

Annex V

The Council Study Terms of Reference



The Mekong River Commission

THE COUNCIL STUDY

**STUDY ON THE SUSTAINABLE MANAGEMENT AND DEVELOPMENT OF THE MEKONG
RIVER, INCLUDING IMPACTS OF MAINSTREAM HYDROPOWER PROJECTS**

Terms of Reference

Final on 21 Jan 2014

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1. Introduction

1.1 Context

The fundamental objective of the 1995 Mekong Agreement is to achieve “the full potential of sustainable benefits to all riparian countries and the prevention of wasteful use of Mekong River Basin waters.” This objective is complemented by the Shared Vision for “an economically prosperous, socially just and environmentally sound Mekong Basin.” Achieving this objective towards the shared vision requires a detailed assessment of the positive and negative impacts of water resources development across sectors and borders.

At the First MRC Summit on 5 April 2010, MRC Member Countries’ Prime Ministers reaffirmed their strong political commitment to implement the 1995 Mekong Agreement with the Hua-Hin Declaration. Subsequently, based on the outcome of the verbal discussion between the Member Countries’ Prime Ministers at the 3rd Mekong-Japan Summit¹, the 18th Council Meeting of the MRC agreed in principle to implement a study on sustainable management and development of the Mekong River Basin including impacts of mainstream hydropower projects. The council resolved to further consult with their respective governments and requested the MRCS to approach development partners to solicit support for the study².

In response to the Council’s decision above, the MRCS developed a Concept Paper which was discussed and endorsed by the Regional Technical Working Group. The concept paper outlined the background and rationale, stated the goals and objectives, and set the thematic and geographic scope for the project. It further discussed the impact areas and provided a general direction as to how the study should be conducted and what the nature of the deliverables should be.

These Terms of Reference expand on the Concept Paper by describing a clear framework methodology, a work-plan, implementation mechanism, and an indicative budget for the Council Study.

1.2 Rationale for the Study

Since its inception the Mekong River Commission has conducted a series of targeted studies through its programmes to inform river basin planning, management and development. The Basin Development Strategy, using a process of scenario analyses to estimate the cumulative impacts of water resources developments and advice Member Countries of options available to develop the resources of the Mekong, identified the most important gaps in knowledge, information and data required to improve the certainty of the estimates.

Furthermore, new challenges are emerging; knowledge of climate change impacts have improved over the past years, new water management and development options have emerged, and demographic and economic conditions are rapidly changing. Further information towards the closure of identified knowledge gaps and the impact of these

¹ Held in Bali, Indonesia, November 2011

² See paragraphs 21 and 22 in the minutes from the meeting of the Council

changes need to be included in a targeted and comprehensive study to better inform critical decisions regarding sustainable development, management and planning in the basin.

The current understanding of how different water uses will impact the Mekong River Basin can be improved and the confidence level of predictions made by models and other tools could be enhanced. The BDP Assessment of Basin-wide Development Scenarios completed in 2011 assessed four future basin development scenarios³ against 42 economic, environment and social criteria that were selected to provide an overall picture of socio-economic development and environment protection parameters of importance for decision-making in the basin.

The BDP Assessment of Basin-wide Development Scenarios allows the Member Countries to identify the 'development space' available for the use of basin resources based on when unacceptable environmental and social repercussions set in. Based on expert opinion estimates, it assessed the scenarios over a 50 year timeframe including broad-based developments in the tributaries, the mainstream and the Upper Mekong River (Lancang) providing a useful tool for the four Member Countries to plan their development initiatives in the basin. However, considering the broad based approach, it does not provide significant resolution on the impacts of large-scale projects planned or already underway in the mainstream of the Lower Mekong Basin. Considering the urgency of understanding the sectoral, cross cutting and cumulative impacts of these impending developments on hydrology, environment, fisheries, society and its economies, the Council Study will be conducted to close these gaps.

In essence the Council Study will address the current uncertainties in assessing the impacts of different development opportunities in the Mekong River Basin and provide a clear, strategic, pragmatic and actionable set of recommendations to facilitate informed development planning in the mainstream of the Lower Mekong Basin.

2. Objectives and Outputs

2.1 Objectives

As agreed to in the Concept Note, the main objective of the Council Study is to further enhance the ability of the MRC to advise member countries on the positive and negative impacts of water resources development on people, economies and the environment of the Mekong River Basin. This study will reduce the uncertainty in estimating these impacts, providing the Members Countries with higher confidence information towards informed decision-making.

The three objectives, also as agreed to in the Concept Note, provide a logical link between the overall objective of the Council Study and the outputs and activities. The first objective is for the generation of knowledge on the positive and negative impacts of water resource developments, the second objective is for the enhancement of long-term MRCS processes using the new knowledge generated and processes tested and the third objective focuses on capacity development.

³ Two of the scenarios were further assessed with and without the potential modifying influence of climate change.

Objective 1: Further develop/establish a reliable scientific evidence base on the environment, social and economic consequences (positive and negative) of development in the Mekong River Basin.

Objective 2: Results of the study are integrated into the MRC knowledge base to enhance the BDP process providing support to the Member Countries in the sustainable management and development of the Mekong River Basin.

Objective 3: Promote capacity and ensure technology transfer to Member Countries in the process of designing and conducting of the study.

With these three objectives, the study will focus on the following thematic areas and sub-areas as agreed to in the Concept Note;

- Irrigation
- Agriculture and land use change
- Domestic and industrial water use
- Flood protection structures and floodplain infrastructure
- Hydropower development
- Transportation (including navigation and roads on major floodplains)

The study will result in the following⁴;

- a. A set of clear, strategic, pragmatic and actionable recommendations directly addressing potential uncertainties, risks and the information needs for development planning in the mainstream of the LMB including recommendations for impact avoidance and mitigation measures.

informed by;

- b. Assessments for each thematic area summarising the transboundary impacts of developments in the selected thematic areas including cross-cutting impacts on the triple-bottom-line: the environmental, social and economic parameters of interest in the Mekong River Basin.
- c. An assessment of the cumulative positive and negative impacts of water resource developments in all six selected thematic areas on the triple-bottom-line including clear indications of hotspots when/if relevant and the thresholds of rapid transition—tipping points—in complex systems such as the Tonle Sap Lake in Cambodia and the Mekong Delta in Cambodia and Viet Nam.

In addition the MRC knowledge base will be enhanced by the knowledge, data and information produced by the Council Study further enhancing the effectiveness of the Basin Development Planning processes.

2.2 Main Outputs

The outputs included in this section are exactly as they were agreed to in the Council Study Concept Paper endorsed by the Regional Technical Working Group⁵. Further clarification is

⁴ The need to clearly state the results of the Council Study was reiterated at the Regional Consultation on the Council Study held 28-29 May 2013 in Vientiane, Lao PDR

included to define the objectives and outputs and indicate the expected outcomes. The activities presented in Section 5 show the steps that will be taken and the work that is required to achieve the expected outcomes via the outputs and objectives.

Objective 1: Further develop/establish a reliable scientific evidence base on the environment, social and economic consequences (positive and negative) of development in the Mekong River Basin.

Output 1.1: *Review the past scientific knowledge base and databases in terms of use as a basis and baseline for the study.*

This will result in an accessible database of existing relevant scientific information, publications and data through a literature review.

This output will include a review of the body of knowledge used to underpin the Basin Development Strategy 2011-2015, results from the Basin Development Scenario analysis and any other scientific literature that may be relevant from within MRC and from other relevant organizations. A detailed and systematic assessment of this literature will be conducted to determine whether the data, assumptions, and methodologies used and results of key related studies sufficiently meet the stated objectives of the Council Study. A scoping report will be produced to guide subsequent activities of the study.

Output 1.2: *Critical knowledge gaps in understanding of the Mekong River Basin system and the impacts of development of the main thematic topics of infrastructure and water use are closed.*

This will result in a series of key reports with clear policy recommendations with supporting information summarising the positive and negative impacts of water resource developments in the six thematic areas including cross-cutting impacts on the triple-bottom-line; the environmental, social, and economic conditions in the basin.

