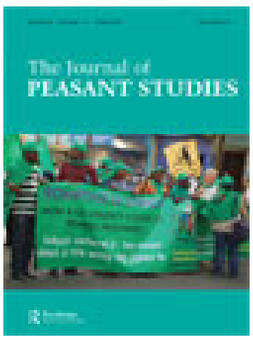

The Journal of Peasant Studies

ISSN: 0306-6150 (Print) 1743-9361 (Online) Journal homepage: http://www.tandfonline.com/loi/fjps20

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To cite this article: Ian G. Baird & Keith Barney (2017): The political ecology of cross-sectoral cumulative impacts: modern landscapes, large hydropower dams and industrial tree plantations in Laos and Cambodia, The Journal of Peasant Studies, DOI: 10.1080/03066150.2017.1289921

To link to this article: http://dx.doi.org/10.1080/03066150.2017.1289921

Published online: 25 Apr 2017.

The Journal of Peasant Studies, 2017
http://dx.doi.org/10.1080/03066150.2017.1289921

The political ecology of cross-sectoral cumulative impacts: modern landscapes, large hydropower dams and industrial tree plantations in Laos and Cambodia

Ian G. Baird and Keith Barney

Environmental and social impact assessment is now a widely accepted tool in the Mekong Region for assessing the impacts of hydropower dams and large-scale industrial tree plantations. However, the cross-sectoral and cumulative effects of such projects have not been sufficiently addressed. Where cumulative impacts have been considered, studies have focused on a single sector, such as multiple hydropower dams. A separation between land and water management frequently leads those assessing project impacts to overlook or underestimate project outcomes. Here we examine such interactions between industrial plantations and hydropower projects, demonstrating that it is the diverse livelihoods of local people – based on everyday use of multiple resources – that crucially connects aquatic and terrestrial environments. The combined social and environmental changes wrought by resource projects can thus produce particular challenges for these communities, as multiple systems are enclosed and degraded. We present case studies of social and environmental impacts occurring in the Mekong Region: in the Hinboun River Basin in Central Laos; the Xe Bang Fai River Basin, also in Central Laos; and the Sesan River Basin in northeastern Cambodia. We strive to demonstrate the practical usefulness of adopting political ecology frameworks for thinking about these crucial agrarian changes.

Keywords: hydropower dams; tree plantations; environmental impact assessment; cumulative impacts; Mekong Region; Laos; Cambodia; cross-sectoral impacts

Introduction

Over the past two decades the Mekong Region countries of Laos and Cambodia have been at the centre of a major extractive development boom which has resulted in local communities losing access to land, forest and water resources. Hundreds of major resource projects have been developed, with plantation-agribusiness concessions and large-scale hydropower developments, in addition to mining, being the most spatially, socially and environmentally significant (IRN 1999; Wyatt and Baird 2007; International Rivers 2008; Baird 2009, 2011; Lawrence 2009; Barney 2009; Schönweger et al. 2012; Baird, Shoemaker, and Manorom 2015). Yet the interrelated roles, intersections and cumulative impacts of large-scale plantation projects and hydropower dams have received insufficient attention. In particular, there has been a tendency to view terrestrial and aquatic ecosystems as areas requiring distinct research and expertise, and as a result the impacts of dams and plantation projects have tended to be assessed separately. Mekong environmental regulatory systems examine circumstances on a sectoral basis, rather than cumulatively across both projects and sectors.

There is often a lack of political will to seriously consider impacts across sectors. In this contribution we outline how the impacts of industrial plantation and hydropower resource mega-projects in Laos and Cambodia are cumulative for communities, thus making it more difficult for rural people to cope with the profound transformations that result.

In Laos and Cambodia, both rivers and forests represent anthropogenic landscapes, 'second natures' (Smith 1984) or 'social-natures' (Castree and Braun 2001), shaped through the outcomes of historical local and state practices of resource management, including the local production and sale of petty environmental commodities. However, the recent industrial-scale commodification of these rivers and forests 'from above' (cf. Hall, Hirsch, and Li 2011) through dams and industrial plantations, and associated double-displacements from resource access (including through physical relocation or resource degradation), are producing complex and transformative agrarian changes, which in turn become 'connected' through the resource-management practices of rural farmers and peasants. In this paper we contend that more needs to be done, not just to better understand these cumulative impacts, but also to bridge the ontological and managerialist divides that compartmentalise and separate water and land management in the Mekong Region (see also Keskinen et al. 2012; Middleton et al. 2015). We forward that close examinations of how villagers' practices of property and livelihood stretch across water and land ecosystems are a useful way to approach this issue.

The need for such analysis is becoming increasingly evident in the Mekong River Basin, where the impacts of large hydropower dams and agribusiness concessions (including crops such as rubber, eucalyptus, cassava, sugar cane, and coffee) are significantly and variously overlapping and producing complex, cascading and frequently unanticipated socio-ecological changes. In this paper, our key argument is that the biophysical and environmental changes resulting from hydropower and agribusiness developments often accumulate and become integrated into the character and trajectory of contemporary agrarian transformations (Kelly 2014). The impacts from different projects intersect through affecting the same people and communities and are interactive because of how villagers' livelihood strategies and resource-management practices change over time in response to successive displacements. As a result, local people frequently experience rapid and negative transformations as certain livelihood thresholds are crossed. We suggest that these linkages and connections are generally under-recognised in mainland Southeast Asia, by private developers, international development agencies, governments and researchers, as this involves paying close attention to what Batterbury (2001, 441) terms the 'micro-politics of livelihood decision-making', in particular places and communities. The stakes of this disconnect are high, and frequently lead to uncompensated resettlement and cumulative impacts that are particularly damaging to rural livelihoods. Moreover, cascading environmental transformations can also undermine developers' attempts at mitigation and livelihood compensation.

In approaching these issues, we elaborate upon two main conceptual insights. First, our research confirms that scholarly understandings of contemporary agrarian transitions benefit from incorporating medium- to long-term, place-based and landscape-based analysis. These sorts of studies can help to better grasp and contextualise how rural changes can be connected with multiple external and industrial-sectoral drivers, and can help identify social-environmental changes that connect different ecologies through community livelihood strategies. Secondly, we call for research and policy approaches that more directly bridge the divides that compartmentalise land and water management. We urge improved understandings of the unruly, complex 'nature' of joint agrarian-environmental transformations (Taylor 2005, 2015).

We proceed by explaining the methods and results of long-term case study fieldwork in three Mekong basin systems – the Hinboun and Xe Bang Fai sub-basins in central Laos, and the Sesan sub-basin in northeastern Cambodia – each of which is being transformed through resource displacements from both hydropower dam and tree plantation development. From this grounded perspective, we then examine the reasons for deficiencies in managing cross-sectoral and cumulative impacts as these relate to the interactive, cascading outcomes of major resource infrastructure projects contextualised within agrarian landscapes. We discuss the failure to recognise the complexity of the impacts from multiple large projects, not only in relation to limitations with public and private environmental regulation, but also related to institutional and professional divides between water planners and forestland regulators, a gap that we view as consistently reproduced through mainstream institutional-regulatory systems. We conclude by considering the analytical potential of integrated livelihood approaches for understanding joint *ecological-agrarian* transitions (Akram-Lodhi and Kay 2010). We outline the future implications of the creation of sector-defined 'modern landscapes' (Robbins 2001a, 2001b), created and materialised through simplified ontological abstractions and discursive framings between aquatic and terrestrial environments.

Conducting research in three Mekong sub-basins: the Hinboun, Xe Bang Fai and Sesan

The research for this paper is based upon long-term engagement with communities in the Hinboun, Xe Bang Fai and Sesan systems, three critically important sub-basins of the Mekong River Basin that have each experienced intensive transformations from both hydropower and industrial plantations (see Figure 1). Rural communities in all three sub-basins are heavily reliant upon natural resources, including non-timber forest products (NTFPs), and wild capture fisheries, and all three are experiencing complex agrarian transformations. The cases demonstrate the locally complex ways in which the impacts from hydropower megaprojects and industrial plantations are intersecting and transforming livelihoods, and show that this phenomenon is not happening in isolation. In addition, we have chosen these three case studies to demonstrate the various ways that cumulative impacts occur.

