



MEKONG RIVER COMMISSION

KEY FINDINGS

from

**The Study on Sustainable Management and
Development of the Mekong River Including Impacts
of Mainstream Hydropower Projects
– the Council Study**

13 December 2017

During the Third Mekong-Japan Summit in Bali in November 2011, the Prime Ministers of the four MRC Member Countries resolved to conduct a Study on Sustainable Management and Development of the Mekong River, including the impacts of Mainstream Hydropower Projects. The MRC Council commissioned the study at its 18th meeting in Siem Reap in December 2011. The Council Study, as it became known, aimed to provide an objective scientific assessment of the environmental, social and economic costs and benefits of existing and planned water resource developments in the Lower Mekong Basin to inform decision makers.

The Council Study used a sequence of qualitative and quantitative models to examine a set of water resource development scenarios. The modelling outputs were integrated as a systematic framework to describe outcomes for selected environmental, social and economic indicators, and to carry out assessments. These, in turn, informed the social and economic analysis of six thematic sectors. The framework provides a coherent, scientific foundation for the assessment of water resource developments, and is complemented with accessible, practical methodologies and modelling tools, and a knowledge base to support further studies, deliberations and decision-making processes.

The Council Study examined three main water resource development scenarios: (i) **The early development scenario**, characterizing baseline water resource developments in 2007 (M1); (ii) **The medium-term definite future scenario**, characterizing existing, under-construction, and firmly-committed water related developments in 2020¹ (M2); and (iii) **The long-term planned development scenario**, characterizing the planned water developments in 2040 in addition to those assigned for 2020 (M3) for implementation over the following two decades. The main scenarios aggregate combinations of water resource developments, enabling the cumulative assessment of environmental, social and economic effects in the Member Countries.

Assessing the cumulative effects of a combination of investments tends to mask the consequences associated with individual developments and/or thematic areas. Twelve sub-scenarios were evaluated to isolate sector-specific contributions, and comprise reductions or increases in sector-specific investments relative to those in the M3 scenario of agricultural land use, flood protection infrastructure, hydropower and irrigation. A set of three sub-scenarios was also devoted to isolating the impacts of Climate Change.

The study was designed to be flexible, transparent and replicable to accommodate improved data management and continued refinements of the assessment tools. The importance of the study assessment framework is not that it is definitive and without information gaps, but that it provides a robust scientific foundation combined with an accessible, practical methodology and knowledge base to support further studies, deliberations and decision-making processes.

EXISTING WATER RESOURCE DEVELOPMENT: TRENDS AND CHALLENGES IN THE LOWER MEKONG BASIN

Future development of water resources in the LMB will need to address a wider portfolio of environmental, social and economic resolutions, and account for current and future challenges specific to the region:

¹ It is including the Xayaburi and Don Sahong hydropower projects

- Existing water resource developments in the LMB create substantial trade-offs between water, food and energy, and between countries.
- Climate change is correlated with impacts associated with water resource development. The combined effects are extremely challenging, demanding broader multidisciplinary analyses. Focal issues include the increase of sea level rise on the propensity for flooding and saltwater intrusion in the Vietnam Delta, and the increased vulnerability of some riparian communities.
- Safety guidelines, preparedness and impact assessments of projects are becoming more objective, and the findings are increasingly subject to independent scrutiny and stakeholder verification.
- Quantifying the relative advantages and detriments of water resource developments is challenged by the conflicting demands of diverse stakeholders, a lack of accepted, standardized methodologies, data of varying reliability and accessibility, and processing capabilities. Combined, the challenges create an environment conducive to multiple and diverse Council Study interpretations aligned with specific advocacies, interests and biases. Targeted data collection is still required, and the integrated tools developed during the Council Study are being further refined in consultation with the Member Countries. The Council Study results are not definitive, but are introduced as a robust science-based foundation to support ongoing studies, deliberations and decision-making processes.

WATER RESOURCE DEVELOPMENT PLANS: BENEFITS, CHALLENGES AND OPPORTUNITIES

Overall key messages of the planned development scenario outcomes. The Council Study identified a number of challenges and opportunities associated with the planned development scenario (2040) in comparison to the M1 (2007) baseline situation:

- Hydropower is predicted to provide nearly half of the combined **sector growth** under the M3 scenario. The estimates of hydropower contributions do not traditionally account for trade-offs.
- Hydropower projects in the Mekong Basin **reduce wet season flows and increase dry season flows under normal operation (with the exception of extreme climatic conditions)**, reducing flood damage, but introducing negative effects on riparian ecosystems, sustainability and food security associated with fish production.
- **Reduced sediment and nutrient transport downstream** caused by hydropower projects in the Mekong Basin, including China, is expected to reduce soil fertility, rice production and fish yields. The most vulnerable areas are the Cambodia floodplains, the Tonle Sap system and the Mekong Delta in Viet Nam.
- **Bank and bed erosion is expected to increase substantially** in the Lower Basin, especially in the Mekong Delta in Viet Nam and some areas along the Mekong River from Vientiane to Stung Treng.
- **Wide-ranging negative ecosystem impacts** from the reduction in sediments include the construction of flood-protection infrastructure and barriers to fish migration. Reservoirs associated with mainstream hydropower projects are expected to convert much of the Mekong River, from Chiang Saen in Thailand to Kratie in Cambodia, into deeper lake-like habitats – with the exception of a large area from Vientiane to Pakse in Lao PDR that will not be impounded.