Building on the existing knowledge, this output will provide the improved understanding of positive and negative impacts of water resources developments/infrastructure to develop clear policy recommendations that will be included in the deliverables of the study; a series of reports summarising the positive and negative impact of developments in the selected thematic areas and sub areas including cross-cutting impacts on the triple-bottom-line, and an assessment of the cumulative impacts with requisite recommendations.

Output 1.3: *Climate change impacts are analysed in the context of the sector development impacts to assess opportunities and risks.*

⁵ The numbering of Outputs has been changed to provide a clear link between Objectives, Outputs and Activities.

This output will result in an enhanced, higher-confidence assessment of how climate change will change the positive and negative impacts of water resources developments and infrastructure within the six selected thematic areas on the triple-bottom-line. The impacts of water resource development and infrastructure will be further analysed in the context of climate change to assess opportunities and risks.

Each thematic area assessment will include considerations of a changing climate (according to the best available knowledge of such changes) in order to better understand the impact climate change may have on the social, environment and economic conditions of the basin, and assess whether changes in precipitation, temperature and extreme meteorological events and sea level rise will exacerbate or mitigate the impacts.

Objective 2: Results of the study integrated into the MRC knowledge base to enhance the BDP process providing support to the Member Countries in the sustainable development of the Mekong River Basin.

This objective is to enhance the ongoing BDP processes using the information and knowledge generated via the Council Study. This will be done by improving information used for management recommendations including the BDP Scenario Assessments.

Output 2.1⁶: *Inclusion of information from the Study and other parallel initiatives into the MRC knowledge base.*

This will result in an enhanced MRC knowledge base and data to facilitate better management

The information, knowledge and data generated by the Council Study in Outputs 1.1, 1.2 and 1.3 will be included into the MRC knowledge base. The products of the literature review in Output 1.1, the processes tested and information and knowledge generated in Outputs 1.2, and 1.3, and the decision support system used to manage the data will enhance the MRC knowledge base.

Output 2.2: *The Basin development scenario assessment for the Basin Development Strategy 2016-2020 uses the information and knowledge generated from the Study.*

This will result in an improved BDP process to support Member Countries in the sustainable development of the Mekong River Basin by testing and integrating the processes and results of the Council Study into the MRC knowledge base.

The Basin Development Scenario assessment process for the Basin Development Strategy 2016-2020 will be further improved through the use of information and knowledge generated and processes tested for the Council Study. Although the work to underpin the

⁶ This is numbered as Output 4 in the Concept Paper.

Basin Development Strategy 2016-2020 will begin before the Study is completed, interim results and improved understanding will directly support the work on the strategy in 2014 and 2015. In addition, results and conclusions from the Council Study will feed into the BDP process for the implementation of the Basin Development Strategy 2016-2020 and development of a new strategy for 2021-2025.

Objective 3: Promote capacity building and ensure technology transfer to Member Countries in the conduct of the study.

Output 3.1: *Comprehensive capacity on scientific assessments, survey and analysis are strengthened among Member Country study team members*

This will result in enhanced capacity among Member Country study team members to conduct scientific assessments, survey and analyse impacts of water resources developments on the environment, economy and social parameters.

Output 3.2: *Member Countries' staff participating in the study is able to undertake major thematic studies and possible tools and guidelines are documented for future use of similar Studies.*

This will result in a decentralized, targeted, incremental and accessible assessment methodology that incorporates emerging issues and supports new approaches to adaptive management for climatic variability and change available for use by riparian countries.

With the on-going efforts towards the decentralization of MRCS functions, the processes and approaches used in the Council Study will provide a working modality, a process and methodology for riparian countries to continue supporting the MRC through scientific analysis and collaborative and participatory processes. The working modality that will be used for the Council Study – thematic and discipline teams consisting of national and international experts generating knowledge to be assessed through a common decision support system – can empower the decentralization process.

The three objectives and the corresponding outputs will work towards the overarching goal of developing a better understanding of the impacts of high priority developments on key socio-economic and environmental indicators. Furthermore, they will develop capacity within the MRC, NMCs and line agencies, and provide information, data and processes that can further strengthen the MRC goals and vision.

2.3 Deliverables

The main policy deliverables of the Council Study will be the following seven interrelated reports;

1. A Thematic Report on the Positive and Negative Impacts of Irrigation Development in the Lower Mekong River Basin including recommendations for impact avoidance and mitigation measures.

The report will highlight the rate of irrigation expansion and the induced changes in flow parameters and the resulting changes in environmental, social and economic parameters including issues of food security, employment and trans-boundary benefits and costs. The report will also cover the impacts of irrigation on fisheries and the impacts of other developments on irrigation including dry season irrigation.

2. A Thematic Report on the Positive and Negative Impacts of Non-irrigated Agriculture Development and General Trends in Major Land-Use Categories in the Lower Mekong River Basin including recommendations for impact avoidance and mitigation measures.

The report will indicate how land-use change including agricultural expansion can influence river flow in term of quantity, quality, timing and content (i.e. sediment, nutrients etc.) and the resulting transboundary positive and negative impacts on environmental, social and economic parameters. The changes in sediment transport linked to land-use change and erosion will be a key section in this report.

3. A Thematic Report on the Positive and Negative Impacts of Domestic and Industrial Water Use in the Lower Mekong River Basin including recommendations for impact avoidance and mitigation measures.

This report will contain an updated map of large existing and planned and expanding urban and industrial centres within the basin, estimate water demand over the period covered by the Council Study, estimate general effluent and waste water discharge and highlight any possible risks of industrial spills or similar significant impacts. The report will further provide an estimate of the impact (positive or negative) of development in other sectors on domestic and industrial water use.

4. A Thematic Report on the Positive and Negative Impacts of Flood Protection Structures and Floodplain Infrastructure and Impact of other Developments on Navigation including recommendations for impact avoidance and mitigation measures.

The report will provide an assessment of the trans-boundary flood protection benefit and risks of existing and planned infrastructure. Furthermore it will describe how these structures can influence river flow in term of quantity, quality, timing and content and the resulting transboundary positive and negative impacts on environmental, social and economic parameters. The changes in sediment transport and ecosystem fragmentation will be a key section in this report as they are highly relevant for agriculture and fisheries, thus for food security.

5. A Thematic Report on the Positive and Negative Impacts of Hydropower Development in the Lower Mekong River Basin including recommendations for impact avoidance and mitigation measures.

The report will present an assessment of the cumulative positive and negative impacts of hydropower development in selected Lower Mekong River tributaries and the mainstream. The focus will be on how the dams can influence fisheries, river flow, sediment and nutrient flux in term of quantity, quality, timing and the resulting transboundary positive and negative impacts on environmental, social and economic parameters in the mainstream corridor, floodplains and Delta as well as coastal processes. Two key sections in this report will be an estimation of the disaggregated economic benefits and updated assessment of sediment transport and the effect of change on geomorphology, bank erosion and coastal processes and fisheries.

6. A Thematic Report on the Positive and Negative Impacts of Navigation Infrastructure Development in the Basin including recommendations for impact avoidance and mitigation measures.

The report will include two main sections: an assessment of how existing and planned navigation infrastructure can influence river flow in term of quantity, quality, timing and content and the resulting transboundary positive and negative impacts on environmental, social and economic parameters and an assessment of the positive and negative impacts of water resources development in other thematic areas on navigation.

7. A Report on the Cumulative Positive and Negative Impacts of the Selected Water Resources Developments (Cumulative Report) including recommendations for impact avoidance and mitigation measures.

This report will highlight the cumulative impact of the developments in the six thematic areas on the river flow in term of quantity, quality, timing and content and clearly indicate resulting transboundary positive and negative impacts on environmental, social and economic parameters. It will also show the economic benefits and costs of development including the direct costs and benefits, positive and negative economic externalities from the developments assessed in the six thematic areas including ecosystem services and social impacts and multiplier effects of development including impact on regional macro-economic development, trade flows, replacement costs of lost benefits, etc.

These reports will present the positive and negative impacts of the selected water resources developments assessed in the Council Study⁷, highlight key concerns and present clear

⁷ Refers to the specific projects selected by the RTWG for analysis in the Council Study.

recommendations for the sustainable management and development of the Mekong River Basin including Impacts of Mainstream Hydropower Projects.

Furthermore, Annex 3 describes the technical and working reports that will be produced by the Council Study as supporting documents.