Specific methodologies for this research include extended, 'critical case' analysis (Flyvbjerg 2006) developed through long-term research in village field sites. Each local community in Laos and Cambodia is of course a particular place with distinctive social processes, and therefore our study sites are not 'representative' in that sense (Burawoy 1998). However, the specific village sites are inclusive of the broader case phenomenon under investigation – of the intersecting impacts of hydropower and industrial plantation impacts with local livelihoods in the Mekong Region – through which many communities are now affected. Our ethnographic methods were operationalised through semi-structured interviews with villagers, government officials and company representatives; long-term participant-observation of daily life; and policy analysis of the hydropower and forestry sectors in both countries over the last two decades. Ian Baird is fluent in Lao, while Keith Barney holds intermediate Lao language capacities and has worked with local field assistants.

Ian Baird conducted a village-based study of the impacts of the Theun-Hinboun Dam in 1999 (Baird 1999). He also collaborated on a river-based livelihoods study of the lower Xe Bang Fai River Basin in Laos in 2001 (Shoemaker, Baird, and Baird 2001), and participated in a 'revisit study' in early 2014 (Baird, Shoemaker, and Manorom 2015; Manorom, Baird, and Shoemaker 2017). He started working in the Sesan River Basin in Cambodia for non-

Figure 1. Map of the three areas in Laos and Cambodia that are the focus of the case studies included in this article.

government organisations (NGOs) in 1995, and since then has conducted additional work there, including graduate research in the 2000s. In 2000 and 2001 he led the first informal environmental and social impact assessment (ESIA) studies on the impacts of the Yali Falls dam in Vietnam on downstream parts of Cambodia (Wyatt and Baird 2007; Baird et al. 2002; Fisheries Office, Ratanakiri Province and NTFP Project 2000), and since 2009 he has studied the Lower Sesan 2 dam (LS2) on the Sesan River in Stung Treng Province,

Cambodia (Baird 2009, 2016). He has also been conducting research on large-scale plantation projects in the basin (Baird and Fox 2015; Baird 2017).

Keith Barney has been engaged in fieldwork in the Hinboun River Basin in Laos since 2004, including ethnographic research in the particular village discussed below from December 2005 to August 2006, followed by biannual or annual visits since then (Barney 2007, 2009, 2012). Over the last decade, his research has also tracked the political ecology of the fast-growing tree plantation sector in Laos.

Rivers and forests as social-nature, community livelihoods, and 'productive bricolage'

Conceptually in this paper, we draw upon critiques that question modernist divides between society and nature, issues which have been explored by other geographers and political ecology scholars (e.g. Ribot 2014; Taylor 2015). Paul Robbins (2001a) has argued against the tendency of environmental managers to draw distinctions between what they consider to be 'social' landscapes from 'natural' ones. Nicholas Blomley (2008, 1835) suggests that 'the scientific river' is produced in part through the simplifying abstractions of property law. More recently, and applying a relational approach, Kuntala Lahiri-Dutt (2015) has advocated taking a more holistic view of rivers, rather than separating their human and physical aspects. As Scott (1998) notes, the creation of sharp and binary distinctions between diverse and entangled socio-natures is a key strategy in the creation of 'legible' environments, and the compartmentalisation of resources into particular sectors plays a crucial role in the extension of state-bureaucratic control. Such strategies of state simplification are greatly facilitated when backed by authoritarian states, although there are also limits to this form of knowledge (Scott 1998). The desire of modernist states for legibility also tends to reinforce the project-by-project concessionary model of resource development, as well as the sectoral land/water divide that is presently the norm.

Rural people in the communities we study in Laos and Cambodia engage in what Batterbury (2001) has called a 'productive bricolage', juggling use of different community resources depending upon tenure and access, season, gender, labour availability and markets. When one critical resource or ecosystem is affected by the externalities of large resource development, rural people tend to diversify and devote more of their energies to using other resources, thus re-creating new social landscapes through changing practices of property, resource access and use. Villagers' livelihoods span the resource sectors that modern planning tends to divide and compartmentalise (as involving aquatic and forestland management), and as Martin and Lorenzen (2016) have demonstrated for Laos, this highly diverse rural livelihoods strategy is frequently associated with higher wealth status and generally more successful livelihood strategies. However, when this sort of diverse livelihoods strategy is in place, and multiple resources are impacted, people can be squeezed between different processes of enclosure (Barney 2007, 2009; Bernstein 2010).

Rural communities thus frequently experience highly damaging cumulative impacts that go largely unrecognised outside of the communities themselves. We contend that the negative externalities arising from the interactive effects between large hydropower and industrial tree plantation investments in the Mekong Region present a pressing challenge, one that can become a significant factor in rapid and negative local agrarian change through reducing the effectiveness of villager livelihood strategies, and contribute to out-migration (e.g. Barney 2012). Farmers' customary access to seasonal local resources is 'squeezed' by cumulative enclosures, leading to progressive economic and social impacts. In part due to ontological (Lavau 2013; Lahiri-Dutt 2014) and bureaucratic-

institutional (Gober et al. 2013; Middleton et al. 2015) divides between water management and land management, regulation and expertise, both public and private regulatory systems in the Mekong countries are currently ill equipped to effectively manage these complex transformations.

Political ecology approaches are effective for tracing the historical co-production of social-natures (e.g. Zimmerer 2000; Castree and Braun 2001), for tracing how capital accumulation works *through* nature (e.g. Boyd, Prudham, and Schurman 2001), and for understanding the implications of cumulative impacts from large project development for resource access and livelihood change. We also intend to demonstrate here that political ecology approaches can be useful for assessing how diversified rural livelihoods in places like Laos and Cambodia are being impacted by multiple development processes that are both cross-sectoral and cumulative in nature.

Regulating 'extractive' hydropower and agri-business development in Laos and Cambodia

In both Laos and Cambodia, a significant amount of policy attention has been focused upon developing stronger regulatory systems and establishing socio-environmental safeguards for managing the impacts from hydropower projects (Porter and Shivakumar 2011; ICEM 2010) and industrial tree plantation concessions (Hett et al. 2015; Schönweger et al. 2012; Vientiane Times 2015; Un and So 2011; Milne 2013). However, considerable challenges remain. There now exists legislation in Laos and Cambodia designed to ensure that the social and environmental impacts of large development projects are better assessed (see GoL 2010, 2012; UNDP-MoNRE 2014; RGC 1996).[1] In both countries, however, major projects can be pre-approved at central levels in ways that effectively bypass the potential for high-quality assessment and meaningful public consultation (Wells-Dang et al. 2016). Where ESIAs have been completed, environmental regulators frequently lack the budget, expertise and time, or political mandate to conduct adequate reviews, and the documents prepared can be of such an uneven analytical quality that their relevance for project design and actual implementation becomes highly questionable (Wells-Dang et al. 2016).[2] A lack of effective intra- and inter-agency co-ordination and information sharing, and sharp political constraints on civil society, further exacerbates these limitations. Government political will and the space for civil society to advocate for serious consideration of cumulative impacts are particularly crucial.

