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SYNOPSIS

Mekong at the Crossroads: Next Steps for Impact Assessment of Large Dams

Marko Keskinen, Matti Kummu, Mira Käkönen, Olli Varis

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INTRODUCTION

The Mekong River in Southeast Asia stands at the crossroads. As discussed in Ambio Special Issue (Kummu et al. 2008), the crossroads is ultimately about the way the river and its abundant resources should be used, with the most heated debate evolving around the issue of large hydropower dams. A relatively pristine river with an estimated hydropower potential of 53 000 MW in the basin, the Mekong forms a tempting source of energy for the growing riparian economies (ICEM 2010; Grumbine and Xu 2011). Yet, the dams are estimated to radically reduce the current benefits derived from the river, including its multibillion dollar fisheries that form the basis for food security and livelihoods for millions of people (Kummu and Sarkkula 2008; Lamberts and Koponen 2008; Dugan et al. 2010; Arthur and Friend 2011). The thematic crossroads thus appears largely as a choice between large-scale, economic-driven water utilization and a more diverse, decentralized use of water-related resources (Keskinen 2008; Kummu et al. 2008; Molle et al. 2009; Lazarus et al. 2011; Stone 2011).

We argue that there is also another, methodological crossroads that deals with the most suitable ways to assess the development plans. While this crossroads is much less discussed, the entire debate about the Mekong development revolves very much around such assessments, as their findings are used to justify the development plans. The contradictions regarding the assessments became well visible last April, when the four member countries of the regional Mekong River Commission (MRC) failed to reach a consensus on the first mainstream dam proposed by a MRC member country, namely the Xayaburi dam in Laos (MRC 2011a). Laos insists that the planning of the project is sound and the dam construction can start, followed by a number of other mainstream dams. Other MRC countries of Cambodia, Thailand, and Vietnam are, however, concerned about harmful impacts, and call for more rigorous assessments—Vietnam even suggested a 10-year suspension of all mainstream dam plans to allow enough time for this. As a result, during the MRC Council Meeting in December 2011, the ministers from the four MRC countries agreed that a further study about the impacts of the mainstream hydropower projects is needed (MRC 2011b).

The suggested strengthening of the regional assessment processes has a good chance to become a landmark event even beyond the Mekong, and it can make the Mekong countries the forerunners in cumulative assessment of hydropower dams and other large-scale water development. For after a slowdown in the construction of large dams at the turn of the millennium due to their remarkable environmental and social costs (WCD 2000), recent years have witnessed a renewed interest toward hydropower (Moore et al. 2010). This has been partly thanks to improved planning and assessment processes, but first and foremost due to rapidly increasing energy demand particularly in the developing world. In the Mekong, the combination of high dependency on hydrocarbons and rapid increase in electricity demand—around 8 % per year, one of the highest in the world—has led to a renewed push toward large-scale hydropower (ICEM 2010). Well over hundred large dams are planned to the mainstream and the tributaries (MRC 2010; Fig. 1), making the Mekong the

scene for one of the most intensive hydropower developments globally.

ASSESSING THE IMPACTS OF WATER DEVELOPMENT

The Mekong has seen a number of regional impact assessment processes of planned hydropower dams and other water development, many of them done by the MRC (Table 1). However, as China is not a member of the MRC, the current regional assessments are focused on the Lower Mekong Basin, and the Chinese hydropower projects are largely seen just as upstream drivers of change. In sum, all major assessments indicate remarkable economic benefits from hydropower, but also significant negative impacts, particularly to the immense fish production of the river.