3. Scope of the Study

The scope of the Study was established in the Council Study Concept Note endorsed by the RTWG⁸. The concept note outlines the major thematic areas as well as the geographic scope of the study.

3.1 *Thematic scope of the Study*

Taking into account the basin-wide MRC context as well as the needs for a comprehensive and holistic sustainability study for the Mekong River Basin, the Study should cover the important thematic IWRM sectors and sub sectors that contribute to development in the basin:

1. Irrigation; including water use, return flows, water quality, proposed diversions, etc.
2. Agriculture and Land use; including watershed management, deforestation, livestock and aquaculture, fisheries etc.
3. Domestic and Industrial use; including mining, sediment extraction, waste water disposal, urban development, water quality etc.
4. Flood protection structures and floodplain infrastructure,
5. Hydropower, including potential of alternative energy options.
6. Transportation; including navigation, infrastructure to aid navigation, and roads on major floodplains.

3.2 *Geographical scope*

In order to focus the study and allow for more detailed and differentiated assessment of both positive and negative impacts, a set of geographic focal areas are selected.

The proposed geographic focus is on the positive and negative impacts on the mainstream. The main rationale for this is that direct causal impact of major development on the main stream as well as the aggregate of many developments on the tributaries are of importance in a transboundary context. In addition the MRC Basin Development Planning through its various initiatives is addressing the basin-wide context of impacts through its support to the implementation of the BDS by the MRC Member Countries together with MRC Programmes.

⁸ Concept Note on the Follow-Up of the MRC Council Meeting decision of 8 December 2011 to Conduct a Study on Sustainable Management and Development of the Mekong River including Impacts by Mainstream Hydropower Projects - 15 January 2013

As a second objective this Study could add a significant body of knowledge and understanding to this work.

For the thematic topics identified as causing impact, listed in the previous section, the whole Mekong River Basin would be considered. A special focal area would be addressing the development on the Upper Mekong (Lancang) with respect to infrastructure and water use.

However, with respect to impacts (positive and negative) of a physical nature the focus would be on the following four areas.

1. A corridor on both side of the mainstream from Chinese border to Kratie (Cambodia)
2. The Cambodia Floodplains including the Tonle Sap River and Great Lake
3. The Mekong Delta in Cambodia and Viet Nam
4. The coastal areas directly influenced by the Mekong estuary

The Mekong main stream corridor is chosen based on the fact that along the mainstream the cumulative impact of development and management in the basin is being directly felt, whereas in the tributaries the impact is mainly due to the activities in the specific tributary. An initial proposal of a 15 km corridor on both sides of the mainstream is based on the extent of direct impact on livelihoods dependent on the main stream (as defined by the MRC Social Impact Monitoring and Vulnerability Assessment, or SIM/VA, of the Environment Programme), however, this may need to be adjusted (wider or narrower) depending on different circumstances, such as confluences of tributaries and areas of steep and narrow geography⁹.

Tonle Sap River and Great Lake and other floodplains in Cambodia is an important area as it forms a unique hydro-ecological system with a unique fishery within the Mekong River Basin which is potentially directly impacted by changes in the flow of the Mekong mainstream with respect to the flood pulse, sediment replenishment, flood extent, etc.

The Mekong Delta in Cambodia and Viet Nam are proposed because being at the end of the river's course it will be affected by the cumulative impact of infrastructure and water use. The central importance of the delta in agriculture and fisheries/aquaculture productivity makes it important to assess potential impact, but also competing uses of water from high population and many urban centres needs to be considered.

The coastal areas in this context are to be delimited to the areas directly affected by changes in the Mekong River's discharge into the sea together with the significance of coastal fisheries and coastal processes (affecting issues such as coastal erosion and impacts of sea-level rise) makes this an important area to study.

3.3 Impact areas

The six thematic areas (described in Section 3.1) are to be assessed in terms of positive and negative impact on a number of primary physical and biological (environmental) factors which includes;

⁹ Cambodia Delegate has proposed during the Regional Meeting 28-29 May 2013 that MRCS reconsider the distance of 15km corridor on both sides of the mainstream which EP(SIM/VA) has practiced. It must be extended wider

- a. Fisheries and fish production; also addressing impacts of over-fishing and illegal fishing,
- b. Environmental condition/health; the definition to be agreed upon for the study,
- c. Biodiversity; using internationally established indices,
- d. Hydrology/water quantity; which should also include ground water,
- e. Water availability (drought),
- f. Floods,
- g. Food Production,
- h. Sediment Transport; including river bank stability, sand mining, delta sediment plume,
- i. Water Quality; this includes salinity intrusion.

There is also a need to assess how these changes result in positive and/or negative impacts on more complex social and economic aspects such as;

- i. Food Security; including aspects of impact on food safety as far as practicable,
- ii. Quality of Life; based on existing indices of UN organisations or new ones developed for the Mekong region,
- iii. Flood Risk,
- iv. Drought Risk,
- v. Human Health, focusing on standard parameters used to assess health and MDG goals such as water borne disease,
- vi. Social Development, including changes in cultural and traditional aspects of life. In this context impact of demographic change will also be considered.
- vii. Economic development,
- viii. Employment; with a focus on income generation,
- ix. Distribution of economic benefits.

The discipline teams described in Section 4.3 will use the information provided by the thematic teams to estimate the positive and negative impact of development on these impact areas towards determining the impact on the triple-bottom-line.

3.4 Impact of climate change

Climate change is an important factor in the Study and will be assessed in terms of how it may exacerbate (increase) or mitigate (reduce) some of the impacts caused by changes in water use, in essence identify the risks and opportunities that climate change provides in the context of basin development.

There are already a number of climate change initiatives in the region, including the Climate Change and Adaptation Initiative (CCAI) of MRC. The Study would be able to draw from the information of these initiatives and use the modelling outputs to provide insights into the impacts relevant to the Study.

4. Implementation Strategy and Methodology

The Council Study will be an in-depth, updated assessment of the positive and negative impacts of selected developments in six selected themes on the triple-bottom-line; social, environmental and economics parameters of interest in the basin. Based on this analysis an assessment of the cumulative impacts of water resource developments in all six selected thematic areas will be conducted.

Starting with a review of existing literature including relevant MRC studies and programmes, the Council Study will assess the positive and negative impacts of water resource development within a definite time range in these six selected thematic areas and sub-areas within the geographical scope defined earlier:

- Irrigation
- Agriculture and Land use change
- Domestic and Industrial water use
- Flood protection structures and floodplain infrastructure
- Hydropower development
- Transportation (including navigation and roads on major floodplains)

Additional data, information and knowledge will be generated as required to fill identified knowledge gaps.

4.1 Methodology

In this study, **two impact pathways** will be considered (see Figure 1).

1. Positive and negative impacts of water resource development **via changes in the hydrological regime** (i.e. a dam or an irrigation project changes the timing, quantity, quality and/or content of the water which changes the biota which in turn has a socio-economic impact). This is similar to the process considered in the Integrated Basin Flow Management initiative.
2. **Positive and negative impacts not transmitted via the hydrological regime.** These include the primary and secondary economic costs and benefits of the selected water resources developments and infrastructure as well as other social benefits including access to services, employment etc., social displacement, migration, and gender impacts.