Cumulative, strategic, cross-sectoral and transboundary impact assessment remain a major challenge, both in the Mekong River Basin and worldwide (Baxter, Ross, and Spaling 2001; Seitz, Westbrook, and Noble 2011; Duinker and Greig 2006; Lejano and Smith 2006; Wyatt and Baird 2007). Corporate social responsibility standards, and regulations for international bank financing, while providing guidance (e.g. the Equator Principles[3]) or requirements (e.g. the International Finance Corporation Performance Standards[4]) on cumulative impact assessment, are in effect restricted to specific, global

[1]While Cambodia does require that ESIAs be conducted for large development projects (RGC 1996), there is as yet no specific environmental impact assessment law. As of 2016 one was being drafted.
[2]See International Rivers (2015), for a benchmarking evaluation of environmental policies and practices in the Lower Sesan 2 hydropower project in Cambodia.
[3]The Equator Principles (2013, 20) indicate that cumulative impacts 'may be addressed' in Environmental and Social Assessment Documentation.
[4]IFC Performance Standard 1 stipulates the need to address cumulative impacts. See also IFC (2013).

firms that are party to these mechanisms and are exposed to particularly high levels of reputational risk. Thus, the extent to which companies in the Mekong Region are subject to such standards and have actually incorporated comprehensive cumulative impact assessments has been quite limited (e.g. BankTrack et al. 2009).

Even the Mekong River Commission (MRC), an inter-governmental basin-wide river organisation with Thailand, Laos, Cambodia and Vietnam as members, and which has a mandate to consider basin-wide issues, has performed relatively poorly with regard to cumulative and cross-sectoral environmental and social impacts (Kakonen and Hirsch 2009; Keskinen et al. 2012). Although the MRC has sponsored or conducted basin-wide assessments, including on the cumulative impacts of hydropower dam development for Tonle Sap Lake fisheries in Cambodia (Ziv et al. 2012), the MRC has come under criticism for a broad lack of integrated assessment of the cumulative impacts of some projects, such as tributary dams, and indeed the organisation has suffered from a lack of a political mandate to push these issues by their government members. As Keskinen et al. (2012, 320–21) note:

> Current impact assessments in the Mekong tend to have a strongly sectoral approach, assessing the impacts of proposed water development separately to water flows, fisheries, livelihoods and economy … . While such an approach provides a logical starting point, it also compartmentalizes the river system into separate units, which are then connected mainly through rigid causal chains. As the river basin in reality forms an interconnected system with complex impact and feedback loops, such compartmentalization leads easily to oversimplified representation of the actual net impacts.

We build upon and extend these insights to argue that such approaches to environmental governance in the Mekong study countries also involves a sharp distinction between river and terrestrial ecosystems, and that there is a lack of attention to how multiple projects, particularly across sectors, produce cumulative impacts, which also transform local livelihoods and resource-management practices.

(1) Theun-Hinboun Hydropower and Oji Lao Plantation Forestry: producing 'modern' landscapes

Over the last 18 years, Sivilay Village (a pseudonym)[5] in Hinboun District, Khammouane Province, central Laos, located in the lower Hinboun River Basin, has experienced multiple social-environmental impacts from a series of large resource development projects. This section examines the sequential, interactive and cumulative impacts of large hydropower dams and tree plantation development for local ecologies and livelihoods in this locale.

Until quite recently rural production in Sivilay Village was based upon 'traditional' systems of farming and fishing, with livelihoods largely secured through access to common property resources, including limited irrigation infrastructure, few cash crops, and little use of capital-intensive inputs. While villagers have not historically produced agricultural surpluses, the sale of fish and various NTFPs has long been occurring. Both subsistence and commercial access to common property natural resources have been crucial determinants of village livelihoods (Barney 2007, 2012), thereby providing a 'non-

[5]We use a pseudonym here because ongoing research is being conducted for this case, and we do not want to jeopardise the work there through identifying the village. For the other cases, villagers indicated that they would like the locations of their villages to be known, as they hope that in the future more people will become aware of their problems and assist in solving them.

commodified subsistence guarantee', and a fair degree of livelihood autonomy from local wage labour markets (see Akram-Lodhi and Kay 2010, 273).

The first large state-backed resource project that impacted Sivilay Village was the USD 260 million, 210-megawatt, Theun-Hinboun Hydropower Project, an inter-basin diversion dam completed in 1998. Sivilay Village is located within the downstream, recipient river impact zone of this project. Nordic Hydropower, GMS Laos, and the state-owned Electricite du Laos (EdL) jointly developed the project, with the Lao equity share financed through a loan from the Asian Development Bank (ADB). The inter-basin design diverts water from the Theun-Kading River system into the Hinboun River, via a small tributary (Shoemaker 1998; BankTrack et al. 2009), producing significant ecological impacts for the downstream communities in both the recipient (Hinboun) and the drawdown (Kading) rivers.

The second large resource project transforming the environment of Sivilay Village has been the Oji Lao Plantation Forestry Ltd. (LPFL), a Japanese-Lao joint-venture eucalyptus-acacia tree plantation project. Between 2004 and 2015, Oji LPFL planted approximately 23,000 hectares of land in Hinboun and Pakkading districts, with an additional 5000 hectares of company-sponsored smallholder plantations. The concession is for 50 years, with an original planned investment of USD 60 million. The government of Laos (GoL) holds 15 percent equity in the project, with their capital investment provided in the form of land. Between 2004 and 2009, in cooperation with local authorities, LPFL cleared and developed approximately 220 hectares of customary communal village forestland for eucalyptus plantations in Sivilay Village.

A third corporate resource development intervention affecting Sivilay Village arrived in 2012, in the form of the USD 720 million Theun-Hinboun Expansion Project (THXP). In response to the drawdown in water flows along the Nam Theun-Kading system resulting from the 2010 World Bank-supported Nam Theun 2 Hydropower Project (NT2; see further discussion in the next case study), Theun Hinboun Power Company (THPC) constructed a new storage reservoir across an upstream tributary of the Hinboun – at the Ngouang River. This expansion project required the resettlement of 4800 people in 11 villages from the reservoir inundation zone (International Rivers 2014). THXP creates additional storage capacity, which supports a doubling of power generation, as well as a doubling of water volumes diverted from the Nam Theun-Kading River system into the Hinboun basin. This has led to more severe wet season overtopping of the downstream Hinboun channel than was the case since 1998. The impacts of this accelerated flooding regime, now reaching up to three metres in the wet season, has further impaired villager livelihoods (Blake 2014). Due to the intensified downstream flooding, and in relation to THXP's obligations under the Equator Principles, 8000 people from 23 villages on the lower Hinboun River, including Sivilay Village, are being relocated and consolidated into focal resettlement sites (International Rivers 2014).

Neither the direct nor the cumulative impacts of these three projects have been adequately addressed through regulatory frameworks. In 2002, Oji-LPFL's predecessor, BGA Plantation Forestry Ltd., produced a 29-page ESIA (EcoLao 2002) that did not address any livelihood impacts. In 2010, district officials in Bolikhamxay and Khammouane Provinces requested that LPFL provide a detailed environmental and social impact assessment report and a management plan (Vientiane Times 2010); however, no full ESIA was completed.[6] THPC-THXP's environmental assessment process has also

[6]A representative from LPFL indicated to the second author that the firm was not obligated to undertake a full ESIA process, since Lao's Decree on Environmental Assessment was not passed until 2010,

been controversial (BankTrack et al. 2009), with diverging environmental assessments undertaken by two separate consultant firms – RMR and Norplan (see FIVAS 2007). The final Theun Hinboun Expansion ESIA (Norplan 2007) reduced its emphasis of impacts identified in the initial impact study regarding the drivers of cross-sectoral terrestrial impacts from forestland development in the Theun-Kading and Hinboun sub-basins (including due to mining, logging, state-sponsored resettlement, and plantation development by Oji Lao) (RMR 2006). The Norplan (2007) assessment included a cursory analysis of cumulative hydrological changes from three relevant hydropower projects (THXP, Nam Theun 2 and Nam Theun 1), with six paragraphs on the cumulative impacts of these hydropower projects for aquatic resources and fisheries.

Whilst cumulative impact assessment has not been strongly elaborated in these regulatory documents and studies, the cumulative effects produced by terrestrial and aquatic resource development interventions have since become quite apparent for villagers. In the Hinboun valley, project externalities intersect with each other, with villagers' livelihood practices, and with a local anthropogenic resource landscape, creating highly complex agrarian changes, ones that are appropriately assessed using a political ecology framework.

