How to guide for Natural Resource Management Basin Development Planning for the Lower Mekong Basin[1]

The aim of this document is not to evaluate or analyze basin development for the Mekong. In recent years this has been addressed in various ways by other studies, including several conducted by the Mekong River Commission (MRC). The 2016-2020 Basin development strategy for the lower Mekong Basin[1], in particular, provides relevant information and guidance and there is no need to duplicate. Rather this document aims to supplement these efforts and draws on the literature from independent studies, theoretical principles and critical discussions of basin management approaches (see insert) [2, 3] and discusses potential application in the Mekong. The intention is not to replicate past efforts or reinvent the wheel but to highlight some of these ideas for consideration.

The aim of this guide is to bring fresh perspectives from global research to the regional planning process and to highlight some interesting ideas and opportunities discussed in the literature and propose them as potential approaches that can be applied to basin development planning in the LMB. This document both acts as a reminder of some key elements of basin planning and also provides forward thinking towards a more holistic planning approach. In doing so, the aim is to demonstrate some of the considerations and opportunities for moving basin development in the LMB towards a more sustainable future.

Key requirements are identified along with describing potential approaches that are highlighted for improving effectiveness, equity and feasibility in basin planning. The document also provides some novel ideas and suggested approaches for meeting the challenges of sustainable and equitable resource exploitation in the face of climate challenges and diminishing resource availability. To meet the challenges of sustainable basin development planning new ideas and approaches will be needed. A theoretical 'how to' of basin development requires taking a step back from the political arena and working out what are the ecosystem needs as a new starting point for basin development. This document outlines a series of steps for developing an equitable and sustainable basin planning framework.



[1] Prepared by Vittoria Elliot for the Mainstreaming Natural Resource Management project. This project was implemented by Conservation International as a part of the Scientific Capacity Building Initiative. It was funded by the Critical Ecosystem Partnership Fund which is a joint initiative of l'Agence Française de Développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. A fundamental goal is to ensure civil society is engaged in biodiversity conservation.

The key to developing improved basin development plans for increased sustainability is integrated and rigorous planning. It sounds obvious but despite reference to basin planning in strategy and dialogue[4], historically basin development has not included a rigorous planning component prior to commencing construction[5,6]. In particular, whilst environmental impact assessments (EiAs) and other site-specific evaluations are frequently completed[4], a more holistic understanding of the broader impact and interaction between different developments is rarely, if ever employed[3].

Within sectors it is becoming increasingly important to plan holistically, such as evaluating the collective impact of hydropower dams at all potential sites and defining a suite of developments[7,8] or impacts of agriculture development in coastal areas and floodplains[9]. But it is also increasingly important to consider the impacts and opportunities between sectors and to plan development more collectively and in a more integrated way[(3-6)].

A principle requirement of holistic and equitable planning is for it to be developed 'apolitically' - a challenging if not impossible task for implementation. Nevertheless, planning for sustainable basin development that exploits natural resources and can continue to provide multiple ecosystem services requires evaluating service provision independent of the biases of any one sector[10]. Realistically, political negotiations will mean that some sectors will benefit more than others but a key element for ending up somewhere closer to the middle is to plan development in a way that initially ignores the sectoral biases[11].

Post-planning stakeholder evaluation is also important for moving from planning to implementation, but again this will have the tendency to complicate the process.

Taking an integrated approach at the planning stage that does not incorporate political bias, sector importance or stakeholder considerations has the benefit of relative simplicity and facilitates developing a more clear cut planning framework. The final stage of planning or the first step of implementation is to consider and incorporate these important elements and modify the implementation accordingly[12].

With these considerations, determining a body to prepare the basin development plan that can be impartial and unbiased whilst sufficiently knowledgeable is critical but also extremely challenging. Setting it as a primary objective however, is a key step towards achieving a plan that is holistic and unbiased.

Much has been discussed in the literature regarding planning and many different terms have been applied to define the principle of essentially integrating multiple components at the planning phase to produce more holistic plans. (See insert right). The challenge is going from discussing these concepts in the literature to applying them in real-life contexts.

A holistic planning approach that considers the risks and opportunities supported by trade-off decision analysis can help to improve the efficiency and sustainability of resource exploitation in the basin.

Basin Development Plans exist for almost all major river basins around the world. Critical review and evaluation of effectiveness and key needs, approaches, and links to IWRM is extensive and should be referenced for planning purposes.

