MRC areas of cooperation</i> 	Equity of benefits derived from the Mekong River system	Total social benefits Total environmental benefits Total economic benefits
	Benefits derived from cooperation	<p><i>Levels of engagement: Number and value of projects of basin-wide significance in own country</i></p> <p><i>Economic value of national benefits gained from projects of basin-wide significance in other countries</i></p> <p><i>Levels of engagement: Number and value of joint projects</i></p> <p><i>Economic value of national benefits gained from joint projects</i></p> <p><i>Proportion of benefits derived from cooperation to total net economic value of all MRC sectors</i></p>
	Self-financing of the MRC	<p><i>Proportion of MRC budget (Core + Programme) funded by national contributions during current period</i></p> <p><i>Ratio of Associated Project Budget to MRC budget during current period</i></p>
	Level of information sharing and participation	<p><i>Approved MRC Communication Policy for the current period</i></p> <p><i>Approved MRC Stakeholder Participation Strategy for the current period</i></p> <p><i>Approved State of Basin Report for the current period</i></p> <p><i>Regional workshops held</i></p> <p><i>National workshops held</i></p> <p><i>Applications for data granted through MRC data portal</i></p>

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