

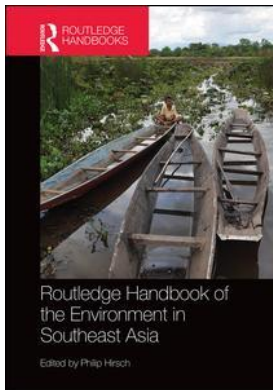
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## **Routledge Handbook of the Environment in Southeast Asia**

Philip Hirsch

### **Water, rivers and dams**

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## 13

## WATER, RIVERS AND DAMS

*Carl Middleton***Introduction**

Rivers throughout Southeast Asia – historically until the present day – are intimately tied to the region’s ecosystems, societies, economies, cultures and belief systems (Rigg, 1992). Rapid economic and societal change is transforming the relationship between rivers and people, and there are divergent viewpoints on rivers and their role in development. The region’s rivers are simultaneously seen as engines of economic growth, in particular for large-scale hydropower dams and irrigated agriculture; as natural resource foundations of rural subsistence livelihoods; as important domains for environmental conservation due to their natural and scientific worth and integral role in ecosystem functioning; as cultural cornerstones of cuisine, festivals and mythology; and as sacred places (Sneddon and Fox, 2006).

The major river basins of mainland Southeast Asia that constitute the majority of the region’s land area, from west to east, are the Irrawaddy, Nu-Salween, Chao Phraya, Lancang-Mekong and Red (Table 13.1). With the exception of the Chao Phraya, they are transboundary rivers with their sources in mountainous south-western China. The rivers of insular Southeast Asia are smaller and mostly enclosed within one country<sup>1</sup> (Wolf *et al.*, 1999). Across the region, river ecosystems – including riverine floodplains and deep pools, fresh and brackish water wetlands and lakes – are highly productive and support remarkable biodiversity (Dudgeon, 2000; UNEP and TEI, 2007).

Overall, the region is transitioning from state-led to increasingly liberalized market-orientated development, including with regard to water resources, although the state retains a significant role (Nevins and Peluso, 2008; Springer, 2011; Barney, 2012). A diverse assemblage of actors interact within water resources decision-making processes, including state agencies, private-sector investors, construction and energy companies, farming and fishing communities, civil society groups and broader social movements (Dore *et al.*, 2012). These include large-scale and typically state-led decisions, such as on large dams, flood control and irrigation schemes, and also small-scale everyday decisions, such as the construction and operation of farm ponds and individual wells (Molle *et al.*, 2009b).

Access to, use of and control over water resources in Southeast Asia is highly politicized (Hirsch, 2010). Mollinga (2008) names four interrelated scalar domains of water politics, all forms of which exist within the region: the ‘everyday politics of water’ between local water

Table 13.1 Transboundary rivers of mainland Southeast Asia

	<i>Irrawaddy (Ayeeyawady)</i>	<i>Nu-Salween (Thanlwin)</i>	<i>Chao Phraya</i>	<i>Lancang-Mekong</i>	<i>Red (Hong)</i>
<b>Countries sharing the basin</b>	PRC* (Yunnan); Myanmar	PRC (Yunnan); Myanmar; Thailand	Thailand	PRC (Yunnan, Tibet, Qinghai); Myanmar; Laos; Thailand; Cambodia; Vietnam	PRC (Yunnan, Guangxi); Laos; Vietnam
<b>Average annual discharge (m<sup>3</sup>/sec)</b>	13,000	1,659	718	14,500	4,239
<b>Basin area (km<sup>2</sup>)</b>	413,710	271,914	178,785	795,000	169,000
<b>Biodiversity status</b>	79 fish species, 95 amphibian species, 0.6% protected areas, IUCN classified 'data deficient'	143 fish species, 47 fish endemics, 92 amphibian species, 2.2% protected areas	222 fish species, 34 fish endemics, 78 amphibian species, 11.7% protected areas	1,200–1,700 fish species, 62 fish endemics, 162 amphibian species, 4 Ramsar sites, 5.4% protected areas	180 fish species, 1 fish endemic, 140 amphibian species, 1 Ramsar site, 3.8% protected areas

\* People's Republic of China (PRC).

Source: Adapted from ADB, 2012a, compiling various sources.

users; the domestic politics of water policy within sovereign states; hydro-politics between sovereign states over shared water bodies; and the global politics of water discourses and policies. Researchers have explored the region's water politics from a diversity of perspectives, including that of geopolitics (for example, Öjendal and Jensen, 2012), ecopolitics (for example, Hirsch, 2010), the politics of scale (for example, Bakker, 1999; Dore and Lebel, 2010), the politics of knowledge (for example, Contreras, 2007; Käkönen and Hirsch, 2009) and political ecology (for example, Pye, 2012).

This chapter explores the politics of water resources, with a particular focus on hydropower development on the transboundary rivers of mainland Southeast Asia. The chapter highlights the ecological and social changes that have already occurred, that are under way and that may result from increasingly extensive hydropower construction, as the region transitions from a state-led to increasingly liberalized market-orientated political economy. The next section briefly outlines the relationship between different groups of people, their livelihoods and various water-related resources across contemporary mainland Southeast Asia, in particular in rural areas, and summarizes plans for hydropower development. The third section describes the initial emergence of large-scale hydropower and irrigation infrastructure in Thailand and Vietnam during the post-colonial Cold War period. This period was heavily influenced by centralized government agencies pursuing 'hydraulic missions' of modernization and nation-building. The fourth section considers water resources across mainland Southeast Asia since the 1990s, a period of deepening regional economic integration and market-orientated policies. It shows how increasingly fulfilled plans for hydropower development in Laos, Cambodia and Myanmar for cross-border electricity trade and domestic consumption intersect with the politics of both water resources and electricity planning. It also highlights the implications for transparency and accountability of decision-making of the growing role of private-sector foreign direct investment in hydropower dam construction and operation. The fifth section turns briefly to the hydropolitics of transboundary rivers in the region. It argues that the growing role of the private sector in hydropower development on transboundary rivers is redefining how national interest is formulated and negotiated between riparian governments. The final section offers some brief conclusions and considers prospects for the region's rivers.