- *Barrow, C.J.(1998). River basin development planning and management: A critical review. World Development [(3)]*
- *Molle, F. (2017). River Basin Management and Development. In International Encyclopedia of Geography: People, the Earth, Environment and Technology [(12)].*
- *World Bank (2006). Integrated river basin management: from concepts to good practice. World Bank Briefing Note 7. River Basin Planning and Management. Peter Millington, Douglas Olson and Shelley McMillan.[(4)]*
- *Dinar, Ariel, and Donna Lee. 1995. "Review of Integrated Approaches to River Basin Planning, Development and Management." Policy Research Working Paper 1446, World Bank.*

Decision support and trade-off analysis

Decision support and trade-off analysis are key components of a holistic approach to planning. Identifying conflicting resource requirements and determining ways to mitigate impacts and find the most equitable sharing of resources is a key component of basin development planning. It is usually not possible however to avoid negative interactions when competing for shared resources. Nevertheless, there is often a way to minimize negative impacts and or use a less detrimental approach.

Rice-field Fisheries is a prize example of a win:win for exploitation of two resources that often compete. As long as agriculture is performed using natural fertilizers and pesticides, then rice production in the floodplain does not necessarily negatively impact fishery habitats. Indeed, the fishery can benefit the rice crop by removing crop pests, whilst the fish benefit from the aggregation of prey items in the rice fields. Provided there are sufficient wetlands/flood forest habitats and other vegetation in the surrounding area, rice production can be beneficial to fisheries. Thus, it is important to ensure that not all floodplain is converted to rice fields, and therein lies the planning requirement. Determining how much should remain and how much to convert is where trade-off analysis comes in. Using sophisticated modeling techniques, it is possible to estimate the amount of habitat requirements and develop a 'plan' that meets these needs.

On the other hand, there are services such as hydropower where it is not possible to identify a win:win solution. However, there are ways of providing hydropower energy with greater or less impact on the fishery. Finding the solutions that have the least impact are key to sustainable development planning that provides equitable solutions for the provision of ecosystem services. For example, moving dams into headwaters, identifying key sites to avoid and designing fish passes are a few of the ways that can minimize negative impacts of hydropower development on fisheries. Going one step further, evaluating alternative energy solutions such as wind or solar power provision can avoid the negative impacts on other ecosystem services of damming rivers. Again, trade-off analysis can help to identify options and essentially determine what compromises are feasible to provide multiple services from the same ecosystem.

A key step to holistic planning is identifying the win:win outcomes, such as actions for the fishery that also improve water quality for drinking[14]. By looking at multiple services together it is also possible to plan development that provides benefits to multiple industries concurrently. For example, prior planning and cooperation between the energy and agriculture sectors can help identify the best placement for and management of dams that provide both irrigation and energy, thereby reducing the overall number of dams and avoiding one dam negatively impacting another[15].

Steps to the planning process

Outlined below are a series of steps or considerations for improving basin development planning and steps towards developing a framework or roadmap for more equitable and sustainable planning for the future.

Step 1: start by identifying the various developments and ecosystem service requirements. See box 1:

Step 2: identify the ecosystem opportunities for providing each service. i.e. energy from hydropower, wind, solar, etc. Food/nutrition from rice, fish, chickens, etc.

Step 3: identify the negative interactions between ecosystem service provision and develop a matrix of interactions

Step 4: identify ways to avoid each negative impact and add to matrix. See box 2:

Step 5: using the negative impact matrix developed in steps 3&4, determine ways to minimize the negative interactions

Step 6: overlay interactions geospatially

Step 7: make use of trade-off analysis tools to better understand interactions and to develop scenarios with different cost benefit outcomes.

Step 8: conduct stakeholder review and evaluation (including consideration of cultural norms)

Step 9: incorporate political context

Step 10: socialize the plan. see box 3

Box 1: identification of developments and ecosystem service requirements should be conducted based on the service provision required. i.e. in terms of *power or energy* needs rather than *hydropower* or *food* and *nutrition* provision rather than *fish*.

By initially considering these services independently of their provision creates an opportunity to think outside the box and consider solutions for service provision that have not necessarily previously been considered in the context. For example, traditionally fish and livestock are considered/ relied upon for the provision of protein in the Mekong. More recently the possibility that beans, nuts, tofu, fungus, and synthetic foods and other alternatives can provide some of the nutritional service has been proposed. Likewise, white rice is the traditional staple of Mekong countries but consideration of alternatives as part of the planning process for a food production solution is important (Obviously cultural considerations are important but at the planning stage these should not be included to offer the potential to explore opportunities unrestricted by these limiting factors and without prior supposition of outcomes. Ultimately a cultural change is needed and if alternatives are not considered because they would be culturally unacceptable there could be no future for food production).