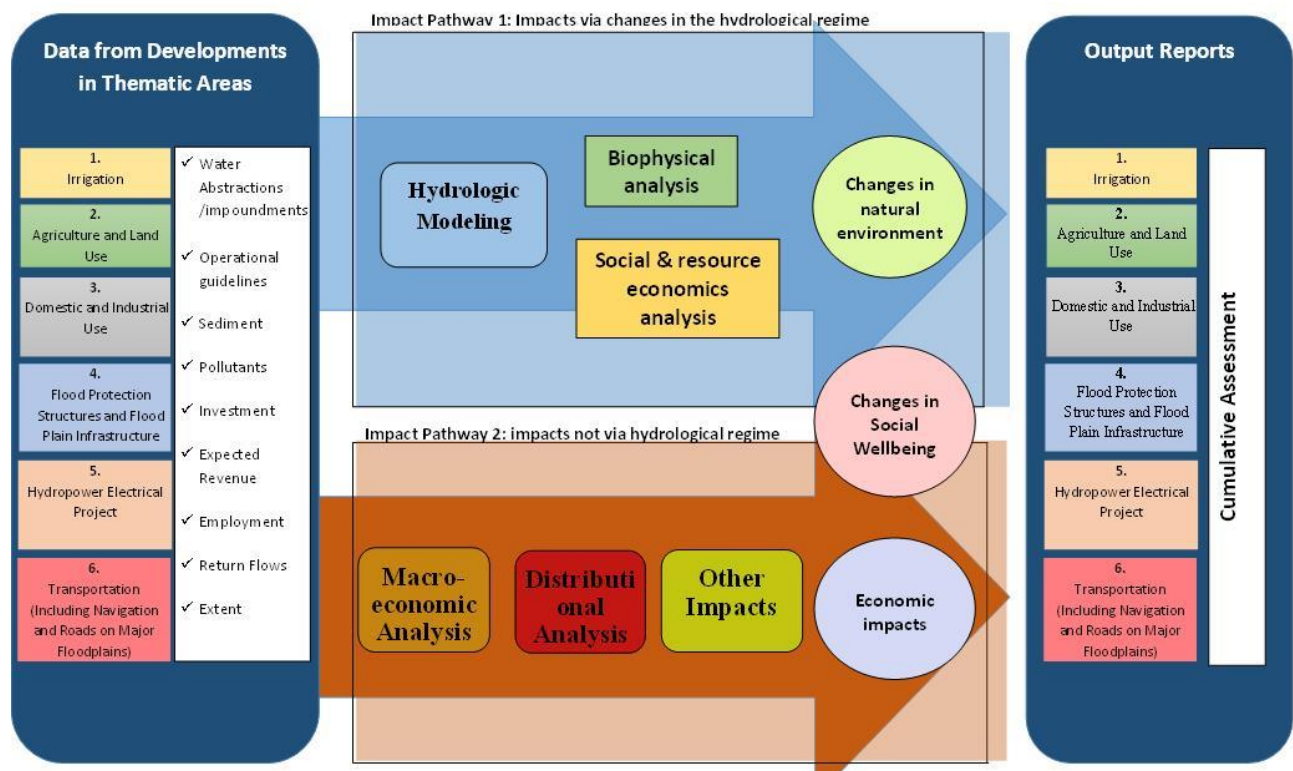


Figure 1: Illustration of Impact Pathways

To this effect the Study will;

- estimate how the water resource developments in each thematic areas and cumulatively will change hydrological, sediment and water quality parameters along the river - key changes in the flow regime,
- estimate the ecological responses to these hydrological, sediment and water quality changes – changes in key biophysical indicators,
- estimate positive and negative socio-economic impacts of these ecosystem and water quality changes – changes in key socio-economic indicators, and,
- assess regional and macroeconomic and distributional positive and negative impacts of the selected water resources developments including replacement costs for mitigating negative impacts.

To estimate the positive and negative impacts of water resource development via changes in the hydrological regime, the MRC hydrological model will be updated to estimate the impact of water resources developments in each thematic area on the flow regime of the river. Likewise hydrodynamic, water quality and sediment transport models will be updated or developed to estimate the impact of flow changes on relevant sediment and water quality parameters. The hydrological modelling will also include a cumulative assessment which includes all selected water resource developments in all six thematic areas as well as the impacts of climate change.

Using the understanding generated on the impact of water resource developments on the hydrological, sediment transport and water quality parameters in the river, teams of experts

on plants, fish, and other aquatic animals will estimate the impact of these changes on the ecological conditions of the river including on fisheries and other aquatic animals.

Then a team of socio-economic experts will use the knowledge generated on the impact of water resource developments on hydrological, sediment transport, water quality as well as the ecological parameters to estimate their impact on people and communities including their social, cultural and economic wellbeing.

In order to promote higher confidence, the Council Study will complement the existing knowledge-base when needed through detailed **field surveys at representative sites**. The data and the understanding of impacts generated at the representative sites will be extrapolated to respective Integrated Unit of Analysis¹⁰; relatively homogeneous zones along the river.

As indicated in the Concept Note, the study will include the Mekong Delta in Cambodia and Viet Nam and the Tonle Sap Lake. For the Delta, the Council Study will cooperate with the recently initiated study on the impacts of mainstream hydropower on the Mekong Delta (Delta Study) where possible.

The macro-economic and a distributional analysis will be carried out to estimate the economic benefits generated and compared them to costs incurred by the developments in the selected thematic areas. The distributional analysis will compare the benefits to the costs and furthermore analyze the incidence of benefits vs. costs amongst communities, livelihoods, countries and people of difference socio-economic strata.

Together, the assessments will outline the predicted impacts of water resources developments in the six thematic areas on the environmental, social and economic well-being of the basin and its people.

¹⁰ ISH and the SIM/VA project define a set of zones that will be used for the Council Study

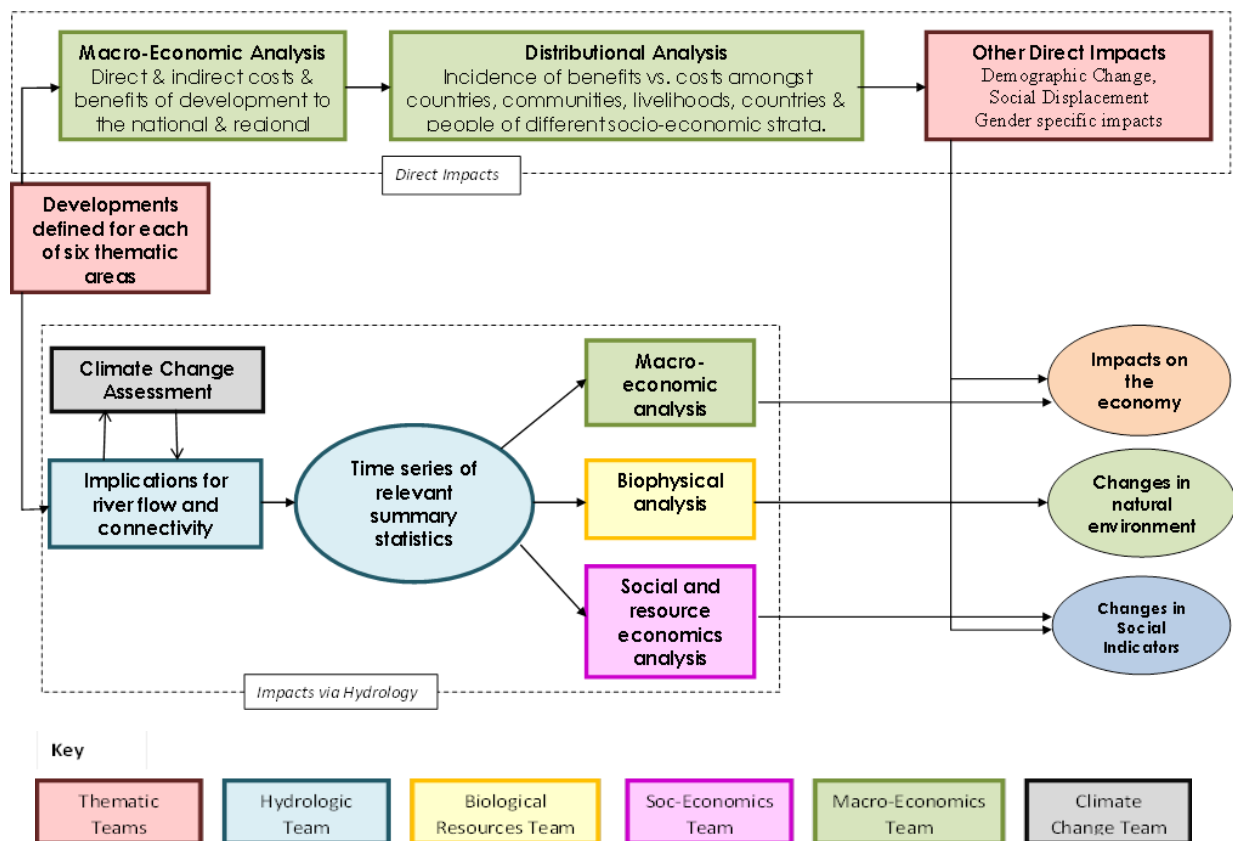


Figure 2: Illustration of Impact Pathways

4.2 Incorporation of on-going or past MRC initiatives and the Literature Review

As the first step, a comprehensive a review of literature and data availability for the Council Study will be conducted. Information and data relevant to the objectives of the Council Study will be collected, archived and made available to the assessment teams. This will include scientific publications, papers, scientific articles, project reports produced or commissioned by the MRC and any other scientific literature or grey literature that may be relevant from other organizations.