### **People, water and life in contemporary mainland Southeast Asia**

The majority of people in mainland Southeast Asia continue to live in rural areas. For these people, rivers and other water resources and the agriculture that they support are central to livelihoods, food security and other measures of well-being. Politically dominant majority ethnic groups have tended to inhabit the region's lowland river valley areas, plains and deltas, while other ethnic minority groups have lived in highland and mountainous areas of watersheds (Scott, 2009). A large number of official reports document the development potential of the region's water resources, with plans for intensifying water resources infrastructure construction increasingly being put into practice (for example, ADB, 2012b; ASEAN, 2009; MRC, 2010). Processes of agrarian transformation and changes in the landscape have also accelerated over the past several decades (Kummu *et al.*, 2009; De Koninck *et al.*, 2012). These changes have to date already affected many river ecosystems and threaten biodiversity (Zhang and Dudgeon, 2009).

In the typically fertile lowland plains and delta areas, agriculture tends to be rain-fed and irrigated rice farming. Overall, the extent of irrigated agriculture is relatively low across the region, ranging from 7 per cent of total cropland in Cambodia to 31 per cent in Vietnam (ADB, 2012a). The most intensively farmed and irrigated areas are the deltas of the Irrawaddy, Chao

Phraya, Mekong and Red rivers, together with the Tonle Sap basin in Cambodia and Chao Phraya's central plains. In areas that are intensively irrigated, water scarcity is often created (on the politics of scarcity see Mehta, 2010); in the Mekong Delta in Vietnam, for example, more than 80 per cent of dry-season flows are diverted for irrigation (ADB, 2012a). Thailand has utilized much of its irrigation potential, while the other countries of mainland Southeast Asia are now increasingly committed to expanding irrigated agriculture via small- and large-scale schemes (Molle, 2005); in the Mekong basin, for example, governments plan to increase dry-season irrigation from 1.2 to 1.8 million hectares by 2030 (MRC, 2011a). Furthermore, extensive plantations of oil palm, rubber, eucalyptus, sugar cane, cassava and other agro-industrial crops are also being established throughout the region's plains and plateaus (ADB, 2012a).

In the upper watersheds, minority ethnic groups have tended to practise swidden agriculture, livestock farming and hunter-gathering. In the past, in the name of forest and watershed conservation and border-stabilization, government programmes have sought to relocate ethnic minorities into lowland areas (Rigg, 1997, p. 115; Baird and Shoemaker, 2007). Hydropower dams and their social and environmental impacts are often located within these upland areas, disproportionately affecting ethnic minority groups, while the electricity, flood-control or water-supply benefits are transferred to lowland urban and industrial areas (Dao, 2011). Upland watersheds are also being transformed by legal and illegal logging, agricultural and plantation conversion and mining.

Wild-capture river fisheries and aquaculture are of great importance to regional food security as a source of protein and micronutrients, in particular to millions of subsistence full-time and part-time rural fishers (Baran *et al.*, 2007; ICEM, 2010; Arthur and Friend, 2011). For the Mekong basin alone, up to 2.6 million tonnes of wild fish and other aquatic resources are harvested each year, worth at least US\$2 billion at first-sale value and US\$5.6 to US\$9.4 billion per year at retail (Dugan, 2008). Threats to the region's fisheries range from a loss of breeding, spawning and feeding habitat, to the increasing intensity and large-scale commercial character of fishing activities, to the fragmentation of the rivers' ecosystems, including as a result of large dam construction (Orr *et al.*, 2012; Ziv *et al.*, 2012). The importance of wild-capture fisheries to livelihoods has often been devalued by government agencies and the private sector in the calculus of promoting large-scale hydropower development and irrigation schemes (Friend, 2009; Sneddon and Fox, 2012).

Increasingly implemented plans for extensive hydropower development across the region represent the greatest potential change to the region's rivers. Grumbine *et al.* (2012) suggest that the principal drivers of hydropower are demographic changes; human development aspirations; food and energy demands; trends in economic growth, trade and investment; and climate change. According to a recent review by the International Centre for Environmental Management (ICEM) (ICEM Asia, 2013), including the Yunnan province of China, mainland Southeast Asia has a total hydropower potential of 256,200 megawatts, of which current installed capacity is approximately 27,896 megawatts (Table 13.2); King *et al.* (2007) identified 82 existing large dam projects and 179 potential projects within the region.

Plans for extensive hydropower hold profound consequences for the region's rivers. For example, river system hydrology would change as the onset of flood pulses is delayed while initial rainfall is used to replenish reservoirs. Dry-season flows would increase as stored water is released. The river ecosystems would become increasingly fragmented (see, for example, MRC, 2011a; Ziv *et al.*, 2012; Orr *et al.*, 2012). While potentially benefiting some economic sectors in addition to hydropower production, such as dry-season irrigated agriculture, a range of negative hydrological and ecosystem impacts would also occur with implications for existing livelihoods, including impacts on wild-capture fisheries and riverbank gardening.

