

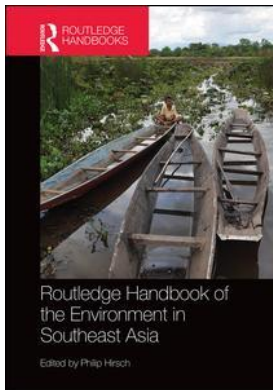
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THE MEKONG

Strategic environmental assessment of mainstream
hydropower development in an international
river basin*Jeremy Carew-Reid***Introduction**

This chapter is the story of damming the mainstream Mekong River – or, more precisely, of attempts by the Mekong River Commission (MRC) to bring a more integrated, informed and precautionary approach to mainstream development by initiating a strategic environmental assessment (SEA) of 12 hydropower dams proposed for the mainstream in Laos and Cambodia (ICEM, 2010). It is written by the team leader of the MRC-initiated SEA of hydropower development on the mainstream Mekong River, who is also director of the organization commissioned to conduct the SEA.¹ As such, it presents an inside reflection on the process and on the wider role of SEA in supporting an improved governance approach within an institutionally and scientifically weak planning milieu. Unless otherwise indicated, the insights and data in the chapter are from first-hand experience and from the SEA report.²

The SEA was only partially successful – it recommended a ten-year postponement of all mainstream dams until the potentially far-reaching impacts were better understood and, much more importantly, until the institutional capacity, expertise and authority were in place at national and regional levels to properly plan, construct and manage cascades of mainstream dams should they proceed. Vietnam and Cambodia embraced the SEA recommendations. However, after some indecision, Laos has ignored international pressure to adopt the SEA, especially from its downstream neighbours, and has permitted the first and second of ten mainstream dams in its territory – Xayaburi and Don Sahong – to go ahead. The fact that Laos would disregard its old ally Vietnam with such unnecessary and confident haste, and where so much is at stake, reflects the complexity of influential interests at play – international and domestic – in pursuing this controversial development. Those interests include China and Thailand – the two most advanced and resource-hungry economies in the Mekong region – as well as narrow vested interests from promoters, financiers and developers in the energy sector. It also reflects Laos's long history of political and economic domination by colonial powers and its neighbours, and now a determination in the Lao Politburo to assert its sovereign authority at all costs.

Dependence on the Mekong River – mother of waters

The name Mekong River, derived from ‘Mae Nam Khong’ or ‘the Mother of Water’, of Thai and Lao origin, reflects the river’s fundamental cultural, ecological and economic importance to the region. It is one of the world’s great rivers. It runs through six countries – seven prior to the 1951 consolidation of China’s sovereignty over Tibet. It is ranked eighth on Earth in terms of annual runoff (475,000 million cubic metres) and twelfth in terms of length (4,800 kilometres). The Mekong River has its source in the Tanghla Shan Mountains, at over 5,000 metres on the Tibetan plateau. From there, it flows south through steep mountain gorges in China’s Yunnan province, and then on to form the international borders between Myanmar and Laos and then between Laos and Thailand. It is a dominant natural feature of Laos, 97 per cent of whose territory lies within the basin (Table 20.1), and shapes its economy and traditions. The river forms the Lao–Thai international border for some 850 kilometres, with its basin taking in one-third of Thailand – its north-eastern region and part of its northern region. Importantly for the first Mekong mainstream dams to proceed, two sections of the river lie entirely within Lao territory. The river is even more central to Cambodia’s ecology and culture – 86 per cent of the country falls within the basin. The Mekong River in Cambodia receives approximately 25 per cent of its total water volume from Tibet and China, a further 50 per cent from north-eastern Thailand and Lao PDR and 20 per cent from north-eastern Cambodia and neighbouring parts of Lao PDR and Vietnam. Over 75 per cent of the flows have entered the mainstream as the Mekong crosses the border at the mighty Khone Falls. The falls pass by thousands of islands and through countless waterways, giving the area its name – Si Phan Don, or ‘the 4,000 islands’.

In Cambodia, the river maintains the world’s largest inland fishery concentrated around the Great Lake and Tonle Sap River, which experiences the unique seasonal ‘flow reversal’ of water into and out of the Lake. By now, the Mekong River flows across the flat terrain of the flood plain. It marks the beginning of the delta system south of Phnom Penh, with the river branching extensively as it flows into Vietnam. One-fifth of Vietnam falls within the Mekong Basin (including the Central Highlands, whose tributaries flow into the river and the delta).

The Mekong has two distinct seasons that are closely related to the rainfall pattern. In April to May each year, at the onset of the wet season and supplemented by Himalayan snowmelt, water levels begin to rise, reaching a peak in August to October. Then, in the dry season, water levels fall rapidly from December, reaching a low point in March to April just before the monsoon. The maximum monsoon flow of the river can reach 50 times its dry-season volume, raising the Mekong to the world’s top three rivers, with the Amazon and the Brahmaputra, in

Table 20.1 Territory and water flow of the six Mekong River Basin countries within the catchments

Description	Country or province						
	Yunnan province, PRC	Myanmar	Lao PDR	Thailand	Cambodia	Vietnam	Mekong River Basin
Area (km ²)	165,000	24,000	202,000	184,000	155,000	65,000	795,000
Catchments as per cent of country or province	38	4	97	36	86	20	
Catchments as per cent of MRB	21	3	25	23	20	8	100

Source: Mekong River Commission, 2003.

terms of wet-season discharge. With the wet season comes extensive flooding across the main-stream and major tributary flood plains, and covering the vast flat lands of the delta. Severe drought often accompanies the dry season, especially in the delta region of Cambodia and the coastal plains in Vietnam. The seasonal Mekong 'flood pulse' drives the immense fisheries and agricultural productivity of the basin.

More than 250 million people inhabit the Mekong region, with some 70 million of them living in the basin itself – most in Thailand and Vietnam, which have around 40 and 30 per cent respectively, while 10 million live in Yunnan province. The population of the lower Mekong Basin is expected to increase by about 65 per cent to 120 million by 2025. The region has more than 70 distinct ethnic and linguistic groups, spread across all six riparian countries. About 80 per cent of the basin population is dependent on the river and its linked natural and agricultural systems – farming, fisheries and the gathering of forest products – as the main source of livelihood, much of it at the subsistence level.

War, peace and pressures for natural resource development in the Mekong

After a long period of international conflict in Indochina, regional rapprochement from the late 1980s saw relative peace develop in the region. Despite ongoing skirmishes along the Lao–Thai, Cambodia–Thai, Thai–Myanmar and Cambodia–Vietnam borders and continuing internal conflicts in Laos, Myanmar and Thailand, the broader geopolitical peace has led to an escalation of aggressive economic expansionism by China, Thailand and Vietnam to exploit natural resources in Cambodia, Laos and Myanmar. This expansion has included forest exploitation, cross-border investments in plantations, and agribusiness, mining and other activities that have had both social and environmental impacts in the target countries.

Much of this development is happening with little information on potential impacts, in a way that is concentrating benefits in the hands of foreign firms and national elites and denying access to poor communities dependent on land and natural systems. The wave of aggressive economic development is transforming the aquatic and terrestrial natural systems of the Mekong Basin in ways that are unplanned and unwanted, reducing their quality, diversity and resilience – and, significantly, having serious transboundary effects. Put simply, wealthy riparian countries are exporting the environmental and social costs of their own growing economic activities and consumption patterns, and host-country governments and commercial interests are encouraging them to do so.

Development of the Mekong River's water resources and power potential is taking place against this web of political, economic and historical ties between the Mekong riparian countries – a web of growing complexity and financial interests.