Thematic and discipline teams appointed for the Council Study (see Section 4.3) will conduct a detailed and systematic assessment of this literature to determine whether the data, assumptions, and methodologies used and results of key related studies sufficiently meet the requirements of the Council Study assessment (i.e. differentiated impact assessments etc.). Likewise, uncertainties and requirements for further clarifications, reinterpretations and/or data will be identified and will guide subsequent activities of the Study¹¹. This information will be included in a literature scoping report and will be used to revise the

¹¹ Each team will assess the results that pertain to their respective discipline. For an example the hydrologic team will assess the hydrological modeling done in the previous studies and improve upon them when necessary in the context of the Council Study.

detailed work-plan, consultant TORs and Team Work Packages to be included in the Inception Report.

The Council Study will coordinate, complement and build on on-going MRC programmes and activities. Relevant programmes, based on their strategies, priorities, work-plans and outputs, will provide the necessary data, information and analyses for the Study. A preliminary assessment indicates the following synergies;

1. The Information and Knowledge Management Programme will provide the required hydrological modelling services. New data may need to be included, current data may need to be quality checked and new indicators need to be generated.
2. The Social Impact Monitoring and Vulnerability Assessment (SIM/VA) initiative of the Environment Program provides detailed analysis of social dependence on river resources and provides baseline social data on a 15-km corridor along the river. The sample size may need to be augmented with additional surveys.
3. Further information is required to link river flow changes to biological and fisheries indicators to determine how the social dependency described in SIM/VA would be affected by flow changes.
4. New sediment data is available and is being quality checked and processed by IKMP. However the Council Study will update existing models with this new data and reassess outcomes.
5. Current Economic Assessment methodologies used could be significantly improved especially in the context of highly dynamic socio-economic conditions in a rapidly changing region. This should consider changing dependence on river resources as well as changes in the availability of alternatives. The Initiative for Sustainable Hydropower is developing such a methodology which can be adapted for the Council Study.
6. The Economic Assessments will be further improved to consider the multiple multiplier effects of development initiatives. The use of tools such as Macro-economic models will provide useful insights.
7. The Initiative for Sustainable Hydropower (ISH) is implementing a number of activities that will form a part of the Council Study. They include ISH11, a study entitled “Improved Environmental and Socio-Economic Baseline Information for Hydropower Planning”, and IHH02 “Development of Guidelines on the Multi-Purpose Evaluation of Hydropower Projects”
8. The Climate Change Adaptation Initiative is currently in the process establishing a relevant database and in selecting and downscaling Global Climate Models to

develop future climate projections for the region. The Council Study will use the results of this exercise and reassess the impacts under likely climate change scenarios.

9. Existing BDP basin-wide development scenarios will be reviewed and updated using the information generated by the Council Study. Likewise the nationally planned developments used to formulate the BDP Scenarios will inform the selection of water resource developments/infrastructure to be assessed in the Council Study.

4.3 Study Coordination, Roles and Functions

The Regional Technical Working Group will oversee and provide strategic direction to the Council Study. The RTWG will also be responsible for the technical endorsement of the Study methodology and intermediate and final deliverables. Furthermore, the RTWG will lead the distillation of the policy recommendations based on the technical output of the Study. The RTWG via the National Mekong Committees can brief the MRC Joint Committee on progress.

The study will be managed and implemented by the office of the CEO with the support of the Technical Coordination Unit (TCU). A Technical Advisory group, comprising of senior MRCS technical experts, will advise the CEO and the formulation of principle policy recommendations.

A MRCS Coordinating Group will coordinate the work of the Council Study including input from MRCS programmes, external consultants and to liaise with National Line Agencies. This group will consist of MRCS program coordinators, the Technical Coordination Unit and external consultants as needed. A technical coordinator with experience in management and technical assessments will support the MRCS Coordinating Group.

The actual assessments and analyses will be carried out by two sets of teams; six thematic teams representing each thematic area and a team tasked with developing the cumulative assessment and five discipline teams representing cross-cutting disciplines. These teams will be headed by relevant MRCS program staff (see Figure 3) and the team members will consist of the following as needed and available:

- RTWG and/or NMC representatives
- MRCS staff
- External consultants
- Technical experts from Member Country Line Agencies

Team members in each team will represent various disciplines as required to produce the outputs required¹². The team approach could have a number of benefits including;

- a. Close coordination with and incorporation of ongoing MRC activities and programmes,
- b. Synergies from a multi-disciplinary approach where experts from different relevant disciplines work towards common outputs,
- c. Continuous and sustained national engagement at all levels leading to enhanced “ownership” of the study process and results,
- d. Capacity building amongst national and MRCS staff, and
- e. An outcome through scientific discourse and collaboration instead of an individual perspective.

As Figure 2 illustrates, the Thematic Teams will collate information/data pertaining to water resource developments/infrastructure in their respective thematic areas. The information that can be used to predict impacts on the flow regime will be used by the hydrologic team to model key flow changes. The biological resources and socio-economic teams will then assess the impact of key flow changes on selected environmental and social parameters. This information will then be returned to the Thematic Teams for feedback and the development of the thematic reports. The Thematic Teams will finalize the thematic reports using the information provided by the discipline teams as well as their assessment of direct impacts (impacts not transmitted via the hydrological regime) as described above.

To assess the cumulative impacts, the hydrological team will model all water resource developments/infrastructure described by all six thematic teams. This cumulative hydrological assessment will be assessed again by the biological resources and socio-economic teams to inform the production of the ‘Report on the Cumulative Positive and Negative Impacts of the Selected Water Resources Developments’. The production of the Cumulative Report will be a collective effort led by a team tasked with developing the cumulative assessment.

The seven Thematic Teams are:

- Thematic Team 1: Land use change, and Agriculture
 - Lead: AIP
 - BDP
 - IKMP
 - National Planning agencies
 - Environmental Management Agencies
 - Cartographic Agencies (survey departments, geological survey etc.)

¹² Exact outputs required from each team (work packages) will be detailed in the Inception Report

- Thematic Team 2: Domestic and Industrial Water use
 - Lead: EP
 - BDP
 - National Planning Agencies
- Thematic Team 3: Flood protection structures and floodplain infrastructure including roads on major floodplains (note that this is moved from transportation)
 - Lead: FMMP
 - IKMP
 - National Planning Agencies
 - National Environment Agencies
- Thematic Team 4: Hydropower development
 - Lead: ISH
 - Relevant National Agencies
- Thematic Team 5: Navigation (roads on floodplains moved above)
 - Lead: NAP
 - Relevant National Agencies
- Thematic Team 6: Irrigation
 - Lead: AIP
 - Departments of Irrigation
 - IKMP
- Thematic Team 7: Cumulative Assessment
 - BDP
 - MRCS Coordinating Group.
 - CCAI
 - IKMP

The Five Discipline Teams are:

- Discipline Team 1: Hydrologic modeling(cross cutting)
The experts required for this team will include specialists on basin hydrology, fluvial geomorphology, hydraulic modeling (includes flood modeling) and aquatic chemistry
 - Lead: IKMP
 - DMP
 - National Academic/Research Institutions (as nominated by the RTWG and/or NMCs)

- Discipline Team 2: Biological Resources

The experts required for this team will include specialists on fish and aquatic animals and plants

- Lead: EP
- FP
- Line Agencies
- National Fisheries Research/academic organizations (as nominated by the RTWG and/or NMCs)

- Discipline Team 3: Socio-economics

The experts required for this team will include specialists on nutrition, health, gender, and resource economics