Table 13.2 Hydropower potential and installed capacity

Country	Installed capacity (MW)***	Total capacity (MW)****	Under construction/ advanced planning (MW)
Cambodia	206	5,000–8,600	1,100
Yunnan province, PRC	11,980*	90,000*	66,706**
Lao PDR	1,878	23,000	4,818
Myanmar	2,559	108,000	33,400
Thailand	3,276	10,000	0
Vietnam	7,970	16,600	8,630
<b>Total</b>	<b>27,896</b>	<b>256,200</b>	<b>114,654</b>

All data ICEM Asia, 2013, except \*ADB, 2012a and \*\*Wikipedia, 2013, which identifies installed capacity in Yunnan as 13,581MW (see also Magee, 2006); \*\*\* excluding small-scale hydropower; \*\*\*\* not all capacity is economically or technically viable.

### The rise of hydrocracy: state-led water resources development in Thailand and Vietnam

In the context of post-colonial mainland Southeast Asia, and during the era of Cold War politics and the tumultuous first and second Indochina Wars, governments of different political hues and degrees of authoritarianism built large centralized government agencies that largely dominated planning for development. During this period, it was Thailand and Vietnam where large water infrastructure was most extensively developed. These two countries pursued industrialization with the respective support and divergent ideologies of the Cold War powers, the United States and the Soviet Union (Greacen and Palettu, 2007). Powerful state-led water resources development agencies emerged, staffed predominantly by engineering professionals, that envisioned how the countries' water resources could be harnessed for hydropower development and irrigation through large-scale infrastructure projects, thus embarking on 'hydraulic missions' of modernization led by state agency 'hydrocracies' (Molle *et al.*, 2009d). Some of these projects materialized, while many remained only in the imaginations of project proponents (Molle *et al.*, 2009c). Large water resource development projects, such as the irrigation schemes in the Mekong Delta (Biggs, 2010) and the north-east of Thailand (Molle *et al.*, 2009a), also aligned with ongoing processes of nation-building by projecting state control over natural resources and local populations. In both Vietnam and Thailand, even as hydropower dams and irrigation infrastructure contributed towards electricity generation and national food production, negative environmental and social impacts went largely unaddressed. These issues have been increasingly raised by civil society in Thailand since the 1980s and, more recently, in Vietnam since the 2000s.

From the 1960s, Thailand underwent extensive water infrastructure planning and construction, receiving aid and technical support from USAID and the US-aligned World Bank. Large dams in Thailand have principally been for hydropower, with irrigation also incorporated as a secondary consideration (Hirsch, 1998). Major projects included the Bhumipol dam on the Ping River and the Sirikit dam on the Nan River, both tributaries of the Chao phraya in northern Thailand and the Ubonrat, Sirinthorn and Chulabhorn dams on tributaries of the Mekong River in the north-east of Thailand (Hirsch, 2010). As of 2005, 32 large and medium reservoirs were operated by Thailand's state-owned utility – the Electricity Generating Authority of Thailand (EGAT) – and the Royal Irrigation Department, two large and influential government agencies, alongside an estimated 11,800 small-scale irrigation projects and ponds (CU-WRSRU, 2012). The 'Greening of Isan' – Thailand's north-eastern region located within the Mekong River basin – has

been a particular ambition of successive Thai governments, which have claimed to seek to address food insecurity and alleviate poverty. During the 1960s and 1970s, they were motivated above all to counter communist insurgency in the region (Mirumachi, 2012). Since the 1960s, successive waves of plans for large- and medium-scale dam and diversion schemes have sought to irrigate Thailand's north-east region, including the Green Isan Project in the early 1980s, the Khong-Chi-Mun Project in the late 1980s and 1990s and the Water Grid Project in the early 2000s (Molle *et al.*, 2009a), which are essentially successive incarnations of the same overall idea.

In Thailand, the developmentalist visions of large irrigation and hydropower schemes have often been heavily contested between state and civil society (Blake *et al.*, 2009). Since the 1980s, large dams were challenged by affected villagers, social activists, NGOs and academics on the grounds of their environmental and social costs – resulting, for example, in the cancellation of the Nam Choan dam in 1988; the ongoing controversy around the Pak Mun dam in north-east Thailand, completed in 1994; and the incomplete plans for the Greening of Isan (Hirsch, 1987; 1998; Foran and Manorum, 2009). The massive flooding in Thailand in 2011 in the Chaopraya basin, however, has revived state-led plans for water mega-infrastructure schemes, with a 350 billion baht (US\$11 billion) flood water management scheme proposed that evoked widespread controversy over potential livelihood and environmental impacts (Chomchuen, 2013).

In Vietnam, the 1,920-megawatt Hoa Binh dam, constructed between 1979 and 1991, remains Southeast Asia's largest dam (excluding dams in Yunnan province, China), and presaged an extensive hydropower development programme across the country in the post-reunification state (Hirsch, 1992; Dao, 2010). The project was built by Electricity of Vietnam (EVN), one of Vietnam's largest state-owned enterprises (SOEs) (Dao, 2011), with financial and technical support from the Soviet Union. Subsequent major state-led projects by EVN include the 2,400-megawatt Son La dam (initiated in 2005) and the 720-megawatt Yali Falls dam (initiated in 1993) (Hirsch and Wyatt, 2004). As of 2010, hydropower generated 37 per cent of Vietnam's electricity (Nguyen, 2012). Despite river basin committees being formed under the Ministry of Agriculture and Rural Development and subsequently the Ministry of Natural Resources and Environment, Dao (2011, p. 112) concludes that they 'have played little if any role in dam planning', with EVN remaining influential even as Vietnam's electricity sector has partially liberalized since 2006. The implications of this liberalization are discussed further below.

