Mekong hydropower development: a review of governance and sustainability challenges

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>ANZ</td>
<td>Australia and New Zealand Banking Group</td>
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<td>BDP</td>
<td>Basin Development Plan Programme (of the MRC)</td>
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<td>COD</td>
<td>commercial operation date</td>
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<td>EdL</td>
<td>Electricité du Lao</td>
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<td>EGAT</td>
<td>Electricity Generating Authority of Thailand</td>
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<td>EPC</td>
<td>engineering procurement contract</td>
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<td>EPFI</td>
<td>Equator Principles financial institutions</td>
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<td>ERAV</td>
<td>Electricity Regulatory Authority of Vietnam</td>
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<td>FIRR</td>
<td>financial internal rate of return</td>
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<td>GoL</td>
<td>Government of Lao PDR</td>
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<td>GoV</td>
<td>Government of Vietnam</td>
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<tr>
<td>GWh</td>
<td>gigawatt-hour (= million kilowatt-hour)</td>
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<td>kWh</td>
<td>kilowatt-hour</td>
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<td>IPP</td>
<td>independent power producer</td>
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<td>IRR</td>
<td>internal rate of return</td>
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<tr>
<td>MEM</td>
<td>Ministry of Energy and Mines (Lao PDR)</td>
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<tr>
<td>MONRE</td>
<td>Ministry of Natural Resources and Environment (Vietnam)</td>
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<tr>
<td>MRC</td>
<td>Mekong River Commission</td>
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<tr>
<td>MW</td>
<td>megawatt</td>
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<td>NT2</td>
<td>Nam Theun 2 project</td>
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<td>NTPC</td>
<td>Nam Theun Power Company</td>
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<td>PES</td>
<td>payments for environmental services</td>
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<tr>
<td>PDP</td>
<td>power development plan</td>
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<tr>
<td>PPA</td>
<td>power purchase agreement</td>
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<tr>
<td>ROE</td>
<td>return on equity (= ‘equity IRR’)</td>
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<tr>
<td>THBX</td>
<td>Theun Hinboun Expansion Project (of the Theun Hinboun Power Company)</td>
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<tr>
<td>UCA</td>
<td>Uniting Church Australia</td>
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<td>WREA</td>
<td>Water Resources and Environment Agency (Lao PDR)</td>
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Executive Summary

We present a critical review of issues related to more sustainable development of hydropower in the lower Mekong region, focusing on the role of the private sector and the possibility for public-private partnerships to improve environmental and social performance of large hydropower in the region. We raise issues about the relationship between commercial hydropower development and social equity worthy of further discussion by a range of stakeholders, including academic researchers and the private sector. Written for a general interested audience, this report also includes recommendations for policy development and ongoing research.

This report was commissioned by the EU Water Initiative’s SPLASH project: ‘Sustainable Development of Hydropower involving the Private Sector in Research Collaboration in the Lower Mekong Region.’ SPLASH aims to explore possibilities for capacity building in the academic sector around critical issues raised by hydropower development in the Mekong region. The authors warmly invite interested readers to respond to issues raised in this review.

Data collection methods included extensive literature review (>80 references, including recent work-in-progress by Mekong colleagues), supplemented by 15 expert interviews and participation/observation during a multi-stakeholder workshop.

We found four key sets of development and governance issues. Together these issues define what we might call the ‘Mekong hydropower regime.’ The issues are (1) the resilience of the Mekong’s aquatic ecosystems, in particular its fisheries, which is uncertain but expected to decline as more dams get built throughout the region; (2) the structure of the electricity industry, in particular an electricity supply chain dominated by monopolistic state utilities, in which willingness to pay, consumer choice, and awareness of sustainability issues are limited; (3) state regulation, which has limited accountability to citizens and is constrained in terms of technical and legal enforcement capacity; and (4) ‘bottom-up’ river basin development.

In bottom-up development, a range of project sponsors (multilateral and private financiers and developers), confront relatively weak state regulatory practices. Among project sponsors, we can distinguish high- and low-risk development strategies, with respect to the quality of environmental and social activities, as well as responsiveness to an emerging sustainability agenda led by diverse actors including the Mekong River Commission and civil society.

We focus on state regulation and bottom-up development. Sustainability outcomes, we argue, might improve if screening and feasibility studies are conducted first not by developers, but by independent institutes with multi-disciplinary capacity, working in a participatory manner. If the governance regime were to shift in this direction, opportunities for rent-seeking would reduce, but more socially optimal planning and project designs might emerge.

Legal frameworks in Laos, Cambodia and Vietnam have the potential to regulate more sustainable hydropower outcomes, but our analysis finds that the hydropower sector continues to be low in transparency, easily influenced by developers and other actors with money and access
to political power, and less responsive to the interests of the weakest segments of society, especially project-affected communities.

While weaknesses in each country’s regulatory practices can be addressed, time to build capacity, as well as leverage to negotiate and implement reforms is needed. Until state regulation improves, complementary ways of regulating hydropower projects – such as industry codes of conduct and sustainability assessment – may be relevant and deserve study.

Financial models of hydropower projects are examined to better understand how investors construct feasibility and make investment decisions. Hydropower projects structured as independent, project-financed companies bring together a mix of actors, including lenders, equity investors, and engineering contractors. The potential for conflicted interests exists when contractors also serve as equity investors; when government also takes an equity investment; and when consulting engineers drawn from the industry serve as the main source of technical advice.

We found that financial rates of return vary considerably between projects, and are strongly influenced by the hydrological properties of a particular site. Large infrastructural projects in developed countries might yield returns to equity investors of 12–14% before inflation. From a sustainability perspective, if an investor’s apparent financial rate of return on a proposed project in a developing country increases beyond about 14% – that is, beyond returns that can be earned in developed countries – it is important to know why. For example, has the investor adequately and fairly budgeted environmental and social project components?

A 2004 study by Maunsell and Lahmeyer International appears to be the most recent comprehensive, publicly available analysis of typical financial rates of return. Most of the 33 projects screened in this study were estimated to have financial rates of return below 10% at a tariff of 4.4 c/kWh (2003 USD) (or approximately 6.9 c/kWh in 2010 USD). As of 2010, however, it is interesting to note that a number of those supposedly marginal projects are actually being built, or in advanced planning. In all cases, the projects were redesigned. For example, for the Nam Ngum 2 and Nam Ngum 3 projects, a number of design changes between 2004 and 2007 resulted in a net power capacity increase. The capacity increase also increased the total inundated area in a way that has not been “socio-environmentally optimal” according to a subsequent cumulative impact assessment conducted by Vattenfall (2008).

Marginal projects overcome their lack of commercial viability through design modification, tariff negotiation, and other financial optimisation. These activities are usually carried out in confidence, but of course have wider social implications. Overall, a striking lack of knowledge exists around the topic of investors’ financial design practices.

A number of mechanisms, currently being applied in the lower Mekong region, that aim to improve the sustainability of private sector investment impacts. These include: (1) investors’ use of sustainability frameworks and corporate social responsibility frameworks; (2) benefit sharing, including development projects aimed at poverty alleviation; and (3) the related concept of payments for ecological services, in catchments where hydropower development takes place (PES).
We review use of the Equator Principles, a voluntary sustainability framework adopted by lenders in the Nam Theun 2 and Theun Hinboun Expansion Projects in Lao PDR. Once adopted, these codes of conduct perform, to a certain degree, a regulatory function. However, both cases highlight challenges in having financiers hold hydropower developers accountable. The Equator Principles’ currently weak disclosure by investors was also identified as a problem.

Lenders’ perceptions of their options – when governments or developers do not deliver upon social and environmental commitments – are worthy of further investigation. For example, during the long repayment period, are lenders willing to alter interest rates or other loan conditions to enforce compliance with best practice?

Without benefit sharing, projects become more difficult to justify to society because of their cumulative environmental and social impacts, and the inequitable distribution of those impacts. We analysed a number of benefit sharing mechanisms including the draft Vietnam Decree on Benefit Sharing from Hydropower, the Nam Theun 2 revenue management framework, and the Nam Leuk hydropower project in Laos.

The Vietnam Decree provides a framework for equitable sharing of benefits from hydropower resources. The Decree calls for long-term revenue sharing arrangements to be established between electricity consumers, and local communities hosting hydropower projects who are adversely affected by the project in their locality. Treating affected people as project stakeholders may create incentives for local action to sustainably manage hydropower assets such as catchments. This may also serve the interests of electricity consumers and hydropower operators. Although promising, the effectiveness of the Vietnam’s draft Decree remains to be seen. Meanwhile, case studies from Laos suggest to function as planned, benefit sharing requires appropriate financial oversight as well as effective implementation. This remains a challenge in countries where levels of transparency and accountability remain low.

We reviewed a promising initiative involving payment for forest environmental services, in Lam Dong Province, Vietnam. Annual payments of $2.8 million from the Da Nhim and Dai Ninh hydropower stations are been made to over 3400 poor households in two watersheds located at the headwaters of the Dong Nai river basin. Households are paid to protect 104,000 hectares of forest.

Any significant benefit sharing, particularly environmental flows release to benefit aquatic resource dependent communities and ecosystems, would have negative financial impacts on IPP projects, and thus might not be viable without compensation or additional financing. This implies sustainable tariffs need to be higher than currently negotiated.

**Conclusions and recommendations**

The conclusions and recommendations here are based on the literature review, expert interviews, and stakeholder workshop.

**Conclusion 1: The Mekong region’s bottom-up approach to development awards the privilege of preparing feasibility studies to developers with varying degrees of commitment**
to environmental and social sustainability. No clear evidence exists of upward harmonization of practice, despite efforts by development actors.

Recommendation 1: Assign project definition, pre-feasibility and feasibility responsibilities to a third party – e.g. independent institute – with a mandate to protect the public interest. In general, projects in earliest stages of feasibility study have the most flexibility to be designed in more equitable terms. The design of alternatives for a particular location should take place in a broadly participatory and multi-objective manner, considering and debating a range of alternatives from small to large in impact and capacity. In the Mekong region, design and public dialogue could build on previous multi-project planning studies as well as improved understanding of ecological and social thresholds, for example, the risk of fisheries collapse.

Recommendation 2: Learn more about the viability of the above institutional reform through further stakeholder dialogue, and comparison to planning initiatives elsewhere. Public-interest design is consistent with an iterative, participatory screening and ranking process carried out in Nepal ca. 2000, supported by World Bank (Haas 2003). It is also consistent with hydropower planning in wealthier countries such as Norway and Canada.

The public-interest design and procurement model means initial higher cost to the state, to be recovered from developers. A public-interest hydropower design and procurement model is easiest to imagine occurring for small projects. But of course it is those sites where very large-scale projects are being planned – such as major tributary and Mekong mainstream dams – that are most controversial and most urgently need fresh approaches to development.

Recommendation 3: Select developers after the public design phase, using a transparent procurement process.

Conclusion 2: Hydropower project design is more sustainable when the power system planning itself is conducted according to integrated demand-side and supply-side principles, in a participatory manner, leading to a rigorous justification of the need for new hydropower.

Recommendation 1: Countries or sub-national regions considering major hydropower consumption should conduct a comprehensive options analysis for the system, using integrated electricity resource planning (IRP) principles.

Recommendation 2: Learn more about the cost and feasibility of alternative project design, including the concept of local benefit sharing, by establishing a number of cooperative case studies with hydropower projects already in operation in the region. Notions of cooperation and ‘collaboration’ raise ethical challenges for academic researchers, whose basic responsibility is to avoid harm. A tension exists between academics and developers, but it is not necessarily unproductive.
1 Introduction

Energy policy makers look at hydropower as a source of low-carbon power and energy. It plays a role in the power system expansion plans of all electricity organisations (utilities) in the Mekong region (Asian Development Bank 2009b, Foran et al. 2010b). With limited institutional commitment to demand-side management, power systems are expanding rapidly, and the hydropower sector in the Mekong is experiencing a boom.

Analysis of hydropower development in the region reveals a number of governance and distributional (equity) challenges. This means that large hydropower development in the region continues to be quite controversial, with the hydropower-capture fisheries trade-off a major issue of concern for civil society and scientific groups (Lawrence 2008, 2009, Middleton et al. 2009, International Centre for Environmental Management [ICEM] 2010). The phrase ‘sustainable hydropower’ is contested.

Hydropower projects are agents of complex social and ecological change. Some views of those changes are positive. Jean Foerster, formerly with the Nam Theun Power Company’s environmental and social program notes that the design of Nam Theun 2, Laos’ largest infrastructure project required:

implementation of a substantial development project in parallel with the industrial project with the overall aim to convert project impacted people into project beneficiaries

(Foerster 2009)

Other views are more critical. Nga Dao, in commenting about state governance in Vietnam, writes that:

the state’s interest in promoting industrial activities severely limits its ability to enforce environmental and other regulations that might decrease the profitability of these activities.

(Nga Dao 2010)

Of course, this comment about unbalanced development applies globally, but rapid industrial expansion in the region means biases in governance can translate to amplified social and ecological impacts.

A key purpose of this report is to raise issues about the relationship between commercial hydropower development and social equity that we consider worthy of further discussion by a range of stakeholders, including academic researchers and the private sector. Written for a general interested audience, the report also includes recommendations for policy development and ongoing research.

Private capital is playing an increasingly important role in hydropower development. In Laos, public resources are limited and public spending on new infrastructure and maintenance of
existing infrastructure does not receive sufficient funding as demand outpaces the financial capacity of the state. The domestic market, however, is too small to attract foreign investors, who thus far have shown little interest in investing in domestic infrastructure. But as Lao hydropower serves a regional market (Thailand, Vietnam, and possibly Cambodia), this has made it more attractive to foreign actors.

In Vietnam, the government has embraced private sector involvement less rapidly than Laos. Nearly all projects are fully state-owned and operated, through Electricity of Vietnam (EVN). Total installed generation capacity of 11,340 MW (as of 2005) was dominated by hydropower (39 per cent), and gas-fired plants (38 per cent). APEC analysts expect total installed capacity to grow at 5.8% between 2005-2030 (Asia Pacific Energy Research Center 2009). Some sources (World Bank) estimate that Vietnam will boost its ratio of hydropower to total capacity while other sources (Vietnam Union of Science and Technology, and APERC) say that coal will become the main power generation source, with the percentage of hydropower dropping below 30 per cent.

For Cambodia, diesel generators using imported fuel oil meet the peak electricity demand of approximately 400 MW, with only three per cent generated by hydropower facilities, although the government plans to triple hydropower output over the next several years. Its goal is to increase rural electricity coverage to 70 per cent by 2030, from some 13 per cent currently, via Rural Electricity Enterprises. The government estimates its hydropower generating potential at 10,000 MW, with nearly half of that coming from projects along the mainstream of the Mekong river. Cambodia has no national grid and most towns are supplied through isolated systems. Its electricity prices are among the highest in the region due to the small size of generation capacity, dependence on expensive imported oil, the lack of high voltage transmission system and the large losses in distribution.

Countries in the lower Mekong basin plan to gradually integrate their electricity energy systems into a regional transmission network. Cambodia and Laos currently encourage private sector investment in the generation, transmission and distribution systems while Vietnam has been slower to do so.

Many examples in this paper come from Lao PDR. The Lao hydropower sector is large, growing, export-driven, as well as diverse in its range of sustainability issues and performance.

1.1 Issues affecting sustainable hydropower development

The ‘Mekong hydropower regime’ – a particular socio-technical system of resource development – might be defined in terms of four key sets of development and governance issues.

Mekong ecological resilience
Mekong inland fisheries rank among the world's largest. Driven by the flood pulse of the annual monsoon – the Mekong fisheries are an important source of nutritional security. They contribute to market and non-market based livelihood strategies of small farmers and other rural people,
and in places such as the Tonle Sap of Cambodia, they are the foundation of important commercial fisheries.

According to Friend and Blake (2009), 87% of species in the Mekong Basin are migratory. Several assessments have drawn attention to the fact that dams would have serious negative impact on fisheries by disturbing migration, and creating bodies of still water to which most species could not adapt (Friend and Blake 2009). For example, two dozen scientific studies shows that the proposed Don Sahong dam would act as a bottleneck for fish migration in the basin (Baran and Ratner 2007). Don Sahong is a controversial dam proposed on the mainstream Mekong in Southern Laos.

