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## **CHAPTER 9**

# **Water Politics: The Future Prospects of Cambodia**

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## Abstract

There is a considerable amount of hydropower dam development along the Mekong River. The rationale behind countries' dam development is based on the premise that these provide long-term economic competitiveness, providing energy for the dams' lifespans of fifty years or more (Cronin, Eyster & Weatherby, 2016). Despite this, the cumulative effects of cascade dams threaten downstream countries' water-energy-food security nexus. The purpose of the study is to provide insights into how the future eventualities - the business as usual scenario, worst-case scenario, and the preferred scenario - may unfold by 2040, and the implications on Cambodia. Regarding the methodology, the study employs foresight methodology to create scenario planning. Thirteen experts from all of the Mekong countries were interviewed to form the expert understanding required to map out the scenario. Given the triangulated effects of dam development and climate change, we ask what measures should be taken to circumvent the worst-case scenario in order to achieve the preferred scenario. There are two policy recommendations: reciprocity, and national water security plan for the next 20 years.

**Keywords:** hydropower dams, water-energy-food nexus, scenario planning, states' interests, leverages

## Introduction

The Mekong River, a 4,763 km trans-boundary river in Southeast Asia, carves its way from the Tibetan Plateau, traversing six riparian countries: China, Myanmar, Laos, Thailand, and Cambodia before forming the complex Mekong Delta in Vietnam (Mekong River Commission, 2019a). After Vietnam, the Mekong River empties into the South China Sea. Within area the sub-basin, China shares 20.8% of area, Myanmar 3.3%, Laos 23.8%, Thailand 26.5%, Cambodia 19.3%, and Vietnam 6.2% (ibid).

**Table 1** Country areas in the Mekong River Basin

Basin	Area		Countries included	Area of the country in the basin (km <sup>2</sup> )	As a % of the total area of the basin
	Km <sup>2</sup>	% of Southeast Asia			
Mekong	798 981	38	China	165 967	20.8
			Myanmar	26 650	3.3
			Lao PDR	190 444	23.8
			Thailand	211 706	26.5
			Cambodia	154,363	19.3
			Vietnam	49 861	6.2

Note. Adapted from 'State of the basin report 2018, by Mekong River Commission 2019. Copyright 2019 Mekong River Commission.

The Mekong basin is the second most biodiverse and one of the most productive inland fisheries in the world and is home to no less than 1,500 species of freshwater fish (World Wildlife Fund, 2016). It also fertilizes the agricultural area and provides freshwater fisheries to the riparian states (Kritsanavarin, 2013). Around 86% of Cambodia's territory is within the basin, and its population is heavily dependent on the river for agriculture and fisheries (Nilsson, 2015). The Tonle Sap in Cambodia (the primary source of fish supply) is fed by the Mekong River. Tonle Sap's flood pulse, which depends largely on the flow of the Mekong River in the wet season to reverse the flow direction in the dry season (Haefner, 2016). Such a unique flood pulse brought Tonle Sap with floodplain for agriculture and immense fish catches, this enriches the Cambodian people's welfare and protein intakes. The total fisheries value accounts for almost 12% of Cambodia's Gross Domestic Product (GDP) (FAO, 2011). These farmers and fishermen are vulnerable to water-related shocks and degradation. Tonle Sap's floodplain also supplies the local people with traditional medicine (Keskinen, Kakonen, Tola & Varis, 2007).

Currently, the Mekong River faces a myriad of issues pertaining to water-food-energy security nexus. The cascade-style dam development along the Mekong River renders the water increasingly scarce, affecting Cambodia's dependency on the Mekong River. Laos, intended to be the future 'battery of Southeast Asia', constructs many dams; simultaneously, Cambodia, Thailand, and Vietnam also construct their gigantic hydroelectric dams, justifying their actions by claiming that they serve national economic development. In 2018, 78 hydropower dams were commissioned in the Mekong River Basin (herein MRB), with an additional 33 under construction, and 89 proposed or planned; the accumulated ramification of these dams on the river's variability of seasonal hydrology, fish passage, sediment flows, and other biophysical resources needs to be taken into account (Geheb & Suhardiman, 2019). There are ten dams in China only, capable of storing more than 47 billion cubic meters of water, or, 10% of the Mekong's annual flow volume (around 40% of the water in the Mekong during the dry season) (Eyler & Weatherby, 2019).



on the farmers to halt their dry-season farming owing to drought (Sun, 2019). Inevitably, climate change vulnerability is exacerbated by a series of dam construction. The 2019 drought has hit the Mekong river to have an exceptionally lowest record of water level at least in six decades, threatening the fishing communities around Tonle Sap in Cambodia to plunge 60 to 70 percent of their catchment (Kijewski, 2019). On November 19, Cambodia and other riparian countries may experience severe drought from now till the end of January, due to the El Nino effect and insufficient rainfall with a delayed arrival and early departure of the monsoon rain, warned the Mekong River Commission (Thmey Thmey, 2019).

Due to the water shortage, Cambodia, reeling under the paucity of 400 megawatts power supply, now experiences electricity and water shortages, disrupting many businesses (Khouth, 2019). Cambodia's hydropower production capacity of 1,378 megawatts a day, due to lower levels of water, had recently experienced a dip to between 184 and 687 megawatts per day (Khmer Times, 2019).

Summing up, given the rapid climate change, demographic and economic expansion, Cambodia will sooner or later find itself in a position not so very dissimilar from Vietnam due to the sheer and growing repercussions of dam building. Therefore, an important subtext, often neglected, Cambodia needs to discern challenges in the Mekong River upon which Cambodia's future development depends on, that are not yet apparent to their contemporaries, and be well-prepared for the future strategic decision making.

'Water is the only scarce resource for which there is no substitute, over which there is poorly developed international law, and the need for which is overwhelming, constant and immediate' (Wolf, 1997, p. 334). Consequently, while ostensibly designed to yield the benefit, a series of dam construction will simultaneously alter the hydrological ecosystem, so it is cumulative in its repercussions. Given the promise of hydro dams to provide electricity, more will be constructed in the future in the Mekong region. Many dams in Cambodia are financed by Chinese companies as a part of China's Belt and Road Initiative (BRI) (Ariffin, 2018). In April, the government permitted the SPHP (Cambodia) Co., Ltd. to construct the 80 MW dam

project in Pursat province. which will be launched in 2023 (RFA, 2019b). Cambodia's hydrological cycle is fickle, concomitant to the rapid climate change altering both the magnitude and seasonality of precipitation.

International rivers, like the Mekong river's unidirectional flow, embodies the victim pay principle, allowing the upstream country to have a dominant strategy not to cooperate with the downstream ones, thereby transboundary externality arises when 'one country's actions blight the welfare of residents in another country in a considerable cost' (Bennett, Ragland, & Yolles, 1998). Consequently, Cambodia, in the weak negotiating position, necessitates decision making and recommendations for any future water tension, so the aim herein is to provide the strategic decisions – a web of interaction among mutual reinforcement incentives, in which Cambodia should follow through the application of Foresight methodology. Therefore, observing the increasing energy thirst in the Mekong countries, it is of high relevance to examine the riparian's interests, and how the hydropower development projects affect Cambodia, so as to avoid any future mistakes. This study aims to provide insights into how plausible future events are likely to unfold.

This paper aims to address the implications pertaining to the course of changes over the Mekong region's long-term future. This paper proceeds in 5 sections. The first provides an overview of the Mekong region as a whole. Section 2 explores the existing literature on the conflict-cooperation paradigm in the transboundary river. The subsequent section discusses states' divergent interests and leverages. In the next part, it sets out the alternative future scenarios, which analyze where the Mekong region stands in terms of current and future energy demand and examines how each scenario impacts Cambodia. Finally, it discusses in detail the possible policy solutions to avoid the intended and unintended consequences.