According to Claridge (1996), prior to the initiation of the THPC project in 1998, the Hinboun valley flooded approximately once each four years. However, with the onset of the first THPC project, seasonal flooding steadily increased and lasted for longer periods. By 2001, the flooding effects from THPC had resulted in the abandonment of wet-season paddy rice cultivation along much of the low-lying area along the lower Hinboun River, and all of the riverside paddy in Sivilay Village. Longer wet-season flooding also presented problems for villagers' health and drinking water, and caused livestock disease. For Sivilay Village and other communities on the lower Hinboun, the years 2001–2010 brought a series of THPC livelihood support interventions, established as part of an overall USD 4.7 million, 10-year downstream compensation and mitigation programme. The projects included irrigated dry-season rice, maize and vegetable farming, fish ponds, village toilets and drinking wells. Some of the THPC programmes have been beneficial, such as village health care kits, livestock inoculations, revolving funds, and the provision of rubber seedlings. These support interventions have not, however, been nearly sufficient to compensate for the village's economic losses. Moreover, an array of factors have worked against the inclusion of the most vulnerable households in these programmes, including a typically short supply of household labour in poorer families, a calculated conservatism by the poor regarding enrolment into risky new schemes, and reinforcing patterns of economic marginalisation and social exclusion. In Sivilay Village, the result of THPC's decade of compensation and mitigation is a landscape dotted with abandoned projects (e.g. the major dry-season irrigated rice project completely collapsed in 2001; Barney 2007), while the community has continued to suffer under weeks of heavy annual flooding. By 2013, 15 years after the initiation of profitable electricity exports to Thailand, Sivilay Village was still without electricity. With the uncompensated, unmitigated loss of 85 hectares of riverside wet rice agriculture, the serious impairment of the previously rich Hinboun fishery (Shoemaker 1998; Baird 1999; Warren 1999; Schouten et al. 2004), impacts for human health, repeated losses of livestock from flooding-linked disease (Barney 2007), and erosion of riverside community gardens (see also Blake 2004; BankTrack et al.

after the 2004 signing of the concession agreement. LPFL suggested that they had, however, voluntarily conducted a full environmental assessment, although their report was not available for public review (interview, June 2013).

2009), a first set of major resource displacements were set in motion. During this decade, Sivilay villagers suffered significant and uncompensated declines in their livelihoods. They responded by moving more of their agriculture into the nearby hills, developing a reliance upon upland swidden rice-agroforestry for rice production.

In 2004 the fast-growing tree plantation development began in Sivilay Village, through Oji LPFL. The project was in line with GoL policy directives behind swidden eradication, the framing of swidden fallows as 'degraded forest', and the promotion of commercial upland agriculture (Barney 2007). For dozens of communities within the concession area of the Oji LPFL project, the land was zoned for commercial plantation development through the state Land and Forest Allocation (LFA) programme. The LFA policy was participatory in design, but less so in practice (Fujita and Phanvilay 2008; Lestrelin, Castella, and Bourgoin 2012), and in the case of Oji LPFL the LFA zoning process was financially supported by the former private concession holder. In a context of heavy dependence upon upland communal forest for rotational swidden rice cultivation (itself an outcome related to hydropower-linked displacement from wet rice paddy), the excision of an additional 220 hectares of forestland in Sivilay Village to Oji-LPFL between 2004–2009 further contributed to a double-enclosure movement. The meager compensation to villagers for this land (delivered in the form of an unsealed, low-quality access road, which has since been washed out by THXP-linked flooding), the loss of forest resources, and a lack of meaningful plantation wage labour opportunities have reinforced a view amongst villagers that local authorities unfairly ceded the land. In part due to villager resistance through complaints made about the land allocation to LPFL (with other villages also making complaints between 2008 and 2010; see Hunt 2011), LPFL's plantation programme in Sivilay Village remained at 220 hectares, well short of the planned 610 hectares.

In 2010–2011, in an apparent effort to boost flagging company targets for plantation establishment, Oji LPFL planted an additional 150 hectares of acacia on the Hinboun floodplain near Sivilay Village. The following wet season, this plantation site was destroyed by being flooded due to THXP. Here we see how complex and unruly nature presents 'a set of obstacles, opportunities, and surprises that firms confront in their attempts to subordinate biophysical properties and processes to industrial production' (Boyd, Prudham, and Schurman 2001, 555), as the biophysical conditions for hydropower (as an extractive industry) and plantations (as an agricultural industry) come into tension, and the externalities of their commodification cascade and ricochet across the southern Laos landscape.

In 2013, as part of THXPs downstream community mitigation and compensation plan, to address issues related to intensified downstream flooding, Sivilay villages were involuntarily resettled four kilometres upstream, and consolidated with two neighbouring communities into a new, company-constructed settlement, at an elevated location away from the river. For Sivilay Village, their new housing area is located within the territory of the upstream neighbouring communities. This has significant implications for accessing swidden land and natural resources back in their home village area. The resettlement of Sivilay Village to the new focal site was implemented against earlier communications by THPC to villagers in 2006, which indicated that they would be relocated to a site within their own community territory.[7] While some young people are extremely relieved to finally be outside of the flooding zone, and pleased with their new THXP-supported

[7]Interviews with villagers in Sivilay Village, June 2006 and January 2014.

houses, as well as (finally) access to electricity, and an upgraded school and a health clinic, overall most residents (reported by a former village leader as 40 out of 70 households) were very reluctant to leave their home village.[8] Indeed, 10 resident households only undertook the move after district authorities issued them official notices, which were backed up by threat of arrest.[9]

The success of the THPC resettlement plan in Sivilay Village now hinges upon a second dry-season irrigated rice programme, the actual performance of which remains to be seen. It is now arduous to walk, or expensive in terms of petrol, for Sivilay farmers to travel up to 15 km daily to their village territory, for the purposes of planting upland rice, caring for their livestock, maintaining their rubber plots, fishing, or accessing forest products. Community food security could be seriously compromised, especially if the THXP dry-season irrigated rice project underperforms for village households, an outcome with which villagers are well familiarised. Meanwhile, the degradation of the Hinboun ecosystem is continuing, and due to the silt loads and brown foam bubbles in the river, the swiftness of the current and steep erosion along riverbanks (which blocks some from accessing the river), many villagers no longer even bathe in the river.[10]

Importantly, THPC are contractually obligated to maintain support for the resettled Hinboun villages until an income standard of 19 million kip (USD 2340) per household per year is reached. Yet, according to THPC's published surveys, Sivilay Village's average household income actually fell between 2011 and 2013, from USD 1169 to USD 775. One might foresee two major scenarios playing out in the coming years. First, and tracking ongoing trends both within the village and across this region of Laos, communal land in old Sivilay Village may come under increasing pressure of household privatisation and external land sales, rendering the upland commons increasingly restricted and swidden agriculture a marginal activity. Second, the orientation of Sivilay residents could increasingly turn away from the Hinboun watershed, and towards new commercial and wage labour markets developing along the main highway, Route 13 South, thus representing a historic rupture in the region's agrarian transition.

(2) *The Nam Theun 2 Hydropower Project and Birla Lao eucalyptus plantations: intersections in Xaiboury District, Laos*

This section summarises research conducted in the Xe Bang Fai River Basin by Ian Baird and colleagues starting in 2001, and then in 2014 and 2015 during three separate visits. In particular, the focus is fieldwork in Palai and Dong Mak Fai Villages, Xaiboury District, Savannakhet Province, as the cumulative impacts of large-scale dams and plantations are especially evident there.