Dam impacts on capture fisheries across the Lower Mekong Basin could be of such a huge and wide scale that mitigation would not be possible, forcing policy makers to confront difficult trade-offs between benefits to power exporters vs. the possibility of aquatic ecosystem collapse, with significant livelihood losses to rural people (ibid). Another sector that would be impacted by large-scale hydropower development is navigation.

**Structure of electricity industry**

For the most part, electricity consumers in the Mekong region have little choice about their electricity supplier. Very few consumers generate their own electricity, or are able to negotiate direct purchases. Instead, the vast majority are dependent on monopoly generation and distribution utilities. Thailand’s EGAT and the two distribution utilities set their tariffs based on a rate-of-return formula that allows the utilities to meet all their expenses plus a particular financial return (e.g. 6.4% return on invested capital for EGAT; 4.8% for the distribution utilities).

The difference between Thai tariff regulation and rate-of-return regulation in North America, however, is that in the latter context, it occurs under the management of high-capacity independent regulators. Those regulators will, for instance, review the power plant expansion plans submitted by various utilities, using a quasi-judicial process. They will comment on whether the proposed costs of supply expansion are prudent and reasonable (in other words, on whether the proposed plan has taken into account a range of options, including on the demand-side).

In Thailand, however, the independent electricity and gas regulator (ERC – Energy Regulatory Commission) is a new institution, essentially created by the Ministry of Energy. It has a mandate to promote economic efficiency, as well as energy efficiency, but its track record of using ‘efficiency’ to rule in favour of enhanced environmental and social choices is still limited.

EGAT (which is part of the Thai Ministry of Energy) is the single buyer of imported electricity. It views imported electricity as a commodity with quality and price as the key issues to be negotiated. Ministry of Energy experts we interviewed stated that environmental and social standards are set by power sector financiers and host governments, they are not issues which the power purchaser should dictate (Interview A, 28/4/10) (Foran et al. 2010b). By contrast, participants at a 2007 Thai-Lao forum on sustainable hydropower (organized by World Bank) argued that low willingness to pay creates a disincentive for developers to improve
environmental and social performance. A World Bank official argued that the time has come for consumers in the region to have ‘green power’ market choices (Interview C, 20/5/10).

Consumer choice however implies competition at the distribution (retail) level. While there has been significant interest among some policy coalitions in privatizing the electricity industry in Thailand and Vietnam, state-led attempts to privatize the Thai utilities have been contested vigorously by civil society, and are off the political agenda as of this writing. Vietnam may transition faster to a privatized industry (see Section 2.3 below), but whether restructuring results in better integration of environmental and social issues remain to be seen.

**Weaknesses in state regulatory capacity and rule of law**

In Mekong countries, progressive policies and laws may be on the books (e.g. the Lao PDR national policy on sustainable hydropower), but capacity and willingness to enforce may still be weak (Lawrence 2009).¹

As more sources of hydropower financing have become available in the Mekong region, we are seeing a divergence in the quality of environmental and social planning and performance (Foran et al. 2010b). We were told that senior figures in government accepted bribes in return for allowing a large hydropower project to bypass normal EIA review (Interview F, 22/5/10).

Relatively high performers like Nam Theun 2 differ from other Lao projects under construction such as Nam Ngum 2. Neither the sponsors nor the state have disclosed the NN2 EIA or resettlement plan despite repeated requests. Observers familiar with resettlement and livelihood restoration programs at Nam Ngum 2 state that they are “far worse” than Theun-Hinboun or Nam Theun 2. The Nam Ngum 2 dam for example is apparently being built with no bottom outlet, making environmental flow releases (i.e. releases for environmental objectives) more difficult. The project originally planned to provide resettled people with dry-season irrigation scheme, however this plan was later abandoned (Interview F, 22/5/10).

The regulatory context continues to be low in transparency, easily influenced by developers and other actors with money and access to political power, and less responsive to the interests of the weakest segments of society, especially project-affected communities (Molle et al. 2009).²

**Bottom-up river basin development**

What we call bottom-up river basin development actually includes two related issues: how options assessment and planning get conducted, and the increased presence and power of private sector actors, particularly financiers and private construction engineering firms.

**Options assessment and power system planning**

In best-practice energy and water resources development, strategic planning (e.g. electricity options assessment, various national and regional development plans) takes place in a

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¹ This issue has been noted not just by international observers, but also by Lao participants (e.g., at a 2009 training on hydropower sustainability assessment hosted by MRC, attended by the first author).

² A donor representative based in the region expressed interest in funding a review of state concessioning processes for mining and hydropower.
transient, objective, ongoing, and participatory manner. Strategic planning occurs regularly, and precedes various project-level studies. The structure of sustainability guidelines issued by the World Commission on Dams (WCD) and the International Hydropower Association (IHA) reflect this planning ideal, which is consistent with principles of integrated water resources management (‘IWRM’).

Actual practice in the Mekong region, however, is far from this ideal. Planners at electricity utilities, for instance, do not include energy efficiency projects as investment options in their long-term power development plans to be considered symmetrically with supply-side options (Foran 2006).

In hydropower-rich countries (e.g. Laos), screening studies exist, but seldom guide prioritization of hydropower sites in a transparent, participatory manner. Hydropower projects instead are developed according to an entrepreneurial and highly exclusive process. The process typically begins with developers bidding with governments for exclusive rights to investigate sites. Developers then proceed to generate more refined knowledge of impacts, costs, and returns. This knowledge supports a number of agreements negotiated with governments and buyers. The agreements become increasingly complex. Later, the public begins to learn about a project's details and may participate in consultations. By this time, the sponsors' flexibility to revise environmental and social performance in response to public input has unfortunately decreased.

Rights to water are defined and defended in concession agreements. According to standard terms of such agreements, any changes to water rights are zero-sum: they must be compensated financially by the party that benefits.

*New sources of finance*

In recent years, the number of dams developed and financed, or co-financed, by “new” financiers has also increased. Private-sector multi-national banks, such as Mizuho (Japan), Fortis (Netherlands), ING Group (Netherlands), ANZ (Australia), and Citigroup (USA) now play an important role as lead financiers or co-financiers in large infrastructure projects worldwide, including in the region (Foran 2009, van Gelder et al. 2010).

New financiers are also based in developing countries. They include state-owned institutions such as China Export-Import Bank, China Development Bank, and Thailand Export-Import Bank. Thai commercial banks are also active in the region, such as Siam Commercial Bank, Bank of Ayudhya, Kasikorn Bank, Siam City Bank, Siam Commercial Bank, Thai Military Bank, and Thanachart Bank. Vietnamese financiers include Vietcom Bank and the Bank for Investment and Development of Vietnam.

Few of these banks have the technical capacity to serve as lead arrangers of finance for large hydropower. This role requires increased responsibility for pre-investment project screening as well as detailed knowledge of how to manage risk in a project-structured financing. In the case of the Nam Theun 2 project in Laos, the regional banks benefited from risk management leadership exercised by the World Bank. But projects that are not likely to get multilateral development bank financing – such as any proposed dam project on the mainstream Mekong – will need to be led by one of the new class of financiers, if they are to proceed at all.
The increased availability of regional finance suggests the possibility that new models of financial decision making have emerged which are significantly different than that of the traditional multilaterals such as the World Bank, with different perceptions of risk and risk management.

*Short term financial motivations?*

In a context where there is limited willingness to pay on the purchaser’s part, as well as variation in rule of law in host countries, some investors’ approach to project design is to approach a site with a view as to how to design it so as to achieve their target financial rate of return, even if this means continuing to increase the inundated area in a socially and environmentally irresponsible way (Interview B, 18/5/10).

Related to the above point, some developers are construction engineering companies who may be motivated to participate as equity investors in the project, primarily because of their interest in the engineering procurement contract (EPC), more so than making a return from successful ongoing operation. One example we were given was the 75 MW Huay Ho hydropower project in southern Laos, where overestimation of hydrological flows led to financial losses. The EPC contractor apparently managed to exit profitably, but other shareholders have yet to do so (Interviews B and D, 18 and 20 May 2010).

In this context, while some discussants see the presence of a contractor as a project company shareholder as a conflict of interest, it is understandable given the financial nature of projects (Interview D, 20/5/10). Others think it can be managed through strict separation of roles (Interview C, 20/5/10; see also Yescombe 2007).

To conclude the above survey of sustainability issues facing hydropower in the region, knowledge and capacity limitations must be acknowledged. Detailed technical knowledge about hydropower planning lies primarily with the private sector, and much less so with the public and academic sector in the Mekong. As we argued above, hydropower projects are agents of complex social and ecological changes, requiring a commitment understanding changes which occur at different scales of space and time, as well as crossing different knowledge domains.

All points raised above deserve further inquiry. The multi-faceted role of the private sector – in particular the willingness of different developers and financiers to build less environmentally and socially damaging projects – is not well understood. Investment continues to take place in a context where information disclosure and transparency is low.

### 2 Institutional and legal frameworks

The purpose of this section is to provide a broad overview of potential gaps in the existing institutional, policy and legal frameworks to regulate and control the private sectors involvement in hydropower development. This section is also intended to provide clear background and context for a number of sections of this report. For more detailed overviews of legal frameworks pertaining to dams and water governance in the Lower Mekong Basin, see (IUCN 2006), and (Hirsch 2006).
2.1 Cambodia

Cambodia is currently undertaking a large-scale hydropower development program, mainly in cooperation with Chinese construction companies funded by Chinese banks. Much of this development is driven by the Cambodian “Rectangular Strategy for Growth, Employment, Equity and Efficiency”, which will ‘promote private sector participation in electricity production and distribution, and support power transmission grids that facilitate electricity imports from Cambodia’s neighbouring countries’ (Middleton and Chanthy 2008). The energy generating potential in Cambodia may be as high as 10,000MW, with over half of this coming from dams on the mainstream Mekong (Lazarus 2008). The Asian Development Bank is backing Cambodia’s electricity sector reforms through its ambitious and controversial Mekong Power Grid Plan, whereby a significant proportion of Mekong energy will traded among the lower Mekong countries, and possibly with China.

Cambodia’s Council of Ministers review projects with investment capital exceeding $50 million; sensitive projects that may impact on the environment or exploit natural resources; and all ‘project-finance’ structured projects, (Lazarus 2008). While there is no direct law on hydropower development in Cambodia, there are relevant articles within other laws related to energy, the environment, and agriculture. Ministries with responsibilities related to hydropower development are supposed to cooperate in its assessment. These agencies and the relevant laws include:

Ministry of Industry, Mines, and Energy (MIME) - administers the Electricity Law (2001). Their mandate related to hydropower includes: conducting research; estimating hydropower potential to develop hydropower projects; and monitoring and evaluation of existing hydropower projects. MIME has been active in developing various power development plans strategies, including feasibility studies with Chinese hydropower companies.

Ministry of Water Resources and Meteorology (MOWRAM) - administers the Water Resources Law (2007). The Ministry’s most important function relevant to hydropower development is to issue and monitor compliance of licenses for water use and water works construction, and imposing water user fees. While MOWRAM is responsible for the overall management of Cambodia’s surface and ground water resources, their role in water resources management remains ‘ill-defined and limited’ due to an apparent reluctance by lawmakers to confer too much power to MOWRAM (Middleton 2008).

Ministry of Environment (MoE) - administers the Law on Environmental Protection and Natural Resources Management (1996) and associated sub-decrees. Their mandate includes: Environmental Impact Assessment (EIA); Natural Resource Management; Environmental Protection; and Public Participation. The MoE’s role in hydropower development is hindered by ill defined or pending sub-decrees and the long standing (over ten years) delay in approving the Law on Protected Areas. The MoEs role in conducting EIAs and facilitating public participation remains weak. While an Initial EIA (IEIA) is required for developments over 1 MW, the conditions required for a full EIA remain loosely defined or enforced. The nature of public

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3 Section 3.1 below discusses project finance.
participation is also ambiguous - when and how this participation should occur, or how it should be incorporated into decision making remain unclear (Middleton, 2008).

While a basic framework exists to regulate private sector hydropower investment in Cambodia, a number of problems concerning clarity over institutional mandates and cooperation, and deliberately delayed or ambiguous legislation hamper its effectiveness.

Cambodia has an extremely supportive investment climate for large hydropower projects, and there is significant high level political support up to the level of the Prime Minister for Chinese, and to a lesser degree Vietnamese investments. This support is extremely influential in the overall decision making process on project selection and approval. Even if gaps and inconsistencies within the current legal framework are addressed, questions would remain about its effectiveness in ensuring sustainable outcomes in an environment where final decision making by elites may overrule official EIA-based processes.

### 2.2 Lao PDR

Lao PDR has big plans for hydropower development, with approximately 24 dams either under construction or in various stages of planning (IRN 2008). Much of this current and future dam development, a key component of the national development strategy of Laos (Thompson, 2010), is been financed by private sector investors predominantly from Vietnam and Thailand. It is generally recognized that a comprehensive legal framework has been developed with the potential to support sustainable hydropower development in Laos (IUCN, 2006), which the GoL has ‘gradually improved to meet international financing requirements’ (MIME 2008). However, some have argued that this framework is let down by poor compliance by dam builders, and inadequate enforcement of laws by the GoL (IRN, 2008).

The planning and construction of Nam Theun 2 catalysed a number of reforms related to the hydropower sector in Laos related to such aspects as consultation and resettlement standards (Illangovan 2009). One promising reform is the National Policy on the Environmental and Social Sustainability of the Hydropower Sector in Laos (2005). Adapting social and environmental standards developed under NT2, the Policy aims to streamline and institutionalise their application ‘to all large hydropower dams, where large dams are defined as having installed capacity of higher than 50 Megawatts or inundating more than 10,000 hectares of land at their fully...[and] applies to hydropower projects constructed after 1990’ (Government of Lao PDR 2005). This policy covers the following aspects:

- environmental impact assessments;
- environmental management plans;
- cumulative impact assessments and their mitigations;
- comprehensive monitoring and evaluation frameworks;
- plans to address the needs of project-affected people;
- watershed management and conservation strategies;
- prior and informed consultations with consent provided without coercion;
- disclosure of information; and
- compliance mechanisms.
The adoption of this Policy by the GoL was well received by civil society groups. International Rivers noted it ‘contains many worthy principles that are in the best interests of the government and people of Lao PDR’ (IRN 2006a).

A notable commitment in the 2005 policy is revenue sharing. A certain portion of the revenues from each hydropower project will be allocated to general funds or special financing windows within the Environment Protection Fund (EPF). These funds will be used to support nation-wide environmental protection and conservation efforts in the country.

Lao PDR has several legal instruments that provide for compensation to people adversely affected by the construction and operation of dams, including: the Electricity Law, 1997, National EIA Regulation, 2000, the Regulation on Implementing Environmental Assessment for Electricity Projects, 2001, and Environmental Management Standards for Electricity Projects, 2001. Legally-binding provisions exist for handling reparation claims for losses resulting from existing dams (IUCN, 2006: 45).

Two GoL agencies are tasked with ensuring that hydropower is sustainable. Under the Electricity Law (Article 43), the Ministry of Energy and Mines (MEM) has primary responsibility for policy formulation and strategic planning. These functions are to be undertaken jointly with the Water Resources and Environment Agency (WREA), as well as the Committee for Planning and Investment (CPI), and other agencies as relevant to the situation (Maunsell, 2006). However, under the Environmental Protection Law (1999), MEM is also responsible for developing sectoral guidelines on Implementing Environmental Assessment for Electricity Project in Lao PDR (Frankel 2010).

The Lao Water Resources and Environment Agency (WREA) is the government body primarily responsible for ensuring hydropower developments complies with social and environmental laws, including EIA. However WREA’s capacity to coordinate and manage complex environmental assessment processes such as hydropower EIAs remains weak primarily because of a lack of authority and technical capacity.

Sitting under the Office of the Prime Minister, WREA does not have the status of a Ministry. The Lao regulatory framework on environmental protection encourages the involvement of multiple organisations within the government at State, Provincial and District levels; however WREA lacks the power to direct or enforce other GOL ministries to follow environmental standards or force project developers to implement mitigation measures to ensure environmental protection (Frankel, 2010: 1). WREA’s role in regulating project developers is compounded by a lack of adequate funding or staff to monitor dams during construction and operation phases (IRN, 2008), and may indeed be compromised in that they receive earmarked financial support from project developers through the Environmental Management Plans (Frankel, 2010).