## Literature Review

The literature over transboundary water embodies heterogeneity of perspectives, approaches, and analytical frameworks to examine the dichotomy between water war and the water peace paradigm. Some scholars discerned the conflictual relations between the riparian states conflating geopolitics with the environmental devastation (Gleick 1993; Homer-Dixon, 1994; Brochmann & Gleditsch, 2012), and there are also notable proponents of cooperation (Wolf 1998; Dinar 2008).

A conflict perspective articulated by Homer-Dixon (1994) claimed that river water is the most likely to trigger interstate resource war because it is critical for national survival. He added that the downstream countries often fear the potential of coercion from the upstream country, citing the case of South Africa and Lesotho. In this line of reasoning, Gleick (1993), using the Jordan and Nile rivers as examples, argued that water resources could be exercised as military or political goals, the instrument of war and owing to the inadequate enforcement, international law and international institutions carry little weight, thereby resource-induced conflicts are likely to arise.

In contrast to such a perspective, Wolf (1998) claimed that what Gleick narrated was about political tensions or stability, rather than about water war. He employed the International Crisis Behavior (ICB) dataset, the most systematic collection of international conflict, to examine the cases of international conflict, and he found that 'there has never been a single war fought over water' (Wolf, 1998, p.254). Precisely, Zeitoun & Warner (2006) highlighted that 'the absence of war does not mean the absence of conflict' (p. 437). The tensions between riparian states are unlikely to escalate to armed conflict because the pursuit of economic development and modernization outweigh the tension (Pearse-Smith, 2012) because 'war over water seems neither strategically rational, hydrographically effective, nor economically viable,' pointed out Yoffe & Wolf (1999, p.209).

There are different theories geared to explain the conflict and cooperation issues in the transboundary river. For example, according to Elhance (1999) 'hydro politics

is the systematic study of conflict and cooperation between states over water resources that transcend international borders' (p.3). Hydropolitics in the MRB is the interplay among various countries with divergent interests. The framework of hydro-hegemony, articulated by Zeitoun and Warner (2006), explained the power asymmetry between riparian states and posited that the hydro-hegemon could use the water resource control strategies including, inter alia, resource capture, integration and containment through different tactics such as coercion, incentive, treaty, and knowledge construction. They applied the framework to the Nile, Tigris, Euphrates, and Jordan Rivers, which resulted in varying degrees of hydro-hegemony.

In tandem, Yookyung Lee, Seungho Lee & Hong (2017), applying the Hydro-hegemony theory to the development of MRB, argued that albeit China sustained its hegemon status as a negative form of domination, there are signs of China's increasing cooperative behavior, such as agreement to share data, confidence building as a dialogue partner, and the establishment of Lancang Mekong Cooperation. On top of this, Poowin (2016) using the Potential Regional Leadership theory to analyze the Lancang–Mekong Cooperation (LMC), argued that LMC allows China to determine the membership by excluding its rivals - Japan, and the US, etc, given the geographic label 'Lancang-Mekong', as well as allowing Beijing to hold the leadership position thereby exerting influence on other members.

Whereas, the small states with little coercion power, Bennett et al. (1998) applied the interconnected games to model issue linkages, to link the water and non-water issues, and they argued that, in the case of the Aral Sea Basin in Central Asian, the linkage issues including air pollution and trade issues might contribute to the bargaining power, and as the case of Euphrates River basin, the issues linkages such as Kurdish rebels and Orontes River Basins can be applied.

## **Institutions in the Mekong River**

Water security plays a crucial role in Southeast Asia's regional stability, and the unilateral multipurpose water use, coupled with climate change, will exacerbate

water insecurity (Ribka & Perwita, 2017). In the MRB, many institutions and collaborative platforms have been established since the mid-1990s. Yet, the weak institution or ineffectiveness of the existing institutions, including the Mekong River Commission (MRC), the Asian Development Bank-backed Greater Mekong Subregion (GMS), and the US-led Lower Mekong Initiative (LMI), as well as the growing power asymmetry between China and other Mekong riparian countries, remain the chief challenges to govern this regional common pool resources (Han, 2017).

Despite a barrage of criticism against MRC, Kittikhoun & Staubli (2018) claimed that while challenges remain, MRC is absolutely critical to providing objective scientific study, facilitating and negotiating the solutions through its technical, legal, institutional, and strategic framework of MRC's water diplomacy, citing the case of Xayaburi dam, which albeit Laos proceeded the plan, but MRC has successfully engaged Laos' government to redesign the dam and take more measures to tackle with fish and sediment issues. Based on the analysis of the existing regional water cooperation, Feng, Wang, Suman, Yu & He (2019) suggested the priorities for water cooperation in LMC including Navigation and flood control/drought relief, data sharing, and most importantly, they argued that hydro dam development at best should be implemented on tributaries and through bilateral cooperation because dams on the mainstream has high controversial impacts.

This Chinese-led LMC is the projection of its new hydro politics, challenging the existing framework like the US-led LMI, and the Japanese-backed GMS (Middleton & Allouche, 2016). As seen, China refused to accede to the 1995 Mekong Agreement, and rejected the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UN-Water Course), reflecting the embedded principle of the now-discredited "Harmon Doctrine"-advocating the principle of indisputable territorial sovereignty of a watercourse state (Chellaney, 2014). In tandem, Olmstead & Sigman (2015) proclaimed that China took a position as a hegemon with no attempt to make any compromises with the other riparian states. In a similar line, the LMC will likely emerge as the

dominant institution in the region, for it has more resources and efficient cooperation, given the already weakened institution, like the MRC, GMS, Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS) (Chheang, 2018a). On top of this, Mak (2016) argues that MRC should develop stricter rules to regulate dam-building activities on the Mekong mainstreams.

### **Diverging regional opinions on Chinese water governance**

With respect to the Mekong River, the existing literature oscillates between the optimistic and pessimistic views of China's role in this transboundary water. The opponent of Chinese behavior in the Mekong River argued that China's coercive water diplomacy and hydropower foreign direct investment are China's new foreign policy instruments to influence other state's foreign policy orientation without using military force, thereby the 'Mekong is not the scene of clashing of militaries, but of gradual creation of a Chinese sphere of influence in Southeast Asia' (Brauer & Kliem, 2017, p. 51). Nguyen (2018) discussed the risks associated with LMC's aid, assistance and infrastructure projects, including, but not limited to, more economic reliance on China, reduced ability in adopting the monetary policy, and the increasing indebtedness to Beijing. As the case of Xayaburi dam construction, given the financial and political support from Thailand, Laos went ahead with the construction despite Vietnam's divergent preference, reflecting the declining Vietnam's leverage on Laos, and the increasing Chinese influence (Giovannini, 2018).

Having brought up the examples of troublesome elements in the Mekong River, Han (2017) added that China has been increasingly involved in collaborative engagements with other riparian states since the early 2000s, citing the signing of the agreement on the Provisional of Hydrological Information of Lancang/Mekong in Flood Season, and the initiation of the LMC. Consequently, the growing power asymmetry between China and the other riparian states need not trigger a vicious cycle of misunderstandings and misinterpretation generating to conflict (ibid).