Such habitats are not suitable for many species that inhabit the Mekong, but are suitable for others, such as bivalves, frogs and snails.

- Water resource development of the M3 scenario is predicted to **affect food security and worsen poverty**. Aggregate household incomes are predicted to decline. Poverty levels are expected to rise in most zones. The total dollar value of fish catch in the Mekong corridor is expected to decline by \$1.57 billion. Fish prices are expected to increase, which would affect poor households. The dollar value of the predicted increase in corridor rice production is \$0.95 billion.
- The **benefits** and **trade-offs are not evenly distributed** throughout the LMB and are not necessarily confined to the source country.
- The developments included in the development plans potentially **over-invest in agriculture and hydropower** to the detriment of existing food security, which is likely to negatively affect GDP growth in the LMB countries. Planned agricultural expansion, especially in medium- and long-term scenarios, would increase labour demand and raise the possibility of underutilised or abandoned agricultural infrastructure.
- **Climate change** will likely amplify negative impacts. Climate change poses a significant risk to both food security and GDP growth, particularly if predicted drier conditions materialise. Drier climatic conditions reduce hydropower benefits by up to \$2.2 billion in net present value and increase fish losses by ca 15%. The combined effects of over-investment in agriculture and hydropower, and more severe climate change, could compromise the prospects of LMB countries achieving or sustaining lower or middle-income status.
- The future growth potential of all Member Countries depends on the availability of **natural capital (forests and fish)**. **Predicted declines in natural capital of the medium- and long-term development plans amount to nearly the entire GDP of the Lower Mekong Basin in 2017.**

SPECIFIC SECTOR OUTCOMES:

- **Agriculture and Land Use:** Hydropower development could enhance farm productivity by reducing the risks of flood and drought. In Viet Nam, however, reduced Mekong flows and rising sea levels will increase saltwater intrusion and lower rice production. Expanding farmlands and increasing irrigation capacity would make agricultural production more reliable, but comes at the cost of accelerating soil erosion and land degradation.
- **Irrigation:** increases agricultural production and reduces food security risks. But irrigation efficiency in the Lower Basin needs to be improved. Sustainable irrigation requires reducing water delivery losses, enlarging storage capacity, rehabilitating old irrigation facilities and strengthening the capacity of farmers to manage the facilities.
- **Domestic and Industrial water use:** Concentrations of nutrients (nitrogen, phosphorus) in the river systems tend to exceed World Bank and MRC thresholds levels. Nutrient loads are amplified during the dry season.
- **Floods:** Reductions in sediment load due to Upper Basin, Lower Basin and tributary dams will necessitate significant expenditure on bank protection along the Mekong mainstream in Cambodia and Vietnam's Mekong Delta. Transboundary erosion will increase rapidly with the completion of dams in the Lower Mekong Basin. The protection of at-risk river banks will require investments of up to \$6 billion. Flood risk and potential damage will increase 5 to 10 times as

the value of assets increases in tandem with developing economies, especially in urban areas with higher exposure.

- **Hydropower:** Hydropower contributes nearly half of the combined sector growth under 2040 plans. Hydropower is linked to trade-offs: about 26% of the hydropower gains would be lost in the fisheries sector under the medium-term development scenario, and 15% for the long-term development scenario. Implemented mitigation measures could reduce fish losses in the long-term development scenario by an estimated 11%.
- **Navigation:** Upstream hydropower dams in the long-term development scenario would create river sections with sufficient water depth over the whole year for larger vessels to sail, which would substantially reduce dredging works. With necessary investments, sustainable growth of the navigation sector in the Lower Mekong Basin can be achieved.

RECOMMENDATIONS

Sustainable water resources development in the LMB, the central tenet of the MRC 1995 agreement, will not be achieved by a singular reliance on unilateral investment decisions of the Member Countries. **The transboundary connectivity**, mutual dependencies, shared resources, opportunities of scale and cooperation necessities require a set of supra-national joint development and planning policies for the advancement of integrated beneficial projects. An objective science-based approach is one of the essential ingredients to guarantee mutually shared benefits and costs, including for private investors. This justifies the identification of more synergetic management, and prioritization on the selection of stronger strategies.

A cross-sectoral mechanism to manage trade-offs and balance positive and negative impacts is preferable to a system that compensates individual losses related to water resource investment between countries concerned. Such a mechanism would minimise the need for decisions and arrangements where a lack of data may be a big concern. A possible solution to benefits acquired by energy companies at the expense of fishing households faced with lower catches in all four countries, for example, could be a levy of around 9 percent of annual profits for tributary dams, and 19 percent of annual profits for mainstream dams. Such levies would mobilise resources and offer unprecedented access to finance otherwise unavailable through climate change mitigation measures.

The institutionalization of the MRC in close collaboration with the NMCs could lead to a better characterisation of processes and integrating mechanisms, as shown by the Council Study. It could anchor the achievements to further support national and regional planning, including the management of trade-offs.

Member Country consideration of **emerging energy technologies** that are competitive with hydropower is a main recommendation emerging from the Council Study. Assessing emerging new technologies would provide major insights for managing the water, energy, and food nexus in the Lower Mekong Basin. Several other components of this study would benefit from further improvement; in particular the socio-economic modelling, by considering price, labour, and migration dynamics; the improved analysis of sediment; and, the advancement of the sustainability index aligned with the UN Sustainability Goals.