Lack of public disclosure remains a general problem with the hydropower EIA process and development projects in general in Laos. While there is no specific legislation on public access to information, provisions for this are contained within different laws, including the EIA law (IUCN, 2006: 45). Public disclosure of EIAs up until Nam Theun 2 has been generally weak
and it remains to be seen if the NT2 model will be institutionalized in line with the 2005 Hydropower Policy.

The Law on the Promotion and Management of Foreign Investment (2004) outlines an application and approval process for foreign investment. This process is the responsibility of the Ministry of Planning and Investment, and the ultimate decision maker on project approval is the Prime Minister’s Office. EIA and Strategic Impact Assessment (SIA) are supposed to be carried out as one of the last steps in the approvals process. Implementing EIA and SIA are the responsibility of the investor, and are reviewed by the relevant Lao technical ministries (MEM, WREA, and Ministry of Agriculture and Forestry). However it is important to note that these technical Ministries play a role only in reviewing relevant documents and approving feasibility studies, EIAs and SIAs. Despite laws to the contrary, there is virtually no public disclosure of information or consultation on these investments (Lazarus, 2008).

A foreign expert advisor to the Government of Lao shared the example of one large dam to illustrate some of the weaknesses in the current regulatory environment (Interview L, 6/9/10). The advisor explained that EIAs carried out by emerging country investors such as China, Vietnam and Malaysia are typically conducted by consultants from the region. In the example given, a Lao-based consultancy firm conducted the EIA, and a hydropower consultant from a Thai university led the study. This consultant was on a register of approved by the Thai Office of Natural Resources and Environmental Policy and Planning (ONEP). The register’s intent is to accredit experts in Thailand with technical competence to carry out EIA. However, upon reviewing the EIA, the advisor found that the entire baseline study had been copied almost verbatim from an EIA prepared for a mining project in the same province of Laos. After some minor editing of the baseline study data to relate it to the hydropower project, the Thai consultant re-packaged the mining baseline study as the official background study required for the hydropower EIA.

The advisor wrote to the chief of the Environment and Social Impact Assessment Department (ESIA) within WREA. The EIA was eventually approved. The advisor believes the matter was not referred to MEM because the Ministry would not easily accept rejection on social and environmental grounds, particularly because WREA is only an agency within the Prime Minister's Office, with lower status than a Ministry. The advisor stated she had come across several other comparable examples. Despite these breaches of EIA process, the situation may be improving. WREA rejected as inadequate an EIA for the proposed Don Sahong dam on the Mekong mainstream, and have asked the project proponent (a Malaysian company) to carry out more studies of the dam’s impacts related to fisheries. While the wider regional politics surrounding mainstream dams may have played a role in this decision, the advisor considers WREA’s decision on the Don Sahong EIA as an example of progress (Interview L, 6/9/10).

According to this expert, the overall EIA process is weakened from the beginning because of the lack of a transparent Concession system in Laos. Hydropower concessions appear to be assigned to concessionaires on an ad hoc basis by GoL officials, rather than a competitive or merit based process meaning that risky investors are not screened at an early stage.
Figure 1 Independent Power Producer project preparation and approval process

Source: (Department of Energy Promotion and Development 2010b). Notes: specifically applies to large projects with foreign purchaser but many stages common to domestic projects. STEA is now WREA.
MIH is now MEM. LHSE = Lao Holding State Enterprises.
2.2.1 IPP planning process

The official approval process for hydropower in Lao (Figure 1) appears to be based on international IPP solicitation and EIA-based permitting practices, and thus lays out in general terms (not restricted to Laos) what a private sector developer could expect in any process leading to a PPA.

Figure 1 shows the process nominally beginning with responsibility for initial investigation given to the public sector. However, in practice, the bottom-up model of development means that more detailed, usable knowledge must be generated by in an entrepreneurial manner by the private sector. As developers proceed to commit (invest) more resources to a given project, knowledge about its various features increases. As the amount of resources invested increases, willingness to withdraw declines. To complete the feasibility study stage for a large project, a developer has typically invested $1-2 million. By the stage at which public consultations are usually held, the wider public is just beginning to participate, and may raise fundamental questions, such as whether a demonstrated need exists for the project. But such questions at that stage are not welcome to the developer, resulting in frustrations for all parties.

2.3 Vietnam

The hydropower sector is currently dominated by Vietnamese owned State Enterprises. While foreign ownership is in theory permissible under Vietnamese law, it has so far been relatively uncommon (Lazarus, 2008). However, Vietnam is currently undertaking a process of electricity sector reform, which will eventually transition the system from a State Monopoly to a competitive open market. This process will require increased reliance on independent power generation (financed by a variety of partners, not only foreign companies); spinning off EVN’s main generating facilities as independent power generation companies, for public investment via the stock market; and similar market capitalization of its distribution companies (Lazarus, 2008: 37).

Under the National Energy Development Strategy up to 2020 and vision 2050, new energy markets will be gradually formed, with diversified ownership and business modes (Đào Trọng Tu et al. 2010), and competitive wholesale and retail markets (Haas, 2007). This strategy is supported by the Electricity Law (2004) which requires the establishment of an electricity market in Vietnam. The Government hopes that the Electricity Regulatory Agency of Vietnam (ERAV) will help mobilise independent financing and attract up to 20 percent of the required investments from the private sector. This process will be further assisted by the IFC, who have signed a mandate with the Ministry of Industry in 2006 to assist the GoV to structure an efficient framework for the power sector that will attract increased international investment (Lazarus et al, 2008: 38).

The willingness of the GoV to facilitate ‘a new age of foreign sector investment into Vietnamese infrastructure’ (VBN 2010) was in evidence at the recent launch of the new Power Development Master Plan VII (PDP VII), where VietPower prepared a marketing campaign targeting:

    regional government, power companies, law firms, financiers, engineering . . .
companies, power grid operators . . . to discuss and capitalize upon investment opportunities opening up across Vietnam’ (VBN, 2010).

Hydropower development in Vietnam (see Figure 2 below) is driven by these PDPs which are developed every five years. The current Plan (VI) is about to be replaced by PDP VII, for which few details are currently publicly available. The 2006–2010 Vietnam Socio-Economic Development Plan (SEDP) is another important policy statement related to hydropower development. The Plan contains specific provisions that relate to hydropower development, including an additional 5,500 MW of installed electricity generation capacity, highlighting three priority state investments, 51 hydropower plants listed for a mix of state credit and private investment, and 3 projects calling for foreign direct investment (Stockholm Environment Institute 2007).

Discussing the Vietnam PDP planning process, Đào Trọng Tu et al. (2010) argue that consideration of political risk has not been addressed explicitly in planning and strategy documents. Risk assessments of potential impacts and uncertainties do not occur as part of planning processes, and which have only just being considered as part of the Strategic Environment Assessment for PDP VI. Given past negative experiences with hydropower in such as the Yali Falls dam on the Sesan River (Sangha 2006), this lack of risk assessment in overall planning may be of concern to investors.

In Vietnam no specific regulations exist for construction and operation of hydropower dams: general regulations related to construction projects apply (Duong Thanh An and Phan Thi Minh Loan 2006). Environmental and social protection measures (including compensation for affected communities) are covered under a range of different laws and decrees, including the Law on Environmental Protection (2005), Land Law 2003, Law on Fishery (2003), Law on Water Resources (1998), and the Biodiversity Law (2007).

The main agencies involved with regulating sustainability aspects of hydropower developments are:

- Ministry of Agriculture and Rural Development (responsible for water resources development and irrigation works);
- Ministry of Construction (responsible for construction works);
- Ministry of Natural Resources and Environment – MONRE (land and environmental protection, including EIA)

Given their crucial role in EIA, there are concerns that MONRE’s institutional capacity is over-stretched, especially at the local level, and thus unable to fulfil its administrative obligations for the implementation of the 2006 Environment Law. Question marks hang over their ability to adequately administer EIA processes for hydropower projects, or refuse approvals that may be environmentally destructive (Lazarus, 2008). World Bank and ADB have attempted to address shortfalls in capacity of relevant agencies in ‘safe and sustainable’ hydropower development (Đào Trọng Tu et al. 2010: 37).
The Law on Environmental Protection (2005) requires both a Strategic Environment Assessment and an EIA for proposed hydropower developments. SEA must be prepared at the time of project formulation, and includes social development issues as well as issues related to environmental protection and resource management. The EIA assessment takes place after the SEA, and includes assessments of social, health and cultural issues. Approval of the EIA report is a prerequisite for a project to get investment and operational licenses (IUCN 2006: 79).

However, the EIA and SEA processes in Vietnam face a number of serious problems in their implementation. SEA for Vietnam PDPs has yet to be implemented by the government. A National Hydropower Plan (NHP) was developed for watersheds covering 21 hydropower plants, however this was largely ineffective due to the fact most projects had already begun implementation. A more effective, pilot SEA process was implemented by Stockholm Environment Institute in 2008-09. The quality of EIAs is generally limited as most investors simply fulfil the basic requirements of the law with very rudimentary EIAs. Capacity of consultancy firms in Vietnam EIA remains limited (Đào Trọng Tự et al., 2010).
Social aspects of EIAs and SEAs are usually treated in a cursory manner and treated more as a formality. There is no separate regulation for social impact assessment, and these issues are seen as part of the EIA. Đào Trọng Tu et al. (2010) cited one example of the Huong Son Hydropower project, where only 1.5 pages of general statements (of the 95 page report) were related to social impacts and mitigation measures. This problem is compounded by the makeup of EIA teams, where social scientists are typically absent.

During options assessments for projects, environmental and social issues form a minor component, which are ‘quantified and integrated’ (e.g. number of households relocated, area of forest cut) during the economic and financial assessment. Other environmental considerations such as biodiversity and habitat are not considered at this stage (Đào Trọng Tu et al., 2010).

When land is requisitioned by the State, affected persons have clear rights to be compensated and assisted in resettlement under the Water Resources Law (1998), Land Law (2003), Construction Law (2003) and associated Decrees. Households in Vietnam have the right to exchange, transfer, rent, inherit, or mortgage the right to use land allocated by the State, and where involuntary resettlement takes place they are entitled to payment of compensation by the State. The GoV sets land prices in the case of sale or compensation. Where land is lost, the principle of land for land is applied: land of higher quality or additional cash compensation must be paid). House and gardens, roads, utilities, schools and medical centres for the community are also a compensation requirement (Cao Thị Thu Yen 2003).

Public participation is required in the EIA appraisal process as specified in the Law on Environmental Protection and Government Decree 175/CP on Implementation of the Law. Public access to information and participation in the decision-making process is also required by the Regulation on Democracy at Grassroots Level. The Construction Law (2003) also allows for public participation on ‘Master plans’ for any kind of construction project.

Overall, however, the public participation process remains weak. The revised Environment Law (2006) requires public consultation during preparation of EIA. However, this form of consultation is specified as a formal letter from representative bodies (e.g., The People’s Committee and Fathers Front in project-affected communes), making it difficult for local people to participate or have individual concerns raised. Concerns also exist over the level of information available to communities about projects. While affected people generally have access to resettlement and compensation plans, they have no chance to participate on project preparation, such as site selection and project objectives (Đào Trọng Tu et al., 2010). Information sharing and consultation mechanisms as part of the Trung Son Dam project have improved remarkably (ibid), most probably due to the involvement of the World Bank. Public consultation remains particularly weak on hydropower projects implemented with domestic investment only (ibid).

Sustainability aspects are considered as part of Vietnam’s investment laws and investment approval process. The Ministry of Planning and Investment (MPI) and MONRE are both involved in assessing and approving foreign direct investment (FDI). Projects on a list requiring
the Prime Minister’s approval, in a conditional investment sector\(^4\), or over 300 billion Vietnam Dong (approx USD 15 million), are required to undergo a more complex approval process. This commonly involves MONRE and their EIA Department, who provide written appraisals to MPI on environmental aspects related to the investments, and which form part of the final decision making process at the Prime Ministerial and Provincial People’s Committee levels (Lazarus, 2008).

2.4 Conclusion

Some observers believe that while more sources of financing have become available in the Mekong region, the regulatory context, unfortunately, has not markedly improved. It continues to be low in transparency, easily influenced by developers and other actors with money and access to political power, and less responsive to the interests of the weakest segments of society, especially project-affected communities (Molle, Foran, and Käkönen 2009).

Despite the development of legal frameworks by Laos, Cambodia and Vietnam with potential to adequately regulate the hydropower sector, this section’s brief analysis supports the above statement. In the case of Laos and Vietnam, evidence exists that in the absence of multilateral or development donor co-financing, which comes with stricter conditions, developers’ standards have been much weaker.

Weaknesses in country regulatory practices can be addressed. Time to build capacity, as well as will and leverage to negotiate and implement reforms are needed. Until state regulation improves, complementary ways of regulating hydropower projects, such as industry codes of conduct and sustainability assessment, may be relevant and deserve study (Foran 2010).

An expert on EIA proposed that two critical reforms must occur for state regulatory processes to have any chance at becoming effective (Interview L, 6/9/2010). First, serious breaches of law relating to infrastructure development should be treated as criminal – instead of civil – cases. Second, all GMS countries should adopt a new practice recently introduced in Laos: detailed annexes covering standard environmental and social obligations that project proponents must consider and include in their Environmental Management Plan (EMP) and their Social Development Plan (SDP) must now be attached to all Concession Agreements. Outcomes however still depend on the ability of designated agencies to monitor compliance with conditions set in those annexes.

3 Finance and investment models

Financial design matters: a private sector investor will not invest in a hydropower project if they can make more money in an alternative investment. Large infrastructural projects in developed countries might yield returns to equity investors of 12–14% before inflation (Yescombe 2007: 103).\(^5\) From a sustainability perspective, if an investor’s apparent financial rate of return on a

\(^4\) The list covers 14 sectors in which investment is conditional to foreign investors, including exploration and exploitation of minerals.

\(^5\) Project rates of return will be slightly lower than returns on equity (see 3.2 below).
proposed project in a developing country increases beyond about 14% – that is, beyond returns that can be earned in developed countries – it is important to know why. Has the investor adequately and fairly budgeted environmental and social project components?

Conversely, as the most favourable sites for hydropower get developed, and theoretical returns on new projects begin to fall, we need to ask whether a proposed project’s performance will allow it to adequately manage environmental and social issues. One challenge is that such data are usually not publicly disclosed: Nam Theun 2 is one notable exception (World Bank 2005).

This section reviews published and unpublished data on financial rates of return. It shows how returns depend on a number of key assumptions about financing, as well as assumptions about a large number of engineering, environmental and social cost components.

3.1 Project-finance of Mekong hydropower

It is increasingly common for large hydropower projects in the Mekong region to get structured according to principles of "project finance" (Yescombe 2007). Project financing is usually for large, complex and expensive installations in which loans are secured by the assets and revenues from a single project under control of a dedicated project company (BIS 2005). Project finance includes build-operate-transfer, build-operate-own, build-lease-transfer, and so on.

For hydropower, an independent company is formed for the specific purpose of developing the project and operating it during the course of a 25-30 year concession period. After the concession period, ownership may be transferred to the state.

The project company is owned by investors, who contribute equity (e.g., 30% of total project cost). The remainder of the project cost (e.g., 70%) is funded by loans. Lenders have traditionally been international finance institutions (such as World Bank or ADB), but it is now common to see large commercial banks and other Asian-based financiers (such as state-owned China Export-Import Bank) acting as lenders.

Sponsors may include both public and private organizations, leading to a project company that is a hybrid ‘public-private partnership’ (PPP). Each organization in the partnership will have different incentives, policies, and standards with respect to sustainability. Bringing disparate actors together is potentially an opportunity to harmonize to higher levels of sustainability performance.

Figure 3 below shows the basic structure of a private power company selling power to a utility under a power-purchase agreement (PPA). The relationship between the private power company and the public utility, structured by a long-term commitment by the latter to buy power according to a particular tariff schedule under particular terms, is one of the earliest forms of public-private partnership (Yescombe 2007).
Figure 3 Basic structure of a power-purchase agreement

Source: Adapted from Yescombe (2007). Note: power purchaser also has a technical advisor (not shown).