On balance, from a Cambodian perspective, Pich (2018) discussed the alignments between Cambodia's national development strategy and LMC, including the Rectangular Strategy – Phase III, and Industrial Development Policy, and the challenges of the cooperation, including unequal project distribution, the paucity of information and engagement, no clear cut distinction between bilateral deals, concern on the unsustainability of Chinese investment, as well as the diplomacy. The author also provided some policy recommendations to drive the LMC to become a sub-regional platform boosting economic growth, confidence and trust-building among its member states, and peaceful coexistence with other Mekong mechanisms.

### Impact of hydropower development

China's old and new Mekong river politics before and after establishing the Lancang Mekong cooperation contended that China's policy remains focused on socio-economic development while neglecting the ecological expenses (Biba, 2018). Surprisingly, the Chinese-financed dam constructions in Cambodia are perceived as a tool to stimulate economic growth and development, whereas Vietnam views the dam as potentially impeding its national growth, development, and security due to threats to the sustainability of the Vietnam part of the Mekong Delta (Urban, Sicilian, & Nordensvard, 2018).

Urban, Siciliano, Nordensvard (2017) discussed the impact of Chinese hydropower development in Cambodia and Vietnam in terms of environment, social, economic, and political impacts. Baker (2012) examined the cascading dam's impacts in terms of food and water security, which could trigger human insecurity, migration, and instability in the Mekong River region. The impacts will be deleterious as Cronin (2009) puts, dams have held back soil-renewing silt, scouring riverbanks and stream beds, damaging fish habitat and wiping away fields and villages. Sediment trapping would cause a reduction in total rice production in both Cambodia and Vietnam (Piman & Shrestha, 2017).

## States' Divergent Interests and Leverages

In terms of negotiation power, China, the uppermost riparian state, is the dominant power economically, politically, and demographically, compared with other riparian states (Haefner, 2016). Second, it is also the primary financier of dam construction, and Beijing possesses a highly advanced knowledge pertaining to large dam building and management (Pohlner, 2010). Third, China's dam network provides China the increasing leverage over the downstream countries, a reminder on to what extent the other riparian states depend on China (Chellaney, 2019). The crux of the matter is that any unannounced water discharge could have a domino effect on the whole system. In order to have the dams in the LMB to operate efficiently, countries need to rely on the Beijing government to release the right amount of water at the right time (Cronin & Hamlin, 2013). China is often blamed for impacts on downstream fisheries and food production; however, every riparian country is building dams, or at least planning to (Grumbine, Dore & Xu, 2012).

Laos wants to graduate from the 'least developed countries' through large scale infrastructure projects, primarily hydropower (Geheb & Suhardiman, 2019). By virtue of an advantageous geographical position, Laos is positioned to reap the most benefit from the Mekong.

In view of the Laotian government, tapping hydropower energy is a lucrative option, for which it provides a primary source of revenue for the Laotian government, selling approximately two-thirds of its energy to neighboring countries by 2025 (Len & Thu, 2018). If all mainstream dams put into operation, it is forecasted that Laos would gain 70% of a total USD 2.6 billion per year in energy export revenue, supporting the country to graduate from the list of least developed countries by 2020 (Nguyen, 2018). Notably, in 2018, Laos exported 4,415 MW to five neighboring countries, and the government expects this electricity export will reach 14,000 MW by 2030 (Xinhua, 2018) 9,000 MW of which will be purchased by Thailand (Xinhua, 2019a).

Its policy to pursue, unfettered dams project by project base in the absence of comprehensive national strategy, is a leverage instrument toward other downstream countries, as it can withhold the water. Such a development trajectory, where it goes largely unregulated, to fulfil its energy needs plays a crucial role in determining the path of Cambodia's future, and it involves volatile political dynamics. The most overt challenge is to obtain adequate and reliable data to conduct an accurate estimation of cumulative impacts of upstream dams on Cambodia and Vietnam's agricultural output and fish catches (Cronin, Eyler & Weatherby, 2016). This makes the impacts of a large bundle of investment projects in Laos are hard to quantify and properly mitigate (Eyler & Weatherby, 2019).

Cambodia has a primary interest in protecting the functionality of the Mekong River ecosystem, as the river and associated sub-basins is the main source of water, sediment, and biodiversity into Tonle Sap - Cambodia's main source of fish supply. Tonle Sap's floodplain is also the most fertile land of Cambodia agriculture. The Mekong basin contributes to 84% of Cambodia's rice production, which is much higher than other Mekong states, which Laos standing at 69%, Vietnam 51%, and Thailand 40%. Second, this also enriches the Cambodian people's livelihood, welfare, and protein intakes. For example, Cambodia's economic value from capture fisheries accounts for 2.8 billion annually. Aside from this, tourists to the basin also contribute to 11% of Cambodia's GDP. (Mekong River Commission, 2019a)

The Cambodian government is making strides in providing greater electricity access to the broader population, coupled with the burgeoning industrial sectors, and the fast-changing speed of urbanization. Hydropower accounts for a third of Cambodia's energy supply (MRC, 2019).

According to Han Phoumin, an energy economist at the Economic Research Institute for ASEAN and East Asia - Cambodia's electricity demand is estimated to expand significantly in the upcoming decades, with an average annual growth rate of 12.8 percent from 2013 to 2040 (Hor, 2017). At present, electricity price in Cambodia is among the highest in the region. On average 610 riels per kilowatt-

hour (kW) is charged for households consuming less than 50 kW per month, whereas they pay between 600 and 800 riels per kWh for commercial usage (Thou, 2019a). Therefore, hydropower development remains a vital source of its national development strategy. Lastly, since the Mekong River is a transboundary river, Cambodia needs to maintain mutual political trust in terms of future development which could trigger dam-induced ecological degradation with other Mekong countries.

Cambodia, as a small country, has less leverage, and it does what it can to promote dialogue, trust-based and rules-based international order (Chheang, 2017). Being a member of various regional mechanisms, including MRC, the US-led LMI, the Japan-backed GMS, China-support LMC as examples, allow Cambodia to have access to information, and have voices. The surge of multilateral institutions manifests the growing interdependence among the riparian countries.

Cambodia is both an upstream and downstream country to Vietnam. Vietnam's Central Highlands is the headwater of the Sekong River flows through southern Laos and mainstream Mekong Cambodia near Stung Treng province (Elyer & Weatherby, 2019). Vietnam will build dams wherever possible particularly Dong Nai River and Sesan River (Haefner, 2016). In the 1990s, the Vietnamese government has built its tributary hydropower dam in the Central Highland (Cronin & Hamlin, 2013). Approximately 200,000 Cambodians in 3,5000 families in Ratanakiri province owing to the 1994 Yali Fall dams in Vietnam (International Rivers, 2000).

Cambodia's part of the Mekong Delta and floodplains is vulnerable to the hydropower development by the upstream countries, thereby it has strong interests in protecting the water resources in the Mekong Delta (Haefner, 2016). A large amount of Vietnamese seafood export, be it wild or farmed fish and shrimp, are from the Delta (Cronin & Weatherby, 2015). Though contradictory to the interest of protecting the Mekong Delta, Vietnam has inked a Memorandum of Understanding (MOU) with Laos to purchase 5,000 MW of electricity by 2030, compared to less than 1,000 MW in the present day (Brunner, Elyer, Weatherby, Kendy, & Avila, 2018).

Although there are some conflicting issues between Cambodia and Vietnam, both Cambodia and Vietnam can prioritize the purchase of electricity generated from tributary dams projects, rather than the mainstream one in Laos, which has fewer negative impacts on both Tonle Sap and the Mekong Delta. Therefore, the two countries can utilize their market positions as a bargaining point to influence how the Laotian government strategizes its future energy pathway. (Cronin, Eyer, Courtney, 2016). By far, Vietnam is the largest producer of aquaculture, constituting 86% of the basin's production value (Mekong River Commission, 2019a).