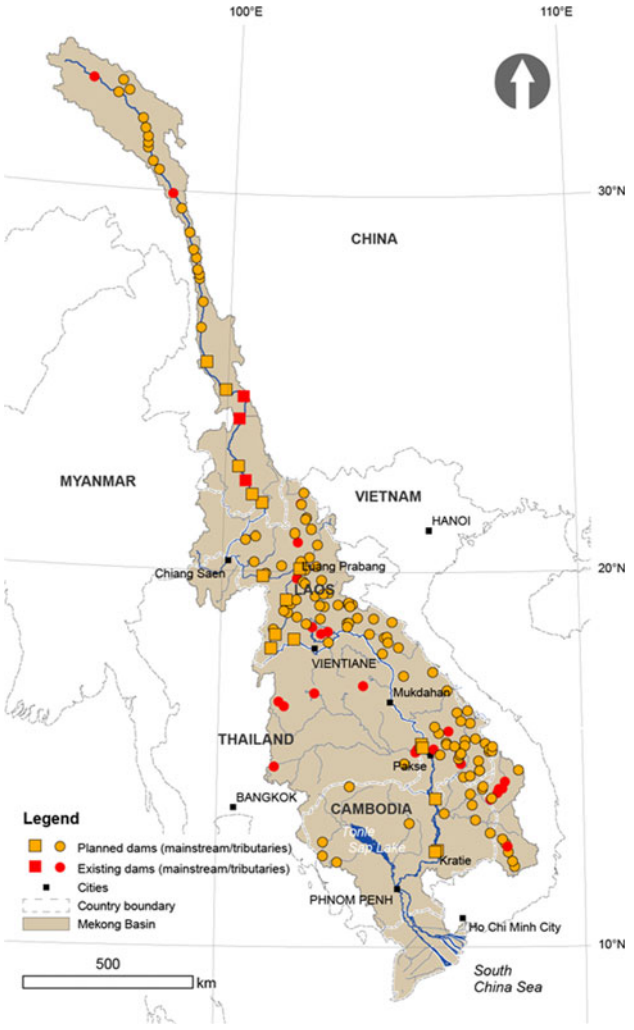

Fig. 1 Existing and planned dams in the Mekong River Basin, with mainstream dams marked with *boxes* and tributary dams with *circles* (modified from Johnston and Kummu 2012)

The benefits and costs of the planned dams are also estimated to be unevenly distributed, both within and between the riparian countries. At the same time, the estimates about the magnitude and actual implications of the impacts range widely, thanks largely to differing methods and framings used in the assessments.

When comparing the findings of the different assessments, it is interesting to note that the assessment done directly within the MRC (2006, 2010) seem to have bit different approach than the assessments done more independently (MRCS/WUP-FIN 2007; ICEM 2010). Most remarkably, the MRC assessments tend to downplay the uncertainties related to assessment processes and instead put more emphasis on the controllability of the impacts and the manageability of the identified trade-offs (Käkönen and Hirsch 2009). We suggest that these characteristics may have to do with the dual role that the MRC has, as it seeks to act both as an independent knowledge producer and as a political discussion forum between its member countries. While such dual role is understandable and globally rather common, the problem is that it has resulted in unhealthy practices, and for example, assessment results are commonly subjugated to the political screening by the MRC member states before being published.

The situation is, however, changing. Following the consultation process of the Xayaburi hydropower dam, also the riparian countries are now calling for broader assessments, and increasingly question the discrepancies between the assessments. There thus seems to be an obvious need to critically review and partially revise the existing assessments methods, in order to make them more responsive to the needs of regional and national decision making. Building on the review of different assessments presented in Table 1 (see also Keskinen 2008; Sarkkula et al. 2007; Keskinen and Kummu 2010; Keskinen et al. 2012), we argue that the most critical steps in revising the Mekong impact assessment are the following three transformations: from assessments of individual projects and sectors to cumulative impact assessment; from purely technical approaches to more holistic and inclusive analyses; and from separate studies to parallel, comparative assessments that also clearly spell out the uncertainties and risks included.

Cumulative Assessment

Current impact assessments in the Mekong tend to have a strongly sectoral approach, assessing the impacts of proposed water development separately to water flows, fisheries, livelihoods and economy (see e.g., MRC 2006, 2010). While such an approach provides a logical starting point, it also compartmentalizes the river system into separate units, which are then connected mainly through

Table 1 Selected regional assessment processes related to the Mekong's development plans