- Lead: EP (SIM/VA)
- FP
- BDP
- Research/Academic Organizations

- Discipline Team 4: Macro-economics

- Lead: TCU (interim)
- ISH
- BDP

- Discipline Team 5: Climate Change

- Lead: CCAI
- DMP
- National Climate Change Focal Points
- National Research Organizations

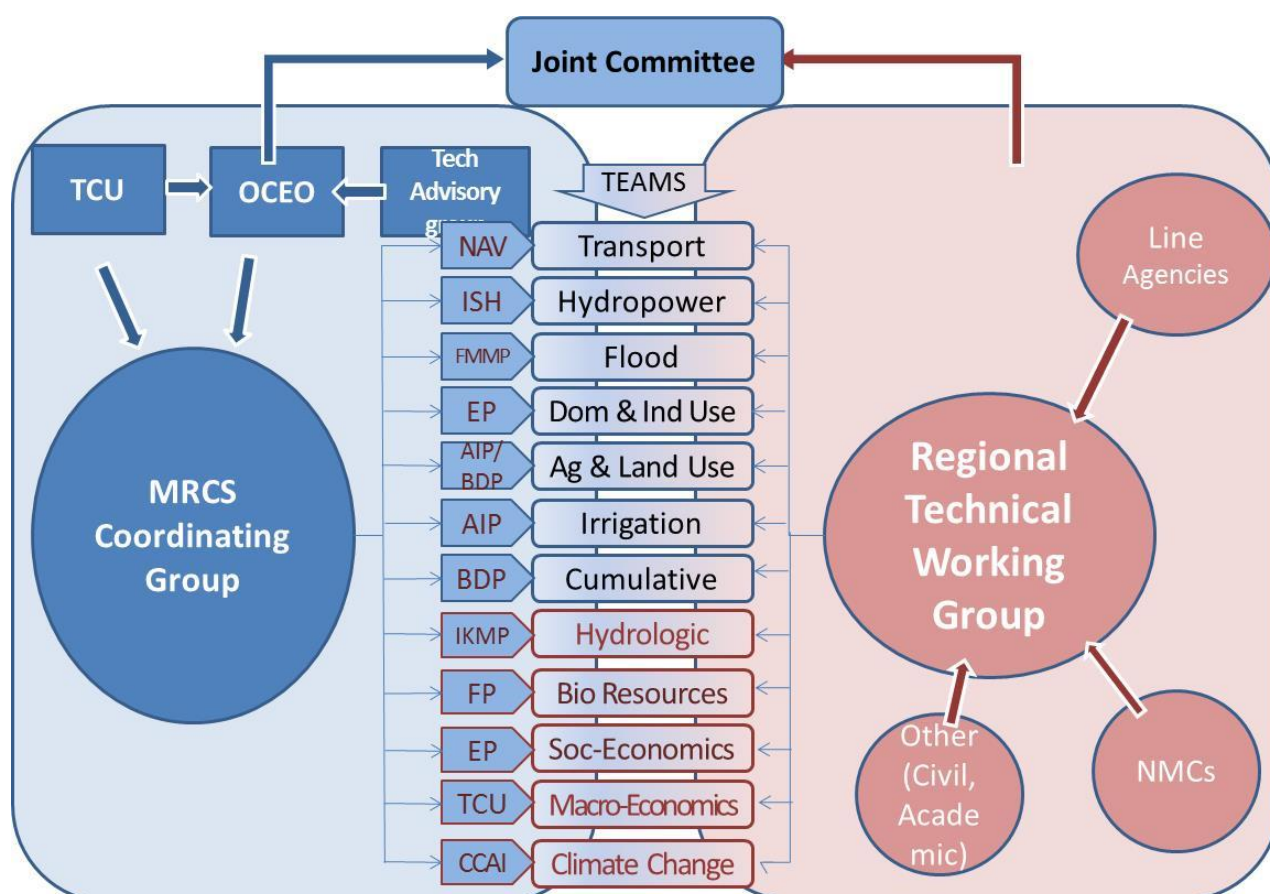


Figure 3: Coordination and Implementation

5. Main Activities

The following activities will be undertaken by the Thematic and Discipline Teams. The numbering indicates a general time-step process but many of the activities will be running concurrently. The objectives and outputs are restated here to indicate which activities contribute to which outputs and hence objectives.

Objective 1: Further develop/establish a reliable scientific evidence base on the environment, social and economic consequences (positive and negative) of development in the Mekong River Basin.

Output 1.1: *Review the past scientific knowledge base and databases in terms of use as a basis and baseline for the study (can the scientific knowledge base and databases be used to inform the Council Study and be used to establish a baseline for the assessment).*

Activity 1.1.1: Identification and collation of existing literature - Literature relevant to Objectives 1 of the Council Study will be collected and made accessible to the thematic and discipline teams. This will include publications including papers, scientific articles, project reports produced or commissioned by the MRC and any other scientific literature or grey literature that may be relevant from other organizations.

Activity 1.1.2: Identification of MRC programme priorities and significant gaps – MRC Programmes will further describe major gaps in knowledge and data towards enhancing integrated management of the Lower Mekong Basin.

Activity 1.1.3: Scoping of existing information - Each Thematic and Discipline Team will assess data, assumptions, and methodologies used and results of key related studies and develop a scoping report on whether the previous work sufficiently meets the stated objectives of the Council Study (i.e. differentiated impact assessments, etc.) and on the uncertainties and requirements for further clarifications, reinterpretation and/or data.

Activity 1.1.4: Archiving of Relevant Information and Data: The MRCS document archive will be updated with the information identified in Activity 1.1.2 as a database to underpin the Council Study and future MRC Programme activities.

Output 1.2: *Critical knowledge gaps in understanding of the Mekong River system and the impacts of water resource developments in the main thematic topics of infrastructure and water use are closed.*

Activity 1.2.1: Describing the water resources developments to be assessed by the study - A participatory exercise involving the RTWG facilitated by Thematic Teams conducted in a workshop setting will determine parameters to select developments in each of the six thematic areas to be assessed by the Council Study.

Activity 1.2.2: Listing priority information, data and knowledge for each water resources developments and infrastructure to be assessed - All water resources developments/infrastructure in the six thematic areas selected to be assessed in Activity 1.2.1 will be described in detail and documents describing relevant specifications will be consolidated as far as practicable. Information generated will be used to model the impact of these water resources developments on hydrology and to start assessing the direct impacts (impacts not transmitted via the hydrological regime). This will be done by all thematic teams working with the hydrology team supported by consultants as needed.

Activity 1.2.3: Updating and setting up of Hydrologic Models– the Hydrologic discipline team, using existing MRC modelling systems will model the impacts of the selected water resources developments/ infrastructure in the six thematic areas. The present day¹³, naturalised¹⁴ and expected future flow regimes associated with developments will be modelled (or existing sequences used). The impacts of land-use change on sediment loading and impacts of infrastructure on sediment transport will be estimated.

- A hydraulic model will convert the surface flows to hydraulic conditions.
- A sediment model will predict how the channel could respond to these changed hydraulic conditions, and predict changes in sediment transport.

¹³ The baseline year is expected to be 2010. This will be further discussed with the RTWG in the course of the study

¹⁴ Naturalized flows are defined as measured flows that approximate the flows that would occur in the absence of regulation and extraction.

- Water-quality specialists will predict how the chemical and thermal regime of the river could change, including changes in the concentrations of specified nutrients and dissolved solids.

Activity 1.2.4: Framing a Macro-economic model – An Economic Model will be developed for the Study. Using updated information from the MRC Decision Support Framework and the BDP scenario assessments, a macro-economic assessment will include an economic valuation of the basin resources (including ecosystem services) under current development and use patterns showing the total for the basin, disaggregated by sector and disaggregated by country. It will also include a valuation of direct and indirect contribution of basin resources (including ecosystem services) to the national economies in all four countries, an analysis of macro-economic benefits of specified water resources developments and corresponding costs of possible losses in ecosystem and social services.

Activity 1.2.5: Conducting Field surveys - Field surveys for data collection will be conducted as needed to gather and/or generate quantitative and qualitative data and information to fill data and information gaps required to assess the impacts of different water development initiatives in the six thematic areas on selected social and economic and environmental parameters. The need for field surveys will be determined by the assessment of existing information and data carried out in the review of literature and data availability for the Council Study and included in the scoping report.