Lenders (whether public or private) usually play an important role in setting sustainability standards for hydropower projects. This is for two reasons: first, lenders are risk averse and will want to minimize damage to their reputation. Significant weaknesses in the regulatory context of a particular state is a potential source of reputational risk.

Second, since lenders are rewarded by interest payments, and get paid before returns to equity investors, constraining the environmental and social cost components of a project is less of a priority to them than it would be to equity investors. (However, lenders insist that the cash flows of a project cover debt service payments. This requirement for minimum debt service coverage ratios works against the notion that lenders are insensitive to project costs, and of course acts as another incentive for a developer to minimize project costs.)

The typical pattern for hydropower investment is that cash flow stream is negative during the construction phase of the project. As soon as the project begins to operate and generate revenue, principal on loans must be paid off, in addition to interest payments (which usually begin before commercial operation). Operation and maintenance costs must also be paid, and royalties may
be immediately payable as well. Lenders, sub-contractors, and governments are thus paid before any of the equity investors in a project company receives cash distributions (‘dividends’).

**Potential for conflicted interests in public-private partnerships**

*Contractors serving as equity investors*
Compared to comparable capacity natural gas fired plants, hydropower projects more require intensive civil engineering work. Although overall project rates of return can be favourable for a large hydropower project, the relatively long construction period and time lag until equity investors begin to receive dividends makes hydropower less attractive than natural gas plants, to financial investors (Head 2009). For this reason it is not surprising that some equity investors in hydropower also play the role of head contractor, or sub-contractor during the construction phase. Contractor roles provide an immediate return. If one of the equity partners benefits from a contract, the other partners will need to exercise oversight to make sure that the cost of that contract is not unduly inflated at the expense of the project company.

A project company dominated by construction engineering companies as shareholders also raises the question of whether it has recruited adequate capacity in hydropower operation, maintenance, as well as environmental and social program design (Interview D, 20/5/10).

*Government as equity investor*
In a situation where a state organisation also joins a project company as an equity investor (as is emerging practice in Lao), the question of whether its interests are conflicted arises. On the one hand, the state by definition is a regulator, nominally in the public interest. On the other hand, the state organisation as an investor is collaborating with private sector investors in a project company designed to generate a particular stream of financial benefits. If the regulatory commitment is weak, the private investors’ interests may override the public interest. One industry expert we spoke to however argued that the presence of a state organisation as a shareholder in a project company gave the state valuable additional access to the internal conditions of a project (Interview D).

*Consulting engineers as technical advisors*
From a sustainability perspective, it is important to note that each of the major parties – the lenders, the equity shareholders, and the public utility – rely on independent technical advisors to certify that a project is meeting particular standards, including environmental and social commitments. Technical advisors are usually engineering firms that service the hydropower sector. An engineering firm that serves as technical advisor to a third party for a particular project should have no financial interest in that project. However it may have a financial interest in other projects, and in the ongoing growth of the hydropower industry.

But independence is not simply a matter of financial interest: disciplinary background also matters. Advisors trained as social scientists and ecologists may be able to bring a more holistic understanding of natural resource dependent livelihoods.
3.2 Structure of financial incentives for the private investor

This section presents rates of return as reported in a number of primary studies. The calculation of any internal rate of return (also known as ‘return on investment’) requires iterative estimation: it is a discount rate at which the net present value (NPV)\(^6\) of the project cash flows equals zero. Investors typically use it as one indicator for the financial attractiveness of a project, often with a decision rule that IRR needs to exceed a particular (usually not disclosed) target rate of return.

The discussion in this section refers to financial internal rates of return (FIRR), not economic rates of return. The difference between the two is that financial valuation includes sunk costs; taxes, royalties, and distributions to equity investors. It also includes commercial interest rates for debt, and nominal (current) values of costs. Economic analysis does not include those terms (Segal 2004).\(^7\) Instead, economic analysis uses a social discount rate (which must be justified by the analyst) and considers only so-called ‘real’ resource costs, ignoring value-added items such as interest payments, taxes, and equity distributions.

Equity investors will expect different rates of return, depending on the timing of their involvement in the project. If the project moves from early development phases, to construction, to operation, it becomes less risky from the standpoint of generating hydropower revenue, and a lower rate of return is justifiable.

The equity IRR (also known as ‘return on equity’ or ROE) is a rate of return calculated taking into account only the equity investor’s positive and negative cash flows. Equity paid in by investors are negative cash flows, dividends are positive (Yescombe 2007). If the project performs as planned, the return on equity will be higher than the project IRR (see Table 2 below). This is because lenders’ contributions to cash flows during the development and construction phase of the project are not included in the calculation.

As Yescombe explains, several complications exist with estimating IRR (Yescombe 2007). First, if cash flows switch from negative to positive and back to negative again during the life of a project, a unique value for the IRR may not exist. Such a pattern occurs if major cost overhauls or decommissioning at the end of project life are included (2007: 53). Of course, projects that do not include a final decommissioning cost will have a higher IRR. Second, the standard IRR methodology assumes cash taken out of project can be invested at the same IRR until the end of period.\(^8\) These points are mentioned here to remind the reader that without access to details of financial models, any financial result presented must be interpreted with caution.

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\(^6\) ‘Net’ means positive and negative cash flows are summed; ‘present value’ refers to a financial value in the future which is divided by \((1+r)^n\) where \(n\) is the number of years into the future, and \(r\) is the interest or discount rate.

\(^7\) Instead, economic analysis uses a social discount rate (which must be justified by the analyst) and considers only so-called ‘real’ resource costs, ignoring value-added items such as interest payments, taxes, and equity distributions (Segal 2004: 2).

\(^8\) A modified IRR (‘MIRR’) is one in which cash flows are invested at an alternate rate of return (e.g., the investor’s cost of capital) which is typically lower than the project. Yescombe argues that this is a better representation of the real world (2007: 54).
3.2.1 Typical financial returns for Mekong region large hydropower projects

Maunsell and Lahmeyer International study
Although dated, a 2004 study by Maunsell and Lahmeyer International appears to be the most recent comprehensive, publicly available analysis of typical financial rates of return. This financial analysis was part of a more elaborate methodology, which included:

- System analysis: Lao power system demand forecasting, least-cost system expansion plan
- Market analysis: estimation of avoided costs for power systems in Thailand (Laos’ major export market)
- Project level analysis:
  - hydrological analysis at the project level,
  - analysis of upstream-downstream interactions, for selected combinations of projects
  - technical-economic analysis at the project level
  - financial analysis

(Maunsell Limited and Lahmeyer International 2004a)

Maunsell and Lahmeyer’s project analysis included desktop analysis of topographic and other field data based on literature review of earlier planning studies. Their hydrological analysis was a time series from 1966 updated to 2002. Individual candidate projects were then designed using proprietary ‘dimensioning’ software (‘EVALS’). This required establishing a detailed cost database to estimate per-unit and per-hour cost rates as charged by contractors.

Project-specific analysis conducted by these consultants appears in a “Project Catalogue” (Maunsell Limited and Lahmeyer International 2004b).

The Maunsell and Lahmeyer study included some quantitative estimation of a project’s environmental and social ‘externality’ costs using a bottom-up spreadsheet accounting methodology (‘SESAMEE’ developed by RMR Associates, a consultancy based in Lao.)

Financial assumptions used by Maunsell and Lahmeyer to derive cash flows appear in Table 1 below.
Table 1 Financial assumptions in Maunsell and Lahmeyer (2004)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value used for Modelling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General:</strong></td>
<td></td>
</tr>
<tr>
<td>Operating concession</td>
<td>25 years</td>
</tr>
<tr>
<td>COD</td>
<td>According to Base Export Scenario, or 2003 as appropriate</td>
</tr>
<tr>
<td>Money values</td>
<td>Nominal</td>
</tr>
<tr>
<td>Discount rate</td>
<td>10% (tariff levelizing)</td>
</tr>
<tr>
<td><strong>Tariff:</strong></td>
<td></td>
</tr>
<tr>
<td>Export price</td>
<td>Primary energy = 4.4 c/kWh in 2003 values</td>
</tr>
<tr>
<td>Domestic off-take price</td>
<td>Secondary energy = 2.5 c/kWh in 2003 values</td>
</tr>
<tr>
<td>Tariff profile</td>
<td>Opportunity cost of foregone export sales</td>
</tr>
<tr>
<td>From 2003 to COD – Escalate at 1.5%</td>
<td></td>
</tr>
<tr>
<td>From COD onwards - Flat</td>
<td></td>
</tr>
<tr>
<td><strong>Costs:</strong></td>
<td></td>
</tr>
<tr>
<td>Development costs</td>
<td>1.5% of base EPC costs</td>
</tr>
<tr>
<td>EPC costs</td>
<td>Escalation: 2% pa from 2003 to COD</td>
</tr>
<tr>
<td>O&amp;M costs</td>
<td>Escalation: 2% pa from 2003</td>
</tr>
<tr>
<td><strong>Financing Terms:</strong></td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td>Debt / Equity ration = 70/30</td>
</tr>
<tr>
<td></td>
<td>GoL equity share = 25%</td>
</tr>
<tr>
<td>Average loan terms</td>
<td>Tenor: 10 years</td>
</tr>
<tr>
<td></td>
<td>Interest rate: 8%</td>
</tr>
<tr>
<td></td>
<td>Loan fees: 3.5%</td>
</tr>
<tr>
<td></td>
<td>Grace period: non assumed</td>
</tr>
<tr>
<td>GOL equity loan</td>
<td>Tenor: 12 years</td>
</tr>
<tr>
<td></td>
<td>Interest rate: 6%</td>
</tr>
<tr>
<td><strong>Concession Terms:</strong></td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td>Years 1 to 5 0% of profit – tax holiday</td>
</tr>
<tr>
<td></td>
<td>Years 6 to 12 5% of net profit</td>
</tr>
<tr>
<td></td>
<td>Years 13 to 25 15% of net profit</td>
</tr>
<tr>
<td>Royalties</td>
<td>Years 1 to 15 5% of sales revenue</td>
</tr>
<tr>
<td></td>
<td>Years 16 to 25 10% of sales revenue</td>
</tr>
</tbody>
</table>

Source: Maunsell and Lahmeyer (2004a: Table 9.1)

Table 2 and 3 below show some results of the financial analysis. Table 2 shows estimated project and equity rates of return at a tariff of 4.4 c/kWh (2003 USD). Maunsell and Lahmeyer assumed that this tariff – approximately 6.9 c/kWh in 2010 USD – was competitive for export to the Thai or Vietnamese systems.\(^9\)

---

\(^9\) The 6.9 c/kWh (2.25 THB/kWh) 2010 result is obtained if the 4.4 c/kWh USD tariff is first converted to Thai baht (THB), then inflated 2003-2010 based on a Thai inflation index. If the 2003 USD tariff is not converted to Thai baht, the 2010 result is only 5.24 c/kWh (using US GDP deflator), or 5.08 c/kWh (using World Bank MUV index).
Table 2 Estimated project and equity rates of return at a tariff of 4.4 c/kWh (2003)

<table>
<thead>
<tr>
<th>Project</th>
<th>COD</th>
<th>Concession Period (25 years)</th>
<th>Service Life (50 years)</th>
<th>Minimum debt service coverage ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Project IRR</td>
<td>Equity IRR</td>
<td>Project IRR</td>
</tr>
<tr>
<td>Nam Mo</td>
<td>2009</td>
<td>15.8%</td>
<td>20.0%</td>
<td>16.2%</td>
</tr>
<tr>
<td>Nam Theun 2</td>
<td>2010</td>
<td>16.8%</td>
<td>20.3%</td>
<td>17.0%</td>
</tr>
<tr>
<td>Xe Kaman 3</td>
<td>2011</td>
<td>15.1%</td>
<td>18.7%</td>
<td>15.5%</td>
</tr>
<tr>
<td>Xe Kaman 1</td>
<td>2014</td>
<td>12.7%</td>
<td>14.5%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Xe Kong 5</td>
<td>2017</td>
<td>12.7%</td>
<td>14.4%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Nam Ngum 3B</td>
<td>2020</td>
<td>9.3%</td>
<td>9.2%</td>
<td>10.3%</td>
</tr>
</tbody>
</table>

Source: Maunsell and Lahmeyer (2004a: Table 9.5)

Table 3 below shows the financial tariff required for projects to meet a nominal return on equity of approximately 17% (a rate chosen by the analysts). The table shows that most projects structured to give investors a 17% ROE, and financed on the terms assumed above, would offer electricity at tariffs above 4.4 c/kWh (2003).

Table 3 Financial tariff required for projects to meet a return on equity of 17%

<table>
<thead>
<tr>
<th>Project</th>
<th>MW</th>
<th>Primary Energy Tariff (c/kWh)</th>
<th>ROE nominal (%)</th>
<th>Minimum debt service coverage ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theun Hinboun Expansion</td>
<td>105</td>
<td>4.3</td>
<td>17.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Nam Mo</td>
<td>125</td>
<td>4.6</td>
<td>16.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Xe Kaman 3</td>
<td>300</td>
<td>4.8</td>
<td>17.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Thakho</td>
<td>60</td>
<td>5.5</td>
<td>17.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Xe Kong 5</td>
<td>410</td>
<td>5.5</td>
<td>17.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Sane 3</td>
<td>60</td>
<td>5.7</td>
<td>17.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Xe Kaman 1</td>
<td>470</td>
<td>5.7</td>
<td>16.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Houyu Lamphan Gmai</td>
<td>410</td>
<td>6.5</td>
<td>17.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Ngiep1 + rereg dam</td>
<td>368</td>
<td>6.8</td>
<td>17.0</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Nam Ngum 3B</strong></td>
<td>690</td>
<td>7.2</td>
<td>16.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Pot</td>
<td>20</td>
<td>7.6</td>
<td>17.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Ngum 5</td>
<td>75</td>
<td>9.3</td>
<td>17.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Sim</td>
<td>10</td>
<td>9.9</td>
<td>17.1</td>
<td>1.0</td>
</tr>
<tr>
<td>Nam Bak 2B</td>
<td>85</td>
<td>10.3</td>
<td>17.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Long</td>
<td>12</td>
<td>10.7</td>
<td>17.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Xe Katam</td>
<td>13</td>
<td>11.9</td>
<td>17.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Nam Ngum 2B</td>
<td>195</td>
<td>12.1</td>
<td>16.9</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: Maunsell and Lahmeyer (2004a: Table 9.3)
The list of projects differs between Tables 2 and 3 above, but comparing the two tables shows that they have a common ranking structure, from highest to lowest rates of return (i.e. lowest to highest commercial energy tariff). Thus over a 25-year concession period, Nam Ngum 3B is below 10% FIRR. The projects listed below it in the table also have rates of return below 10%, which would be marginal to a financial investor.

But financial returns are sensitive to project- and investor-specific details of project financial design. Returns can increase if tariffs are allowed to be set higher during the first several years of operation, when loans are still being paid (see the Nam Long case study below).

Returns will obviously increase if low-interest lenders can be found, or if commercial lenders are willing to allow a grace period before interest payments are due. An example of the sensitivity of a project to interest rates and loan conditions is given in Table 4.

Table 4 Required tariff under different loan terms for a 56MW proposed hydropower project

<table>
<thead>
<tr>
<th>Average interest rate (% pa)</th>
<th>Commercial Terms</th>
<th>IBRD terms</th>
<th>GoL on-lending terms</th>
<th>China Exim Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan term</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8%</td>
<td>10 years</td>
<td>7%</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>7%</td>
<td>20 years</td>
<td>20 years</td>
<td>15 years</td>
<td></td>
</tr>
<tr>
<td>6%</td>
<td>5 years</td>
<td>4 years</td>
<td>5 years</td>
<td></td>
</tr>
<tr>
<td>Grace period (from COD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>17.1%</td>
<td>17.1%</td>
<td>17.0%</td>
<td></td>
</tr>
<tr>
<td>Calculated ROE (% nominal)</td>
<td>1.6</td>
<td>1.7</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Calculated minimum DSCR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Tariff (2003 c/kWh)</td>
<td>6.50</td>
<td>5.30</td>
<td>5.06</td>
<td>4.24</td>
</tr>
</tbody>
</table>

Source: Maunsell and Lahmeyer (2004a: Table 9.4). Notes: Project is ‘Houay Lamphan Gna’ in Attapeu province, Southern Laos. In the China Exim Bank case, no allowance is made for the possibility of higher maintenance costs or shorter service life often associated with Chinese equipment.