From Thailand's stance, given its geographical setting and topography, most of its hydropower dam potential has already been exploited, thereby it is no longer able to exploit much of the Mekong River's potential (Cronin & Hamlin, 2013). At present, it has the largest density of hydropower/irrigation projects (Khem, 2013). First, the Thai government's interests in the Mekong are associated with its water diversion and irrigation projects for its water-stressed northeastern region, which has less productive agriculture (Haefner, 2013). Its mega-scale water diversion projects have been in the pending list, and not yet officially stop; therefore, there is always a possibility that Thailand revives the plans as its water scarcity increases (Interview 1001, August 7, 2019).

Second, Thailand continues to finance the dam construction in Laos to feed its increasing thirst for energy in tandem its interests of internationalization of hydropower production and diversification of energy sources (Gabriele, 2018). For example, a Thai company called CH Karnchang is the primary investor in the Xayaburi dam, selling 90% of electricity to Thailand (Osborne, 2016). Some experts argued that Thailand's energy demand is overestimated (Haefner, 2016).

**Table 2** Summary of States' Interests and Leverages.

<b>States</b>	<b>Interests</b>	<b>Leverages</b>
China	<p>Satisfying the water, energy and resource demand in its southern region</p> <p>Support hydro elsewhere</p> <p>Take a leadership role in the Mekong</p>	<p>Geographical power: Utmost Upstream</p> <p>Material power: powerful in economic, political and military power (Its dam network/cascade)</p> <p>The main financier in Laos and Cambodia)</p>
Laos	<p>The battery of Asia - sell energy</p> <p>Hydropower as a source for revenue</p>	<p>Geographical power: Upstream</p> <p>Policy to build more dams</p>
Thailand	<p>Water diversion project for its northern region</p> <p>Finance dams in Laos to get the energy.</p>	<p>Geographical power: Upstream</p> <p>Mega-scale water diversion for its water-stressed northeastern region</p>
Cambodia	<p>Ecological interests: sediment, biodiversity, and land for agriculture</p> <p>Economic interests: the welfare of people in terms of agriculture, fishery, transportation, and tourism</p> <p>Political Interests: mutual political trust and security relations among the Mekong Countries</p>	<p>Geographical power: Upstream to Vietnam</p> <p>Members to various organizations - - access to information and data, and voice concerns</p> <p>Prioritize tributary project</p>
Vietnam	<p>Protect Mekong Delta for agriculture</p> <p>Meet energy demand</p>	<p>Upstream to Cambodia in the Central Highlands</p> <p>Material power: build its own renewable energy</p> <p>Prioritize project w/ less neg.</p>

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*Note.* The author's summary

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The basin states are, undeniably, not equally endowed with water resources, economic power, political power, and technological capability. The pursuit of pro-hydropower policies resonates with its national interests. Different riparian countries have different emphases in terms of utilization of river water: China and Laos emphasize the hydropower industry; Thailand and Vietnam emphasize the importance of water in agriculture, and Cambodia emphasizes the fishery industry (Xing, 2017). At the same time, these countries also exploit its hydropower potential.

## Research Design and Methodology

This paper aims to understand whether and how Cambodia can increase its leverage over the governance of the Mekong River in support of its national interests. In order to answer this there are three key questions that must be answered:

- What will be the future eventualities in the Mekong River?
- What are the implications of each eventuality on Cambodia?
- What kind of policies are necessary for Cambodia to further its national interests and increase leverage?

In order to answer these questions, the author opts for the in-depth analysis of Cambodia as a single case study, rather than multiple case comparison. The study is qualitative in nature which is deemed essential for understanding contextual factors and water-related narratives.

### Methodological Framework: The Foresight Model

Foresight methodology is a framework that structures the data to devise an informed and strategic decision for the future. Foresight method takes into account layered causal analysis and provides a systematic framework for strategic decision-making and strategic planning. Under this model, there are four levels of

strategy, with its guiding questions. First is input, focusing on what is happening. Second is the analytical part, which examines what seems to be happening. Third, the interpretive part analyzes what is really happening. Lastly, the prospective section explores what might happen in the future. (Conway, n.d.)

The attempt at answering the above-mentioned questions begins with business as usual scenario, in which countries will cooperate to maintain the existing river in terms of water flow, sediment, and fisheries. The author discusses the future eventualities, such as the worst-case scenario and a best-case scenario, which might occur and what the drivers are of these events and how they affect Cambodia. Lastly, the paper will provide policies best for Cambodia, given these eventualities.

Technically, these scenarios cannot be described as forecasts based on particular fact patterns. Instead, they are the projections, which are based mainly on a host of other assumptions and uncertainties. To keep the scope manageable, key assumptions are the cooperation-conflict paradigm, economic growth, energy prices, and the availability of water.

## Measurement Procedures

On the conceptual account, leverage refers to the bargaining power or influence to negotiate for the preferred outcome. National interests are categorized into three aspects. The first aspect is ecological interests, referring to sediment, biodiversity, and land for agriculture. Second is economic interests which incorporate the welfare of people in terms of agriculture, fishery, transportation, and tourism. Lastly, political interests refer to mutual political trust and security relations among the Mekong countries. Future eventuality, in this paper, is confined to the plausible event that happens due to actions taken by the state to allocate, use, or manage the sharing river. Lastly, the governance of the Mekong River refers to the exercise of power on allocation, use, or management of the shared basin and river.

## Data Collection

The initial phase of data collection comprises document analysis, and the documents or secondary data are derived from academic publications like journal articles, policy papers, working papers, and reports from the Journal of Hydrology, Water Policy, and International Journal of Water Resources Development, etc. Another source is law related document, including inter alia, treaties, declarations, bilateral and multilateral agreements, and conventions to examine the contemporaries in the international water governance and arguments advanced by each state party.

Correspondingly, in order to gain an in-depth analysis, the next phase is fieldwork (gathering primary data), semi-structured key informant interviews with multiple stakeholders, including, inter alia, academics, and Civil Society Organizations (CSOs), International Organizations (IOs) professionals, and government officials. The experts from all the Mekong countries were interviewed to capture a greater breadth and depth of information and avoid the seeming biases. Key informant interviews were undertaken between early August and late October 2019 with different stakeholders: a senior government official in Cambodia (n=1), Cambodian academia (n=1), Chinese academia (n=1), Lao PDR academia (n=1), Thailand-based academia (n=3), Thai academia (n=1), Vietnamese academia (n=1), US academia (n=1), UK-based academia (n=1), Netherland-based academia (n=1), and an Italian-based academia (n=1).

Within the interview, the probing questions were asked when needed to clarify certain information or to gain more relevant insights. Snowball sampling was employed to gain access to the target informant groups. Some of the interviews were conducted in Khmer and later translated into English. The online interviews were conducted with international academics to assist in further in-depth study. The author is cognizant of the need to respect boundaries in probing and disclosing relevant information on a sensitive topic.

## Modelling Future Scenarios

### Business as Usual Scenario

It is forecasted that by 2040, as complex interdependence increases, the investment in infrastructure development, connectivity, and trade between Cambodia and other nations grows, thereby countries are more likely to cooperate (Interviewee 106, September 27, 2019). At a glance, many communities in Cambodia enjoys the benefits as the price of electricity declines.