Box2: step 4 refers to the negative impacts not interactions as it is not possible to provide some services without negative impacts to others thus interactions already implies trade-offs or compromise. For example, to avoid a negative *impact* of hydropower on fisheries you could plan to remove all hydropower development from a plan, but this would obviously still be a negative *interaction* as the maintenance of the fishery would negatively impact the development of hydropower.

Box 3 socializing a plan in step 10, is required when the plan steps away from 'business as usual' planning model. This is a key step in the process and critical for taking a plan that challenges the status quo to implementation. Cultural norms, such as food preferences and traditional approaches to cooking, etc. are often deep set and whilst alternatives may exist, automatic uptake will be limited due to social acceptance of change. Change is however essential if growing populations are to be fed, watered and maintained. And society can be adaptable. To adapt an old saying "The proof is in the eating of the bread and potatoes". Bread is not a traditional Asian food and potatoes were not traditionally eaten in Europe. Today however, both of these commodities are widely available and consumed. Change of this nature takes time but steps must be taken to propose alternatives if much needed changes are to occur. Socializing alternatives for food, energy etc. are key to getting stakeholder acceptance and identifying the best ways to introduce new opportunities and viable alternatives for service provision to society.

Conclusion

Whilst many planning processes can and should start with stakeholder consultation and context evaluation, taking a step away from the complexities of society and social requirements can also be extremely useful for determining the fundamental ecosystem service needs. It is not that these elements are unimportant - they are indeed critical for moving from plan to implementation. Nevertheless, if a planning framework for resource exploitation starts with considerations of political and societal preferences it constrains the process from exploring novel approaches or incorporating a fundamental understanding of the ratio of resource availability : resource use and usually results in the maintenance of the status quo or 'business as usual' model of exploration. With natural resources rapidly being depleted and climate change altering the environmental conditions, the status quo will not provide a sustainable solution for future development and resource exploitation. Exploring a variety of alternatives for meeting service (e.g. clean water, food security, energy) needs by looking at non-traditional resources for fulfilling them should be part of the next generation of sustainable development planning for the Lower Mekong Basin.

References: [1]MRC 2017. Mekong River Commission IWRM-based Basin Development Strategy 2016-2020; [2]Hart, B.T., 2016. The Australian Murray–Darling basin plan: challenges in its implementation (part 1). IJWRD, 32(6), pp.819-834; [3]Barrow, C. J. (1998). River basin development planning and management: A critical review. World Development; [4]World Bank (2006). Integrated river basin management: from concepts to good practice. World Bank Briefing Note 7. River Basin Planning and Management; [5]Loucks & van Beek (2017). Water resource systems planning and management: An introduction to methods, models, and applications; [6]Hernowo (2009) Roadmaps for river basin development: Center for River Basin Organizations and Management, Solo, Central Java, Indonesia. Small Publications Series. Managing water in Asia's river basins; [7]Winemiller et al. (2016) "Balancing hydropower and biodiversity in the Amazon, Congo, and Mekong." Science 351, no. 6269: 128-129; [8]Jager et al. (2015). Spatial design principles for sustainable hydropower development in river basins. Renewable and Sustainable Energy Reviews; [9]Hoanh et al. (2006) Environment and livelihoods in tropical coastal zones: managing agriculture-fishery-aquaculture conflicts. Environment and livelihoods in tropical coastal zones: managing agriculture-fishery-aquaculture conflicts (IWMI); [10] Wong et al. Power and politics in water governance: Revisiting the role of collective action in the commons. In: Water Governance and Collective Action, pp. 9-20. Routledge, 2017; [11]Flannery et al. (2016) Exploring the winners and losers of marine environmental. PT&P, 17:1, 121-151; [12]Molle, F. (2017). River Basin Management and Development. In International Encyclopedia of Geography: People, the Earth, Environment and Technology (pp. 1–12); [13]Dinar and Lee. 1995. "Review of Integrated Approaches to River Basin Planning, Development and Management." Policy Research Working Paper 1446, World Bank; [14]Bernes et al.(2015) "What is the influence of a reduction of planktivorous and benthivorous fish on water quality in temperate eutrophic lakes? A systematic review." Environmental Evidence 4.1: 7; [15]Lebel et al. (2005). "The politics of scale, position, and place in