As noted above, Maunsell and Lahmeyer (2004) is the only publicly available analysis of financial rates of return for large hydropower projects in the region. A number of limitations of the study deserve comment. First, and most obviously, unit cost database are not disclosed. Neither are the actual per unit and per hour construction costs of construction engineering companies operating in the region. During the 2007-2008 escalation in world oil prices, hydropower civil works escalated.

Second, the study is somewhat dated. The MRC, through its BDP project, has commissioned a similar analysis based on an updated list of projects, as well as updated hydrological analysis, but the study and the ‘power economics model’ are not publicly available (Mekong River Commission n.d.).

Third, as noted above, estimated rates of return results are sensitive to project- and investor-specific details of project financial design. More favourable loan terms raise returns. On the other hand, returns will fall if there is any delay between investment in project planning studies and the expected commercial operation date. In order to understand the effects of unplanned delays, cost
overruns, and hydrological fluctuations, it would be necessary to conduct sensitivity analysis, but this was not done for all projects (compare to Nam Long case study below). Another limitation of the Maunsell and Lahmeyer study is that the project-specific environmental and social analysis intends to allow the quantification (monetization) of a broad range of impacts, including:

- costs associated with capital works with an environmental purpose (e.g. re-regulation dam, variable level intake);
- payments made by the project owner for social mitigations during construction (e.g. resettlement, compensation for lost production systems);
- recurring mitigation costs paid by the project owner during project operation (e.g. watershed management payments, support for social infrastructure, ongoing compensations, etc).

(Maunsell and Lahmeyer 2004: 213)

This kind of approach is data intensive, but data were not available for all of the impacts identified (see Appendix below, Table A2). Moreover, RMR Associates, the Lao-based small consulting firm that was managing the database, is not currently in operation.

The surprising result is that after the important contribution made by Maunsell and Lahmeyer (2004), no publicly available information system exists for site-specific environmental and social impact costs.

3.2.2 Typical financial rates of return: a small hydropower project

**Nam Long 5 MW hydropower project case study**

As with large hydropower projects, financial rates of return for smaller projects are not publicly disclosed. The following data are based on a review of a proposal to build a 5MW hydropower plant on the Nam Long river in Northern Laos (Luangpaseuth Construction Co. Ltd 2007). The Nam Long project was one that was presented to the first author in late 2008, in the context of a project that was seeking additional investment, possibly from EU donors.

The proposed project is in Long District of Luang Namtha province (Table 5). The developer is Luangpaseuth Construction Company based in Vientiane. By November 2008, a Memorandum of Understanding regarding the Nam Long project had been signed, the feasibility study had been approved, and the Concession Agreement was under negotiation.
Table 5 Summary of project hydrology & design, Nam Long hydropower project

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment</td>
<td>156 km²</td>
</tr>
<tr>
<td>Rainfall</td>
<td>1730 mm</td>
</tr>
<tr>
<td>Stream width</td>
<td>28 m</td>
</tr>
<tr>
<td>$Q_{\text{ave}}$</td>
<td>4.33 m³/s</td>
</tr>
<tr>
<td>$Q_{\text{design}}$</td>
<td>2.62 m³/s</td>
</tr>
<tr>
<td>$Q_{95%}$</td>
<td>1.73 m³/s</td>
</tr>
<tr>
<td>Head</td>
<td>245 m</td>
</tr>
<tr>
<td>Output</td>
<td>5000 knowledge</td>
</tr>
<tr>
<td>Average annual energy</td>
<td>37.296 million kWh</td>
</tr>
<tr>
<td>Construction cost</td>
<td>11.87 m USD (base case)</td>
</tr>
<tr>
<td>Construction unit cost</td>
<td>2374 USD/kW</td>
</tr>
<tr>
<td>Generation cost</td>
<td>4.23 cents / kWh</td>
</tr>
<tr>
<td>Tariff (years 1-8)</td>
<td>6.8 c/kWh (+1% p.a. escalation)</td>
</tr>
<tr>
<td>Tariff (years 8+)</td>
<td>5.4 c/kWh (+1% p.a. escalation)</td>
</tr>
<tr>
<td>Royalties</td>
<td>1% of gross revenues</td>
</tr>
<tr>
<td>Taxes</td>
<td>0% of net profit (yrs 1-5)</td>
</tr>
</tbody>
</table>

Source: Luangpaseuth (2007)

The Nam Long feasibility study (FS) includes analysis of the effect on financial rates of return for a number of adverse cases (Table 6):

Table 6 Sensitivity analysis, Nam Long hydropower project

<table>
<thead>
<tr>
<th>Case</th>
<th>Cost (Million USD)</th>
<th>Energy (GWh/yr)</th>
<th>FIRR</th>
<th>ROE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case</td>
<td>11.87</td>
<td>37.30</td>
<td>13.5%</td>
<td>15.1%</td>
</tr>
<tr>
<td>Base cost with 20% cost overrun</td>
<td>13.70</td>
<td>37.30</td>
<td>11.9%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Base cost with 20% less energy production</td>
<td>11.87</td>
<td>27.75</td>
<td>9.3%</td>
<td>10.2%</td>
</tr>
</tbody>
</table>

Source: Luangpaseuth (2007: 77-78)

The feasibility study (FS) conducted by Luangpaseuth Construction Company does not include discussion of the socio-economic values of the Nam Long river. The river runs over a series of
steep rapids and natural waters below the proposed dam site (Luangpaseuth 2007: 49). These rapids and waterfalls are difficult to access but may have some existing ecological value as well as value for eco-tourism. In the dry season, with a hydropower project diverting water into a headrace canal, flow over the natural rapids would decrease significantly. A powerpoint presentation of the FS refers to a future tourist “waterfall”, but this refers to a possible tourist site at the man-made weir. The FS also mentions that up to 2MW could be consumed by a Chinese copper mine 15 km from the site of the dam, which is currently importing power from China. The other load centers would be small districts and villages that are apparently not fully electrified.

4 Additional details of public-private partnership (PPP) models

4.1 Role of political risk insurance

The concept of "political risk" is typically framed in terms of risks to investors (not to affected people or wider stakeholders). The focus is on risks that originate from countries that host a particular investment. Political risk can be divided into expropriation risk, financial transfer risk, and risk of political violence.

The Multilateral Investment Guarantee Agency (MIGA), the World Bank agency that provides insurance against political risk, played a crucial role in lowering Nam Theun 2’s risk profile. This in turn enabled the government and developers to attract commercial financing and gave the investors assurance needed to proceed with the deal. In 2005, MIGA provided $91m in political risk insurance: $86m of this provides cover for a loan made by Fortis Bank NV of Belgium (representing itself and acting as agent for a number of commercial banks) against the risks of expropriation, breach of contract, war and civil disturbance, and currency transfer restrictions in both Lao PDR and Thailand. The rest of the coverage protects EDF International against the risk of transfer restrictions in Laos. The MIGA risk insurance complements a $50m partial risk guarantee issued by the World Bank (Multilateral Investment Guarantee Agency 2006).

4.2 Financial structure of Nam Theun 2

This section provides additional detail on financial design of Nam Theun 2, which is arguably one of the most ambitious PPP hydropower projects in the region

Role of Lao Holding State Enterprises

Government of Laos uses Lao Holdings State Enterprise (LHSE) for holding government shares in IPP project companies, and to administer GoL interests under project Shareholder Agreements. LHSE’s responsibilities include raising capital to meet GoL equity commitments, managing and disbursing GoL receipts from dividend distributions and re-financings. The primary function of LHSE is to hold, manage and maintain on behalf of GoL, shares in Nam Theun 2 Power Company, and any other power project companies which are acquired by LHSE or transferred to it by GoL (Lao Holding State Enterprise 2010a).
Nam Theun 2 is the largest investment ever in Laos and according to its sponsors, is also the world’s largest privately financed hydro-electric project. It is a public-private build-own-operate transfer (BOOT) joint venture structured as:

- 35% EDF International (France)
- 25% Electricity Generating Company (EGCO)
- 15% Italian-Thai Development Company
- 25% LHSE

Italian-Thai and EGCO are Thai publicly listed companies; EGCO is also partially owned by EGAT (which is a state-owned enterprise). In addition to being shareholders in the project company, EDF is the Head contractor, and ITD is a main contractor. Other main contractors include Nishimatsu Construction Co, General Electric/ABB/Clemessy, Mitsubishi Corporation, and JPower Systems Corp. Some 27 financial institutions have provided loans to the project.10

Ninety-five percent of total generation is sold to Thailand with take-or-pay commitment and 5% to Electricité de Lao (EDL). The total project costs US$1250 million, consisting of US$350 million equity and US$900 million debt financing (equity to debt ratio of 28:72). LHSE is responsible for its own equity financing, which it has obtained from GoL and the following additional sources:

- **Lenders:**
  - Asian Development Bank (ADB);
  - European Investment Bank (EIB);
- **Donors:**
  - World Bank’s International Development Association (IDA);
  - Agent Français pour Développements (AFD)

(Lao Holding State Enterprise 2010b)

The above financiers of GoL’s equity share require the Lao government to adopt and implement poverty alleviation programmes, environmental programmes and social and economic development programmes in a manner that is appropriate to their respective institutional guidelines (see Section 5.3 below).

**5 Towards sustainable financing?**

This section explores three broad ‘innovative mechanisms’ currently being applied to financing hydropower in the lower Mekong Region, and discusses their potential in improving the sustainability of private sector investment. These three mechanisms include:

- Investors’ use of sustainability frameworks & corporate social responsibility (CSR) frameworks;
- Benefit sharing, including development projects aimed at poverty alleviation;
- Payments for ecological services of watershed management in catchments where

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10 See Nam Theun Power Company (http://www.namtheun2.com/images/stories/structure2.jpg)
hydropower development takes place (PES).

Table 7 Selected ‘innovative’ mechanisms in the lower Mekong region

<table>
<thead>
<tr>
<th>Example</th>
<th>CSR / sustainability frameworks</th>
<th>Benefit sharing</th>
<th>PES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nam Theun 2 project - Equator Principle Banks (Lao PDR)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theun-Hinboun Expansion project – Equator Principle Banks (Lao PDR)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamdong Payment for Forest Environmental Services project (Vietnam)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Vietnam draft Decree on Benefit Sharing</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Thai commercial banks</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: authors’ analysis

5.1 Investor’s use of sustainability & corporate social responsibility frameworks

The current expansion of hydropower in the lower Mekong region is being increasingly supported by the private sector. In contrast to earlier periods where multi-lateral development banks (MDBs) and western bilateral donors dominated, the current expansion is supported much more by commercial loans by private banks and investments by firms from rapidly developing economies, often in partnership with governments (Middleton et al. 2009, Lebel and Foran n.d.). MDBs and bilateral donors have specific codes of practice and safeguard policies. While their success in terms of sustainable practices has been questioned, their safeguard policies at least provide a baseline against which they can be measured and held accountable. The commitment of the new generation of private sector investors in terms of sustainability and accountability is not so clear.

Many global banks have now adopted some form of Corporate Social and Environmental Responsibility policies, with a focus on environment, sustainability, transparency and accountability (Matsumoto 2009). Private-sector multi-national banks, such as ANZ (Australia), ING Group (Netherlands), Citigroup and Fortis, now play an important role as lead financiers or co-finance in large infrastructure projects worldwide, including in the region (Middleton 2009). However, many of the new hydropower developers from emerging economies such as Thailand, Vietnam, and China have failed to adopt any kind of CSER frameworks, and appear to be less encumbered by corporate social and environmental responsibility (CSER) policies raising concerns about the quality of hydropower projects and their impacts on sustainability in affected communities (Bosshard 2008).
Section 2 of this paper outlined a range of weaknesses in state oversight of hydropower developers. One alternative and complimentary approach is to encourage the private sector to develop and adopt methods of *self-regulation*. Self-regulation refers to rules that an actor adopts voluntarily, as distinct from state regulation, or market incentives. All three modes of regulation operate in any given context. Many frameworks exist. For example, a particular bank may announce its own forest-sector or water-sector policy (e.g., ANZ).

However, given the diversity of new actors investing in different countries in the region, codes of conduct such as the International Hydropower Association’s guidelines for sustainable hydropower and the Equator Principles may be useful in the Mekong region.

**International Hydropower Association Guidelines**

The International Hydropower Association developed a set of “Sustainability Guidelines” in 2004 and then an Assessment Protocol in 2006 building on the World Commission on Dam’s core values and principles (Locher 2009). In 2007 IHA, the Nature Conservancy and World Wildlife Fund established the “Hydropower Sustainability Assessment Forum” to review and improve the protocol. The forum includes 14 members and is a collaboration of representatives from different sectors including government, industry and international non-government organizations (Locher 2009) who aim to develop a broadly endorsed sustainability assessment tool to measure and guide performance in the hydropower sector. In August 2009 the forum released the draft Hydropower Sustainability Assessment Protocol (HSAP) and expects a final version in 2010.

The HSAP covers four parts of the project cycle: strategic assessment, preparation, implementation and operation (Hydropower Sustainability Assessment Forum 2009a). The first part is intended to inform decisions to invest based on things like demonstrated need, option assessment, energy plans, and institutional capacity. Conducted in a transparent and participatory manner, this part of the Protocol is seen as an essential component and could make a contribution to sustainability. However the 2009 draft Protocol was complex and required careful interpretation before it could be used (see Section 7 below).

**Equator Principles**

The Equator Principles are a voluntary code of conduct and set of standards that apply to project financing (Equator Principles 2006). The Principles were developed by a group of banks based on the policies and guidelines of the International Finance Corporation. The Principles apply to new projects with capital costs above US$10 million. As of early 2010, 68 banks from 27 countries working in more than 100 countries had adopted the Equator Principles (Equator Principles 2010).

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11 ANZ has adopted brief policy declarations with respect to water, forests, mining, and energy. Each of its sectoral policies refer to other sets of standards, such as IFC and ADB standards. Where a trade-off is necessary between competing development objectives, ANZ will follow priorities of the host government (ANZ Bank 2010).
Table 8 Key features of the Equator Principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>1. Review and categorization</td>
<td>Lender</td>
</tr>
<tr>
<td>2. Social and environmental assessment</td>
<td>Borrower</td>
</tr>
<tr>
<td>3. Applicable social and environmental standards</td>
<td>Borrower &amp; Lender</td>
</tr>
<tr>
<td>4. Action plan and management system</td>
<td>Borrower</td>
</tr>
<tr>
<td>5. Consultation and disclosure</td>
<td>Expert or Borrower or Government</td>
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<td>6. Grievance mechanism</td>
<td>Borrower</td>
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<tr>
<td>7. Independent review</td>
<td>Expert</td>
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<tr>
<td>8. Covenants</td>
<td>Borrower</td>
</tr>
<tr>
<td>9. Independent monitoring and reporting</td>
<td>Lender</td>
</tr>
<tr>
<td>10. Public reporting</td>
<td>Lender</td>
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</table>

Source: Lebel and Foran (n.d.)

A number of hydropower investors financing projects in the Mekong region have already adopted the Equator Principles. These Equator Principle Financial Institutions (EPFIs) have joined other private sector investors, many of whom have weak or non-existent sustainability policies or codes of conduct.

However, measuring compliance with EPs can be complicated given that projects are implemented under national regulatory frameworks, and in the case of NT2 below, under World Bank and ADB Safeguard policies.