However, in this scenario, the impacts of hydropower dams and climate change make Cambodia's water scarcity becomes more acute, coupled with increasing poverty and environmental degradation, undermining food security. First, the dire ramifications of the cascade-style dams affect Cambodia's ecology, as dams aggravate the intensity of drought and the alteration of fish migration, and the reduced flow of the bulk of sediment. If all the 11 proposed mainstream dams go ahead, it could trap 94% of the nutrient-rich sediment loads from flowing to the downstream countries (Fawthop, 2018). Sediment provides a myriad of benefits to fisheries, soil nutrition for agriculture, water-based plant and animal, and as a whole support the countries' economy; furthermore, sediment starved river could trigger riverbank erosion (Piman & Shrestha, 2017).

Secondly, dam development and climate change upset people's livelihood. Of the hydropower schemes underway, it is estimated that Cambodia's rice production will fall to a minimum estimated loss of USD 80 million/year, and the loss of rice production in Cambodia would be 430,000 tons/year (Intralawan, Wood, Frankel, Costanza, & Kubiszewski, 2018). According to MRC's new release report, Cambodia is likely to experience an approximately 35% decline in fish catches due to sitting dams of China and Laos through 2040, and simultaneously the migratory fish in the Mekong River would go extinct. Since fish is the main nutrition for Cambodians, when there is insufficient nutrition, children are more likely to have stunting

problems which could lead to a permanent physical and cognitive effect (Woodrow Wilson Center, 2016).

Thirdly, coupled with the high uncertainty of Climate Change, this will trigger acute levels of food insecurity in Cambodia and Laos' urban poor and landless people (Mekong River Commission, 2017). Herein lies the challenges of the climate-related vulnerability of many Cambodian communities and its fish export-related profits would be put at risk (Mekong River Commission, 2017a). The natural disasters like drought and flood will have negative repercussions on water security (Interviewee 104, personal communication, September 21, 2019). As a matter of fact, the use of groundwater for agriculture is an unsustainable short-term solution (Woodrow Wilson Center, 2016). As a result, the current development path entails the privatization of benefit, and socialization of cost, for the natural disaster will threaten to tip significantly of Cambodian poor and marginalized groups into poverty (Interviewee 101, personal communication, August 07, 2019).

In this setting, the progress of smart agriculture and aquaculture allays concerns. People, by 2040, start using smart agriculture and aquaculture techniques to bound back all the setbacks. Additionally, in Cambodia, the Early Warning System (EWS) advances, and there are a sufficient flow of data and information to the general public; hence, the severity of natural catastrophe makes people less vulnerable to shocks, such as floods and drought. The mitigation capacity and collective actions within countries enhance, as there is greater collaboration among the public, civil society and the government on water resource management.

**Table 3** Country by Country Growth between 2015 and 2040 (year by year) under BAU

Country	Population growth	GDP growth rate	Energy consumption
Cambodia	1.5%	5.5%	3.1%
Laos	1.2%	6.0%	4.8%

Thailand	0.03%	3.8%	2.9%
Vietnam	0.6%	6.0%	4.0%
China	0.2%	5.1%	1.3%

*Note.* Adapted from “Energy outlook and energy-saving potential in East Asia 2019” by S. Kimura and H. Phoumin, 2019. Copyright 2019 Economic Research Institute for ASEAN and East Asia.

According to Table 3, as demographics change and economic development, increasing energy thirst, the economic growth in the region grows modestly. According to Economic Research Institute for ASEAN and East Asia (ERIA), the Mekong countries’ economies expand steadily, standing at 5% to 6%, except Thailand, at 3.8% annually between 2015 and 2040. Cambodia will experience 1.5% population growth, 5.5% GDP growth rate, followed by a 3.1% rise in energy consumption. Simply put, population growth also put pressure on the government to provide more energy supply to its demands in order to sustain its economic growth.

Table 4 provides clarification regarding the above-mentioned percentage and assumption, illustrating the overall picture of each country’s population, energy consumption, and electrification of the total population. Cambodia by 2019 has 6 million people while Laos’ population stands at 7.2 million, while Thailand 68 million, and Vietnam 98 million. Although both Cambodia and Laos has the highest population growth, standing at 1.5% and 1.2%, the overall population of both countries remains low, compared to its neighboring countries. Also, Cambodia and Laos’ overall energy consumption is at a similar level, approximately 5 billion kWh, which are considerably low, compared with Thailand and Vietnam, 187 billion kWh, and 143 billion kWh, respectively. By 2016, only 49.8% of Cambodian people are electrified, juxtaposed with its neighboring counties where 87% in Laos, 99% in Vietnam and 100% in Thailand. The figure shows that albeit Cambodia’s energy

consumption will grow dramatically, its proportion appears to be substantially low in the region. Things to be cautious is the increasing energy consumption of Vietnam, Thailand, and China. Just a small percentage growth translates into billion kWh rise, thereby it is challenging for them to satisfy the demand, and the likelihood of them further finance the dams also increases. Concomitantly, to offset the demand, countries invest more in renewable energy, like solar, and wind.

**Table 4** Country by Country Population, Energy Consumption, and total Electrification.

Country	Population*	Energy Consumption**	Electrification** *
Cambodia	16	5.857	49.8%
Laos	7.2	5.471	87.1%
Thailand	68	187.7	100%
Vietnam	97	143.2	99%
China	1,384	5.564 [trillion]	100%

*Note.* Adapted from “The World Factbook”. Copyright 2019 Central Intelligence Agency.

\* Population in 2018 – million

\*\* Energy consumption in 2016 – billion kWh

\*\*\* Electrification of the whole population in 2016

China, the utmost upstream country, softens its approach toward the Mekong countries. Agree or not, the establishment of LMC manifests China's willingness to involve other riparian states into the consultation process. Cambodia always wants to enhance relations with its neighbors, and welcome all the institution establishment, geared to deeper cooperation (Interview 102, personal communication, August 08, 2019). Notably, the competing institutions remain a

tool for China and other external actors to influence the LMB countries' foreign policy. The absence of China and Myanmar's membership remains an exigent challenge for MRC's battle for relevance in transboundary water governance. On the other hand, albeit the actual implementation remains limited, the 1995 Mekong Agreement does provide a detailed provision for the maintenance of river flow (Dharmadhikary, 2017).

To facilitate cooperation, states establish various institutions. Vietnam-China relations remain stable, the South China Sea dispute is still there (Interviewee 110, October 16, 2019). The territorial disputes, historical antagonism, and the perception of 'China threat,' and external power intervention still exists. Indeed, the mistrust between Cambodia and Vietnam, Cambodia, and Laos remain there. The acceleration of initiatives and mechanisms signifies diverging national interests and development strategies, taking the establishment of MRC, the US-led LMI, the Japan-backed GMS, China-support LMC as examples (Weatherbee, 1997).

In addition, this period sees little US engagement because the US does not have a great deal of interest in the Mekong the same as in the South China Sea dispute, where the US champions the freedom of navigation. The US remains episodically engage with Southeast Asian countries, as the so-called 'Free and Open Indo-Pacific Strategy' appears to be imprecise in scope and process of implementation (Hussain, 2019).

The surges in the Mekong mechanisms, such as LMC, Mekong-Japan, and Mekong-Korea cover varying aspects in the Mekong River, not just in the water sector. As the continual shortcomings in governance and institutions carry on, as new institutions are established and the old ones die out. These various kinds of cooperation mechanisms either have flaws, or lack of coordination (Guo, 2013). None of these initiatives has a durable power over states, nor has robust institutionalized processes. Despite this, Cambodia would continue to welcome all the cooperative mechanisms (Interviewee 102, personal communication, August 08, 2019).