Hydropower development on the mainstream Mekong River

The Mekong Basin has two distinct parts: the upper basin in China and Myanmar makes up 24 per cent of the total area and contributes 18 per cent of the flow, and the lower basin within the other four riparian countries contributes 82 per cent of the Mekong flow. That divide is significant politically in terms of river basin management – both China and Myanmar operate independently in development of the mainstream river, while the lower Mekong basin countries work to cooperate within the 1995 Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin and consultative framework provided by the MRC. China and Myanmar are observers at MRC meetings. Various assessments of the MRC have concluded that until the two upper basin countries join the Commission as full members – and

until national representation is raised to prime ministerial level – it will be hard for the MRC to take on effective river basin planning and management functions.

China’s Manwan dam was the first to be constructed across the Mekong River, or the Lancang as it is known in the upper basin. Construction began in 1986, with operation commencing nearly a decade later in 1995. Until then, the Mekong River was one of the last remaining large free-flowing rivers on Earth. Since then, China has built five more large dams across the river, eight more are underway and several others are planned in Tibet and Qinghai province. These large structures have been planned, constructed and operated without consultation with downstream riparian countries.

The Mekong River Commission’s SEA of hydropower on the mainstream Mekong River was launched in May 2009 at a time of renewed economic vigour and escalating investment in the region. The SEA was completed 16 months later, with the submission of the final report in September 2010. It began in a climate of general acceptance of the inevitability of mainstream hydropower development, and ended following an intensive region-wide consultation with a recommendation for a ten-year moratorium on mainstream projects until their far-reaching implications were better understood and adequate management and regulatory capacity was in place.

Early in 2009, 12 mainstream projects worth US\$25 billion were in the pipeline for Lao PDR and Cambodia, with investors and developers in detailed feasibility and design stages backed by substantial political momentum and commitment. Ten proposed mainstream projects would involve constructing dams in a cascade across the entire river channel – eight in Lao PDR, two of which are on the Lao–Thailand reaches of the mainstream and two in Cambodia. Another two projects near the Khone Falls in Lao PDR involve either partial damming (Don Sahong) or a diversion (Thakho) of the mainstream. The proposed dam

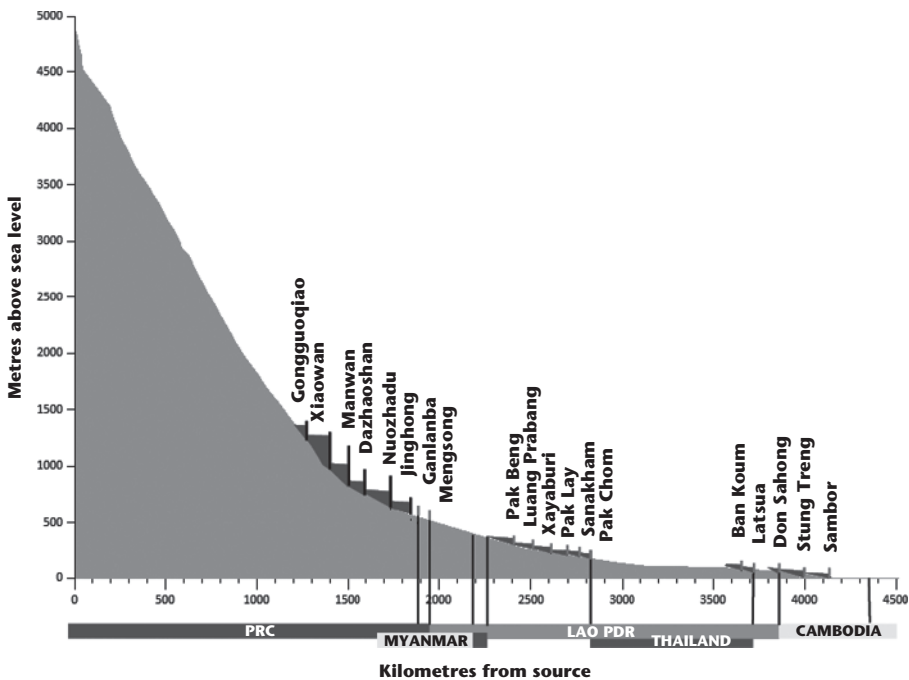


Figure 20.1 Proposed Mekong mainstream hydropower projects in the Lower Mekong Basin and Yunnan province, China

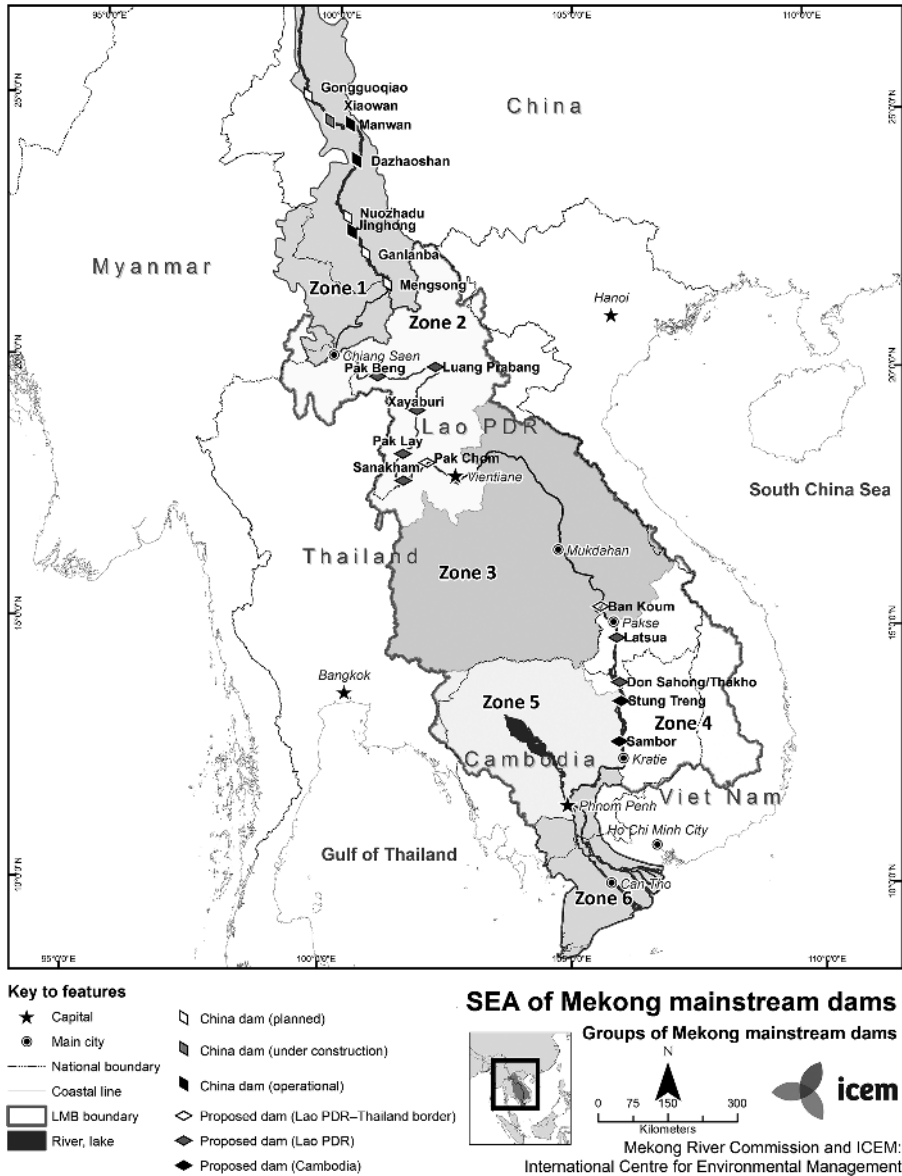


Figure 20.2 Proposed mainstream dams by ecological zones

structures ranged up to 18 kilometres in length across the river at Sambor in Cambodia and up to 76 metres in height for the dam at Pak Beng in Lao PDR (Figures 20.1 and 20.2). The main financiers and developers were from China, Thailand and Vietnam. Some 95 per cent of the power generation from the ten Lao projects is for the export of electricity to Thailand and Vietnam. Some 90 per cent of the Cambodia projects are also for export to Thailand and Vietnam. If those two countries were to decide not to import mainstream power, the projects would not be feasible.