Impact assessment process	Based on	Main findings and recommendations
World Bank synthesis based on MRC Decision Support Framework DSF (World Bank 2004)	MRC's DSF model suite + related analyses	Coordinated development: Large hydropower potential with relatively small hydrological impacts, maintenance of fisheries requires attention. Calls for a coordinated development to ensure benefits for all countries
Basin-wide cumulative impact assessment as part of the Nam Theun 2 impact assessment study (ADB 2004)	Hydrological models (Mike Basin, Mike 11) + related analyses	Development brings both pros and cons: Significant hydrological changes bringing both positive (flood prevention, delta support) and negative impacts (fisheries, Tonle Sap system)
MRC Integrated Basin Flow Management (MRC 2006)	Expert panel review combined with modeling (MRC's DSF)	Room for development: Substantial room for water development with significant economic benefits, and possibilities for both mitigation and trade-offs. Yet considerable negative impacts to fish and the Tonle Sap system
MRC Lower Mekong Modeling Project (MRCS/WUP-FIN 2007)	Modeling (EIA models) complemented with environmental and social analyses	Tonle Sap and fisheries under threat: Remarkable negative impacts to fisheries and floodplains, and hence to livelihoods and food security. Distribution of the benefits and costs most likely very unequal both within and between the countries
MRC Strategic Environmental Assessment of Mainstream Dams (ICEM 2010)	Synthesis of existing modeling and assessment work	High risks so moratorium needed to learn more: Hydropower brings benefits, but also significant negative impacts. Due to serious risks and uncertainties a 10 year moratorium on mainstream dams is recommended to allow more thorough studies and consultation
MRC Basin Development Plan Assessment (MRC 2010)	MRC's DSF model suite + additional assessments	Economic gains, but also harmful impacts to fish: Economic benefits significant, but also negative impacts particularly on fisheries. The more intensive the development, the more uneven the distribution of both benefits and risks

ADB (2004), ICEM (2010), MRC (2006, 2010), MRCS/WUP-FIN (2007), World Bank (2004). Several other assessments at both national and regional levels exist; see e.g., Adamson (2001), ADB (2008), Costanza et al. (2011) as well as the listings in Sarkkula et al. (2007) and Keskinen and Kummu (2010)

rigid causal chains. As the river basin in reality forms an interconnected system with complex impact and feedback loops, such compartmentalization leads easily to oversimplified representation of the actual net impacts (Keskinen 2008; Lamberts 2008).

The assessments also focus predominantly on hydrological impacts, as these are by far the easiest to estimate. Yet, the debate about the dams is not only about the changes they cause in water levels, but essentially about the impacts to water-related ecosystems and, consequently, to livelihoods and food security. None of the current assessments in the Mekong is, however, able to describe such impacts in a very reliable manner. In addition, most impact assessments focus on project level, looking at the estimated impacts of a certain predefined set of development plans. Yet, in the context of several dozens of water infrastructure projects in both the Mekong mainstream and the tributaries, such separate assessments cover only part of the actual, combined impacts of the planned water development projects.

For these reasons, it feels evident that project level, sectoral assessments should be complemented with broader, cumulative assessments looking at the combined impacts of all known development plans that better account for social and economic impacts. Critical is also the temporal dimension of the expected impacts: as the development projects are not implemented simultaneously, also their impacts are felt differently at different time scales.

Increasing Inclusiveness

Impact assessment is commonly an expert-led undertaking building on detailed mathematical models and intricate cost-benefit analyses. While well-developed technical methods are a prerequisite for successful assessment, they can also become—intentionally or unintentionally—tools for exclusion. For all their details, the methods easily translate the discussion about the impacts into technical language that excludes most of the non-experts from the debate.

Given the highly political nature of water development, assessments should pay a particular attention in avoiding such over-technicalization and 'black-boxing'. Also, as the assessments do not belong to the area of pure science but

that of regulatory science (Jasanoff 1990), the importance of communicating their findings in an inclusive manner is even greater. These points argue for assessments that provide a distinct, transparent account of the methods used and findings achieved, including a forthright description of the risks and uncertainties involved. Transparency is particularly important as the assessments—while aiming for objectiveness—are shaped to varying degree by certain assumptions, values, and power relations. This holds specifically in situations, such as in the Mekong, where the decisions relate to complex systems and can lead to high economic and social gains and costs.

It seems therefore important that the assessment models are not seen as simple 'truth machines' describing reality and offering authoritative policy advice, but understood as cognitive heuristic devices that can advance diagnosis and facilitate discussion (Bäckstrand 2003). To increase their trustworthiness, the results from technical assessments should also be coupled and compared with other forms of knowledge production, including local knowledge on already felt impacts (see e.g., IUCN 2005). The assessment methods and findings should also be discussed openly in public, for example through similar multi-stakeholder forums that were organized during the recent consultation process regarding Xayaburi dam.

Comparative Approach

The Mekong has seen several assessment and modeling exercises looking at the impacts of proposed hydropower dams, and more is on-going and planned (see e.g., MRC 2011b; MONRE 2012). The great number of impact assessments has not, however, led to consistent understanding of the implications of the development plans, as the assessments provide partly differing findings thanks to their varied methods and scope (Keskinen and Kummu 2010; Johnston and Kummu 2012). Yet, the decision-makers base their decisions on the assessments, relying often on the findings of even a single assessment alone (Käkönen and Hirsch 2009).