**Nam Theun 2 and Theun-Hinboun Expansion Projects**

Two existing hydropower developments in Laos, Nam Theun 2, and Theun-Hinboun Expansion have a number of funders who are Equator Principles Financial Institutions (‘EPFIs’):

- **Nam Theun 2** is funded by the World Bank (risk guarantee), ADB, European Investment Bank and fifteen private financial institutions. Eight of these are EPFIs (ANZ, Bank of Tokyo Mitsubishi UFJ, BNP Paribas, Crédit Agricole CIB, ING Group, KBC Group, Société Générale, and Standard Chartered)

- **Theun-Hinboun Expansion (THBX)** is funded by eleven financial institutions. Three of these are EPFIs (KBC Group, ANZ and BNP Paribas)

These two case studies differ slightly; the Nam Theun 2 project involves private banks and multilateral development banks: the latter played significant roles in negotiations over social and environmental safeguards. THBX does not involve multilateral finance (however, ADB financed the original Theun-Hinboun project).
Both Nam Theun 2 and THBX projects, however, have been criticised for not complying with the Equator Principles. In the case of Nam Theun 2, the World Bank was criticised for tolerating violations of its own safeguards policies, including those concerning environmental assessment, involuntary resettlement, indigenous peoples and natural habitats (Lawrence 2009). The project has experienced numerous delays, with commitments on mitigation and compensation always proceeding much more slowly than construction and impacts (Lawrence 2007). Many of the criticisms were directed at the capacity and transparency of the government of Laos. NT2 began operations on 15 March 2010. Citing unfulfilled environmental and social conditions contained in the projects concession agreement, a prominent civil society organisation recently called for:

An independent, rapid, transparent and accountable review process . . . to determine whether the Nam Theun 2 Dam has complied fully with the requirements to be met before commercial operation commences, as committed to by NTPC, the Asian Development Bank, the World Bank, the European Investment Bank and the Equator Principles Financial Institutions.

(International Rivers 2010)

Claims of non-compliance were strongly refuted by the ADB and World Bank who stated that the NT2 operations are in compliance with all applicable agreements, regulations and laws (ADB and World Bank, 2010).

Critics of the THBX project have also argued that the project violated Lao law, and also a number of the Equator Principles (or performance standards [PS], listed in Table 8 above) including: Provisions for resettlement (PS5); failure to establish monitoring mechanisms in downstream areas (PS1); no documentation on ‘good faith negotiations’ or land use with indigenous communities (PS7); and lack of periodic reporting on the resettlement action plan to effected communities (PS1) (IRN 2009: 6).

The Theun-Hinboun Power Company countered with a detailed response claiming that the “allegations are either misleading or incorrect” (THPC 2009), and that reviews by independent consultants hired by the three additional investors in the project ‘concluded that THPC’s plans were compliant with the IFCs performance standards’ (THPC 2010). A social and environmental expert working on the THBX project supported the company’s claims. This expert was highly critical of other hydropower projects on which he had been involved, but felt that THBX was one of the only projects in Laos where the developer had a strong and genuine commitment to achieving positive environmental and social outcomes: ‘they are genuinely concerned about been seen by others to be doing the right thing’ (Interview F, 9/9/2010).
Like Nam Theun 2 project, the Theun-Hinboun hydropower project, is a transbasin diversion project involving a run-of-river dam on the Nam Theun River in central Lao PDR. Water is diverted from the Theun River through tunnels into a surface powerhouse, then into the Nam Hai, and Nam Hinboun rivers. The project was funded by the ADB, Nordic Development Fund and the Theun-Hinboun Power Company (THPC). The project was launched in 1994 and became operational in early 1998.

Regarding impacts of THPC's dam on the Theun River, an independent study by Shoemaker (1998) reported a 30-90% decline in fish quantity caught in downstream areas, substantial loss of agricultural land and damage to fragile ecosystems. Shoemaker argued that thousands of Lao citizens suffering harmful impacts from the project did not receive direct compensation for their losses. Within the entire $260 million dollar project cost – which allocated $2.59 million for a mitigation program – $50,000 was allocated for all resettlement and compensation costs for affected local people. In October 1996, the Lao government, acting with legal advice from the ADB, signed a license agreement with THPC, which absolved the company from any further obligation to assist with mitigation or compensation measures for the life of the project (Shoemaker 1998).

Barney (2007: 15) argues that it took pressure from environmental NGOs to prompt ADB to commission a second review. This was conducted in November 1998. ADB subsequently acknowledged for the first time that the project impact area should be expanded to include the full downstream impacts. THPC subsequently created a ten-year program designed to mitigate and compensate fully for all negative environmental impacts, developed by independent consultants (Theun Hinboun Power Company 2000) and financed by ADB.

In 2007, the Association of International Water Studies (FIVAS), monitoring Norwegian aid in the water sector, deployed researchers to assess impacts of the Theun-Hinboun project after almost a decade of operations. They found that fish and aquatic resources have continued to decline, causing loss of livelihood options for local communities. No compensation has been paid for lost fish productivity and a few small aquaculture ponds were built in a few villages as mitigation measures, but which have not had a significant impact. Fluctuating water levels and stronger water flows have seriously eroded banks along the receiving rivers (the Hai and Hinboun) leading to loss of agricultural lands and riverbank gardens. These losses have not been compensated by the THPC. Flooding has become increasingly severe since 1998, which was linked to THPC water releases. Villagers have experienced repeated loss of wet season crops, leading to widespread abandonment of rice agriculture (FIVAS 2007).

Apart from increased flooding, the turbidity and sediment level of floodwaters have killed rice crops, thus over 820 hectares of paddy land has been abandoned. Increased flooding has also caused skin diseases, water contamination, livestock disease, loss of fruit trees, loss of boats and fishing gear due to sudden water releases and food shortages due to mobility problems during flooded periods (FIVAS 2007). Fisheries, an important source of nutrition and livelihood for most Mekong populations, are one of the most important sectors affected by dam development.
Because the THB project sits below the newer Nam Theun 2 project, it was known that water supply from the Theun River and hydropower revenues would decline once the upstream dam for Nam Theun 2 was closed. The THPC was thus allowed to develop the Theun-Hinboun Expansion Project, which involves a storage dam on the Nam Gnouang, at a higher-elevation site in the Theun catchment. The additional water is diverted so as to flow into the same powerhouse, increasing power production to approximately 500 MW, but exacerbating flooding along the Hai and middle Hinboun Rivers during the wet season. This will require relocation of affected households, fisheries monitoring, promotion of improved and flood resistance rice varieties, and, if necessary, investment in dry-season irrigated systems (Theun-Hinboun Power Company 2010).

Theun Hinboun Expansion Project has commitments, formalized in its Concession Agreement, to reach income targets of affected people 30% above the poverty level. Other examples of THBX benefit sharing include health and education support, infrastructure and service improvements, and support for conservation programs. Theun Hinboun Power Company is interested in developing clear and simple development indicators (e.g., education, health care access rates) to help the industry better document the performance of projects.  

Source: adapted from (Foran et al. 2010b)

Further analysis of Equator banks’ response to the above criticism is desirable. In their reports on implementation of the Equator Principles, BNP Paribas (BNP 2009), ANZ (ANZ 2007), and KBC Group (KBC 2009) do not mention either Nam Theun 2 or the Theun Hinboun projects. EP reporting for all three banks gives almost no specific information on any of their projects, instead presenting statistics in graphs and tables grouped under the three IFC project categorizations. This lack of data is not surprising: a weakness of the Equator Principles is that they have limited requirements for public disclosure, and no requirements at all for disclosure of project-level details (Foran 2009).

The Uniting Church Australia has taken a particular interest in the accountability of Australia’s ANZ Bank regarding their commitments under the Equator Principles. Its investment arm, UCA Fund Management, has invested in ANZ shares. Following a visit to the THBX project in 2009 with partner NGOs, they found evidence that the project was violating Laotian resettlement law and the Equator Principles (Wagg, 2009), which was detailed in the report ‘Expanding Failure’ (IRN et al 2009). UCA chose not to divest their shares in ANZ, but decided instead to engage with the Bank over these issues, in the hope that they may be able to ‘influence the policies and decisions of the bank going forward’ (Wagg, 2009). The Bank’s response to UCA’s concerns was that it ‘could not comment on the operations of individual clients’ (ibid), advising UCA to speak with THPC directly. Emphasising the limitations of the Principles regarding public disclosure, a UCA representative voiced frustrations:

Surely the bank itself has a responsibility to ensure its investments are socially and environmentally sound, and not rely on third parties for that assurance. And surely being

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transparent about those investments is part of that responsible behaviour (ibid).

UCA has continued its engagement on this issue and recently met with THPC in Laos in August 2010 to continue discussions.

5.1.1 Corporate social responsibility and Thai Banks

Amongst the major private investors in hydropower in the region, Thailand remains the only country where commercial financial institutions have some measure of CSR in their operating policies. While major Thai commercial banks have adopted some form of CSR policy with some commendable commitments, there is no evidence that these policies have led to substantial changes in business practices (Middleton, 2009).

Three Thai banks lending to hydropower projects in Laos have international strategic investors: GE Money (Bank of Ayudhya); ING Bank (Thai Military Bank); and the Bank of Nova Scotia (Thanachart Bank). These strategic investors have committed to a number of international standards that the Thai banks have not yet adopted. Middleton argues they should accept significant responsibility in strengthening their Thai bank partners’ social and environmental performance (Middleton, 2009).

5.2 Implications and opportunities for private sector CSR

Decisions by financiers based in emerging economies such as Thailand, China, Vietnam, Malaysia and Russia to adopt international codes of conduct might include the following:

- Screen out risky projects;
- Enhance reputational image;
- Respond to anticipated changes in government regulations, and civil society pressures;
- Motivate staff, attract co-financing, reduce costs, and help build competitive advantage.

(Utting 2005, Lebel and Foran n.d.)

Middleton (2009), an analyst based in Thailand argues that “with the right commitment, Thai banks could take up – or even surpass – the much higher social and environmental standards already adopted by many international banks” (Middleton, 2009).

If investors and developers become involved in hydropower projects in more than one lower Mekong Region country, and regulatory frameworks differ markedly between countries, it would seem sensible that a common protocol be adopted across the region (including China and Myanmar). A common approach would help deal with transboundary impacts, such as the impacts of the Yali Falls cascade in Cambodia. But it might not be realistic.

Once lenders adopt codes of conduct for sustainability, they can serve as regulators. However, the cases of Nam Theun 2 and Theun Hinboun Expansion Project highlight the challenges in having financiers hold hydropower developers accountable.

Codes of conduct do not, on their own, resolve the tensions and politics around hydropower development. When commitments to CSR programs and standards are breached or side-stepped,
sanctioning and enforcement is very difficult. A context in which states or financiers are non-transparent or weakly accountable to affected communities makes the challenge of influencing actual practices through codes of conduct, standards, and guidelines particularly difficult (Lebel and Foran n.d.).

For their part, Equator banks are not required to report at the project level at all. However, the Equator Principles steering committee has suggested that signatories go beyond minimum requirements to produce non-confidential case studies of their internal review processes, including review of complex and challenging projects (Equator Principles 2010). Advocacy by civil society and shareholders such as that carried out by the Uniting Church of Australia with respect to THBX, as well as case studies by researchers that engage private sector actors may encourage increased disclosure by EFPIs.

While more robust monitoring and open reporting would be laudable, it remains to be seen how much leverage investors have over the project once loans are approved and funds are disbursed. One NGO analyst questioned the usefulness of monitoring by lenders under the current system. ‘Once loans are disbursed, all the investor can do is provide advice, such as action plans - it is up to the government and the developer to implement corrective actions’ (Interview K, 6/9/2010). What options lenders perceive they have – when governments or developers do not deliver upon social and environmental commitments – is a topic worthy of further investigation. For example, during the long repayment period, are some lenders willing to alter interest rates or other loan conditions to enforce compliance with best practice? How is ‘best practice’ framed, negotiated, and monitored?

5.3 Benefit sharing, including development projects aimed at poverty alleviation

While the primary beneficiaries of dams (electricity users) typically live far from the site, it is displaced communities, downstream users, tax payers and the environment that typically bears the costs (WCD, 2000). Benefit sharing is a mechanism in addition to standard compensation and resettlement for affected communities (see Figure 4 below), which treats both displaced people and communities that host the hydropower project in their locality as legitimate partners in the project and first among its beneficiaries (Haas, 2007: 8).

Potential objectives for benefit sharing include:

- Providing additional long-term compensation to affected populations;
- Establishing long-term regional development funds; and
- Establishing a partnership between developers and local communities based on sharing of economic rent generated by the dam project.

(Egre 2007:8)
With respect to benefit sharing, hydropower affected people in Lao are regarded by the GoL as more fortunate than those who live in districts without hydropower development.

While there are numerous examples of benefit sharing from hydropower from around the world (see for example Egre, 2007: 9-10) it remains a relatively new concept in the Lower Mekong Region. Vietnam appears to be taking a regional lead, where a draft national law was recently piloted with the aim, apparently, of full national implementation in 2010.

In Laos, Theun Hinboun Expansion Project has formally committed to raise incomes of affected people 30% about the poverty level. Nam Theun 2 also has formal commitments to raise affected peoples’ incomes, and a number of revenue sharing mechanisms to fund social and environmental programs. However despite clear direction in the National Policy on the Environmental and Social Sustainability of the Hydropower Sector (2005) there appears to be no commitment to expand these to other hydropower projects in Laos at this stage.

5.3.1 Draft Vietnam decree on benefit sharing from hydropower

Vietnam is currently undertaking a process of electricity sector reform, which will transition the system from a State Monopoly, to a competitive open market. A Draft Decree has been developed by the Electricity Regulatory Authority of Vietnam (ERAV) with the assistance of the ADB. Finalised in 2007, the draft Decree’s priorities are:
(1) . . . equitable sharing of benefits arising from sustainable development of the nation’s hydropower resources.

(2) [to establish] a long-term revenue sharing arrangement between the main consumers of electricity services in towns, cities and industry and the local communities hosting hydropower projects who are adversely affected by the project in their locality.

(Haas and Dang Vu Tung 2007: Appendix)

The draft decree is intended to cover ‘all existing and new hydropower projects, including large multi-purpose dams with a hydropower component and any grid connected hydropower project over 30 MW or small hydropower projects with a legal requirement for an environmental impact assessment’, and ‘All production enterprises (hereafter referred to as hydropower projects) owned or operated by national and foreign organizations and individuals, unless exempted by the State’ (ibid).

The decree was field tested at the A’Vuong hydropower project site in Quang Nam Province (central Vietnam) in 2008–09. The project was built a decade ago and communities have already resettled. While few details can be found, the pilot was part compensation, and part benefit sharing. Resettled households were qualified to apply for funds. Eligible applicants received a one-time grant depending upon the size of the household. A total of 482 households in two communes received grants totalling of $15,300 (Binh 2009).

The current status of this decree is unclear. It has been stated that the implementation of the decree would ideally ‘coincide with the introduction of the rules for the competitive generation market, scheduled in 2009-2010’ (Haas 2007: 7). In addition to the draft decree on benefit sharing, Vietnam has also developed legislation for payment for environmental services (see 5.4 below).

5.3.2 Nam Theun 2 Revenue Management Framework

Unlike other hydropower developments in Laos, one key argument used to justify Nam Theun 2 was that the GoL would use project revenues to address poverty (Lawrence 2009). It is estimated that government revenue from dividends, taxes and royalties will be approximately US$2bn over 25 years, with average annual revenues expected to be $80 million (NTPC web site, 2010).

A revenue management framework is been developed with the support of the ADB and World Bank, with the goal of ensuring that NT2 revenues are directed to poverty reduction programmes as required (Lawrence 2009). However GoL has faced a range of problems in developing an expenditure framework and associated systems. The World Bank’s own assessments point to ‘weaknesses in capacity building and reporting problems (World Bank et al. 2007), as well as ‘limited progress on medium-term expenditure framework for social sectors, and developing performance measurement systems for expenditures’ (World Bank 2009). Despite these problems, the GoL has already developed indicative allocations for priority sectors, which have been approved by the legislative assembly for use by eligible programs as part of the FY2009/10 budget cycle. These are: (i) education 35 percent; (ii) rural roads 30 percent; (iii) health 20
percent; and (iv) environment and forestry 15 percent. These allocations would be adjusted in the future, depending on performance (World Bank 2009).

A question mark remains over whether revenues from the NT2 project, or any project for that matter, will be channelled through the Lao Environment Protection Fund (EPF) as promised in the National Policy on the Environmental and Social Sustainability of the Hydropower Sector in Laos (2005). This policy states (under Section 7, ‘Revenues’) that:

The Developer will cover the cost of implementing all environmental and social safeguard procedures under the "user pays" principle. A certain portion of the revenues from each project will be allocated to general funds or special financing windows within the Environment Protection Fund (EPF). These funds will be used to support nation-wide environmental protection and conservation efforts in the country. In general, it is recognized that investment in future productive capacity, in the form of manufactured capital, human capital, social capital, or maintenance of the renewable resource base, would be prioritized in the use of revenues.