The planning context for the SEA

The MRC contracted the International Centre for Environment Management (ICEM) to conduct the SEA following a competitive bidding process. At the time, the overriding opinion among National Mekong Committees and power-sector agencies was that mainstream hydropower development was a *fait accompli*. The China storage dams had opened the way for downstream development and even made it more economically attractive by smoothing out the seasonal peaks in flow. In the early days, the SEA team was regularly reminded by various power agencies and experts that the projects had already been decided by both host and consumer governments, with incentives given to national power organizations and national private-sector firms to take steps to put them in place.

The MRC's concern was that the planning was moving forward on a project-by-project basis, without adequate information on the cumulative effects of many projects – each affecting the operations and impacts of the others. The MRC launched the SEA to enhance the baseline information and assessment framework for subsequent government review of project-specific environmental impact assessments (EIAs) prepared by mainstream developers. The SEA was intended to deepen the guidance available to member countries when the formal process under the 1995 Mekong Agreement for prior consultation on any individual mainstream proposal was triggered (that is, the Procedures for Notification, Prior Consultation and Agreement, or PNPACA). The SEA findings were also to inform MRC programmes in the next MRC Strategic Plan Cycle (2011–2015) to help address the knowledge gaps and the key areas of uncertainty and risk concerning proposed mainstream developments.

There was not unanimous support for the SEA within the MRC Secretariat. That was understandable. Each programme team, especially the Basin Development Planning (BDP) team, was extremely busy with its own priorities and the SEA appeared as an add-on to already overloaded Secretariat staff. Some were concerned that it would distract from efforts to make the BDP and related consultations the main vehicle at the regional level for defining what should fill the 'development space' (the assumed potential for using Mekong water for electricity generation and irrigation without imposing unacceptable impacts) – the BDP process too was progressing on the assumption that at least some mainstream projects would go ahead. The BDP team was concerned that another parallel consultative process on strategic issues would create confusion and contradictory strategies for Mekong development. At a later stage in the SEA, the team attempted to forge an agreement with the SEA team to ensure that its recommendations were consistent with those of the BDP – especially on the issue of mainstream development. That would not have been appropriate and would have compromised the SEA process.

The above concerns notwithstanding, the SEA has made an important contribution to the BDP. The BDP is taking a basin-wide perspective and exploring options for all development sectors. The SEA was much more focused. It was situated within one sector – hydropower – and assessed the implications of proposed hydropower projects on the mainstream Mekong and the sectors that use its resources. Yet, at the time, the BDP process had such a head of steam that efforts to integrate the two – with the SEA feeding into the BDP and being part of the BDP process – were unsuccessful.

From the outset, it was clear to the SEA team that building credibility and good working relationships within the MRC Secretariat was essential. The SEA was dependent on each of the MRC technical programmes for foundation information and ongoing analytical and modelling support. It was the determination of senior MRC management that kept the SEA as an independent and cross-sector initiative in the MRC programme at the highest strategic level with a committed budget and reporting direct to the chief executive officer and to the MRC Council.

Challenges for the SEA

Equally important and challenging in the early stages was the need for the four Lower Mekong Basin (LMB) governments to ‘own’ the SEA process – to fully engage at the highest level and with active participation of the two ‘observer’ nations, China and Myanmar. Similarly, non-government stakeholders needed to believe that the SEA was an objective and valuable process worth contributing to. How was this to be achieved when time and funding were so limited – and with so many other issues on the regional political agenda? SEA success depended on finding ways to solve this critical issue.

In the early weeks of the SEA, the team and MRC management settled on a way forward. It was decided that ICEM would design an expanded consultation and communications plan to be integrated with the SEA process – and additional funding would be provided for the purpose. The backbone of the plan would be two rounds of national workshops linked to a series of four regional workshops with local-level meetings in riparian communities as feasible. Those events would take place at key stages in the SEA – scoping, baseline, impact and mitigation – and would include a back-to-back programme of small roundtable meetings with line agencies in each country (Figure 20.3). An important innovation was the preparation of a draft report at each of the four stages, which was circulated beforehand to regional workshop participants and placed online for review and comment. Stakeholders would be able to critique the SEA as it went forward, correct factual errors and have their opinions heard. This phased full disclosure approach ensured that at the end of the journey there would be no surprises for any interest group. Whether they agreed or disagreed with the outcome, they respected the process and were given an opportunity to influence it. More than 60 line agencies, 40 NGOs and civil society organizations and some 20 international development organizations were involved in SEA meetings and workshops.

Other challenges confronted the SEA. Normally, SEAs are seeking either to improve the sustainability performance of an existing plan, or to help shape it as it is prepared. In this case, there was no plan – only 12 projects unrelated from a planning viewpoint. The 12 projects were

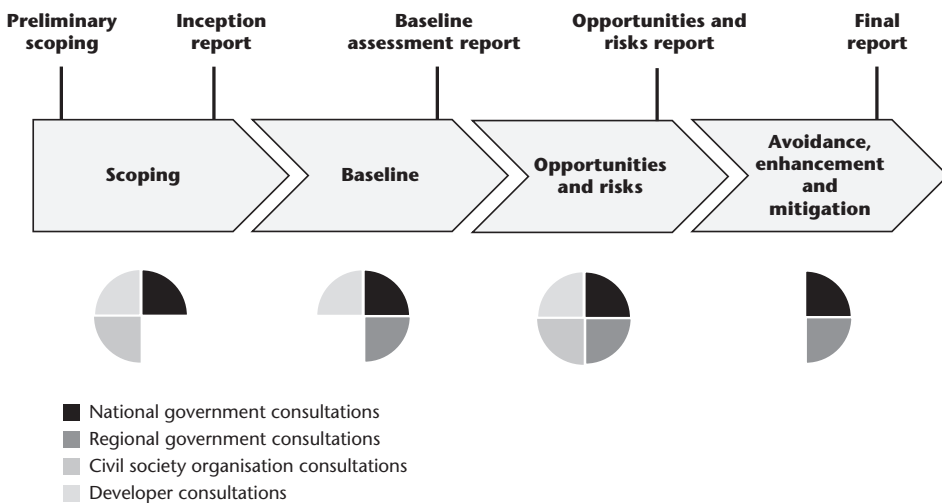


Figure 20.3 Main stages in the SEA process

'the plan'. A related concern was the absence of a Mekong River Management Plan – within each country or at a regional level – against which the projects could be assessed. At the 'Greater Mekong Subregion' level, there was a Power Plan which was under revision by the Asian Development Bank and involved all six Mekong countries – but it was strictly sector-based, without consideration of environmental and social issues or even of the full range of alternative energy futures. The MRC BDP was a basin-wide plan but without a focus on power development. Then there were the four national power development plans at various stages of completion. The Lao PDR, Thai and Vietnam BDPs did not refer to the mainstream hydropower projects, even though all national power sectors were actively involved in their planning and investment.