## Worst Case scenario

The worst-case scenario sees the dried-up Mekong River could not operate at maximum efficiency, and cooperation is not in place (Interview 105, personal communication, September 25, 2019). This may cause the collapse of the entire ecosystem (Lovgren, 2019). Such a scenario sets out to alarm the Mekong countries, particularly Cambodia, to take measures in order not to allow this occurs. In theory, severe drought triggering water scarcity may brew conflict (Interviewee 104, personal communication, September 21, 2019). In spite of the rising calamity, in this period, the high-intensity military conflict is circumvented.

The pursuit of hydropower development remains a catalyst for economic growth. The forward movement of Laos' project-by-project dam construction delivers the likelihood of future excess capacity that Laos has too many dams (Cronin, Eyler & Weatherby, 2016). The mainstream mega-dam takes years to fill the reservoir, and this worrisome development holds back water triggering substantial falls in water levels for the downstream riparian countries, particularly Cambodia and Vietnam. With this caveat in mind, the hydropower produced electricity does not provide the necessary payback due to the severity of drought and the insatiable demand for electricity. A series of natural catastrophes, such as the effect of El Nino might paralyze the dam operation in the Mekong countries, and water scarcity may increase the potential for intra-water conflict escalation, ruining the economy.

There are six drought-prone provinces in Cambodia: Battambang, Banteay Meanchey, Kampong Cham, Kampong Chnang, Prey Veng, and Svay Rieng (Mekong River Commission, 2019b). Dams might collapse due to low-quality construction; then, countries will undergo prolonged blackouts and water shortages, exacerbating the livelihood and welfare of the population. Take Venezuela's dam crisis for example. Caused by the El Nino phenomenon, Venezuela's Guri dam, responsible for the country's 60% of energy consumption, by 2019 produces only 5,000 MWh, instead of the expected 10,000 MWh (Nunez, 2019). Venezuela has experienced prolonged chronic blackouts and water supply shortages (ibid). Such a crisis manifests the vulnerabilities of hydropower dams face, coupled with

rampant corruption and mismanagement (Brousseau, 2016). By all means, the severity of natural disasters like floods and drought paints a sobering picture for the future, as these calamities pose manifold security risks, jeopardizing food security by imperiling agricultural production, and concomitantly menacing public health, and rural livelihoods.

Cambodia might proceed with its Sambor and Stung Treng dams which would cause the decline in agricultural production triggers hunger and malnutrition (UNDP, 2019). By the same token, in Cambodia, there are increasing undernourishment numbers in poor populations due to the loss of fish-based protein (Mekong River Commission, 2017a). The sub-normal water level in the Mekong River produces no flood pulse, affecting Cambodia's fisheries (Lovgren, 2019). Cambodia, according to Global Hunger Index 2019, has long been under the serious hunger condition. That said, the poor households vulnerable to the increase in food prices would be pushed into poverty and more vulnerable to climatic conditions (Mekong River Commission, 2017a).

Generally, Cambodia stumbles into a widening inequality from within, upending the livelihood of Cambodians and creating the new poverty rise in the community (Interviewee 105, personal communication, September 25, 2019). The poor, marginalized, and the less powerful segments of Cambodian society will be hit the hardest (Interviewee 103, personal communication, August 29, 2019). Owing to weak institutional capacity at the national and sub-national levels, the government is incapable of providing effective natural disaster management and emergency response with the wave of catastrophic natural disasters and increasing domestic unrest. Inside of this, too, are some impoverished migrants or refugees fleeing away from the natural catastrophe. Since the impacts are so substantial, it also generates waves of protests as the social discontent roars in Laos, Cambodia, and Vietnam (Interviewee 110, personal communication, October 16, 2019). A few intrastate conflicts happen on the margin, as different groups within the countries vie for the right to control water after the horrifying parades of extreme weather. In situations involving conflict, hardly do the riparian states rebound from the

setbacks. The public and civil society engagement shrivel, and none of these criticisms sway the government's attention.

In considering the energy mix, the intermittent sources of renewable energy cannot keep up with increasing demands. Therefore, countries embark on uncompromising focus on water nationalism, which uses water as national development, as a symbol of economic development to build more dams (Interviewee 105, personal communication, September 25, 2019). During the critical time, countries go for self-interests (Interviewee 111, personal communication, October 17, 2019). Such a scenario assumes the upstream induced water stress brings about countries to pump more groundwater reserves in response to drought and water surface availability. Thailand has suspended its water diversion projects due to public backlash, however, at some point in the future, there is always a possibility that it may greenlight the project in the Northern region due to severe drought (Interviewee 101, personal communication, August 07, 2019). Thailand might revive its grand plan of water diversion to its northeast region, in order to fulfill its political promises to its people's urgent need for water (Interview 111, personal communication, October 17, 2019). For example, the 2016 drought has brought about Thailand to divert more water into its intensive irrigation plans in the absence of consultation with Cambodia and Vietnam (Cronin, Eyler & Weatherby, 2016). The compounded problems of Thailand water diversion projections, and Cambodia's overfishing, and overexploitation of unmonitored groundwater resources also undermine Cambodia's food security.

This scenario sees a diminishing role of existing mechanisms as a platform for states to cooperate. Apart from this, due to the drought-induced famine, the Mekong countries are mired in tension over water resources. Each riparian state, given the limitations of MRC, and other weak institutional processes, prioritize its national interests by upholding the principle of national sovereignty and integrity. Consequently, the institutions in the Mekong continues to be fragmented. So far, the challenges of transboundary water governance are the sole focus on technical issues and the lack of robust conflict management mechanisms to hold back

conflict if arising (Pohl, 2014). Subsequently, as conflict arises, the diplomatic relations could be interrupted, and there is a fragmentation of the region (Interviewee 106, personal communication, September 27, 2019). The fight for water, and the bilateral tension between Laos, and Cambodia, as well as Laos and Vietnam, will rise (Interview 110, personal communication, October 16, 2019). ASEAN will be divided into opposing groups (Busbarat, 2018). This escalates the mistrust among the member states, especially the Mekong countries. Of equal note, this skews the power asymmetry further in Chinese favor. More importantly, due, in part, to its inclination toward unilateralism, China is unlikely to negotiate with downstream countries regarding the future dam constructions (Interviewee 111, personal communication, October 17, 2019). Chinese National Committee on Large Dams (CHINCOLD) had dismissed the report done by the World Commission on Dam in 2000, arguing that countries should construct dams based on their local conditions (Yeophantong, 2017). China's push for 'South-South' cooperation, One Belt One Road initiative, and the Asian Infrastructure Development Bank (AIIB) illustrates its global soft power offensive (Yeophantong, 2017).

When the need for water becomes urgent in the critical period, China might close the tap and divert the Lancang/Mekong water to fulfill its growing water demand and water scarcity (ibid). Given the geopolitical conflict embroiling, the sense of grievance against China, and the escalating mistrust between China and Vietnam over the transboundary river increase owing to fears of the ramifications of China's dams constructions (Moore, 2018). The 2040 Mekong, the agitation of China's control of water throws the Mekong countries into a panic, fearing that China would use its hydropower foreign direct investment as Beijing's foreign policy instruments. Take the BOT contracts as examples, which the companies could have up to 40 years ownership prior to handing over to local authorities, grant the Chinese dam-building companies the power to control dams' impacts, thereby reinforcing the view that the state-run Chinese firms will be able to control water issues in the region for several decades. 'No matter what China does, the fear remains', said Interviewee 107 (personal communication, October 04, 2019).