(Government of Lao PDR 2005)

The EPF was established in 2005 under the new Hydropower Policy. It has five ‘windows’ to invest in enhancing quality of growth and reducing poverty, including: community and biodiversity investments, policy implementation and capacity enhancement, pollution control, sustainable land management, and water resources management. While the original funding was through an ADB endowment, the intent was that the Fund should be replenished with revenues from large development projects such as the NT2 dam, which was identified as one of the main potential funding sources at the time.

The Fund’s 2009 annual report however raises a point of concern about ‘whether it is eligible to receive the Government budget, especially the revenue of Nam Theun 2 Project’ (EPF 2009), a question even more pertinent following the commencement of NT2 operations on 15 March 2010.

5.3.3 Nam Leuk project

While never strictly a benefit sharing scheme, The Nam Leuk hydropower project is worth including in the discussion on benefit sharing in this section. Built in central Laos in 1999, Nam Leuk (60 MW) was funded by the ADB and the Japan Bank for International Cooperation. It was the first project in the region where the ADB lent money for hydropower development in a protected area. As a condition of the loan, the dam operator Electricité du Laos (EdL) promised that one percent of revenues from sales of power to Thailand would be used to protect the Phou Khao Khouay National Biodiversity Conservation Area in which it was located. According to the ADB:

‘The [protected area] receives 1 percent of the export revenues for conservation measures and maintaining the reservoir as an attractive potential tourism site. The [protected area] administration has been developed . . . to a stage where it can start to function as a protection agency’ (ADB 2002) (p13).
However, a subsequent audit by the ADB found that:

‘Although the 1% funds are being disbursed by EdL to the PKK Park authorities, the [ADB Office of Environmental Management] believes that the intended goal, which was to support ecotourism and village-based integrated conservation and development programs is not being achieved’

(ADB 2004)(p38)

5.4 Payments for ecological services

A relatively new concept globally, payments for ecological services (PES), has no universally accepted definition. (Moore 2006) defines PES as:

[A] voluntary agreement to enter into a legally-binding contract under which one or more buyers purchase a well-defined ecosystem service by providing financial or other incentives to one or more sellers who undertake to carry out a particular land use on a continuous basis, which will generate the agreed ecosystem service at specified levels.

Pilot Payment for Forest Environmental Services, Lam Dong Province, Vietnam

This pilot scheme (‘PFES’) is sharing hydropower revenues with poor forest dwelling households in Lamdong Province, southern Vietnam. Initiated in 2007 by Winrock International, with funding from USAID, the aim of the PFES is to reward households to participate in the protection of watersheds. Signed by the Prime Minister of Vietnam, this pilot policy (PM Decision 380) is been implemented and evaluated by the Ministry of Agriculture and Rural Development (MARD) and Winrock International (Winrock 2009).

A provincial Forest Protection and Development Fund have been established under the Forest Protection and Development Law (2005), which collects approximately 10% of revenues from power generation. Annual payments of $2.8 million from the Da Nhim and Dai Ninh hydropower stations are been made to over 3400 poor households in these two watersheds located at the headwaters of the Dong Nai River Basin. These households are paid to protect 104,000 hectares of forest. When the payments are completed, each household will receive US $500 a year, a 400% increase in income (Santiago 2010).

By 2009, the PFES has generated over $4 million in revenues (Santiago 2010). In addition to payments to households (who receive 90% of available funds), 10 percent of revenues will be used by the government agency managing the payment. A draft national decree on forest PES is currently been drafted by the Government of Vietnam, with the hope that the Prime Minister will approve by the second half of 2010. Once it is scaled up to a national level, revenues are estimated to reach $1 billion (Santiago 2010); the decree is expected to be signed into national legislation on 20 September 2010.

Due to the success of the PES activities in Vietnam, the Winrock program has been formally requested to assist Laos and Cambodia to establish national pilot payment for environmental
services policy (Winrock International 2010). According to a program representative, Laos is planning to do on-ground activities, but do not appear to be ready for a pilot policy at this stage.

5.5 Implications and opportunities for benefit sharing involving the private sector

The Nam Theun 2 and Nam Leuk cases above suggest that benefit sharing frameworks require appropriate financial oversight as well as effective implementation to function appropriately. The Lao government faces serious challenges in terms of its ability to administer large hydropower revenues in a transparent and accountable way. As happened with the Nam Leuk project, it is unclear what authority non-government institutions such as the World Bank or others will have in Laos to ensure that NT2 revenues are directed as promised.

The development of legally binding benefit sharing legislation at the national level appears to be the most promising approach seen so far towards ensuring some consistent level of benefit sharing over the long term. Vietnam’s government has been motivated to take these bold steps through recognition of the ‘benefits of benefit sharing’, such as:

- Vietnamese authorities recognising that sustainable forms of hydropower are consistent with international criteria for project lending, and will assist in mobilizing resources to fund Vietnam’s ambitious national hydropower development plans (between $1.5 – 2 billion per year);
- Benefit sharing contributes to national policy goals, particularly reducing poverty of the poorest members of society – those who are typically affected by hydropower; (Haas and Dang Vu Tung 2007)

Treating affected people as project stakeholders in theory creates incentives for local action to sustainably manage hydropower assets such as catchments (ERAV, 2007) which in turn ‘contribute to sustainably manage hydropower assets over the longer-term, which is in the interest of electricity consumers and hydropower operators’ (Haas 2007: 8).

The activities in Vietnam, and the promise of a national PES decree could improve Vietnam’s image as a best practice/low risk destination for foreign investment.13

Significant local benefit sharing, including environmental flows release to benefit aquatic resource dependent communities and ecosystems, would have negative financial impacts on private projects, and thus – without compensation or additional financing – might not be viable. However, if benefit sharing or PES is not an explicit part of project designs, it is difficult to see how these projects can be justified when one considers the cumulative environmental and social costs that result.

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13 An issue worthy of further investigation is possible conflict between the PES and Benefit Sharing decrees in Vietnam, which have been developed by separate GoV agencies (MARD and ERAV). The PES decree can be applied to a variety of settings, not limited to hydropower or watershed protection. However, if both decrees were simultaneously applied to hydropower developments, developers might face overlapping requests for social and environmental payments.
Questions for further research include: potential barriers to implementation, and investors’ perceptions and responses to benefit sharing schemes (e.g. are they perceived as a disincentive to invest in hydropower, or as beneficial for reasons related to long-term catchment, facility maintenance and social responsibility).

6 Research and capacity building programs

We have argued that four key development and governance issues comprise the Mekong hydropower regime (Figure 5).

Figure 5 Summary of the Mekong hydropower regime

Challenging and diverse, the four sets of issues summarized in Figure 5 are relevant to the entire project life cycle of hydropower development, with emphasis on early planning and design stages.

What contribution can academic research and capacity building make towards less sustainable hydropower development, in particular, to pro-poor planning and design? This section briefly outlines research and capacity building programs among academic and other organisations, on topics relevant to this question. It also includes groups with the potential to make future contributions.
6.1 Cambodia

- Cambodia Development Resource Institute (CDRI) conducted a Natural and Social Environment Survey for the Master Plan Study of Hydropower Development in Cambodia, for the NGO Forum on Cambodia. This three-month survey, funded by JICA, was conducted in 2008 and involved 800 households in 26 villages in Koh Kong, Pursat, Kampot, Ratanakiri and Stung Treng.

- Center for Development Oriented Research in Agriculture and Livelihood Systems (CENTDOR) conducts research focusing on issues related to agriculture, rural development and livelihoods.

- Civil society research in Cambodia: significant research on issues related to sustainable hydropower is carried out by an active civil society network in Cambodia. A broad coalition of civil society organization has formed the Rivers Coalition of Cambodia (RCC). RCC works to ensure sustainable hydropower development and to protect and restore river ecosystems and river-based livelihoods in Cambodia. Core members include: 3S Rivers Protection Network (3SPN - http://3spn.cfsites.org/), Cambodian Volunteers for Society (CVS - http://www.cvs.org.kh), Conservation and Development on Cambodia (CDCam), Cultural and Environment Protection Association (CEPA - www.cepa-cambodia.org), Fisheries Action Coalition Team (FACT - www.fact.org.kh), NGO Forum on Cambodia (NGO Forum - www.ngoforum.org.kh), Oxfam America (OA), and Oxfam Australia (OAus). RCC activities have included:
  - investigation and monitoring of dam impacts on affected communities living near the Sesan, Srepok and Sekong Rivers; Mekong River; Tatay River; and Kamchay River;
  - developing capacity of local leaders in analyzing issues and negotiating with decision makers on their concerns;
  - promoting mechanisms for local, provincial, national and regional consultation and dialogue between different stakeholders, especially communities.

The NGO Forum is the coordinator of this network. Through its Hydropower and Community Rights Project, NGO Forum has also been conducting its own awareness raising, research, and training activities (see www.ngoforum.org.kh).

6.2 Thailand

The Asian Institute of Technology has plans to develop courses related to hydropower and sustainable development, water and gender, led by Dr Bernadette Resurrection. Dr Resurrection is one of several AIT researchers involved in the regional Mekong Basin Development Challenge and a contributor to a sustainability assessment of the Thai power development plan (Foran et al. 2010b). Section 7 provides more detail on the sustainability assessment.
6.3 Vietnam

- Center for Sustainable Development of Water Resources and Adaptation to Climate Change (CEWAREC) recently conducted sustainability assessment of the Vietnam PDP process (Dao Trong Tu 2010).

- Can Tho University, Department of Environmental and Natural Resources Management (DENRM), has collaborated on a number of research papers related to water management, environment and livelihoods in the Mekong region (Lebel et al. 2009).

- Research Institute for Climate Change at Can Tho University (‘DRAGON Institute’) was established by the governments of USA and Vietnam for cooperation in research and training to maintain healthy ecosystems and the sustainability of major river deltas. Their focus on river deltas and climate change is of relevance to various scenarios for dam development (www.ctu.edu.vn/institutes/dragon/dragon_eng).

- Institute of Water Resources Planning have conducted a national hydropower plan in collaboration with Electricity Consultant Company No. 1 and Norplan (the Norwegian consulting firm), but without emphasis on hydro projects that involve the private sector.14

6.4 Regional

The CGIAR-funded Challenge Program on Water and Food (CPWF) is supporting a research program called the Mekong Basin Development Challenge (BDC). The project has five components:

Mekong Component 1 led by International Water Management Institute (IWMI), on *livelihood strategies* (focused on optimized management at *reservoir level*). Project Leader: Sonali Senaratna Sellamuttu), with input from WorldFish and ICEM (International Centre for Environmental Management);

Component 2 led by WorldFish Centre, focused on *water valuation*. Project Leaders: Christoph Béné and Yumiko Kura, with input from ICEM, IFPRI, CEPA;

Component 3 led by ICEM, on optimized management at the *catchment level*. Project leader: Peter John Meynell, with input from Aalto University, WorldFish, National University of Laos, and Vietnam’s Western Highlands Agro-Forestry Scientific and Technical Institute Vietnam (WASI);


Component 5 led by CPWF, focusing on stakeholder dialogues. Project Leader: Kim Geheb), with input from M-POWER research network.
Mekong Component 4 focuses on the governance structures and mechanisms needed to enable, support and maintain efficient and fair management strategies for water storage infrastructure in the issue fields of livelihoods, water valuation and dams. It will consider the ways in which such infrastructure is presently being planned, developed, managed, and what needs to change if benefits are to be increased, burdens and risks reduced, and allocation to multiple uses fairly distributed and decided upon.

In addition to the Mekong BDC, an Australian partnership known as the AusAID-CSIRO Alliance is implementing ‘Exploring Mekong Region Futures.’ The research project takes on the future of rural people and landscapes, specifically the potential of scenario-building and participatory modelling to inform state decision making. It will consider systemic interactions between policies to develop water resources and market agriculture, in the context of other drivers of change (such as migration, changes to governance, and climate change). The project has four local case studies: Tonle Sap, Northeast Thailand farming futures, Nam Ngum basin irrigation policy, and Vietnam Delta.

This section outlined a number of ongoing and new research activities at several scales. Academics tend to collaborate with governmental or non-governmental organizations. Research on governance and distributional issues related to hydropower requires capacity in development studies, as well as autonomy to pursue those questions. Collaboration with the private sector usually occurs in the form of consultancies. These benefit the concerned parties, but may not generate public knowledge.

Any sustainability or governance-related hydropower research led by academics could obviously benefit from greater dialogue with the private sector and with Mekong governments. For example, we noted that with the exception of Maunsell and Lahmeyer (2004), no publicly available information system exists for project- and site-specific environmental and social impact costs (see Section 3).

However, notions of cooperation – and especially ‘collaboration’ – raise a number of ethical challenges for academic researchers. One basic academic responsibility is to ensure that research does not in any way contribute to individual or social suffering. Many researchers hesitate to engage with powerful actors who have pre-determined agendas. But ironically, hydropower developers regard some civil society researchers as also having pre-set agendas, as well links to anti-dam networks. Thus there is tension between these different actors, but one that is not necessarily unproductive. The independent panel of experts commissioned to review implementation of the Nam Theun 2 project appears to be an example of cooperation, resulting in the production of usable yet critical knowledge; see for example (McDowell et al. 2010).

In summary, the pace of Mekong hydropower development creates an urgent need for usable knowledge, for research that can help answer fundamental and urgent sustainability questions in a critical and cross-disciplinary way. But the region’s socio-technical regime makes such research difficult.
7 Results from rapid sustainability assessment

As we have seen, hydropower development in the Mekong takes place in a number of distinct national settings, each marked by different institutional frameworks, actors, and capacities. The SPLASH project expressed an interest in a technique to visualize or compare the different national arenas. This section presents results of two of three independent assessments of electricity planning in Cambodia, Vietnam, and Thailand, conducted by researchers affiliated with the M-POWER research network.

The assessments were trials of the 2009 draft Hydropower Sustainability Assessment Protocol (HSAP) (Hydropower Sustainability Assessment Forum 2009b). The HSAP is a qualitative multi-criteria evaluation method. Divided into four sections, Section 1 assesses the quality of certain strategic planning activities, which may be carried out by developers and governments, ideally before a decision to proceed with any project has been made. Case studies were conducted from January–June 2010. Tables 9 and 10 show results of the Thai and Cambodia assessments (with Vietnam still in progress as of October 2010).

When viewing the results, the reader should be aware that the 2009 draft Protocol was a difficult tool to use. Many indicators were not clearly specified, requiring careful interpretation before they could be used. Multiple actors and processes at different levels deserved to be assessed. Readers interested in more critical discussion of the HSAP and our experience using it can refer to Foran (2010) and Foran et al. (2010).

With respect to both interpretation and scoring, the teams were given a set of common guidelines but allowed to work independently. Each developed their own responses to common methodical challenges. Not surprisingly, scores given by the teams are not calibrated with each other, and are not comparable in a reductionist manner.

Nevertheless, some results are suggestive. Cambodia and Thailand generally received low scores. Despite its greater material wealth and arguably more vociferous civil society, Thai electricity planning processes are not qualitatively superior in terms of their ability to integrate a broader range of environmental and social issues into decision making around importing hydropower.

Both Cambodia and Thailand received low scores for the quality of analysis that informed their options assessment. Integrated electricity planning principles are relevant to developing countries. Countries such as Thailand have significant experience with demand-side management, which is a prerequisite for an integrated approach (du Pont 2005, Foran et al. 2010a). However, no one has completed a long term, comprehensive, demand- and supply-side analysis of electricity options for the Mekong region, or of administrative sub-unit of the region.