The SEA stepped into this vacuum of strategic direction on mainstream development and was required to 'stand in the shoes' of the planners in defining and assessing strategic options and their relative impacts. Compounding the strategic planning void was the absence of spatial plans for the river at any level of government – which meant minimal up-to-date spatial information and integrated assessment on the individual projects and on the surrounding land use and socio-economic trends. Much of this baseline information had to be generated from scratch by the SEA team. The SEA had a modest budget for 'additional studies' and this proved valuable in deepening understanding in a number of critical fields such as fisheries, socio-economic analysis and hydrology.

Another issue confronting the SEA was its status and authority within the planning system. A number of national power agencies, especially in Lao PDR, were keen to know if the SEA recommendations would be in any way binding on LMB governments under the MRC agreement. No regional SEAs had been conducted in the Mekong Basin and there was no mention of this strategic planning tool in the Mekong Agreement or MRC protocols – especially none in the PNPCA procedure. At the time, only Vietnam and China had legislative requirements for SEAs. Thailand had non-committal SEA guidance. Lao PDR and Cambodia were not so familiar with the tool and barely coping with effective implementation of the EIA systems. What credence or authority, if any, should they give this ad hoc SEA initiated by a regional organization?

Was this SEA the precursor to a permanent innovation to the MRC's regional planning and advisory services? The MRC extended the SEA's terms of reference to explore this exact question. In the meantime, the SEA had to proceed as a one-off event without a formal place in the regional and national power development framework. In fact, the SEA was the first of its kind globally – the first to be conducted on the development of an international river, in this case shared by six countries. With the MRC having no regulatory functions, the issues of downstream transboundary impacts and upstream responsibilities were being settled by LMB countries within the MRC framework through consultation, compromise and consensus – or not at all. Already, the mainstream in China was dammed by four projects in a planned cascade of up to eight storage hydropower projects, without consultation or agreements from downstream countries and with uncertain impacts. As observers to the MRC, China and Myanmar have no obligations to notify and consult – or to share information.

The most significant challenge for the SEA was the lack of any form of overarching national regulatory and management authority for the river in Lao PDR and Cambodia – and further downstream in Thailand and Vietnam as targets for engagement and recommendations. The projects were moving forward independently with no credible institutional arrangements or capacities in place to coordinate and manage them. Potentially, this was leading to an international river being managed by the private sector on a project-by-project basis with power production and site-specific interests driving their decisions – the first such case of fragmented private-sector control of a major river worldwide.

SEA development scenarios and method

At the earliest – if construction were to commence at the time of the SEA – the proposed LMB mainstream projects could enter the Mekong system in 2020–2030. The SEA methodology started by establishing a baseline that differentiated between (i) impacts of existing and definite development, and (ii) impacts of planned development well into the future without mainstream projects. That approach allowed the SEA to assess the impacts of the LMB mainstream projects against two levels of basin development, for 2015 and 2030 – the more distant coinciding with commencement of the mainstream project operations if approved.

This SEA drew on three scenarios developed by the MRC Basin Development Program that characterize additional developments in hydropower, irrigation and water supply for the LMB (Table 20.2). In total, LMB mainstream projects represent 12 of the 88 hydropower dams existing or planned for the Mekong Basin by 2030.

The SEA assessed the incremental impact of different combinations of the 12 LMB mainstream hydropower projects on top of the 2015 and 2030 scenarios.

The LMB mainstream projects were not assessed individually but rather as groups of development for each of the hydro-ecological zones of the Mekong River and in combinations of the four dam groupings outlined in Table 20.3 – three in Lao PDR and one in Cambodia.

Table 20.2 Summary of development expected in the BDP scenarios

Type of development	Definite future (2015)	20 years without LMB mainstream hydropower (2030)	20 years with LMB mainstream hydropower (2030)
Hydropower development	6 Chinese dams	6 Chinese dams	6 Chinese dams
	0 LMB mainstream dams	0 LMB mainstream dams	11 LMB mainstream dams
	40 LMB tributary dams	70 LMB tributary dams	70 LMB tributary dams
Irrigation development	4 × 10 ⁶ ha	6 × 10 ⁶ ha	6 × 10 ⁶ ha
Water supply	2,938 × 10 ⁶ m ³	4,581 × 10 ⁶ m ³	4,581 × 10 ⁶ m ³

Table 20.3 Grouping of mainstream project proposals according to hydro-ecological zone

Hydro-ecological zone	Mainstream projects
1 Lancang River	Eight existing (3), under construction (1) and planned (4) mainstream dams in Yunnan province, China*
2 Chiang Saen to Vientiane	1. Pak Beng 4. Pak Lay 2. Louangprabang 5. Sanakham 3. Xayaburi 6. Pak Chom
3 Vientiane to Pakse	7. Ban Koum 8. Lat Sua
4 Pakse to Kratie (Lao section above Khone falls) (Cambodia section below Khone falls)	9. Don Sahong 10. Thakho 11. Stung Treng 12. Sambor
5 Kratie to Phnom Penh	
6 Phnom Penh to South China Sea	

* According to the latest information, Mengsong, the most downstream project in the Chinese cascade, has been postponed without a firm date set for construction.

The SEA was a staged process with consultation, analysis and documentation at each of four steps (Figure 20.3). The key questions addressed by the SEA at each stage were the following.

Scoping

In the first step, the coverage or scope of the assessment was defined. The scoping identified the strategic themes and issues of concern to the Mekong River by asking two questions: What are the most important issues of concern to development and conservation of the mainstream Mekong? How can those issues be categorized and prioritized – that is, given strategic focus?

Baseline assessment

The second step involved gathering information in each country and at a regional level on the strategic development concerns and analysing their past trends and current status. There were two main questions addressed: What have been past trends for each of the key issues? What will the trends look like when projected to 2030 without mainstream projects and when other trends and drivers are considered?

Impact assessment

In the third step, the impacts (risks and opportunities) of the proposed mainstream projects on the strategic development concerns were assessed. Three main questions were addressed: Will the mainstream projects affect the trends in the key strategic issues? Will those effects provide benefits and/or costs? Will those effects enhance or reduce sustainability?

SEAs are a form of sustainability analysis – this SEA considered the economic, social and biophysical trends and effects of the mainstream dams.

Avoidance, enhancement and mitigation

The fourth step involved defining measures to avoid or mitigate the negative effects of the proposed projects and to enhance their benefits. Three main questions were considered: How will the most important risks (negative effects) be avoided? How will the most important benefits (positive effects) be enhanced? How will the negative effects that can't be avoided be mitigated – that is, be reduced?

As part of the sensitivity and trends analysis, the SEA drew from original modelling of hydrology and sedimentation, as well as climate change, under various scenarios conducted by MRC programmes. The original research going to support the BDP on fisheries, water quality, socio-economic conditions and navigation was also fed into the assessment. Other methods applied by the SEA included macro-economic analysis and valuation, social and demographic analysis, geographic information systems (GIS) analysis of natural and social system effects, GHG comparative analysis, extreme event risks analysis, energy and power modelling and analysis, and species population dynamics and migration patterns analysis for fish.

Usually, SEAs do not conduct original research. In this case, the 'additional studies' funds supported research where critical gaps could be filled within the SEA timeframe. For example, the team used GIS analysis to calculate the area of wetlands to be submerged in the mainstream by the proposed projects and the primary productivity implications. Other issues requiring more extensive research were included in the SEA recommendations.

Defining the SEA scope

The SEA relied on the four governments of the LMB and other stakeholders to define, prioritize and qualify the strategic development issues for the Mekong River that might be affected by the mainstream hydropower and that needed to be considered in the assessment. The strategic issues were further refined by hundreds of national participants in national meetings, roundtables and regional workshops. The SEA team consolidated the issues identified by LMB countries into a list of eight themes and linked issues, which served as the substantive backbone of the SEA – that is, its scope (Table 20.4). A paper was prepared on each of the eight strategic themes, outlining the assessment objectives and methodology and providing detailed coverage.