Data already collected by and data collection activities underway by the Environment Program (including SIM/VA), Fisheries Program, the Information and Knowledge Management Programme and the Initiative for Sustainable Hydropower will be the primary source of data. They will be augmented as necessary. These surveys will be conducted by the discipline teams as needed with national support

Activity 1.2.6: Linking changes in flows to changes in environment and ecosystem parameters - The biological resources team will describe expected biotic responses by predicting how vegetation, fish and other aquatic animals would respond to the flow changes. These predictions will be organized in the form of response curves linking changes in flow attributes to changes in biological indicators. The Discipline Team on Biological Resources will work with the Hydrologic team.

Activity 1.2.7: Linking changes in flows and changes in environment and ecosystem parameters to changes in social and economic parameters - The socio economic team will predict how the described flow changes and the resultant changes in fish, plants, and other resources affect people, their wellbeing and their income based on the assessments done by EP through SIM/VA, the Fisheries Programme and by using new information and field surveys as required. Close liaison from the outset between the biophysical and socioeconomic teams will ensure that all the ecosystem attributes identified by the people as important in some aspect of their lives are assessed by the biophysical team. These predictions will be organized in the form of response curves linking changes in flow attributes and biological indicators to changes in social and economic parameters. The Hydrologic modelling, Biological Resources and the Socio-economics Discipline Teams will collaborate on this activity.

Activity 1.2.8: Compiling information generated in a linked spreadsheet application¹⁵ - A spreadsheet application will be used to manage the data and information generated (response curves, hydrological modelling outputs) by the Council Study. This application will provide a transparent, replicable and adaptive mechanism to link the impacts of water resources development on hydrology, water quality and sediment dynamics to direct and secondary impacts on environmental, social and economic parameters.

Activity 1.2.9: Consolidating and integrating predictions of water resources development per thematic area and cumulatively on the social, environmental and economic conditions of the Mekong River Basin - Integrative workshops will be held to address the interactions between the relevant thematic areas in important cross cutting impact areas. Interdisciplinary workshops with experts working in the different thematic areas synthesising their findings and assess the overall impacts on the specific parameter (or set of parameters) will be held. These workshops will include; a Biophysical Synthesis workshops where Hydrologic and biological resources teams meet to predict flow-driven ecosystem change and a Socio-economic and macro-economic synthesis workshop where Hydrologic, Biological Resources and Socio-economic teams meet to describe socio-economic responses to the flow changes and resulting ecological changes.

Drawing upon these, a cumulative impact assessment will be undertaken of considered developments by re-running the hydrological models, integrating the findings from the thematic and discipline teams and applying these in a triple bottom line assessment (social, environment, economic) to demonstrate the linkages between impacts and the overall impact of these developments.

Activity 1.2.10: Synthesizing draft thematic reports - Thematic teams will develop a draft report per thematic area incorporating outcomes from above workshops.

Activity 1.2.11: Synthesizing the draft Cumulative Report – The Cumulative Team, under the guidance of the MRCS Technical Advisory Group, will develop a draft report incorporating outcomes of the above workshops and the draft thematic reports. This report will integrate the six thematic areas to show the likely cumulative impacts of water resources developments in the six thematic areas.

Activity 1.2.12: Holding of the first results workshop – A Regional Technical Working Group meeting to discuss and validate intermediate findings will be held. National consultations with a wider range of stakeholders may also be considered. Clear policy recommendations will be synthesized at this meeting.

Activity 1.2.13: Presentation to wider stakeholders and dissemination: Workshops to solicit inputs from a broader set of stakeholders to the Study including NGOs, CBOs, Development Partners, International Organisations, private sector and other interested individuals. Reports disseminated using electronic media, policy briefs produced.

¹⁵ This is a Decision Support System where data from Activity 1.2.3 is held and linked with the response curves generated in Activities 1.2.6 and 7. It informs the predictions and brings all the information together for the assessments.

Output 1.3: *Climate change impacts are analysed in the context of the sector development impacts to assess opportunities and risks.*

Activity 1.3.1: Downscaling a Global Climate Models: The MRC Climate Change Adaptation Initiative (CCAI) will aggregate and downscale Global Climate Models to estimate the changes for the area encompassing the Mekong River Basin.

Activity 1.3.2: Estimating Hydrological impacts of Climate Change - Using the hydrological models updated through Output 1.2 the estimated changes in climate parameters from the above activity will be translated to changes in the Hydrological regime of the river.

Activity 1.3.3: Estimating the impact of hydrological changes on water yield, assurance of supply, environmental, social and economic indicators – the hydrological data produced in Activity 1.3.2 will be assessed via the processes in Activity 1.2.3 to Activity 1.2.13.

Activity 1.3.4: Synthesizing Clear Recommendations to policy makers– In coordination with the Regional Technical Working Group, clear policy recommendations on relevant to the Council Study will be developed at the results workshop.

Objective 2: **Results of the study integrated into the MRC knowledge base to enhance the BDP process providing support to the Member Countries in the sustainable development of the Mekong River Basin.**

Output 2.1¹⁶: *Inclusion of information from the Study and other parallel initiatives into the MRC knowledge base.*

Activity 2.1.1: Updating of databases – The MRC hydrological, sediment, and water quality databases will be augmented using new data generated by the Council Study. In the course of the study new data generated directly via the Council Study or sourced from elsewhere through Activity 1.2 will be used to update the current databases.

Activity 2.1.2: Augmenting of the MRC knowledgebase – the information and knowledge generated by the Council Study will be made available for all MRC programmes¹⁷.

Activity 2.1.3: Updating of the MRC Document Archive – the MRC document archive will be upgraded and updated with reports collated through the literature review and with the technical and thematic reports produced by the Council Study.

Output 2.2: *The Basin development scenario assessment for the Basin Development Strategy 2016-2020 uses the information and knowledge generated from the Study.*

¹⁶ This is numbered as Output 4 in the Concept Paper.

¹⁷ As an example, the Environmental Programme will be provided with improved information and knowledge with regards to the impact of developments on environmental parameters. The Fisheries Programme with improved information of the impact on fisheries.

Activity 2.2.1: Updating of Current BDP Scenario Assessments – the assessment of impacts from the Council Study will be made available to the Basin Development Strategy to inform their Scenarios Assessment process.

Activity 2.2.2: Informing future updates of the Basin Development Strategy – the Basin Development Program will review existing scenarios assessment in late 2013-2014 and the result will be used to prepare the Basin Development Strategy 2016-20. Outcomes of the Council Study will inform this process

Objective 3: Promote capacity building and ensure technology transfer to Member Countries in the conduct of the study.

(NOTE: Considering the similarity of the two Outputs the activities required to achieve them are similar. Therefore one set of Activities are proposed for both Output 3.1 and 3.2¹⁸).

Output 3.1: *Comprehensive capacity on scientific assessments, survey and analysis is strengthened among Member Country study team members*

Output 3.2: *Member Countries' staff participating in the study is able to undertake major thematic studies and possible tools and guidelines are documented for future use of similar Studies.*

Activity 3.1.1: Including NMC specialists in monitoring the Council Study – staff members nominated by the National Mekong Committees will be regularly briefed of the Council Study enabling them to appreciate the process, methodology and results

Activity 3.1.2: Including Member Country line agency experts in the conducted of the study – relevant line agency staff members will actively participate in the conduct of the study as riparian experts. This will improve the capacity of the participating staff through on-the-job training.