NT2 is presently the largest dam in Laos, costing USD 1.45 billion, and with the capacity to produce 1070 megawatts of electricity, the vast majority of which is exported to Thailand (Baird, Shoemaker, and Manorom 2015). This highly controversial project (see Porter and Shivakumar 2011; Lawrence 2009; International Rivers 2008; IRN 1999) was first proposed in the late 1980s, but it was not until 2005 that the World Bank agreed to provide financial guarantees required for the project to move ahead, as a Build, Operate and Transfer (BOT) initiative owned by the Nam Theun Power Company

[8]Interviews with villagers in Sivilay Village, June 2013.
[9]Interviews with villagers in Sivilay Village, January 2014 and November 2015.
[10]Interview with villagers from Sivilay Village, May 2012.

(NTPC), a consortium involving Electricite du France (EdF) (40 percent shareholder), the Electricity Generating Public Company of Thailand (35 percent), and the GoL (25 percent). The dam was finally completed in 2010, and has a 25-year concession period. Crucially – and in a similar design to the Theun-Hinboun project described above – NT2 involves the inter-basin transfer of a large amount of water from the Theun River to the smaller Xe Bang Fai River (Porter and Shivakumar 2011; Baird, Shoemaker, and Manorom 2015).

In 2001, Shoemaker, Baird, and Baird (2001) demonstrated that the lower Xe Bang Fai River supported the river-based livelihoods of approximately 120,000–150,000 people, including those living in Palai and Dong Mak Fai Villages. Since then, the dam has caused serious downstream impacts in the Xe Bang Fai Basin (Richter et al. 2010). In early 2014, over three years after NT2 started operating, Baird, Shoemaker, and Manorom (2015) found that dramatic changes in hydrology and water quality, all caused by NT2, had resulted in a number of serious and continuing negative social and environmental impacts, including heavy losses of fish from wild-capture fisheries, and other aquatic life; the degradation of river water for drinking or bathing; the destruction of many river-bank gardens; and the flooding of rainy season rice, along with others. NTPC and World Bank have so far failed to adequately mitigate downstream impacts or sufficiently compensate affected people (Baird, Shoemaker, and Manorom 2015; Manorom, Baird, and Shoemaker 2017).

In 2006 the Aditya Birla Group, a global company based in India, was awarded a concession to negotiate with village and district-provincial authorities for up to 50,000 hectares within a broadly defined area in Savannakhet Province (later expanded to Champasak Province) to develop commercial eucalyptus plantations. Birla Lao Pulp and Plantations (Birla Lao), a subsidiary created to implement the project, were also granted permission to construct an associated pulp mill, to process the fiber that the plantations were expected to produce (Pongkhao 2007). An ESIA for the overall project was never completed. Although over USD 40 million has reportedly been spent, the company has only been able to gain control of about 15,000 ha of land for planting eucalyptus, which is insufficient to support a competitive dissolving pulp mill. The plan to build the factory has been cancelled. Due to the unwillingness of local communities to relinquish more land to the company, and the GoL to force villagers to give up more land, Birla has been actively trying to sell its existing plantation holdings so that it can withdraw from Laos.[11]

Despite the difficulties that Birla Lao has experienced, in Dong Mak Fai and Palai Villages the company was able to work with the local government early on to gain control over much of the dry dipterocarp forestland previously important for local livelihoods, especially NTFP collection and livestock grazing. These communities have also lost some important agricultural land. In addition, both villages have been heavily impacted by NT2.[12]

Palai Village, a community mainly inhabited by indigenous ethnic Brou people, was heavily flooded by the Xe Bang Fai River at the end of the rainy season of 2011, like many other villages located near the river. Villagers widely believe that the flooding was at least exacerbated due to increased water being released into the Xe Bang Fai River from NT2's reservoir, and they expected that increased flooding would occur in future years. NTPC denied that the dam caused the flooding,[13] and so was unwilling to take any responsibility for related impacts (Manorom, Baird, and Shoemaker 2017). Birla Lao

[11]Interview with Shailendra K. Sitani, President of Birla Lao, Savannakhet, July 2015.
[12]Interviews with villagers in Palai and Dong Mak Fai villages, January 2014 and July 2015.
[13]Interviews with villagers in Palai Village, January 2014.

had also, however, taken much of the village's land for its own project. Some land was expropriated for plantations, while other land was taken for the company's nursery and planned pulp mill. This has resulted in Birla Lao gaining control of close to 200 hectares in Palai Village, more than any other target community. Because of these heavy land losses, and to address flooding risk believed to be caused by NT2, Birla Lao agreed to support the village's relocation to a nearby location about one kilometre from the old village.[14]

Birla Lao called Palai their 'Model Village', and supported the costs of building a school and health care centre at the new village location. However, there is insufficient qualified staff available to work at the school and health centre, greatly reducing community benefits. In addition, a large military camp has been established near the new village location, resulting in Palai losing over 100 hectares of additional forestland.[15]

Ultimately, villagers feel that they are trapped between various incursions and problems. As one villager commented in 2015, 'We are being squeezed. The river cannot provide what it used to, and we have lost most of our land to flooding, the plantations and the army camp'. A vastly decreased land base is encouraging many people to look beyond the village for livelihood opportunities. Here we can see clearly how the holistic livelihoods of villagers have been affected by the impacts from NT2, Birla Lao and the army camp intersecting to cause complex agrarian transformations. A group of village elders interviewed in July 2015 reported that more people are travelling elsewhere, especially to Thailand, to look for new employment opportunities. They claimed that prior to 10 years ago nobody was going to work in Thailand, but now many are. As one older man put it, 'It is not like before. Now people can't make a living here so they have mainly gone elsewhere to find work as labourers'.[16] The crucial point in this case village is that people are being affected by multiple project impacts that are not recognised by any of the parties causing them as being connected, and this has made it very difficult for people to divert their livelihood strategies to different resources. Villagers have lost aquatic resources due to the NT2 dam, and they have been prevented from diverting their efforts to more land-based activities such as cattle raising or mushroom picking because the land needed for those activities has been taken by Birla Lao and the army camp. Their incomes have been strained from more than one loss, as they have lost both aquatic resources and land-based resources. Thus, the NT2 and Birla Lao projects, and army camp land expropriation, have intersected through the lives of villagers, causing cross-sectoral cumulative impacts and associated agrarian change.

Neighbouring Dong Mai Fai Village, a larger ethnic Lao community, is located next to the Xe Bang Fai River and has also been impacted both by NT2 and by Birla Laos' land concession. When Shoemaker, Baird, and Baird (2001, 54) visited the area over a decade ago, one of the main sources of income for villagers in both Dong Mak Fai and Palai was selling different kinds of wild mushrooms from the same dipterocarp forests that have now largely been cleared and taken over by Birla Lao. Villagers also relied on these forests for livestock grazing. Now villagers have lost income from rapid declines in Xe Bang Fai River fisheries, and reduced calcium carbonate in the water due to water quality changes caused by the dam has resulted in dramatic declines in shellfish in the river, which used to be an important source of food and income in the villages (Baird,

[14]Interviews with villagers in Palai Village, January 2014.
[15]Interviews with villagers in Palai Village, January 2014.
[16]Interview with man from Palai Village, July 2015.