Table 20.4 Consolidated key strategic themes and issues defining the scope of the SEA

Theme	Issues
1. Terrestrial systems	<ul style="list-style-type: none"> • Changes to terrestrial biodiversity and changes to agricultural and land-use patterns along the mainstream
2. Fisheries	<ul style="list-style-type: none"> • Changes to the unique features of the Mekong River fisheries: <ul style="list-style-type: none"> – biodiversity – migration patterns – catching techniques • The importance of fisheries to local livelihoods and national/provincial economies
3. Hydrology and sediment	<ul style="list-style-type: none"> • Changes to the hydrological processes of the Mekong River • Fate and transport of sediment through the Mekong River • Changes to water quality
4. Energy	<ul style="list-style-type: none"> • Importance of mainstream power generation for regional power demand and expansion generation needs • Feasibility of alternative energy sources for the region • Compatibility of mainstream hydropower and domestic electrification and energy poverty alleviation • Importance of foreign exchange earnings to national and local development • Contribution of mainstream dams and secondary stimuli to national and provincial development
5. Social systems	<ul style="list-style-type: none"> • Changes to poverty alleviation, economic development, livelihood resource base, land acquisition and resettlement in mainstream Mekong provinces • Effects on the water, energy and food needs of mainstream Mekong River communities, as well as potential to improve lifestyles in view of existing opportunities and constraints • Changes in social equity within Mekong provinces and nationally
6. Economics	<ul style="list-style-type: none"> • Impacts of mainstream dams on broader energy economics and macro-economic trends in the LMB region • Distributional and sectoral changes in population, infrastructure and public health, as well as other key development sectors or economic sectors, including agriculture, fisheries, navigation/transport and tourism • Economic evaluation of non-monetized environmental services • Significance of mainstream hydropower for long-term power supply in the region, and the extension of electricity distribution networks

Table 20.4 (Continued)

Theme	Issues
7. Aquatic systems	<ul style="list-style-type: none"> • Productivity and biodiversity of aquatic habitats • Nature and importance of Mekong River ecosystem services
8. Climate change	<ul style="list-style-type: none"> • Predicted changes to the LMB climate system, in particular hydrological variability and extremes • Vulnerability of mainstream hydropower to a warming climate • Vulnerability of proposed mitigation measures to a warming climate • Net potential CHG emissions reductions from mainstream hydropower • Linkages between mainstream hydropower and national commitments under the UNFCCC for climate change mitigation and adaptation • Carbon financing options for mainstream hydropower

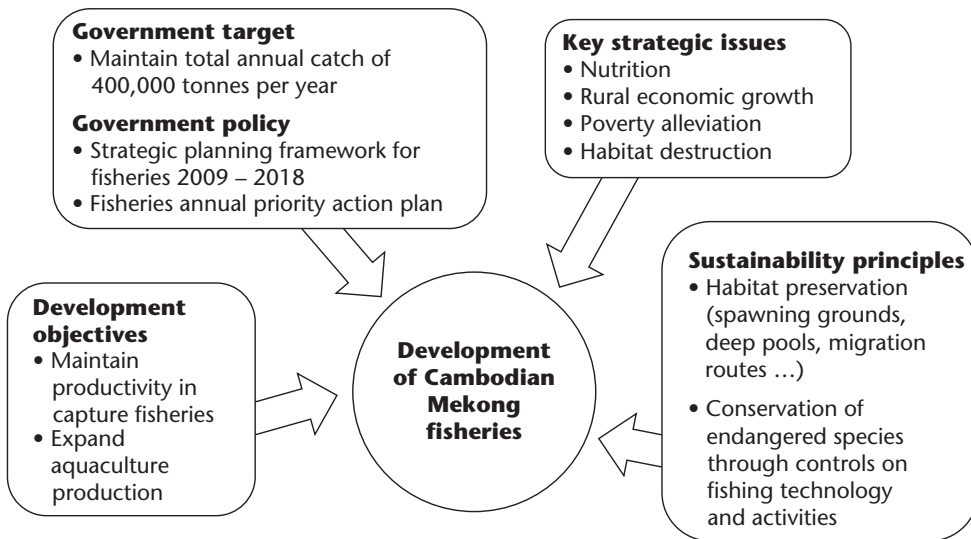


Figure 20.4 Cambodian fisheries: Objectives, targets and sustainability principles

At national workshops during the baseline phase, government technical staff were asked to define the main official objectives, targets and sustainability principles for the eight ‘sectors’ or strategic themes (in Table 20.4) as expressed in government legislation, policies, strategies and plans. This exercise was completed in each country and the results were synthesized into a set of sustainability objectives against which the mainstream projects were assessed. Some of the results from the Cambodia national workshop are summarized in Figure 20.4 and Figure 20.5 to illustrate the process. The regionally synthesized sustainability objectives drawn from those exercises appear as Table 20.5. They provided the backbone of the participatory impact assessment exercises conducted at national and regional workshops.

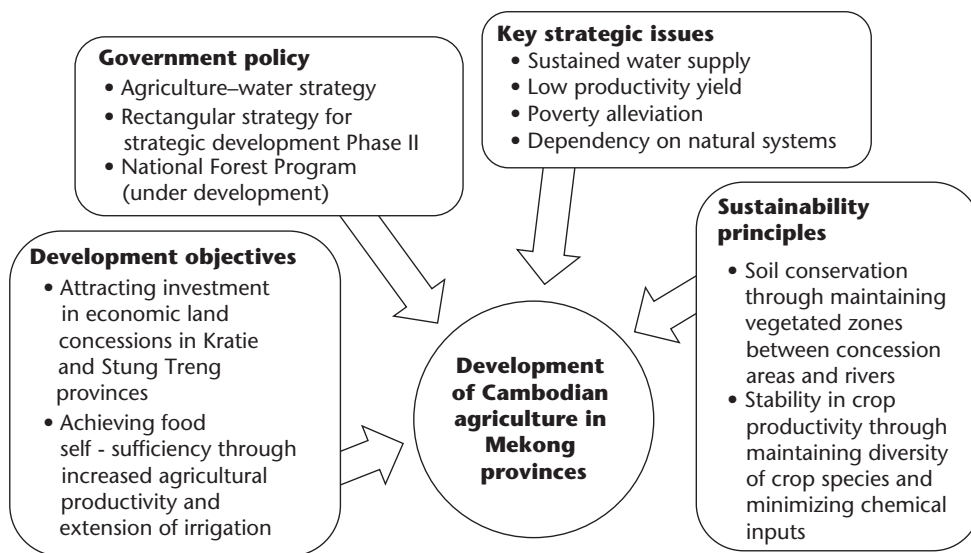


Figure 20.5 Cambodian agriculture: Objectives, targets and sustainability principles

Table 20.5 Sustainability objectives for key strategic themes

1. Hydrology and sediment	<ul style="list-style-type: none"> • Maintenance of natural patterns of sediment transport and deposition in flood plains and the Delta
2. Aquatic ecosystems	<ul style="list-style-type: none"> • Maintenance of aquatic ecosystems for conservation of biodiversity, connectivity and ecosystem services
3. Terrestrial and agriculture	<ul style="list-style-type: none"> • Maintenance of terrestrial ecosystems for conservation of biodiversity, connectivity and ecosystem services • Maintenance and enhancement of diversity and productivity of agricultural systems
4. Fisheries	<ul style="list-style-type: none"> • Maintenance and enhancement of diversity and productivity of fisheries resources
5. Social	<ul style="list-style-type: none"> • Ensuring the well-being of vulnerable and minority groups • Maintaining a vital (living) cultural diversity (ways of living) and heritage of importance to riparian communities
6. Economics	<ul style="list-style-type: none"> • Ensuring equitable distribution of economic benefits, including long-term support to vulnerable affected groups and areas • Ensuring that economic development follows the precautionary principle – (in situations of high uncertainty of impact, take the cautious approach)
7. Energy	<ul style="list-style-type: none"> • Ensuring a secure and diverse energy supply from renewable resources without losses in sustainability of social and natural systems
8. Climate change	<ul style="list-style-type: none"> • Maintaining and improving options and capacities to adapt to climate change