Unquestionably, Vietnam has a territorial dispute with China concerning the South China Sea dispute, and the power asymmetry balance and the deep-seated mutual historical antagonism between the two exacerbate the political mistrust. Indeed, amidst contestation by several external partners in the Mekong Basin, such a scenario would represent the widening of the existing split between continental and maritime Southeast Asia would make ASEAN loses its relevance and centrality in this aspect as a regional architecture (Ho & Pitakdumrongkit, 2019). Cambodia, in the era of weakening ASEAN, loses another platform to maintain its say toward the upstream dam development.

### The Future Preferred Scenario

Looking forward to 2040, a more benign geopolitical space takes this scenario to a direction of cooperation and quality interdependency. The food-energy-water nexus plays a central thread in the Mekong region, as the water stress level in each country increases. The general impact of Climate Change remains modest, although there is an increased frequency of extreme climatic events (Marko, Kumm, Salmivaara, Someth, Lauri, Moel, Ward & Pech, 2013). In parallel, the climate information and early warning system are well-equipped in Cambodia, thereby people are well-aware and not vulnerable to shocks, thereby rural to urban migration has been balanced. The prevalent practices of smart agriculture in Cambodia paves the way for better livelihood given the increasing agricultural activity (Marko et al., 2013). In this scenario, recycling and reusing water become more prevalent to keep suffering to a minimum, after a joint effort from a tri-partnership among government, private companies, and civil society. Ideally, in Cambodia, the involvement from the public, civil society organizations, and media to debate on the future trajectory of transboundary water governance is increasing.

There is a strong upward economic growth; therefore, the Mekong countries are undergoing an era of prosperity, and the energy supply satisfies the demands. The government opts for a change in policy thinking steering away from the nationalist

approach to multilateral engagement, where countries begin to discuss environmental sustainability rather than national interests (Interviewee 105, personal communication, September 25, 2019). In terms of in-country generation, Cambodia and upstream countries steer away from damming the river and opt for a circular economy relying on renewable energy to obtain diverse and resilient energy systems (Interviewee 101, August 07, 2019).

The fact that energy efficiency and green technology drive the price of solar power down would make the dependency on unsustainable hydropower development thus drop significantly. Thailand and Vietnam are energy independent and no longer purchase electricity from Laos. Consequently, the likelihood that countries are more energy independence and the shrinking market for Laos' energy exports open up a new opportunity for Laotian government to reconsider pursuing its vision of being the 'Battery of Asia' through constructing hydropower dams (Interviewee 110, personal communication, October 16, 2019). This would allow Laos to explore a more environmentally sustainable energy to sustain its growth. Simultaneously, the standard and safety of dam construction improve (Interviewee 108, personal communication, October 06, 2019). The dam developers will employ the newly invented technology to mitigate the cumulative impacts of hydropower dams; as a result, the intensification of dams' impact on the downstream countries is significantly reduced (Interviewee 108, personal communication, October 06, 2019).

China adopts a far more cooperative approach toward the Mekong countries, as it ascertains that it would lose its friends in the region if a stronger approach applied, given the increasingly stronger partnership between Japan and the US (Interviewee 104, personal communication, September 21, 2019). Therefore, LMC further strengthens cooperation among the Mekong countries. Unlike the South China Sea dispute, the US will not involve officially in the Mekong because it is not interested in the Mekong, but it still provides some kinds of support (Interview 110, October 16, 2019). The power interplay between the US and China does not affect the Mekong countries' relations. The basin countries are able to manage bilateral

relations with China and increase government to government collaboration (Interviewee 106, personal communication, September 27, 2019).

Recognizing that MRC, by its nature, continues to be a consultative body to facilitate cooperation on apolitical issues (Matthews, 2012). Departing from several key donors which is the primary constraint to engage with China, MRC would maintain its relevance, playing a crucial platform for countries to cooperate, as it provides space for cooperation with China (Interviewee 113, personal communication October 22, 2019). Countries cooperate more, as each state is interdependent in all sectors, not just in the water sector (Interviewee 102, personal communication, August 8, 2019). Apparently, the increases in trade-investment, infrastructure development, and connectivity make the riparian states more interdependent, thereby making the dam-building, not a threat (Interviewee 106, personal communication, September 27, 2019).

## Conclusion and Recommendations

To address the potential future water conflict, Cambodia, at first, should pay attention to the local water security. Cambodia should outline a National Plan for Water Security, which requires coordination across multiple scales, authorities, stakeholders, and policy domains, envisioning for the next 20 years adhere to the principle of Integrated Water Resource Management (IWRM), covering essential aspects of Cambodia and corresponding to the United Nations Sustainable Development Goals (SDGs). The National Water Security Plan will bring about better domestic water management. By all means, this contributes to lesser pressure on the limited and decreasing water resources, as well as reduce pressure transboundary water, which in turn contributes to the overarching foreign policy's objective regarding conflict prevention, and regional stability (Polh, 2014).

Currently, each of Cambodia's policies has a period of 5 years to quickly adapt to the new situation (Interviewee 102, personal communication, August 8, 2019). However, it is not sufficient enough to solve the issue at hand and in the future. In

addition, the government should 'question the idea of "Cambodia's national interest" at every opportunity. There is no singular national interest – only the interests of various segments of Cambodian society, different political actors, multiple economic players, and different parts of the natural environment', suggested Interviewee 103 (personal communication, August 29, 2019).

This national plan should be based on the principle of inclusiveness, transparency, and accountability, which have a clear goal and objective to implement a holistic. Hence, Cambodia government should establish a high-level committee on water security, called Cambodia National Water Resource Committee, formed by relevant ministries, like the Ministry of Water Resources and Meteorology, Ministry of Environment, Tonle Sap authority, etc., to prepare a masterplan for the country's water security and build more effective operational links in order to reduce the institutional fragmentation. A wide array of water security issues such as floods, droughts, water quality in surface and groundwater should be incorporated in all future infrastructure planning and programs.

Long term strategy as such undergoes challenges, and there are common challenges to obtain effective coordination and implementation of water policies. According to OECD's gap in multi-level governance framework, there are seven gaps: information gap, capacity gap, funding gap, policy gap, administrative gap, objective gap, and accountability gap. Simply put, there is insufficient information between different stakeholders, as well as the inadequate scientific, technical and infrastructural capacity of officials at the sub-national level. The diverging objectives among different stakeholders' lack of funding, fragmentation of policies, mismatch of responsibility among different ministries and agencies, and lack of transparent practices are the primary challenges to water policy design and implementation.

**Table 6** OECD's Gap in Multi-level Governance Framework (2011).

Gaps	Key Explanations
Information Gap	Asymmetries of information (quantity, quality, type) between different stakeholders, either voluntary or not. ⇒ Need for instruments for revealing and sharing information.
Capacity Gap	The insufficient scientific, technical, infrastructural capacity of local actors, in particular for designing appropriate strategies ⇒ Need for instruments to build local capacity
Funding Gap	Unstable or insufficient revenues undermining the effective implementation of responsibilities at the sub-national level or for crossing policies ⇒ Need for shared financing mechanisms
Policy Gap	Sectoral fragmentation across ministries and agencies ⇒ Need for mechanisms to create multidimensional/systematic approaches at the sub-national level, and to exercise political leadership and commitment.
Administrative Gap	"Mismatch" between functional areas and administrative boundaries. ⇒ Need for instruments for reaching "effective size".
Objective Gap	Different rationalities creating obstacles for adopting convergent targets ⇒ Need for instruments to align objectives
Accountability Gap	Difficulty to ensure transparency of practices across the different constituencies ⇒ Need for institutional quantity measurement ⇒ Need for instruments to strengthen the integrity framework at the local level

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⇒ Need for instruments to enhance citizens' involvement

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*Note.* Reprinted from "Water governance for sustainable development: International practices and implications for the Mekong Delta region" by T. Vo, T. Tran, D. Luong, *Journal of Economic Development*, 24, pp 99-120.