Shoemaker, and Manorom 2015). Villagers have also been affected by forestland enclosure of a few hundred hectares of land, indeed most of their forestland, both for plantations and for establishing the company's nursery and pulp mill. The cross-sectoral cumulative impacts from different projects have led to the loss of access to both fish and forest products, and a couple of families also lost valuable wet-rice paddy. While villagers sometimes cross the Xe Bang Fai River to collect wild mushrooms in other forests that have not been impacted by Birla Lao's operations, it takes a considerable amount of travel time and effort, and therefore villagers do not collect nearly as many mushrooms as they used to. Cow and buffalo rearing in the village has also declined dramatically, as there are no longer places where livestock can be released to graze.[17]

The NT2 cumulative impact study mainly focused on the downstream impacts of the dam for the mainstream Mekong River, including considering the impacts on the Tonle Sap Lake in Cambodia. It was cumulative in the sense that it looked at the downstream impacts of multiple dams, but it did not consider how land-use changes might exacerbate river-based impacts on villager livelihoods, or vice versa (EcoLao and Norplan 2004). Birla Lao only began developing its plantations after the NT2 impact studies had already been completed, which further adds to the temporal complexity, and demonstrates how difficult it often is to deal with cumulative impacts. They did not consider how NT2 might impact the villagers who were also going to be affected by their project. This particularly identifies the weaknesses of government and NTPC monitoring in identifying new problems as they emerge, as their assessment did not consider the potential impacts of Birla Lao's projects on communities, or the intersection of NT2 and Birla Lao impacts combined. In addition, the impacts of Birla Laos' plantations have undermined compensation measures associated with NT2, such as support provided for agricultural development by NTPC related to the downstream impacts of NT2 (see Baird, Shoemaker, and Manorom 2015; Manorom, Baird, and Shoemaker 2017). Although these compensation measures have been limited, villagers have not been able to benefit from NT2's cattle-raising scheme, or to grow new crops being promoted by NT2, as there is no longer enough land to do so due to land losses to Birla Laos. The combined impacts from NT2 hydropower and Birla Lao agribusiness development have resulted in uncompensated losses of villager livelihood assets and associated future income-earning opportunities. In these new sectoralised 'modern landscapes', local livelihoods are not adequately take into consideration. A political ecology framework can be useful for assessing the implications of such cross-sectoral and cumulative impacts.

(3) The Yali Falls and Lower Sesan 2 dams, and large-scale rubber plantations: nature-society intersections in Stung Treng and Ratanakiri provinces, northeastern Cambodia

This section reviews the ways that the impacts of large-scale plantations and hydropower dams are intersecting in Talao Village in Andong Meas District, Ratanakiri Province; and Srekor and Phluk Villages in Sesan District, Stung Treng Province. All three communities are mainly populated by ethnic Lao people[18] and are located adjacent to the Sesan River. The different parts of this larger case study are all situated in the same sub-basin.

[17]Interviews with villagers in Dong Mak Fai Village, January 2014 and July 2015.
[18]Much of northeastern Cambodia was previously part of Laos before being transferred to Cambodia in 1905 (Breazeale 2002). Therefore, much of the population is ethnic Lao.

More importantly for this paper, however, they all address hydropower dam-induced resettlement, which has been made especially problematic because rubber plantations have come to occupy the best resettlement sites.

Construction of the 720 megawatt, USD 1 billion Yali Falls dam in Vietnam, the first hydropower megaproject in the Sesan River Basin, began in 1993. It was completed in 2001, and the significant negative downstream social and environmental impacts of this project in Cambodia have been well documented (Fisheries Office, Ratanakiri Province and NTFP Project 2000; Baird et al. 2002; NGO Forum on Cambodia 2005; Wyatt and Baird 2007). Impacts include both construction and operational-period impacts. Over 55,000 people in 90 villages were directly impacted in northeastern Cambodia, due to losses of fisheries and other aquatic resources, material and livestock losses due to water releases, riverbank garden flooding, human and animal health problems due to water quality problems, and a number of other impacts. At least 39 people died due to water releases from the dam (NGO Forum on Cambodia 2005). A half dozen other large dams have since been built in the Sesan River Basin in Vietnam.

The circumstances in Talao Village, Andong Meas District, illustrate how the impacts of the Yali Falls dam have intersected with impacts caused by a large rubber plantation being developed by the Vietnamese firm Hoang Anh Gia Lai (HAGL). On the one hand, the Sesan River has changed due to sediment being held back by upper river dams in Vietnam, including the Yali Falls dam. This has been causing significant riverbank erosion downstream, including at Talao Village (NGO Forum on Cambodia 2005). During fieldwork conducted by the first author in July 2015, villagers reported that the river is eroding at a rate of up to 10 metres a year and is increasingly encroaching on village residential areas. Ten households have already been forced to relocate away from the river, and others are preparing to do the same. Even the village's health clinic will need to be moved soon as the river shifts.[19] This erosion is almost certainly due to what is technically known as the 'hungry water effect', a process that is caused by sediment deficiencies in water released from hydropower dams. The lack of sediment in the water causes the water to easily pick up sediment, resulting in more than normal riverbank scouring and erosion to occur (see McCully 2001; Sarkkula et al. 2010).

The problem has been made worse, however, because HAGL has taken over hundreds of hectares of land near the village for rubber plantations, leaving villagers with very little land and few options for relocating their houses away from the river, since the most suitable sites have been planted with rubber. While HAGL claims that it conducted an ESIA for its plantations, the company has refused to make it public.[20] Paradoxically, HAGL hired Bureau Veritas, an international consulting company, to conduct retroactive baseline environmental assessments with the goal of trying to gain sustainable management certification in the future. Those studies also, however, have not been publicly released.[21]

Relationships between many local people and HAGL became especially tense when an approximately 10-hectare piece of land where the villagers had planned to relocate some of their houses due to the river-bank erosion was rapidly planted with rubber by HAGL. Previously, villagers had firmly told the company that they intended to use this high ground as a site of refuge from flooding, as they had done during heavy flood periods in the past. The villagers became upset when HAGL planted rubber on this land. Most of the community

[19]Interviews with villagers from Talao Village, July 2015.
[20]Interview with David Pred, October 2015.
[21]Interview with David Pred, October 2015.

resisted HAGL's move, and villagers uprooted the company's rubber saplings. In reclaiming this land, they also removed all the fence posts that the company had put up to enclose the area.[22] Essentially, the intersecting impacts of dams and plantations squeezed villagers' resource access and livelihood options, resulting in complex cumulative social impacts, and a dramatic and rather desperate response to enclosure. We now turn to the next part of this case study, which further illustrates how plantation development is impeding relocation associated with hydropower dam development.

The Lower Sesan 2 dam (LS2), which is presently under construction, is the first large hydropower project to be developed on the Sesan River in Cambodia. Located in Sesan District, Stung Treng Province, just downstream from the Sesan's confluence with the Srepok River, it is only 25 km away from the Mekong River. Although originally designed by Electricite du Vietnam (EVN; Baird 2016), after ADB-hired consultants had earlier proposed this site as a possibility (Halcrow and Partners 1999), LS2 is presently being built through a collaboration between Hydrolancang International Company from Yunnan Province, southwestern China, and the Royal Group of Cambodia, owned by a Cambodian tycoon named Kith Meng. EVN still apparently maintains a 10 percent share in the project. The 400-megawatt capacity, USD 781 million dam is expected to cause a number of serious environmental and social impacts (see Baird 2009, 2016; Ziv et al. 2012).

Impacts caused by the construction of LS2 are interacting closely with impacts caused by large-scale tree plantation development in the area. On the one hand, Srekor villagers claim that the best sites for potential resettlement are no longer available because they have been planted with rubber by three Chinese plantation companies – particularly Grand Land Agricultural Development, Phou Mady Investment Group and the Huayue Group (formerly Siv Guek Investments). These plantations are at various stages of development, from being recently planted to being tapped for the last few years. Dam-related resettlement is having an intensified negative impact on villagers, as rubber development has resulted in villagers losing access to forests important for their livelihoods. Therefore, villagers in the reservoir area of LS2 are going to have to move to a different location, one much less suitable for supporting their livelihoods.[23]

In Phluk Village, Sesan District – also adjacent to the Sesan River – and located just downstream from LS2, the problem is somewhat different. The people there are not expected to be resettled due to the dam, like Srekor, since they are situated a few kilometres downriver, but they will certainly experience serious downstream impacts from LS2, including dramatic changes in river hydrology and water quality (see Baird 2009). This will undoubtedly reduce villager access to fisheries and other aquatic life, resources important to their livelihoods (Baird 2009), and also to the livelihoods of people throughout much of the Mekong River Basin (Hortle 2007). Declines in fisheries are likely to force villagers to rely more on inland resources away from the river, in order to replace lost food and income. Phluk Village is also, however, facing increasing intrusion from large-scale rubber plantation concessions being developed towards the river from the south, including Grand Land Agricultural Development (China) and Sopheak Nika Investments (Cambodia).[24]

All these impacts have been cumulative and cross-sectional, and have involved interactions between different resource sectors, over time, and in ways that impact local

[22]Interviews with villagers from Talao Village, July 2015.
[23]Interviews with villagers from Srekor Village, July 2015.
[24]Interviews with villagers from Phluk Village, July 2015.

people with diverse livelihoods that transcend the sectoral divides, and have led to ecological changes and agrarian change that can be most usefully considered using a political ecology framework.