SEA conclusions

Identifying the ‘big strategic issues’

With the benefit of the impact assessment, and during the mitigation phase of the SEA, government and non-government stakeholders further consolidated the eight themes as five ‘big strategic issues’ relating to mainstream development. They are:

- 1 Power security and generation, including revenue, trade and foreign investment.
- 2 Economic development and poverty alleviation.
- 3 Ecosystems integrity and diversity – aquatic, terrestrial, hydrological dynamics and sediment/nutrient transport.
- 4 Fisheries and food security (including agriculture).
- 5 Social security – livelihoods and the living cultures of affected communities.

It was important to involve governments and other stakeholders in the impact assessment process and in the review of the draft results on impacts before moving to discussion on mitigation and conclusions.

At the impact assessment stage of the SEA, strong input from stakeholders was especially important in achieving balance, particularly because (i) the assessed impacts implied major changes to the mainstream projects if they were to proceed; (ii) the assessment on key issues was confronted with extreme uncertainties; and (iii) the planned developments and the SEA involved a wide range of expert judgments, values and assumptions about the future. There needed to be a broad consensus that the assessment was fair and reasonable, and that the impact report described the benefits and the risks in an objective and balanced way. The SEA team felt that it must indicate where there was a divergence of views on strategic issues and give reasons for the conclusions it drew. Above all, the SEA team and impact report needed to establish a technical credibility to have authority – otherwise, decision-makers would not take the final SEA conclusions and recommendations seriously.

The SEA findings and conclusions for the five big strategic issues reflect the stark trade-offs involved in what is the most significant transboundary development decision that LMB countries have ever faced. Some of the most important conclusions are summarized in this section.

Often, SEAs are confronted with situations where benefits are relatively well enunciated and expressed in economic terms while the risks are unclear, unsubstantiated and indirect. The definition of risks or negative impacts is not as straightforward. They are often hard to express in economic or commercial terms and are difficult to integrate with economic decisions. That was the case for the SEA of mainstream hydropower, which found that the power sector and economic benefits of the 12 projects would be very substantial at regional and national levels.

Power security

The SEA found that if all 12 mainstream dams were developed, they would bring substantial increases to power generated and generation capacity in the region. Peak demand requirement forecasts for LMB countries in 2025 totalled 130,366 megawatts. The mainstream schemes represent 11 per cent of additional LMB installed capacity³ required between 2015 and 2025. Looked at another way, the mainstream schemes represent 6–8 per cent of the projected LMB power demand for 2025, which is equivalent to the expected LMB energy demand growth rate experienced annually between 2015 and 2025.

As would be expected, Lao PDR gains most from the overall power benefits directly associated with mainstream hydropower, although it has sufficient tributary hydropower potential to ensure healthy growth in the medium term and produce economical electrical energy for domestic supply and export without LMB mainstream projects. The projects are most critical to Cambodia, which has few alternatives to importing expensive fossil fuels. They are less significant for the power sectors of Thailand and Vietnam, where it would have a minor impact on electricity prices (less than 1.5 per cent) and a limited effect on the energy supply strategies due to the size of their power sectors.

The SEA found that the alternatives to completely blocking the mainstream to produce electricity have not been adequately explored. Though power output would likely be less, partial damming of channel branches, in-stream turbines and diversions has potential for much reduced natural systems and livelihood impacts and a more sustainable marriage of the power and integrated water-resource management objectives subscribed to by the MRC.

Economic security

The SEA concluded that the US\$25 billion of foreign direct investment from all 12 projects would likely lead to a significant economic stimulus to the host countries and to the region. Lao PDR would benefit most, receiving 70 per cent of export revenues (US\$2.6 billion annually), with Cambodia receiving 30 per cent (US\$1.2 billion annually). Yet, the projects would have significant net negative impacts on the fisheries and agriculture sectors and would contribute to growing inequality in the LMB countries. The SEA concluded that, in the short to medium term, poverty would be made worse by any one of the mainstream projects – especially among the poor in rural and urban riparian areas.

Ecosystem security

The SEA found that the main potential impacts on natural systems related to sediment and nutrient transport, loss of ecosystem integrity and loss of biodiversity. The mainstream projects would degrade the longitudinal connectivity of the Mekong ecosystem, compartmentalizing it into smaller and far less productive units. They would likely result in irreversible losses in the productivity of natural systems and in biological diversity. They would have a negative impact on ecosystems of international importance, a large number of species, and a number of globally endangered species, likely leading to their extinction in the wild. The largest impact on the riverine terrestrial system would affect wetlands. Almost 40 per cent of the Mekong River's wetlands lie within reaches of the river where projects would be located – 17 per cent would be permanently inundated.

The Mekong hydrological regime has remained relatively stable for the 90 years of recorded data. Over the past 15 years, rapid hydropower development on the LMB tributaries and on the upper Mekong Basin mainstream in the Yunnan province of China has brought about intensive change. The load of suspended sediment in the Mekong River is estimated at 160–165 million tonnes per year. In the order of 50 per cent of the load will be removed by storage hydropower projects in China and in the '3S' rivers – Sesan, Sre Pok and Sekong – which are mainly in Vietnam.

The LMB mainstream projects would have significant additional basin-wide effects on the future movement of water and sediment through the Mekong system, including the coastal and offshore zone. With all 12 dams, the sediment load would be halved again – that is, at Kratie it would be reduced to 25 per cent of the current load (~42 million tonnes per year).

This reduced suspended load would have significant implications for the transport of nutrients that naturally fertilize the Tonle Sap system and 23,000–28,000 square kilometres of floodplain in Cambodia and Vietnam, as well as destabilizing the river channels, floodplains and coastline of the Mekong Delta.

Food security

The strategic issue on which all stakeholders agreed was the likely negative impacts of the projects on fisheries. The SEA estimated that potential losses in fish resources due to the LMB mainstream dams would be ~340,000 tonnes annually – that is, 16 per cent of the 2000 baseline or the equivalent of 110 per cent of current total annual livestock production of Cambodia and Lao PDR. By 2030, the LMB dams and 77 other planned dams on LMB tributaries and on the Lancang River mainstream would result in an annual reduction of up to 42 per cent in fish on the 2000 baseline. Substantial losses in the fresh and marine capture fisheries and in delta aquaculture would have basin-wide impacts on the fisheries sector, ancillary and processing industries, fisheries-associated livelihoods and health and nutrition.

The mainstream projects would reduce food security in riparian provinces, especially when combined with the potential effects of climate change. The SEA found that climate change is likely to see (i) overall agricultural productivity increase in the basin (around 3.6 per cent by 2030) but food security decrease, despite the increasing areas under irrigation; and (ii) decreases in fish biodiversity and stability in fisheries-sector production, despite some climate change benefits of increasing flooded area and nutrient loading. The projected increased dry-season temperatures and reduced rainfall in some catchments of the basin, such as Monduliri and Ratanakiri provinces in eastern Cambodia, would force poor communities to greater dependence on forest and fisheries resources for subsistence livelihoods – both natural resources negatively affected by mainstream hydropower development.