What is therefore needed is a comparative assessment process that through an independent expert panel brings already existing assessments and models systematically together, compare their methods and scope, and provide a synthesis of their common findings and discrepancies. This would result in an impact range that would provide a more coherent picture of the expected impacts of planned development. In addition, such a process would point out the biggest uncertainties and risks included in different assessments, hence also recognizing the areas that still require further studies.

This kind of a comparative process is by no means undemanding—methodologically or politically—but there actually exist promising examples of such processes. At global level, for example, Millennium Ecosystem Assessment and the Intergovernmental Panel on Climate Change have made use of these kinds of comparative processes (MEA 2005; IPCC 2007). In the Mekong, the recent Strategic Environmental Assessment done for the MRC used a comparative approach in its work (ICEM 2010). In addition, the MRC has already successfully used an independent expert panel when seeking advice on the mainstream dams' impacts to fisheries (MRC 2008; Dugan et al. 2010).

WAY FORWARD

The Mekong Region is, similarly to many other fast-developing regions in the world, seeing rapid changes. The economies are developing and livelihoods diversifying. The environment and natural resources feel an increasing pressure from these changes. In terms of energy and food security, the mighty Mekong River forms a particularly critical resource. Unfortunately, the two forms of security seem not to be complementary, but largely contradictory: increasing energy security through large-scale hydropower is expected to radically reduce the food security, mainly due to harmful impacts to the immense fish production of the river system.

Tough decisions need therefore to be made about the water development in the basin. This difficulty was vividly reflected in the recent consultation process on Laos' Xayaburi dam, where the Mekong countries for the first time requested their neighboring country to refrain from building a hydropower dam to allow more comprehensive impact assessment take place. The good news is that promising examples for such assessments can already be found from the Mekong, as many of the recent assessments (e.g., ADB 2004; MRCS/WUP-FIN 2007; ICEM 2010; MRC 2010) have clearly more strategic and cumulative approach than earlier assessments.

Yet, more concerted effort is needed to assess benefits, costs and uncertainties of the current development plans, in order to maximize their sustainability and equality for all riparian people. For this to happen, we see that the existing assessment procedures require a revision, building on the three transformations—cumulative assessment, increasing inclusiveness, and comparative approach—discussed above. We believe that such transformations would increase the consistency of the assessments, help to indicate the areas still requiring further research, and, thus, enhance their relevance for the discussion about the ways to develop the region.

As the only transboundary water management institution in the Mekong, the MRC is, even with its weaknesses

(Molle et al. 2009), well placed to become a key institute leading such transformations. For this to happen, however, it needs to solve two difficult issues: to bring China on board to the basin-wide planning process, and to ensure the reliability and transparency of its assessments. We suggest that these challenges could be best solved through partnerships. At political level, such partnership would include much closer collaboration with China as well as with other regional cooperation mechanisms, most importantly the Greater Mekong Subregion Program. At methodological level, research cooperation with key Mekong universities and international research institutes would ensure increased trust toward the MRC's assessments. In this way, the Mekong assessment process would have a clear institutional home, but its application —and revision—would be a shared responsibility of all riparian countries, extending also beyond the governmental agencies.

This kind of coordinated assessment process would, we believe, radically improve the current assessments, and do this with considerably small additional resources. More generally, the on-going assessment process in the Mekong can provide important lessons learnt—both positive and negative—about cumulative assessment of large hydropower dams. Given the renewed interest to hydropower around the world and the drive to make hydropower more sustainable (IHA 2010), such lessons should be listened carefully also in other river basins.

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Marko Keskinen (✉)
Address: Water & Development Research Group, Aalto University, PO Box 15200, 00076 Aalto, Finland.
e-mail: marko.keskinen@aalto.fi

Matti Kummu
Address: Water & Development Research Group, Aalto University, PO Box 15200, 00076 Aalto, Finland.
e-mail: matti.kummu@aalto.fi

Mira Käkönen
Address: Finland Futures Research Center, University of Turku, Korkeavuorenkatu 25 A 2, 00130 Helsinki, Finland.
e-mail: mira.kakonen@utu.fi

Olli Varis
Address: Water & Development Research Group, Aalto University, PO Box 15200, 00076 Aalto, Finland.
e-mail: olli.varis@aalto.fi