Vietnam's large hydropower projects have been important in meeting national electricity demand, as well as for flood protection, in particular for Hanoi. Despite this, Vietnam's large hydropower dams have been associated with massive resettlement and outstanding environmental and social concerns (Dao, 2011). The Hoa Binh dam resettled between 50,000 and 60,000 people (Hirsch, 1998), while the Son La and Yali Falls dams resettled 100,000 (Dao, 2011) and 8,475 (Dao *et al.*, 2004) people respectively, the majority of whom were ethnic minority groups whose livelihoods have been seriously affected by the projects. Dao (2010) shows that the absence of resettlement policies prior to 1990, together with a lack of expertise within EVN in recognizing and addressing environmental and social issues, contributed to these early project impacts. More recently, some limited improvements in policy and practice can be found, even as the decision-making process remains top-down (Dao, 2011). This has been accompanied by a limited but growing role for civil society, including the nationwide Vietnam Rivers Network, formed in 2005 of NGOs, academics and others, which has documented environmental and social issues at a number of projects.

Foreshadowing present-day regional economic integration and cross-border power trade, the Mekong River Basin has been a focus of regional-scaled planning since the 1950s, with the active intervention, in particular, of the United States (Mitchell, 1998; Hori, 2000). In brief, plans for extensive dam development were first conceived in the 1950s by the UN Economic

Commission for Asia and the Far East (UNECAFE) and the US Bureau of Reclamation, which held a modernizing vision to ‘tame the Mekong River’ for the purpose of irrigation and hydro-electricity generation. A cascade of seven mainstream projects and around 170 tributary projects was envisioned, detailed in an ‘Indicative Basin Plan’ published in 1970 (Molle *et al.*, 2009b). To facilitate the projects, in 1957 the inter-governmental Mekong Committee was formed, under the auspices of UNECAFE, with the membership of the governments of Cambodia, Laos, South Vietnam and Thailand. The programme was also conceived to align with US Cold War interests in the region. In 1975, however, as the region descended further into conflict, the Mekong Committee dissolved and the majority of projects – including the mainstream dams – were shelved. Following a return to peace in the region, the mainstream projects were reconceived in the early 1990s, but dropped when the Asian financial crisis struck in 1997. They have been revived again since 2007, this time with a strong role played by private-sector developers alongside state agencies that reflects a broader turn in the region’s political economy of water resources development, discussed in the following sections.

### **Liberalizing hydropower: water resources development in the market economy era**

Since 1986, the socialist states of Vietnam and Laos have undergone deepening reforms towards socialist-orientated single-party market economies. Cambodia, meanwhile, transitioned towards a multi-party democracy and market economy following the comprehensive peace settlement in 1991. Most recently, with the first elections in 20 years held in November 2010, Myanmar has created a nominally civilian parliament and is heading towards ending decades of international isolation (Jones, 2014). All countries are pursuing regional and global economic integration, and are liberalizing while retaining a mix of neoliberal and illiberal governance forms (Springer, 2011; Barney, 2012). This section explores how large hydropower dam construction now takes place within this new regional political economy, where private-sector actors take an increasingly significant role in financing, construction and operation, backed by supportive government policies that also retain a significant role for state agencies as both regulator and project co-developer (Suhardiman *et al.*, 2011; Jensen and Lange, 2013). To a degree, the countries of the region are also shifting towards policies that pursue the management principles of integrated water resources management for the allocation of water (MRC, 2010; Mirumachi, 2012).

With the economies of mainland Southeast Asia expanding, demand for electricity continues to grow, especially in Thailand and Vietnam; Thailand’s government estimates that the country’s electricity demand will approximately double to 70,686 megawatts by 2030 (EPPPO, 2012), and in Vietnam the government predicts that demand will more than triple to 75,000 megawatts in the decade to 2020 (Socialist Republic of Vietnam, 2011). Predictions for power-demand growth and the best way to meet it have been contested between government agencies and civil society (see Greacen and Greacen, 2012; VUSTA, 2007). In Thailand, no large hydro-electric dams have been built since the Pak Mun dam in 1993, due to civil society and community resistance together with the fact that the best sites have already been exploited. Meanwhile, in Vietnam, it is anticipated that 83 per cent of Vietnam’s hydropower potential will be exploited by 2025 (Suhardiman *et al.*, 2011). The governments of Thailand and Vietnam are therefore looking towards neighbouring Laos, Cambodia and Myanmar for hydropower projects as a new source of imported electricity. The governments of Cambodia, Laos and Myanmar, in response, have demonstrated that they are keen to develop hydropower for both export and domestic use (Middleton *et al.*, 2009).



With the exception of Laos's Nam Ngum 1 dam, which has exported power to Thailand since 1971, cross-border power trade only became realistic when a relative degree of regional and domestic political stability emerged in the early 1990s, both for cross-border institutional arrangements and to reduce perceived political risk for potential investors (Bakker, 1999). Since then, the Asian Development Bank (ADB), through its Greater Mekong Subregion (GMS) programme, has encouraged regional economic integration between the countries of mainland Southeast Asia and the Yunnan and Guangxi provinces of south-western China. Integral to this programme, which also has the support of the World Bank and many bilateral Western donors, has been cross-border electricity trade that promotes construction of cross-border high-voltage transmission lines and hydropower dams in Laos, Myanmar and Cambodia for power export to Thailand and Vietnam (Greacen and Palettu, 2007; ADB, 2012c). The programme's overarching logic is that the region's water resource-rich (but cash-poor) countries should seek foreign direct investment in hydropower development, so that these host countries in principle can then benefit from economic growth and increased government revenue collection for poverty reduction, while more industrialized neighbouring countries can satisfy their high electricity demand.