Social security

The SEA calculated that some 29.6 million people live and work within 15 kilometres of the Mekong River throughout the LMB. Of these, 2.1 million are in local riparian communities living within 5 kilometres of the river who are expected to be most at risk to the direct and indirect impacts of the LMB mainstream dams. Of these, 106,942 people will suffer direct impacts from the 12 LMB mainstream projects, losing their homes and land and requiring resettlement. More than two million people in 47 districts living within the proposed reservoirs and dam sites and immediately downstream of the mainstream projects are at highest risk of indirect impacts from the LMB mainstream projects. The proposed dams would inhibit community access to and availability and quality of the food they eat and increase the level of hazard or exposure to risk. The projects have potential to induce significant and rapid fluctuations in downstream water surface levels by several metres at a daily and even hourly time-step.

The most difficult and perhaps most important issue for the SEA was how best to address the intangible values of the Mekong River to current and future generations and compare them to the power and economic values of mainstream development. Mainstream projects are likely to have significant effects on riparian ways of life, cultures and sense of community. How was the SEA to consider the existence value of a free-flowing Mekong River, for example? The SEA found that conventional valuation methods were not up to the job. Other than noting the issue and extreme divergence in values and views, the SEA team felt unable to properly explore the

fundamental questions: What of their natural systems do the Mekong countries wish to keep as heritage for future generations? Will economic gains make up for the losses in cultural and social values and the sense of community well-being which come with the Mekong River as a free-flowing and healthy ecosystem?

SEA recommendations

The recommendations of the SEA called for utmost caution in taking decisions on mainstream development when so much is at stake; when there are evident threats of serious and irreversible environmental, social and economic damage; and when transboundary impacts could affect international relationships between riparian countries. The SEA pointed out that the principles of sustainability – which all LMB countries have embraced – require that trade-offs and changes associated with major development decisions avoid permanent losses, and avoid closure of options for future generations and inequitable distribution of costs and benefits among existing communities and areas. The SEA found that in the case of the mainstream proposals, there are likely to be permanent losses and, even where mitigation measures might reduce unwanted impacts, there remain significant gaps in knowledge and inadequate institutional capacities to implement and enforce them effectively. Importantly, it was evident that alternatives to harnessing energy from the mainstream without full channel dams and other off-stream options had not been adequately considered.

The SEA report sets out comprehensive strategies for the way forward, all hanging off the following key recommendations:

- 1 Decisions on mainstream dams should be deferred for a period of ten years, with reviews every three years to ensure that essential deferment-period activities are being conducted effectively.
- 2 As the highest priority, the deferment period would include a comprehensive undertaking of feasibility studies for partial in-channel, diversion and other innovative systems for tapping the power of the mainstream in ways that do not require dams across the full breadth of the river channel. This would involve governments in partnership with the MRC, multilateral development banks and developers.
- 3 The deferment period would also include a comprehensive assessment and fast-tracking of tributary projects that are considered feasible and ecologically sustainable according to current international good practice, including retrofitting of existing projects and innovative schemes.
- 4 The deferment period needs to commence with a systematic distribution of the SEA report within each LMB country, in national languages and in consultation with line agencies, the private sector and the NGO community.
- 5 The Mekong mainstream should never be used as a test case for proving and improving full dam hydropower technologies.

Response to the SEA

The initiative for the SEA came from the MRC and, although its place within the regional decision-making process was not well defined, the MRC Secretariat took the view that the SEA results would support the consultation process for individual mainstream hydropower projects that is required under the 1995 Mekong Agreement before a decision is made whether or not to go ahead and, if so, under what circumstances. Just as the SEA report was submitted,

the PNPCHA process was triggered by Laos, which notified the MRC of the planned Xayaburi project in northern Lao PDR, the first of the proposed dams.

The MRC translated a summary of the SEA report and distributed it to LMB countries through the National Mekong Committees. The SEA had recommended that funding be provided to each Committee to facilitate cross-sector roundtables and workshops to fully discuss and consider the report. That was not done, which greatly limited the influence and use of the SEA report in national debates. The MRC Secretariat did not follow the SEA recommendations on MRC facilitation of discussion on the report – that is, to facilitate consideration of the report by the MRC Joint Council, by the National Mekong Committees, by national cabinets and by appropriate parliamentary committees. Even the key consultative requirements that had been discussed with the MRC Secretariat before completion of the SEA – supporting line agency roundtables in each country and convening a large regional multi-stakeholder conference to discuss the report – were not followed. The debate on mainstream projects had become too difficult and politically sensitive within the MRC to move forward decisively with a plan for communications and consultation on the report. Instead, all attention was now given to the PNPCHA process and discussions on one project – Xayaburi. Key questions on process raised in the final SEA regional workshop were not fully resolved, such as:

- How can it be ensured that strategic consultations on the SEA report happen in each country before project-specific decisions are made?
- What needs to happen at the strategic level *before* the PNPCHA process on specific projects proceeds?
- What strategic level of national policies, plans and decisions needs to be reviewed before project-specific decisions are made?
- How is the SEA process and consideration of its report linked to the PNPCHA process?
- How does the SEA process help shape the BDP, and will that influence be timely in terms of mainstream decisions?

One question – the PNPCHA is a process focusing on projects, so how should the SEA outcomes be expressed in terms of project-specific guidance? – was picked up by the MRC Initiative on Sustainable Hydropower, with the SEA helping shape the MRC guidelines on sustainable hydropower adopted by LMB countries.

Largely, it was left to individual countries to take the initiative on further consultation on the SEA report. At this point, the bilateral donor agencies, international and national NGOs and international media became influential in fuelling consideration and continuing debate over the SEA report. In Vietnam, a group of scientists translated the full report and sent it direct to Prime Minister Nguyen Tan Dung, along with a strong letter of concern over impacts on the Mekong Delta. NGOs convened workshops with the Vietnam National Assembly Committee on Environment, Science and Technology members and delta provinces. In Thailand, the Senate Committee on Water Resources conducted hearings on the report and made recommendations to government. In Cambodia, Thailand and Vietnam, local NGOs convened workshops and meetings at the national and local levels to raise awareness regarding the report. Riparian communities in Thailand in particular – with support from members of parliament – conducted meetings and demonstrations against the mainstream projects.

Officially, Vietnam and Cambodia announced their support for the SEA recommendations and endorsed the ten-year moratorium on mainstream development to allow time for research and capacity building. Vietnam decided to fund a major study of the impacts of upstream development on the delta following the SEA recommendations, and US\$10 million from the

national emergency fund was earmarked for the purpose. ICEM was asked to design the study and to assist in the international bidding process. The Australian government is supporting the Vietnamese initiative. Prime Minister Dung has led a series of negotiations with Cambodia and Laos to encourage their participation. Cambodia agreed to join as a partner and the study coverage was extended to take in the Tonle Sap system and floodplain. The diplomatic process of bringing Lao PDR on board continued with one-to-one meetings and through the MRC. Vietnam and Cambodia urged Lao PDR to hold off on development of Xayaburi until the Mekong Delta study was completed.

Initially, the Lao Prime Minister agreed to that postponement, but conflicting statements from the Lao government power sector expressed the view that the MRC PNPCA process was complete and that Xayaburi would proceed. Oversight hearings by the Thai Senate and the National Human Rights Commission confirmed that the Thai government had joined Laos in concluding that the MRC process was finished, thereby allowing Thai developer Ch. Karnchang to proceed with the project.