Making connections: agrarian transitions and the ontological divide between rivers and land in the Mekong Region

As mentioned in the introduction, and as our case studies above clearly indicate, the cross-sectoral cumulative impacts of the projects we have examined in this paper have not been adequately recognised. We believe that this problem is evident not only in the Mekong Region, but also in many other parts of the world (see also Keskinen et al. 2012).

In Laos and Cambodia, there are few mechanisms in place to help coordinate across ministries and sectors, and between government and civil society. We expand upon these portrayals to highlight a consistent division and compartmentalisation established between the regulation of large projects affecting terrestrial and aquatic ecosystems. Moreover, the biophysical changes occurring are interwoven with socio-political relations. The 'glue' that links terrestrial and aquatic environments so closely for us is that the villagers we work with rely heavily on all these environmental resources for their livelihoods. Local resource-management practices stretch across aquatic and terrestrial resources, and people depend on multiple livelihood strategies. When one of the environments important to local people is impacted by a development initiative, the tendency of local people is to shift reliance to other environmental resources/habitats (see Baird 2000 for a more positive example of how these causal relations can work), but this can lead to the overexploitation of the remaining resources. Moreover, when more than one cluster of environmental resources is impacted simultaneously, the character of agrarian change has the potential to be much more negative and transformational. Even when ESIAs and cumulative impact assessments are completed, managers and politicians frequently fail to appreciate the importance of these relational connections between communities and multiple ecosystems (see, for example, 3SPN 2007).

We observe that the separation of riverine and aquatic resources from land management is part of the production of what Robbins (2001a, 639) has referred to as the creation of 'modern' landscapes, in which 'efforts to fit landscapes into abstract and purified modern categories actually increase the proliferation of hybrids and impure landforms'. There are many reasons for this, related to expertise, professionalisation and the legibility-based divisions in state-bureaucratic administration (Scott 1998), and we propose that these problems are not only specific to Laos and Cambodia. The modern bureaucratic divisions between land and water resource management has been associated with the development of professional and disciplinary specialties; particular realms of knowledge production and expertise whereby watershed ecosystems are 'compartmentalized into separate units … and connected through rigid causal chains' (Keskinen et al. 2012, 320). In many parts of the world, people who specialise in water resources do not interact with those who study terrestrial landscapes, and there are separate government agencies responsible for dams and plantations. Thus, when actual implementation occurs, differences frequently emerge, since the people working for different agencies rarely effectively coordinate. Those researchers who study dams have historically focused on reservoir resettlement, whereas those who study plantations have tended to focus on other issues such as the dispossession of common lands.

As can be seen in the contexts of Laos and Cambodia, where many rural communities are located along rivers, and where communities are engaged in multiple resource-based

livelihoods, these socio-natural environments are managed and connected through peoples' everyday practices. In this sense, not only actually existing ecosystems, but also local community livelihoods, have never been 'modern', or based upon a separation of the natural and the social, and institutionalised into abstracted and compartmentalised knowledge systems (Latour 1993; Zimmerer 2000). In the major Mekong sub-basins, and in our study communities, farmers are also fishers, forest users and hunter-gatherers. Moreover, although large resource projects seek to define resource landscapes, and extract natural resources for commodification (measured as units of water released at particular times to produce hydropower revenue, or annual yields from a hectare of tree plantation), the actual landscapes created through these extractive processes continually spill across classificatory separations. Indeed, the impacts merge into new outcomes, ones not always expected or recognised due to a focus on specific sectors. The hybrids and other 'impure' landforms we observe include sites where the externalities of hydropower and tree plantations cascade into each other (dams which have their water supply undercut by additional dams, plantations flooded by hydropower releases), as well as the ways in which local resource-management practices are set onto new trajectories by cumulative, double-displacement processes. For people living in rural places, these forces can create highly disruptive, multiple enclosures and de-stabilising exclusions. Such cumulative impacts, we argue, are now shaping the character of contemporary agrarian transitions in Laos and Cambodia.

Mekong hydropower developers are only slowly and very unevenly moving towards a regime based upon compliance with legal requirements, environmental review, and the implementation of social safeguards (Grumbine, Dore, and Xu 2012, 94). Presently, the governments of Laos and Cambodia lack mechanisms that support forms of cumulative social and environmental assessments that consider the impacts of multiple projects, or which transcend the land/water divide. There is insufficient political support from high-level decision makers to ensure that these important issues are taken seriously. In relation to hydropower, Suhardiman, Giordano, and Molle (2012) have also examined the 'scalar disconnects' between national and regional decision-making, and sectoral fragmentation between different ministry regulators, which are characteristics of the current Mekong transboundary water governance regime. Furthermore, the MRC does not have the capacity to enforce (but also, to our knowledge, has not publicly advocated for), cross-sectoral and cumulative impact assessments that draw connections between different types of large projects, such as dams, plantations and mining developments. Pittock et al. (2015) have also pointed out other structural problems associated with the MRC, including the vague nature of many parts of the founding agreement, leading to conflicting interpretations. This has resulted in difficulties for the member countries in coming to consensus over water allocation and development.

In Laos, more comprehensive cumulative impact assessments studies have been conducted for a small number of internationally backed projects – notably for NT2 and the Nam Ngum cascade of hydropower projects in Laos (EcoLao and Norplan 2004; IFC 2012). Dore, Lebel, and Molle (2012, 31), however, indicate that the NT2 cumulative impact assessment was 'remarkably disconnected from the Nam Theun 2 approvals process'. Recent research in the Xe Bang Fai River Basin in Laos also demonstrates that despite undertaking a downstream cumulative study, NT2 is still causing heavy undercompensated and undermitigated downstream impacts (Baird, Shoemaker, and Manorom 2015). Although the World Commission on Dams (WCD) did carefully consider the impacts of hydropower dams around the world, it focused on aquatic resources, rather than the ways in which land and water management interact (WCD 2000).

For large-scale tree plantation concessions in Laos and Cambodia, there has been even less of an attempt to consider environmental or cumulative impacts of any type, largely because the governments have not required rigorous consideration of these impacts. Where completed, environmental assessments of individual plantation projects have failed to consider the cumulative impacts of other agribusiness concessions, let alone the impacts of projects across the land/water divide (for an example of such an approach, see Guardiola-Calarmonte et al. 2010). The deepening shift towards the regulation of forest environments through corporate social responsibility standards and private certification systems generally discourages integrated landscape approaches and evaluations of cumulative and cross-sectoral social-ecological impacts, as corporations do not generally have a specific mandate to protect the broader public interest, and private certification systems such as the Forest Stewardship Council are ultimately sector- and project-specific standards. While there have been attempts in both Laos and Cambodia, by both government and NGOs, to inventory all the large land concessions in the country, these inventories do not include hydropower dams (Schönweger et al. 2012; Licadho 2014; Hett et al. 2015; Open Development Cambodia 2015), and no studies have specifically examined how these projects might be interacting with each other.