The GMS programme has championed the role of private-sector independent power producers (IPPs) in hydropower construction, promoting build–operate–transfer (BOT) investment vehicles under concession periods that last between 25 and 40 years and that involve either direct private ownership or public–private partnerships (PPPs) (Wyatt, 2004; Merme *et al.*, 2014). Proponents of the BOT/PPP model argue that it is a means to leverage international private capital and expertise to build capital-intensive projects, in the absence of the availability of domestic funds, while at the same time redistributing infrastructure investment risk from governments to the private sector. On the other hand, some question whether governments really do shed significant risk under PPP arrangements (Wyatt, 2004; Middleton *et al.*, 2015b). In the process, attracting BOT projects also necessitates a reorientation of state involvement in large dam infrastructure from state provision of public goods to neoliberal notions of incentivizing private-sector entrepreneurship for investment for profit, in which the state becomes regulator and potentially part-owner (Wyatt, 2004; Hirsch, 2006). This takes place in a context where the state's ability to regulate private-sector activities is generally weak (Suhardiman *et al.*, 2011), although at the same time the state may pursue its interests through steering private-sector investment towards particular projects (Suhardiman and Giordano, 2014).

The GMS programme ultimately envisions a regional competitive power-pool market with most electricity generated by IPPs (ADB, 2012b) – although in practice, even as IPPs take a larger role in hydropower dam construction and operation, institutional progress towards a fully competitive regional power-pool market is a long way off (Greacen and Palettu, 2007; Middleton and Dore, 2015). On the other hand, partial liberalization of the electricity sector domestically in Thailand and Vietnam has facilitated the cross-border importation of IPP-generated hydro-electricity (Middleton *et al.*, 2013). In Thailand since the late 1980s, in a complex and contested process, the power sector has shifted from a state-led to a partially liberalized model (Wattana *et al.*, 2008; Middleton, *in press*), where IPPs now generate half of Thailand's electricity. The remainder is generated by the still influential Thai electricity utility, EGAT. Meanwhile, in Vietnam, a new Electricity Law in 2005 led Vietnam's SOE utility, EVN, to transform into a private holding company structure that will eventually be limited to operating strategically important large hydropower plants (namely the Hoa Binh, Son La and Yali hydropower dams, the first two of which provide flood protection to Hanoi), while IPPs are to be responsible for non-strategic power generation (Nguyen, 2012). Facilitated by domestic and regional policies on cross-border power trade, IPPs and construction companies from both Thailand and

Vietnam are now among the leading hydropower investors in neighbouring countries, extending the footprint of Thailand's and Vietnam's mode of water resources development – although this is now mediated by the private sector rather than state agencies alone.

For Laos in particular, hydropower export projects to Thailand and Vietnam are a key pillar of the country's development strategy, as it aspires to be – and is increasingly becoming – the 'battery of Southeast Asia'. These plans for hydropower exports, mainly developed as PPPs under BOT investment vehicle agreements (Middleton *et al.*, 2013), have gradually materialized since the late 1980s, and accelerated since the Nam Theun 2 dam was approved for construction in 2005 (Middleton *et al.*, 2009). An initial wave of hydropower export projects in Laos during the 1990s was backed by large amounts of Western foreign capital and expertise, in particular from France and Norway, but the 1997 Asian financial crisis halted more extensive plans (Bakker, 1999; IRN, 1999). As the region's economy recovered, suspended projects were picked up again from the early 2000s, but this time led by companies from Thailand, Vietnam and China, alongside companies from Japan, India, South Korea and Russia. As of March 2013, 12 large hydropower dams (over 30 megawatts) were operating in Laos (GoL, 2013). A further 11 large hydropower dams were under construction, and 24 and 29 large hydropower dams were at an advanced stage of planning and feasibility study stage respectively (GoL, 2013).

In Cambodia, large hydropower dam construction did not commence until the early 2000s. While Western aid was provided to the Cambodian government from the early 1990s, the main multilateral lenders – the ADB and the World Bank – and Western IPP hydropower developers were reluctant to support large hydropower in Cambodia, for reasons including the environmental and social impacts and the country's weak governance (Middleton, 2008). Hydropower development, however, has been placed as central to the government's power development plans to be led by private-sector investment (Jona, 2011). Reflecting increasingly close diplomatic ties between Cambodia and China, it was Chinese developers who led the first hydropower projects as BOT projects in Cambodia (Urban *et al.*, 2013). In December 2011, Cambodia inaugurated its first large hydropower dam, the 193-megawatt Kamchay dam, developed by Sinohydro Corporation (Grimsditch, 2012). While the Cambodian government lauded the project for increasing electricity supply and reducing electricity prices, civil society groups have criticized it for its construction in Bokor National Park, flooding 2,000 hectares of forest; the limited public consultation; and an overall lack of transparency in the decision-making process (Grimsditch, 2012). Four more large hydropower dams located in south-west Cambodia are presently operating or under construction by Chinese companies (Grimsditch, 2012), while at least a further 11 large hydropower projects are under study by Chinese, South Korean, Russian and Vietnamese developers (Jona, 2011; see also Middleton *et al.*, 2015b).