In December 2011, the Mekong River Commission, comprising Cambodia, Laos, Thailand and Vietnam, announced that member governments had agreed to delay a decision on building the Xayaburi dam pending further studies on the impacts of the controversial project. They also agreed to approach the Japanese government and other international development partners to support further study of the impact of mainstream development before giving Laos the go-ahead to continue construction. This initiative was strongly supported by the MRC's international partner agencies. But the Secretariat found it difficult to nurture consensus among its members on the details of the initial study concept paper, with Laos refusing to agree on the content and approach.

In the meantime, Vietnam decided to proceed with its delta study while attempting to involve its riparian neighbours and supporting the broader MRC initiative. If it had been launched in a timely way, the Vietnam delta study may have created a momentum of support and interest, which might have convinced the Lao government to postpone Xayaburi for several years. But it took the Vietnamese authorities 18 months to agree on the design and procurement process – emergency funds had never been used for an environmental study – and the lead ministry had never been called upon to manage such a large government-funded initiative for which so many institutional issues needed to be sorted out.

Also, the MRC-coordinated study had difficulty advancing beyond concept stage, with Laos blocking agreement and the Secretariat unable to arrive at a formula to resolve the impasse. In April 2012, the dam developer, Ch. Karnchang, informed the Stock Exchange of Thailand that it had signed a contract with Xayaburi Power Co to build the 51.8 billion baht dam in Laos and to purchase 1.28 gigawatts of power from the dam. Since then, construction has continued unabated, with minimal oversight by Lao authorities and no systematic site monitoring by the MRC. That decision has relieved China of the international opprobrium over its mainstream dams, with Laos now at the forefront of international criticism.

Undoubtedly, construction of the Xayaburi dam has loosened caution concerning the other proposed mainstream projects – private-sector firms are now harnessing their financiers and actively lobbying on their arrangements with Laos and with Cambodia to commence work. Other major projects for exploitation of mainstream waters have also been rapidly advanced and approved.

In March 2013, Cambodia launched a US\$200 million project to divert water from the Mekong River to irrigate 300,000 hectares of rice fields in Prey Veng, Svay Rieng and Kampong Cham provinces. The four-and-a-half-year project is being financed by a loan from China and would be carried out by China's Guangzhou Wanan Construction Supervision

company. The project will involve constructing canals 13 to 27 kilometres long, between 44 and 55 metres wide and between 18 and 25 metres deep. Another two canals of 78 kilometres are planned initially to irrigate an estimated 108,300 hectares of wet-season rice and 27,100 hectares of dry-season rice in Kampong Cham and Prey Veng provinces. Prior to Xayaburi, this project would not have moved forward – and, in this case, it is now proceeding without prior notification to the MRC as required under the PNPCA process, which does not bode well for future regional consultation and consensus through the MRC. The next major diversion that may reappear after many years on the shelf is for irrigating Thailand's north-east region.

After two decades of caution and reluctance to develop the Lower Mekong mainstream, the floodgates are open and governments and the private sectors in China and Thailand are competing intensively for a stake. Even in Vietnam, where the government is committed to a major impact study on the delta, Vietnamese semi-government firms are informally continuing discussions on their participation in a number of mainstream projects in Laos and Cambodia.

Conclusion: lessons from the SEA and its use as a strategic planning tool

The SEA recommended that the MRC adopt the SEA as a regional strategic planning tool to assist countries in the consideration of plans with transboundary implications – they may be road corridors, transmission lines, upstream industrial and urban development, major irrigation schemes or cascades of hydropower projects. The SEA of mainstream hydropower demonstrated how valuable the consultative process and accumulation and synthesis of scientific evidence and opinion can be in informing major strategic discussions and decisions. SEAs differ from project-specific EIAs. They are a form of sustainability analysis and address the broader strategic issues that relate to more than one project and that need to be resolved and decided prior to making project-specific decisions. SEAs follow similar steps to EIAs but have much larger scope in terms of time, space and subject coverage. They focus on the planning instruments and processes involved in decision-making and serve as an umbrella level of analysis that feeds more specific EIAs and improves their quality.

To work effectively, SEAs need full commitment and public backing by their commissioning agency – in this case, the MRC. They require a champion at the highest level in the organization. They also need an entry point into established planning and decision-making processes – it needs to be made clear what plans and processes they are aiming to influence.

In Europe, SEAs are designed to be rapid desktop sustainability audits where planning frameworks are robust, planning processes are consultative and data and information are plentiful. In the Mekong region, consultations and data are limited and spatial and management planning frameworks are absent. It is difficult to establish a strong science evidence base for SEA conclusions and recommendations. Therefore, the role of SEAs in the Mekong region as part of the MRC toolbox is different. Here, SEAs need to 'stand in the shoes' of planners. With limited information, and sometimes non-existent plans, SEAs need to expand beyond a sustainability audit to become an integral part of the planning process itself. They have a key role in filling critical information gaps, conducting additional focused research on critical strategic concerns and facilitating a consultative process that builds consensus and allows for debate on 'hot' issues and consideration of alternatives and their environmental and social consequences – something normally left to planners.

Given the complexity of relationships in the Mekong region, the consultative and communications process is critical to the success of an SEA (that is, to its influence and

acceptability). A broad range of key stakeholders need to be involved at each phase of the SEA and contribute to decisions as they evolve. 'Consensus' (or acceptance) and credibility need to be built at each phase of the SEA before moving on. There are a number of reasons why stakeholder engagement is especially important in achieving balance. As was the case with the mainstream assessment, major changes can be involved if the proposals are to proceed; the assessment of impact on key issues is confronted with extreme uncertainties; and the planned developments and the SEA involve a wide range of expert judgements, values and assumptions about the future.

At the same time, in this region governments and communities need to embrace expert judgment as part of the SEA process – especially in situations where data are scarce and available information is poor. The more strategic the decisions, the more value-laden they become, and so expert judgment becomes essential where scientific information is not available – but that judgment should be applied in an open, consultative and critical manner. Effective SEAs need to build consensus among trans-sectoral and transboundary stakeholders. To do so requires an open and transparent process where limitations are identified and assumptions are made clear. It is necessary to keep the consultations and issues at a strategic level. SEAs can be overwhelmed by detail raised by local interests and by project-specific issues and concerns.

A challenge for SEAs in the Mekong region is the fundamental constraint that, in major developments, benefits are often more readily defined than risks and losses. The benefits become evident in commercial and economic terms from the early stages. EIA often comes late in the planning process when economic benefits are already well defined. The definition of risks or negative impacts is not as easy. Risks are hard to express in economic or commercial terms and are difficult to integrate with economic decisions. SEAs are often confronted with situations where the benefits are well enunciated and expressed in economic terms while the risks are unclear, unsubstantiated and indirect. Governments need to accept that there may be some critical values that are best not expressed in economic terms, but that need to be given weight where compared with financial gains.

The introduction of SEAs through the MRC system should be phased. Rapid introduction of SEAs can quickly overwhelm regional, national and provincial capacities. SEAs should continue to be piloted, their scope should be focused and the experience should be well documented to inform and guide their application. They should become a regular part of the MRC's function – and a way to invigorate its authority and credibility in mainstream development.

The final lesson from the mainstream hydropower SEA is that strategic assessments need to be viewed by stakeholders as credible processes. SEA reports need to be credible and to have authority – otherwise, decision-makers will ignore them. To be credible, their reports must be balanced, describe the benefits and the risks in an objective way, indicate where there is a divergence of views on strategic issues and give reasons for the conclusions they draw.

Notes

- 1 The SEA was commissioned by the MRC and conducted by the International Centre for Environmental Management (www.icem.com.au).
- 2 The SEA report can be found, along with key supporting documents, at ICEM, 2010 and MRC, 2015.
- 3 Installed capacity measured in watts (W), or multiples thereof, is the rated maximum power generation capacity of installed generators.

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