At the regional scale, regional actors performed better than state agencies. In the Aspect ‘Regional & national policies & plans,’ the Thailand case study attempted to assess the quality of strategic planning undertaken by MRC and ADB as well as Thai state agencies. Evidence that Thai state agencies took into account Mekong regional-level strategic issues was thin, in comparison to copious evidence of planning initiatives led by MRC and ADB on behalf of the Mekong countries.
Table 9 Summary results: assessment of Cambodia’s electricity planning

<table>
<thead>
<tr>
<th>CAMBODIA / Aspect:</th>
<th>Quality of Process</th>
<th>Level of Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assessment</td>
<td>Management</td>
</tr>
<tr>
<td>Demonstrated need</td>
<td>Poor--Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Options assessment</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Regional &amp; national policies &amp; plans</td>
<td>Poor</td>
<td>Very Poor--Poor</td>
</tr>
<tr>
<td>Political risks</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Institutional capacity</td>
<td>Poor</td>
<td>Very Poor--Poor</td>
</tr>
<tr>
<td>Technical issues &amp; risks</td>
<td>Poor--Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Social issues &amp; risks</td>
<td>Poor--Good</td>
<td>Poor--Good</td>
</tr>
<tr>
<td>Environmental issues &amp; risks</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Economic &amp; financial issues &amp; risks</td>
<td>Poor</td>
<td>Good</td>
</tr>
</tbody>
</table>

Source: adapted from (Pech et al. 2010). Note: grey shading refers to attributes regarded as ‘generally not relevant’ by authors of draft Protocol (HSAF 2009).

MRC is a river basin organization with sustainable water development clearly on its agenda; evidenced by detailed preliminary guidance (Mekong River Commission 2009), its strategic environmental assessment of mainstream hydropower (International Centre for Environmental Management [ICEM] 2009), as well as an ongoing basin planning initiative (‘BDP’). On the other hand, the ADB’s Greater Mekong Sub-region energy strategy (Asian Development Bank 2009a) was a call to greatly expand energy trade in the region based primarily on aggregated economic analysis. When taken together, the MRC and ADB policies send mixed signals about sustainable hydropower and energy development (Foran et al. 2010).
Table 10 Summary results: assessment of Thailand’s electricity planning

<table>
<thead>
<tr>
<th>THAILAND / Aspect:</th>
<th>Attribute</th>
<th>Quality of Process</th>
<th>Level of Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assessment</td>
<td>Management</td>
<td>Consultation</td>
</tr>
<tr>
<td>Demonstrated need</td>
<td>Poor–Good</td>
<td>Poor–Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Options assessment</td>
<td>Poor</td>
<td>Poor–Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Regional &amp; national policies &amp; plans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRC</td>
<td>Good</td>
<td>Poor</td>
<td>Poor–Good</td>
</tr>
<tr>
<td>ADB</td>
<td>Poor–Good</td>
<td>Poor</td>
<td>Poor–Good</td>
</tr>
<tr>
<td>Thai state agencies</td>
<td>not rated&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>Good (prelim.)</td>
</tr>
<tr>
<td>Political risks</td>
<td>Very Poor–Good</td>
<td>1</td>
<td>Poor</td>
</tr>
<tr>
<td>Institutional capacity</td>
<td>Poor</td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Technical issues &amp; risks (not chosen)&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social issues &amp; risks</td>
<td>Poor</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Environmental issues &amp; risks</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Economic &amp; financial issues &amp; risks</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor–Good</td>
</tr>
</tbody>
</table>

Source: adapted from Foran et al. (2010). Notes: <sup>a</sup>Not relevant to this actor. <sup>b</sup>Insufficient evidence. <sup>c</sup>Topic not selected for assessment. ‘Demonstrated need’ defined as electricity demand forecasting.

8 Discussion & conclusion

Large hydropower is capital intensive: private investors have strong incentives to ensure stable income over time that fully covers costs and a risk premium. Environmental concerns, social issues, and sustainability issues may be looked upon as incremental costs that may be a threat to “pure” financial performance of the investments. Public goals and private investment criteria may conflict. The way out of such a dilemma may be to share risks and establish some sort of a public private partnership (PPP). Such a model could be set up and coordinated in many different ways to work properly. One important and challenging issue will be to include poverty alleviation in the hydropower development, when economic performance opens up for some sort
of profit sharing mechanism. A revised look at regulatory practices and concession policies may be necessary if these represent barriers to ecologically sustainable, profit-sharing designs and sectoral expansion plans.

Based on the investment models reviewed above (Section 3) we know that financial rates of return vary considerably between project, and are strongly influenced by the hydrological properties of a particular site (Maunsell and Lahmeyer 2004a: 221). As one expert observed, for large hydropower in Laos “the best sites are already taken” (Interview B).

Most of the 33 projects screened by Maunsell and Lahmeyer (2004a) were estimated to have financial rates of return below 10% at a tariff of 4.4 c/kWh (2003 USD). As of 2010, however, it is interesting to note that a number of those supposedly marginal projects are actually being built, or in advanced planning (Table 9).

Table 11 Status of some Lao hydropower projects in 2010 assessed as marginal in 2004

<table>
<thead>
<tr>
<th>Project / Current Capacity</th>
<th>Status</th>
<th>Estimated tariff at 17% ROE (2003 c/kWh)</th>
<th>Capacity (MW) of assessed option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nam Ngiep 1 (278 MW)</td>
<td>Submission of final draft EIA documents to WREA in 2010</td>
<td>6.8</td>
<td>368 MW</td>
</tr>
<tr>
<td>Nam Ngum 3 (440 MW)</td>
<td>CA / PPA under negotiation; COD planned 2014</td>
<td>7.2</td>
<td>690 MW (\text{Nam Ngum 3B})</td>
</tr>
<tr>
<td>Nam Ngum 5 (120 MW)</td>
<td>Under construction COD 2011</td>
<td>9.3</td>
<td>75 MW</td>
</tr>
<tr>
<td>Nam Ngum 2 (615 MW)</td>
<td>Under construction; Initial operation 2011; COD 2013</td>
<td>12.1</td>
<td>195 (\text{Nam Ngum 2B})</td>
</tr>
</tbody>
</table>

Source: (Maunsell Limited and Lahmeyer International 2004a, Department of Energy Promotion and Development 2010a)

In all cases, the projects have been redesigned. Vattenfall notes that for the Nam Ngum 2 and Nam Ngum 3 cascade, a number of design changes between 2004 and 2007 resulted in a net power capacity increase, which increased the total inundated area considerably in a way that has not been “socio-environmentally optimal” and indeed a lapse from integrated water resource management (IWRM) principles (Vattenfall 2008).

We do not know how each project in the above table overcame its apparent lack of commercial viability, for example through design modification, tariff negotiation, and other financial optimisation. This gap in knowledge is striking, but not surprising, because it involves activities usually carried out in confidence.

Even as the projects in Table 9 were engineered to become viable to investors, as of this writing, none has announced additional benefit sharing or poverty reduction programs beyond that
required by law. But could they actually afford to do so? What changes to the Mekong hydropower regime would be necessary?

The promise of hydropower projects to share benefits and alleviate poverty through innovative public-private partnerships remains largely unfulfilled.

Conclusions & recommendations
Our conclusions and recommendations are based on literature review, expert interviews, and comments recorded during the September 2010 SPLASH-Mekong workshop in Vientiane.15

Conclusion 1: The Mekong region’s bottom-up approach to development is risky. It awards the privilege and responsibility of preparing feasibility studies to developers with varying degrees of commitment to environmental and social sustainability. No clear evidence exists of upward harmonization of practice, despite efforts by development actors.

Recommendation 1: Assign project definition, pre-feasibility and feasibility responsibilities to a third party – e.g. independent institute – with a mandate to protect the public interest. As a general rule, projects in earliest stages of feasibility study have the most flexibility to be designed in more equitable terms. The design of alternatives for a particular location would then take place in a broadly participatory and multi-objective manner, considering and debating a range of alternatives from small to large in impact and capacity. In the Mekong region, design and public dialogue could build on previous multi-project planning studies (Maunsell Limited and Lahmeyer International 2004a, Vattenfall 2008) as well as improved understanding of ecological and social thresholds, for example, the risk of fisheries collapse (Baran et al. 2007, Barlow et al. 2008, Sarkkula et al. 2009).

Recommendation 2: Learn more about the viability of the above institutional reform through further stakeholder dialogue, and comparison to planning initiatives elsewhere. Public-interest design is consistent with an iterative, participatory screening and ranking process carried out in Nepal ca. 2000, supported by World Bank (Haas 2003). It is also consistent with hydropower planning in wealthier countries such as Norway and Canada.

The public-interest design and procurement model means initial higher cost to the state, to be recovered from developers. A public-interest hydropower design and procurement model is easiest to imagine occurring for small projects. But of course it is those sites where very large-scale projects are being planned – such as major tributary and Mekong mainstream dams – that are most controversial and most urgently need fresh approaches to development.

Recommendation 3: Select developers after the public design phase, using a transparent procurement process.

Conclusion 2: Hydropower project design is more sustainable when the power system planning itself is conducted according to integrated demand-side and supply-side principles, in a participatory manner, leading to a rigorous justification of the need for any new power plant, including hydropower.

Recommendation: Countries or sub-national regions considering major hydropower consumption should conduct a comprehensive options analysis of their systems, using integrated electricity resource planning (IRP) principles.

Integrated electricity planning principles are relevant to developing countries and supported by a variety of authors including the World Commission on Dams (Swisher et al. 1997, World Commission on Dams 2000, D'Sa 2005). Countries such as Thailand have significant experience with demand-side management, which is a prerequisite for an integrated approach (du Pont 2005, Foran et al. 2010a). However, no one has completed a long term, comprehensive, demand- and supply-side analysis of electricity options for the Mekong region, or for any sub-unit (city, country) of the region. Modelling work by Austrian specialists, commissioned by ADB, was detailed at the scale of the Greater Mekong Sub-region, as well as national regions (Integrietes Ressourcen Management (IRM-AG) 2008, Asian Development Bank 2009a). However on the demand-side this study looked only at compact fluorescent light bulbs, whereas many other relevant options exists, such as a regime of periodically increasing efficiency standards for common electricity-consuming appliances, building efficiency standards, and active demand response. It cannot be considered integrated electricity planning, but is a good reference for future work. For inspiring applications of IRP, the reader is referred to work by the US Northwest Power and Conservation Council (Northwest Power and Conservation Council 2009).

Conclusion 3: Any significant local benefit sharing, including environmental flows release to benefit aquatic resource dependent communities and ecosystems, would have negative financial impacts on IPP projects, and thus – without compensation or additional financing – might not be viable.

Recommendation: Learn more about the cost and feasibility of alternative project design, including local benefit sharing, by establishing a number of cooperative case studies with hydropower projects already in operation in the region. Notions of cooperation and ‘collaboration’ raise ethical challenges for academic researchers, whose basic responsibility is to avoid harm. A tension exists between academics and developers, but it is not necessarily unproductive.

Acknowledgments

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# Appendices

## Table A1 Interviews conducted

<table>
<thead>
<tr>
<th>Code</th>
<th>Organisation</th>
<th>place</th>
<th>Date (2010)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A</td>
<td>Environmental specialist, Ministry of Energy</td>
<td>Bangkok</td>
<td>28 April</td>
<td>EGAT perspective on Lao environmental approval process</td>
</tr>
<tr>
<td>2. B</td>
<td>Private sector hydropower company</td>
<td>Vientiane</td>
<td>18 May</td>
<td>Governance Diversity of performance practices in Laos</td>
</tr>
<tr>
<td>3. C</td>
<td>Multilateral development organisation</td>
<td>Vientiane</td>
<td>20 May</td>
<td>Governance</td>
</tr>
<tr>
<td>4. D</td>
<td>Private sector hydropower consultant</td>
<td>Vientiane</td>
<td>18 May 20 May</td>
<td>Private sector perspectives on PPP Risk transfer</td>
</tr>
<tr>
<td>5. E</td>
<td>Regional development organisation</td>
<td>Vientiane</td>
<td>21 May</td>
<td>Benefit sharing Nepal screening and ranking project SEA; SPLASH project</td>
</tr>
<tr>
<td>6. F</td>
<td>Private sector hydropower consultant</td>
<td>Vientiane</td>
<td>22 May 8 Sept</td>
<td>Governance &amp; private sector performance</td>
</tr>
<tr>
<td>7. G</td>
<td>Private sector energy specialist</td>
<td>Bangkok</td>
<td>21 June</td>
<td>Perspectives on ease of entry into Mekong power sector</td>
</tr>
<tr>
<td>8. H</td>
<td>Private law firm</td>
<td>Bangkok</td>
<td>21 June</td>
<td>Governance</td>
</tr>
<tr>
<td>9. I</td>
<td>Private law firm</td>
<td>Bangkok</td>
<td>23 June</td>
<td>Governance</td>
</tr>
<tr>
<td>10. J</td>
<td>Private sector hydropower developer</td>
<td>Bangkok</td>
<td>25 June</td>
<td>Introductory meeting, proposals for benefit sharing, potential for collaborative research</td>
</tr>
<tr>
<td>11. K</td>
<td>NGO</td>
<td>Bangkok</td>
<td>6 Sept</td>
<td>Governance</td>
</tr>
<tr>
<td>12. L</td>
<td>Environmental expert</td>
<td>Bangkok</td>
<td>6 Sept</td>
<td>Governance</td>
</tr>
<tr>
<td>14. N</td>
<td>Multilateral development organisation</td>
<td>Vientiane</td>
<td>5 Sept</td>
<td>Governance</td>
</tr>
<tr>
<td>15. O</td>
<td>Private sector hydropower developer</td>
<td>Vientiane</td>
<td>13 Sept</td>
<td>Private sector perspectives on PPP</td>
</tr>
</tbody>
</table>
### Table A2 Environmental and social impacts with financial implications

<table>
<thead>
<tr>
<th>Environmental and Social Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Downstream Impacts:</strong></td>
</tr>
<tr>
<td>Infrastructure / Developments Loss during filling</td>
</tr>
<tr>
<td>Severely affected persons on Main River during filling</td>
</tr>
<tr>
<td>Infrastructure / Developments Loss during operation</td>
</tr>
<tr>
<td>Resettle affected persons on main river during operation</td>
</tr>
<tr>
<td>Severely affected persons on main river during operation</td>
</tr>
<tr>
<td><strong>Transmission Line Impacts:</strong></td>
</tr>
<tr>
<td>Infrastructure / Developments Loss</td>
</tr>
<tr>
<td>Resettle affected persons</td>
</tr>
<tr>
<td>Severely affected persons</td>
</tr>
<tr>
<td>Transmission line camp management costs (sanitation effluents, epidemics)</td>
</tr>
<tr>
<td>Civil works management (erosion, drainage changes, fires)</td>
</tr>
<tr>
<td><strong>Access Road Impacts:</strong></td>
</tr>
<tr>
<td>Infrastructure/Developments Loss</td>
</tr>
<tr>
<td>Resettle affected persons</td>
</tr>
<tr>
<td>Access road line camp management costs (sanitation effluents, epidemics)</td>
</tr>
<tr>
<td>Civil works management (erosion, drainage changes, fires)</td>
</tr>
<tr>
<td><strong>Reservoir Impacts:</strong></td>
</tr>
<tr>
<td>Infrastructure / Developments Loss</td>
</tr>
<tr>
<td>Resettle affected persons</td>
</tr>
<tr>
<td>Severely affected persons</td>
</tr>
<tr>
<td>Drowning and loss of property during filling (wildlife, humans, domestic animals)</td>
</tr>
<tr>
<td>Biomass clearance (water quality mitigation)</td>
</tr>
<tr>
<td>Catchment Management</td>
</tr>
<tr>
<td>Variable level intakes</td>
</tr>
<tr>
<td>Destratification system</td>
</tr>
<tr>
<td>Thermocline distortion devices</td>
</tr>
<tr>
<td>Bottom Outlet</td>
</tr>
<tr>
<td>Floating Debris and Macrophyte Management</td>
</tr>
<tr>
<td><strong>Construction Impacts:</strong></td>
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<tr>
<td>Infrastructure/Developments Loss</td>
</tr>
<tr>
<td>Resettle AP's</td>
</tr>
<tr>
<td>Severely AP's</td>
</tr>
<tr>
<td>Labour Camp Management Costs (sanitation effluents, epidemics)</td>
</tr>
<tr>
<td>Civil Works Add Management (erosion, drainage changes, fires)</td>
</tr>
</tbody>
</table>

Source: Maunsell and Lahmeyer (2004: Table 9.2)
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