In Myanmar, the government plans to develop a large number of hydropower dams to meet domestic demand, as well as to export electricity to Thailand, India and China (Kyaw, 2006). Many of Myanmar's first power stations were funded by bilateral soft loans and loans from multilateral financial institutions, while since the West's aid and trade embargo came into operation in the mid-1990s Myanmar's power generation projects have been largely built through the government's own funds and via loans and supplied credits from China (Kyaw, 2006). The possibility of exploiting Myanmar's large hydropower potential has proven attractive to hydropower developers from China, India and Thailand. Especially up to the political transformation in 2010, however, large foreign investments in Myanmar, including hydropower dams, were seen as supporting the military junta financially and politically. Hydropower development has also been associated with a process of militarization and human rights concerns in the project areas, as many of the hydropower dams are located in ethnic minority areas – including some where there was active conflict, such as the Hat Gyi dam on the Salween River in Karen State (Simpson, 2007;

Magee and Kelley, 2009). Myanmar's water-resources sector has been undergoing significant reform since the democratic transition (Kattelus *et al.*, 2014). While specific details remain scarce, it is estimated that up to 48 hydropower dams are presently in operation, under construction or planned on Myanmar's major rivers; 25 of these projects alone will generate up to 40,000 megawatts, with 90 per cent of this power planned for export (BEWG, 2011).

Across mainland Southeast Asia, political rights, civil liberties, corruption curtailment and press freedoms are generally weak, and the quality of governance is uneven between countries. While policies and laws on water governance and social and environmental protections may be broadly improving (Oliver *et al.*, 2006), there remain significant gaps within policies themselves and between policy and practice (ADB, 2010; Dao, 2010; Foran *et al.*, 2010; Grumbine *et al.*, 2012). For example, the ADB (2010, p vi) notes that Thailand and Vietnam have the most comprehensive environmental impact assessment (EIA) procedures, although 'loopholes still exist', while the practices of Cambodia, Laos and Myanmar are significantly weaker. Various voluntary tools of hydropower governance have increasingly been promoted and piloted in the region, including the Hydropower Sustainability Assessment Protocol (HSAP) for private-sector hydropower developers and the Equator Principles for international financiers (King *et al.*, 2007; Foran *et al.*, 2010). While, in the absence of sufficient government regulation, these tools may be a means for some improvement to mitigate the environmental and social impacts of hydropower development, there is little evidence that they can be a substitute for comprehensive and improved state regulation accompanied by rule of law.

Hydropower dams have become political flashpoints – to the extent that varying political spaces allow – over their environmental and social impacts, and more broadly over contested visions of development (see, for example, Hirsch, 2007; Badenoch *et al.*, 2011). The region has a long list of projects with high environmental and social costs, including the Pak Mun dam in Thailand (Foran and Manorom, 2009), the Theun Hinboun dam in Laos (FIVAS, 2007) and the Hòa Bình dam in Vietnam (Dao, 2011). While livelihood-recovery and benefit-sharing programmes are put in place more regularly (MRC, 2011b; Suhardiman *et al.*, 2014), on the whole these have a poor track record in the region to date (Missingham, 2003; International Rivers, 2008; Dao, 2010). Middleton (2012) argues that some hydropower projects recently built in Laos for electricity export to Thailand would nowadays not be permitted within Thailand itself – for example, the Theun Hinboun dam. In other words, project developers benefit from Laos's weaker governance to displace the impacts of hydropower development across borders where media freedoms are fewer, space for civil society is less and access to justice for affected communities is weak, creating transboundary environmental injustices (see also Matthews, 2012).

Local, national and transnational civil society networks – diverse in their approach and vision – have been important in seeking redress for environmental and social injustice (Simpson, 2013). In Myanmar, for example, president Thein Sein's September 2011 suspension of the 6,000-megawatt Myitsone dam on the Irrawaddy River because it was 'against the will of the people' is recognized as a milestone in the country's political transition (Watts, 2011). Dore and Lebel (2010, p. 60) highlight a number of public deliberative processes that – although imperfect in many ways and 'still far from being a norm' – have sought to progress diverse actor engagement over contested water resource development, for example with the Mekong River Commission (see below). In too many other cases, however – such as the Lower Sesan 2 in north-east Cambodia, which is predicted to result in a 9.3 per cent drop in fish production Mekong Basin-wide (Ziv *et al.*, 2012) – projects are proceeding despite high anticipated environmental and social costs, even as they may contribute towards growth in formal measures of development, such as gross domestic product.

## Transborder water governance and critical hydropolitics

The previous section outlined the contemporary political economy of hydropower in mainland Southeast Asia. The majority of the projects built or proposed are located within the region's transboundary river basins, either on the main-stem or tributary rivers. This section briefly explores the tensions that emerge from dam construction on transboundary rivers. The influence of private energy and construction companies is discussed, highlighting the need for deeper understanding of these increasingly influential actors in shaping processes of transboundary water governance.

Within mainland Southeast Asia, complex hydropolitics of conflict and cooperation (Zeitoun and Mirumachi, 2008) have already emerged on several transboundary rivers due to large hydropower dam construction. China's construction of a cascade of up to eight dams on the lower Lancang (Upper Mekong) River mainstream in Yunnan province (Magee, 2012), and a partially completed navigation channel project, have created transboundary impacts on riparian communities in northern Thailand and Laos (Osborne, 2004). These dams were initially developed without any inter-government or community consultation with downstream countries. Downstream governments, however, have been reluctant to engage China, despite documented impacts (Räsänen *et al.*, 2012), arguably due to China's broader political and economic importance to the region (Biba, 2012) – although more recently Chinese scholars have encouraged the government to engage downstream countries (for example, Zhai *et al.*, 2007). China's plans for up to 13 dams on the Nu-Salween River, shared with downstream Myanmar and Thailand, have also proceeded without consultation to date (Magee and Kelley, 2009), although at the time of writing these plans were suspended. In another case, Vietnam's Yali Fall's dam on the Sesan River was built without consultation with Cambodia. It was the first of dozens of dams planned and now operating or under construction within the Sesan-Srepok-Sekong river basins in southern Laos and central Vietnam with transboundary impacts on downstream north-east Cambodia (Wyatt and Baird, 2007; Grimsditch, 2012). Following widely reported cross-border impacts in Cambodia, a government-to-government cross-border committee was established between Vietnam and Cambodia, although impacts on communities in Cambodia are yet to be satisfactorily addressed or compensated for (Hirsch, 2006; see also Middleton and Dore, 2015).