Recent approaches to understanding complex ecological systems and local resilience, for example in relation to research on the 'water-land-energy nexus', hold some promise for bridging the sectoral, scalar and ontological divisions between ecosystems, livelihoods and social landscapes. A framework document for the CGIAR Research Program on Water, Land and Ecosystems (CGIAR 2014, 4) develops an integrated landscape management approach, based upon ideas of 'embedded and interlocked' socio-ecological systems, in which changes are 'unpredictable and non-linear', and 'dynamics in one system affect the other'. However, in CGIAR (2014, 4) we note that there is a depoliticising, technical emphasis, involving social-ecological systems divided according to sectors, for which 'trade-offs' can be accurately calculated and efficiently managed. The framework document states, 'To achieve positive impacts on human well-being, Water, Land, and Ecosystems scientists research … (iii) type and distribution of and trade-offs between ecosystem services across and between landscapes under different management regimes'. First, there is little evidence of how these ideas would differ in practice from previous models of integrated water resource management (IWRM), which have produced limited practical results in changing the paradigm of sector-defined regulation in the context of extractive mega-project development in the Mekong Region (Blake 2015). Second, we find that such 'ecological systems' research can be framed by positivist, compartmentalised and sector-based approaches, through which ecosystems are rendered into components for which efficient 'trade-offs' can be identified. Mainstream nexus thinking does not appear to challenge technical perspectives on understanding and 'solving' the complex socio-environmental impacts of development, while simultaneously masking development impacts at the local scale, where integrated livelihoods stretch across sectoral boundaries. Nexus thinking can underemphasise how forestland grabbing and aquatic-based enclosures often need to be considered in relational perspective, and can simplify and depoliticise locally complex realities of how specific, large resource project developments are connected to joint ecological-agrarian and class transformations (see Akram-Lodhi and Kay 2010). This can be contrasted to political ecology approaches, which emphasise politics and power in the framing of environmental interventions and narratives. This also leads us to critically interrogate how the simplifying metrics of modernist scientific knowledge systems can ultimately support processes of top-down industrial commodification (Scott 1998; Robbins 2008). As Middleton et al. (2015) have noted, both the THPC and the

NT2 projects have been used as examples of sustainable approaches to the water-energy-food nexus, but in fact both demonstrate the potential for such models to become unproductively de-politicised.

The human geographies of the Mekong and its sub-basins, including the Hinboun, Xe Bang Fai and Sesan, have been formed out of relational socio-ecological histories (Barney 2009) and through multiple networks linking to wider national and global processes (Rigg 2005; High 2014). At the village and landscape scale, forestlands, river waters and human communities do not function as distinct segments or 'sectors', and the local outcomes of both hydropower dam and tree plantation development can only be fully understood when these interventions and their effects are considered in relation to each other, and to local resource-management and livelihood systems. In numerous communities the interactive effects between land enclosures and hydropower development are producing multiple, cascading displacement effects, as property rights are reorganised, and as resource degradation takes effect. The Hinboun, the Xe Bang Fai and Sesan, are now highly engineered, and highly impaired, ecosystems, with villagers' environmental livelihoods subject to the impacts of a number of major developments. The socio-ecological transformations described above escape modernist political-administrative categorisation, flowing across landscapes, and territorial and sectoral boundaries. In the process new complex, hybrid interactions between the socio-political, the technological and the natural are being created (Robbins 2001a, 2001b).

Conclusions: connecting political ecology, agrarian studies, and cross-sectoral cumulative assessment

Bridging the ontological divide between water and land, and pursuing an approach to environmental governance that seriously considers the interactive and cumulative impacts of multiple projects upon social landscapes, including ones that cross sectors, is not a simple or straightforward task, for developers or for regulators. Indeed, the legacy of past bureaucratic, disciplinary and professional divides is likely to persist long into the future, since real change would require new institutional orders that would challenge many long-standing norms. More importantly, through applying sectoral blinders, this separation facilitates managerialist legibility and the commodification of natural resources, at the expense of peasant resource users whose integrated livelihoods cross the water-land divide, in part through how it allows developers to undermitigate and undercompensate for cross-project and sector impacts.

Nevertheless, it is possible for gradual change to occur, whether in academic institutions, government agencies, the private sector or within civil society. We argue that significant and primarily negative impacts are essentially being left unstudied and unaddressed, because of how various regulatory and other conceptual divides interpret the range of causality in social-environmental interactions. Although it is unlikely to bring positive results in the short term, educational institutions could start teaching ESIA methods that emphasise the need to bridge the ontological barrier between water and land management, and to consider cumulative impacts across projects and between sectors and across national borders. More effort could go into strengthening existing cross-sectoral institutions, the coordination between different agencies, and orienting these institutions towards integrative, participatory planning processes founded upon notions of multi-functional landscapes (Castella et al. 2013). However, as Mollinga (2010, S-4) has appropriately cautioned, natural resource-management systems are complex, and boundary-crossing between disciplinary research and policy work 'does not occur automatically, and requires a concerted effort'. Mollinga

also suggests that we need inter-disciplinary and trans-disciplinary approaches to research, a position that we also support.

Broadening the forms of knowledge that are considered as relevant for resource policy and project planning processes is particularly crucial. Roopali Phadke (2011) has discussed such forms of 'hybrid knowledge' in India, combining both expert science and local knowledge and experience, in which civil society plays a crucial role. In the Mekong Region new inter-disciplinary approaches hold some promise, but need to move beyond de-politicised approaches based on abstracted exercises in ecosystem modelling and sectoral trade-offs, and focus more on actual communities in specific landscapes, facing real cumulative impacts that are undermining ecosystems and community livelihoods. As Foran (2015) points towards, integrated landscape approaches to water-energy-food research could be approached through a more critical political economy approach – and, we would add, an agrarian and peasant studies-focused, social studies lens, one that ultimately leaves us with political ecology approaches.

We could all benefit from paying more attention to the fundamental challenges associated with the ontological divides that presently limit us so much in terms of our abilities to assess and adequately address cross-sectoral and cumulative impacts of various kinds of development initiatives, particularly the especially under-considered relationship between large hydropower dams and large tree plantations. Geographers who combine political ecology with agrarian studies frameworks are well positioned to undertake such research. Such research can be most illuminative through engagements with the ecological knowledge of local people, communities and resource managers, whose livelihoods straddle sectoral boundaries, and who can provide important insights into the ways that cumulative impacts are occurring, due to villagers' intimate understandings of how multiple community livelihood strategies connect water and land.

It is crucial to develop a new approach to cumulative and cross-sectoral assessments. People working in various sectors need to coordinate and be involved, but most importantly, much greater meaningful local participation is essential. One way of approaching this would be to assess the impacts of new projects in relation to the impacts of previous projects on the same communities. We believe that communities that are impacted by more than one project should be the centre of analysis, as it is through them that we can really see the necessity of transcending cross-sectoral boundaries. Doing this effectively would not be easy, but these sorts of innovative and cumulative cross-sectoral assessments are important, and so justify the efforts and time required to implement them.

Ultimately, however, probably the most important change needed to ensure that cumulative cross-sectoral impacts are better addressed is government political will, something that has so far been gravely lacking in the Mekong Region. In addition, there needs to be more space allowed to civil society so that they can effectively support communities or lobby governments to address the potential for using integrated livelihood approaches for better understanding joint *ecological-agrarian* transitions.

Acknowledgements

The authors sincerely thank the local residents of the Hinboun, Xe Bang Fai and Se San river basins of Laos and Cambodia for sharing their stories of community livelihoods and environmental change. Thanks to Katie Hardwick from the Cartography Lab at the Department of Geography, University of Wisconsin-Madison, for preparing Figure 1. The paper benefited from comments by Bruce Shoemaker, Peter Vandergeest, Laura Schoenberger, the Political Ecology Reading Group at the Australian National University, and particularly by three anonymous reviewers. Any remaining deficiencies are our own.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Some of the research done in the Xe Bang Fai and Sesan River Basins was supported by National Aeronautics and Space Administration (NASA) grant no. NNX14AD87G (implemented through the East-West Center in Hawai'i, under the supervision of Jefferson Fox). Some of the research in the Xe Bang Fai Basin was supported by the McKnight Foundation, the Blue Moon Fund and the Open Society Foundations.

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