¹⁸ Outputs 6 and 7 in the Concept Note

Annex 1: Budgets (in USD)

a. Output Budget

Budget Line	2013	2014	2015	Total USD	MRC Funded USD	Trust Fund USD
Management and Coordination	319,500	312,000	330,500	962,000	396,000	566,000
Thematic Studies	588,000	3,836,000	588,000	5,012,000	2,552,000	2,460,000
Integrative processes	88,000	246,000	238,000	572,000	75,000	497,000
Contingency	49,775	219,700	57,825	327,300	151,150	176,150
Subtotal :	1,045,275	4,613,700	1,214,325	6,873,300	3,174,150	3,699,150
Management & Admin. Fee 11%	114,980	507,507	133,576	756,063	349,157	406,907
Total :	1,160,255	5,121,207	1,347,901	7,629,363	3,523,307	4,106,057

b. Input Budget

Description	2013	2014	2015	Total USD	MRC Funded USD	Trust Fund USD
Experts / Consultants	762,500	3,993,000	808,500	5,564,000	2,948,000	2,616,000
Official Travel	98,000	216,000	98,000	412,000	38,000	374,000
Meeting costs	50,000	170,000	200,000	420,000	37,000	383,000
Operational costs	85,000	15,000	50,000	150,000	0	150,000
Contingency (5%)	49,775	219,700	57,825	327,300	151,150	176,150
Subtotal :	1,045,275	4,613,700	1,214,325	6,873,300	3,174,150	3,699,150
Management & Admin. Fee 11%	114,980	507,507	133,576	756,063	349,157	406,907
Total :	1,160,255	5,121,207	1,347,901	7,629,363	3,523,307	4,106,057

c. Detailed Budget

Description			2013	2014	2015	Total	MRC Funded	Partner Request
International Experts / Consultants								
--12 Specialist Consultants	2112	days	528,000	1,056,000	528,000	2,112,000	1,232,000	880,000
--Data Integration Consultant	132	days	33,000	66,000	33,000	132,000		132,000
--Study Coordinator	396	days	132,000	132,000	132,000	396,000	396,000	0
--Report Editor	44	days			44,000	44,000		44,000
-- Literature Review Consultant	40	days	20,000			20,000		20,000
-- Project evaluation	22	days			22,000			
Sub-Total Int Experts			713,000	1,254,000	759,000	2,726,000	1,628,000	1,098,000
Riparian Experts / Consultants								
--4 National Coordinators	396	days	49,500	99,000	49,500	198,000		198,000
--40 National Thematic Experts	5280	days		2,640,000		2,640,000	1,320,000	1,320,000
Sub-Total Riparian Experts			49,500	2,739,000	49,500	2,838,000	1,320,000	1,518,000
Travel								
-- 3 TWG meetings	40	pax/meeting	38,000	76,000	38,000	152,000	38,000	114,000
--12 International consultants to VTE	3	trips/pax	60,000	60,000	60,000	180,000		180,000
--local field studies				80,000		80,000		80,000
Sub-Total Travel			98,000	216,000	98,000	412,000	38,000	374,000
Meeting Costs (expect int & reg travel)								
-- 3 TWG meetings			50,000	50,000	50,000	150,000	20,000	130,000
-- 8 National Meetings				80,000	80,000	160,000		160,000
--2 Synthesis Meetings				40,000	40,000	80,000	17,000	63,000
--Stakeholder Workshop					30,000	30,000		30,000
Sub-Total Meeting Costs			50,000	170,000	200,000	420,000	37,000	383,000
Operational costs								
--Software Licences			50,000			50,000		50,000
--Equipment			25,000	5,000	0	30,000		30,000
--Stationary			10,000	10,000	10,000	30,000		30,000
-- Document Production					40,000	40,000		40,000
Sub-Total Operational Costs			85,000	15,000	50,000	150,000	0	150,000
Contingency 5%			49,775	219,700	57,825	327,300	151,150	176,150
Sub-Total			1,045,275	4,613,700	1,214,325	6,873,300	3,174,150	3,699,150
Management & Admin 11%			114,980	507,507	133,576	756,063	349,157	406,907
Total			1,160,255	5,121,207	1,347,901	7,629,363	3,523,307	4,106,057

Annex 2: Work-Plan

Tasks	2013												2014												2015											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec									
Objective 1: Further develop/establish a reliable scientific evidence base on the environment, social and economic consequences (positive and negative) of																																				
Output 1.1: Review the past scientific knowledge base and databases in terms of use as a basis and baseline for the study.																																				
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Activity 1.1.3: Archiving info																																				
Output 1.2: Critical knowledge gaps in understanding of the Mekong River system and the impacts of development of the main thematic topics of infrastructure																																				
Activity 1.2.1: Describing WR developments																																				
Activity 1.2.2: Listing priority information, data and																																				
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Output 3.2: Member Countries' staff participating in the study is able to undertake major thematic studies and possible tools and guidelines are documented for																																				
Activity 3.1.1: Including NMC personnel in monitoring																																				
Activity 3.1.2: Including Member Country line agency																																				
Key																																				
Deliverable																																				
Workshop																																				
Activities Undertaken by others																																				
Council Study Activities																																				

Annex 3: List of Main Thematic, Supporting and Technical Reports

a. Main Thematic Reports

- Cumulative Positive and Negative Impacts of the Selected Water Resources Developments and infrastructure on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.
- A Thematic Report on the Positive and Negative Impacts of Irrigation Development on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.
- A Thematic Report on the Positive and Negative Impacts of Non-irrigated Agriculture Development and General Trends in Major Land-Use Categories on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.
- A Thematic Report on the Positive and Negative Impacts of Domestic and Industrial Water Use on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.
- A Thematic Report on the Positive and Negative Impacts of Flood Protection Structures and Floodplain Infrastructure on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.
- A Thematic Report on the Positive and Negative Impacts of Hydropower Development on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.
- A Thematic Report on the Positive and Negative Impacts of Navigation Infrastructure Development on the Social, Environmental and Economic Conditions of the Lower Mekong River Basin and Policy Recommendations.

b. Technical Reports

- Inception Report of the MRC Council Study.
- Scoping and Assessment Report of Existing Information, Data and Knowledge for the MRC Council Study.

- Hydrology Data, Modelling and Results Report for the Assessment of Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Groundwater Hydrology Data, Modelling and Results Report for the Assessment of Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Sediment Data, Modelling and Results Report for the Assessment of Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Water Quality Data, Modelling and Results Report for the Assessment of Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Fisheries Assessment of the Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Environmental Assessment of the Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Socio-Economic Assessment of the Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Macro-Economic Assessment of the Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- A Climate Change Assessment of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.

c. Working Papers

- Specifications of Selected Irrigation Developments and Infrastructure for Use in Hydrological Modelling.
- Specifications and map of Selected Non-irrigation Agriculture Development and General Trends in Major Land-Use Categories in the Lower Mekong River Basin for Use in Hydrological Modelling.

- Specifications and Map of Selected Domestic and Industrial Water Use in the Lower Mekong River Basin for Use in Hydrological Modelling.
- Specifications and Map of Selected Flood Protection Structures and Floodplain Infrastructure for Use in Hydrological Modelling.
- Specifications and Map of Selected Hydropower Developments for Use in Hydrological Modelling.
- Specifications and Map of Selected Navigation Infrastructure Development.
- Data Collection Guidelines for the Integrated Basin Flow Assessment of Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin – A Report for the Council Study.
- Description and Map of Consolidated Eco-hydrological Zones and the Representatives Sites for the Integrated Basin Flow Assessment of Positive and Negative Impacts of Selected Water Resources Developments and Infrastructure in the Lower Mekong River Basin.
- Modelling Report on the Impact of Climate Change on Hydro-Climatology in the Lower Mekong River Basin.

Annex 4: Table of Contents – MRC Council Study Inception Report

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2.3 Existing Modelling Activities

2.4 External Research Organizations and Publications

2.5 Significant Gaps

3 Methodology and Framework

3.1 Detailed Assessment Methodology

3.1.1 Hydrologic Assessments

3.1.2 Biological Assessments

3.1.3 Social Assessments

3.1.4 Economic Assessments

4 Study Implementation

4.1 Detailed Work-Plan, Activities, Work-Plan, Milestones and Budget

4.1.1 Field Assessment Plan/Needs

4.2 Resources Requirements

4.2.1 Consultancy Input

4.2.2 Other Resources Input

4.3 Detailed Budget

5 Study Management

5.1 Composition of Thematic and Discipline Teams

5.2 Roles and Responsibilities of MRCS Programmes

5.3 Study Monitoring and Evaluation

5.4 Risk Management

6 Conclusions and Recommendations for Study Implementation

Annex 1 – Council Study Terms of Reference

Annex 2 – Composition and Detailed Work Packages for Thematic and Discipline Teams

Annex 3 – Terms of Reference for External Consultants including Study Coordinator

Annex 4 – Map of Consolidated Hydro-Ecological Zones and Representative Sites