In the cases above, the dams have been developed and operated by SOEs principally for domestic hydroelectricity consumption rather than cross-border power trade (Wyatt and Baird, 2007; Magee, 2012). National interest in energy security is privileged over cross-border cooperation on shared water resources, and the locus of plans and decision-making to develop the projects can be located principally within the state. Recent projects on transboundary rivers, however, have seen a far greater role for private-sector developers as project proponents via foreign direct investment in partnership with the host and power-importing states. These include plans for a cascade of up to 11 dams on the lower Mekong River mainstream (see below) and a cascade of five dams proposed on the Salween River mainstream in Myanmar by Chinese and Thai investors for export to Thailand, with potential transborder impacts in particular on Thailand (Magee and Kelley, 2009). These dams have led to heavy contestation between Thai civil society and EGAT (Simpson, 2013).

At present, of the region's four major transboundary rivers, only the Mekong River has a formally established transboundary river basin organization, namely the Mekong River Commission (MRC). Created on 5 April 1995, the MRC commits the four lower Mekong River countries of Cambodia, Laos, Thailand and Vietnam '[t]o cooperate in all fields of sustainable development, utilization, management and conservation of the water and related resources of

the Mekong River Basin' (MRC, 1995) (see also chapter 21 in this volume). Much has been written about the effectiveness of the MRC as a transboundary water governance institution (Hori, 2000; Hirsch and Jensen, 2006; Dore and Lazarus, 2009; Dore and Lebel, 2010). Strengths of the MRC include a relatively comprehensive scientific knowledge base; water quantity and quality data-sharing mechanisms between countries; and the provision of a forum for discussion between governments for transboundary water governance, guided by the 1995 Mekong Agreement. The MRC is challenged, however, by the soft law status and definitional ambiguities of the 1995 Agreement; the absence of upstream China as an MRC member; the 'ASEAN way' of non-interference between lower Mekong countries; a Catch-22 situation between government ownership and perceived lack of MRC neutrality by civil society; a heavy dependence on donor support; frequent marginalization even by the member states themselves when it is in their interest to do so; and a lack of clear institutional mechanisms for public participation. Overall, regional economic growth – as promoted by the GMS programme, and which has only recently begun to address environmental and social issues – has been privileged over protecting against river degradation (Haefner, 2013).

The MRC has been particularly challenged by the proposals since 2006 for a cascade of up to 11 large hydropower dams on the lower Mekong River's mainstream, of which seven are inside Laos, two on the Thai–Lao border and two in Cambodia. The full Mekong mainstream dam cascade holds the potential to generate up to 14,100 megawatts of electricity and thus to contribute significantly to the region's economic growth; however, by changing the river's hydrology and ecology and blocking major fish migrations and the movement of sediment, the mainstream dams would have serious repercussions throughout the entire basin and put at risk the livelihoods, local economies and food security of millions of people (Baird, 2011; Grumbine *et al.*, 2012). The MRC commissioned a regional-level strategic environmental assessment (SEA) study in May 2009 to provide an appraisal of the costs and benefits of the mainstream dams at a cascade level. Published in October 2010, in summary it identifies significant knowledge gaps and institutional weaknesses, and recommends that any decision to proceed should be deferred for at least ten years to allow time for further studies (ICEM, 2010). The SEA study, however, was not formally endorsed by the MRC as it was not approved by all member governments. The study is discussed at length in Chapter 20 of this volume.

Since it was first proposed in 2007, the 1,260-megawatt Xayaburi dam, located in northern Laos, has emerged as the mainstream dam at the most advanced stage of planning and construction. The US\$3.5 billion project is being built by a predominantly Thai private-sector consortium, backed by Thai financiers, and will export 95 per cent of its electricity to Thailand (Matthews, 2012). The project, which is developed as a BOT project, has been surrounded by intense local, national, regional and global politics (Stone, 2011; International Rivers, 2014). Project proponents – including the Lao government, the project developer and some of Thailand's relevant ministries, as well as EGAT – argue that the Xayaburi dam will contribute to Thailand's energy security and generate cheap electricity. They also suggest that the cross-border foreign direct investment and project revenues will bring 'development' to Laos. Those opposing the project – who together formed the Save the Mekong Coalition, which includes a number of local NGOs throughout the region and international NGOs, together with representatives from tens of communities – emphasized that the Xayaburi dam would require the resettlement of approximately 2,130 people in Laos and that the project's hydrological and ecosystem impacts, including on sediment movement and fish migrations, would affect the livelihoods of more than 200,000 people located near to and downstream of the dam, both within Laos and in neighbouring countries. They also highlighted how the project's EIA report is of poor quality and does not consider transborder impacts (International Rivers, 2011).

The project developers and the Thai and Lao governments drew extensive criticism as they sought approval for the Xayaburi dam through a regional decision-making process, initiated in September 2010 and facilitated by the MRC, while at the same time proceeding with preliminary construction work and resettlement activities (Stone, 2011). In the negotiations, the Lao government claimed its right to development. Thailand's government, meanwhile, also quietly supported the project, although there was a division within the government between those ministries supporting cheap electricity and energy security and others concerned about the transborder environmental impacts on Thailand (Thabchumpon and Middleton, 2012). On the other hand, the Cambodian and Vietnamese governments clearly indicated their disapproval of the project, raising concerns about cross-border impacts on capture fisheries and food security as well as loss of sediment flows to the delta region, ultimately creating a distinct rift among the MRC member governments. The predominately Thai project consortium – in particular the lead construction company, Ch. Karnchang, and several Thai banks – was also targeted publicly by civil society groups opposing the project. Despite this, the consortium built close working relationships with, and maintained the support of, the relevant Lao and Thai state agencies, and thus has been able to continue the operation without direct engagement with civil society.

In the case of the regional decision-making process through the MRC for the Xayaburi dam, Hirsch and Jensen's (2006) earlier observation regarding the MRC that the concept of 'national interest', when invoked, typically 'represents, privileges and legitimizes the exclusive interests of one sector' (p. 48) is indeed well founded. The 'national interest', in other words, does not reflect the interests of all within the nation state, and the process of defining national interest, not unexpectedly, is saturated with domestic politics. Recent research has sought to further unpack how domestic water politics influence transnational hydropolitics, in particular how competition and contradictions between the mandates and priorities of various water-sector agencies (agriculture, energy and others) shape the formulation of 'national interest' or, on occasion, even disregard negotiated inter-governmental regional agreements (Suhardiman *et al.*, 2012; Mirumachi, 2012). The growing role of a for-profit private sector in hydropower development further complicates the process by which national interest is formulated and negotiated within formal and informal inter-government hydropolitics, and in particular its democratic credentials for transparency, accountability and public participation. Simply put, state agencies in both the host and power-receiving countries and private-sector financiers and developers become bound together via projects of mutual interest. Dore and Lebel (2010, p. 61) suggest that '[i]nternational banks and private firms have often had better access to information from, and stronger accountability relationships with, national governments than a country's own citizens'. The influence of private-sector project developers adds urgency to Sneddon and Fox's (2006) call for a critical hydropolitics that moves beyond a state-centric and inter-governmental institutional view of transboundary hydropolitics towards unpacking how control over water is exercised by multiple state and non-state actors at multiple scales (local, national and international) within formal and informal transboundary governance and management institutions.

### **Conclusion: people, water and the environment**

Important decisions are being taken over the future of the rivers and water resources of South-east Asia. This chapter has documented the transition in the region from state-led to increasingly liberalized market-orientated modes of water resources development, with a focus on large hydropower development in mainland Southeast Asia. It has shown how trends in the use of the region's water resources cannot be decoupled from broader trends towards regional integration, industrialization and economic growth. Exploitation of the region's water resources for

large-scale hydropower and irrigated agriculture is high on the governments' agendas. In this context, water resources, ecosystems and biodiversity are under increasing pressure, as are rural livelihoods that continue to depend upon these resources – even as the region undergoes rapid agrarian transformation (De Koninck *et al.*, 2012).

This chapter has emphasized the significance of the region's transition to a new political economy of hydropower development that is increasingly shaped by the incentives and interests of private-sector developers and financiers. The new political economy, however, is clearly built upon the old one, which emphasizes a continued role for the state as both regulator of BOT projects and/or PPP project co-developer – although these roles potentially carry conflicts of interest. Hydropower development appears to be proving profitable for the government and private-sector operators, even as social and environmental concerns remain outstanding (*Vientiane Times*, 2013). For example, following the Lao government's announcement in November 2012 that there would be a ground-breaking ceremony for the Xayaburi dam, the lead construction company's share price rose 5.7 per cent to its highest level for almost two years (Chenaphun, 2012), reflecting how the sector has also become partly subject to financialization (Middleton, in press). On the other hand, the benefits of river resources that were previously common pool resources (CPRs) mainly utilized by riparian communities are being transferred to larger-scale private hydropower developers, which in turn redistribute the benefits of rivers to industrial and urban electricity consumers, alongside the shareholders of these listed companies. Middleton *et al.* (2013) argue that this represents a 'partial-enclosure' of the region's transboundary CPRs, including the annual flood pulse, sediment flows and wild-capture fisheries.

To date, the governments have largely privileged national economic growth and energy security over protecting the river ecosystems and biodiversity, and they do not systematically ensure that impacts on the livelihoods of affected communities are mitigated or fully compensated. The current trajectory for water resources development – in particular, the large number of dams planned – has significant potential for impacts on food security and other environmental and social impacts (ICEM Asia, 2013). The challenge of ensuring transparency, accountability and public participation in these intensely political and interest-laden decision-making processes remains significant, even with the improved but imperfect use of planning tools (EIA, SEA) and voluntary governance mechanisms (Dore, 2014). Even where laws exist on paper, these are easily sidestepped as rule of law and access to justice are often weak, and the vague notion of benefit-sharing between project developers, the state and affected communities is barely institutionalized.

Recently, the concept of waterscapes has been successfully applied by researchers to explore the relationship between water, power, politics and governance in mainland Southeast Asia (Molle *et al.*, 2009b). As this chapter has argued, in Southeast Asia water resources development is nowadays heavily shaped by the political economy of the electricity sector. Kaisti and Käkönen (2012) have thus proposed extending the concept of waterscapes to 'energyscapes', seeking insight into how waterscapes are mediated by energy technologies and their governance. Middleton and Dore (2015), meanwhile, have explored the 'linkages and disjunctures' between 'decision-making arenas' of water and electricity governance. Relatedly, the concept of the 'water–energy–food' nexus has also recently emerged as a research and policy agenda globally and within the region (Middleton *et al.*, 2015a). As electricity governance and water governance are intertwined, the lack of transparency and accountability in the region's electricity planning processes represents a significant challenge to strengthening water governance. And yet, it will be at the intersection of these dual politically charged arenas that the future of the region's rivers will be decided.

## Note

- 1 The notable exception is the Sembakung River shared between Indonesia and Malaysia on the island of Borneo.

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