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The government can hire multidisciplinary teams of consultants to discuss, evaluate and plan the short- and long-term water resources economics, institutional, and financial aspects, thereby to incorporate all the necessary actions, which could systematically deal with the ongoing and future challenges and opportunities. Cambodia may learn from successful Panama's Water security Plan and the recent Thailand's 20 years masterplan on water resource management (2018 - 2037). The chief challenge of this 20 years masterplan for water resource management is how to bring about the alignment between economic planning and water development planning at all levels of government. 'Water governance cannot be achieved without proper governance at large.' (OECD, 2015, pp 32).

There are three main components should be incorporated in the National Water Security Plan: water accessibility and quality, water development, and institution and people's capacity development. First, to maintain water accessibility in the next 20 years, the government should introduce the water conservation program to reduce the profligate of water use in general. Knowledge concerning the excessive use of water should be integrated into formal education.

Regarding water quality management, the government should restore the rivers, canals, and natural water bodies throughout the country which have been polluted by the growing industrial waste. Attracting more investment in the wastewater treatment program is a viable option. Even though the Cambodian government has got USD 27 million funds from the Japan International Cooperation Agency (Jica) to construct a wastewater treatment plant in Phnom Penh (Taing, 2019), more investment is needed to tackle this issue.

Second, in terms of water development, the government should introduce space for innovation for companies and individuals to design a solution to reduce water

usage among different industries which consume a lot of water in their production process. The government may incentivize companies to adopt new technologies to cope with increasing water scarcity.

The last component is that equipping the institution and people with the capacity to mitigate and adapt to shock. Although cash-strapped Cambodia often has the limit capability to adopt a broad range of green technology at the local and national levels, the government can incentivize the companies to invest more in green technology. The smart grid system employed in Thailand can also be a solution (Interview 1001, personal communication, August 07, 2019). At the local level, it is a crucial juncture to enhance the weak forecast and warning system, the insufficient flood management, minimal irrigation infrastructure, inadequate water stored in the reservoir.

**Table 7** National Plan for Water Security Components.

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#### I. Water Accessibility and Quality

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##### Water conservation program

- a) Formal environmental education at all levels
  - b) Restore river, canals, and natural water bodies throughout the country
  - c) Wastewater treatment program
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#### II. Water development

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- a) Introduce space for innovation and incentivize companies to invest
  - b) Stronger Enforcement of Environmental Impact Assessment (EIA)
- 

#### III. Institution and people's capacity development

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- a) Preventive management risk concerning water
    - i. Improve the forecast and warning system to sufficiently manage flood
  - b) Improve adaptation capacity Enhance
    - i. Capacity building in aquaculture & smart agriculture
-

ii. Educate people to understand the adaptation

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*Note.* Author's analysis

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Simultaneously, at the regional level, preventive diplomacy is critical at this stage to form a consensual diplomatic and political actions (Chheang, 2018b). The government of the Mekong countries needs to think of the Mekong issue as reciprocal (Coclanis, 2019). To enhance Cambodia's negotiation position, it necessitates the inclusion of reciprocity and issue linkage. Reciprocity could allow effective cooperation, in which the downstream countries should recognize that they also have a responsibility toward the upstream countries, not just the upstream's responsibility toward the downstream (Zhong, Tian, Hua, Grey & Glimont, 2016). In order to have reciprocity, states need to understand different types of benefit-sharings (Interview 109, personal communication, October 7, 2019).

There are four types of benefit-sharing, and benefit-sharing is defined as 'any action designed to change the allocation of costs and benefits associated with cooperation'. Therefore, countries need to acknowledge the importance of benefits underlying cooperation. The type 1 is 'benefit to the river' which occurs by cooperative basin-wide environmental management. Type 2 is that cooperative development by the basin could lead to 'benefit from the river' in terms of food and energy production, for example. The type 3 is 'reduction costs because of the river' which international river can be the agent of cooperation that yield benefits from the river and further integrates countries' economy; and in turn, it generates 'benefit beyond the river' gaining from economic cooperation. (Sadoff & Grey 2002)

The first type is 'increasing benefits to the river' (environmental). In the Cambodian context, Tonle Sap's flood pulse, which is essential to its fisheries and agriculture, depends largely on the flow of the Mekong River in the wet season to reverse the flow direction in the dry season (Mekong River Commission, 2019a). If the flood arrives too early or late it can affect agriculture and fisheries. By 2030, due to the

dam development, there will be a 5-10% reduction of Tonle Sap's inundation (500-600 km<sup>2</sup>) (Sokhem, 2013). The 2016 drought rendered 2.5 million people in Cambodia lacking access to water (Mekong River Commission, 2019b). And, the 2019 drought has hit 150,000 hectares of Cambodia's rice fields (Khut, 2019). The farmers and fishermen are vulnerable to water-related shocks and degradation, and it necessitates the MRC secretariat to establish regional coordination and collaboration to mitigate this menacing threat (Mekong River Commission, 2019b).

Type 2 benefit is 'increasing benefits from the river' (direct economic). First is fishery sector, under the 11 dams scenario, 77 tributary dams and reservoir fisheries, the incremental impacts of dams would result in a net reduction between 495,000 and 792,000 tonnes, which is equivalent to 23-38% of the current amount (World Wildlife Fund, 2018). The loss of fish triggers the issues of malnutrition for children, so they are likely to have a stunting problem which could lead to a permanent physical and cognitive effect (Woodrow Wilson Center, 2016). Second, the Mekong river contributes to 84% of Cambodia's rice production, much higher than other Mekong states, in which Laos standing at 69%, Vietnam 51% and Thailand 40% (Mekong River Commission, 2019a). Third, tourists to the basin also contribute to 11% of Cambodia's GDP (ibid).

Type 3 is 'reducing costs because of the river' (political). The tension over water quantity is to some extent always present in all river basins (Sadoff & Grey, 2002). Cooperation across the border will contribute to regional security and stability. Cambodia's maintenance of the Tonle Sap Lake brings regional benefits but also depends upon regional cooperation to maintain it (Sokhem & Sunada, 2006). It is expected to have a drastic change in the Mekong Delta if the flow of water into Tonle Sap reduces (Sokhem, 2013). By not constructing hydropower dams on Cambodia's mainstream river would reduce tensions with Vietnam. The cumulative implications of the Stung Treng dam (978 MW) and Sambor dam (2,600 MW) will undermine Vietnam's agriculture and fisheries (World Wildlife Fund, 2018).

Type 4 is 'increasing benefits beyond the river' (indirect economic). The integration of market and trade between Laos and Cambodia are intensified. First, Cambodia's

fish are traded with neighboring countries, ensuring the region’s food security. A large proportion of Cambodia’s inland fish capture is exported to Singapore, Malaysia, and China, while marine fishery productions are exported to Thailand and Vietnam (Chea, 2019). Second, as the case of the power trade between Laos and Cambodia, the government of Cambodia has agreed to purchase 2,400 MW from Laos, which is scheduled to begin in 2024 (Chea, 2020). It is of great importance to note that regional integration through long-term bilateral power purchase agreement provides significant economic and environmental benefits. The interconnectedness with the GMS power system could contribute to USD 14.3 billion in saving (World Wildlife Fund, 2016).

There are a number of challenges in applying the concept of reciprocity. The main challenge of pursuing the policy of reciprocity is that one state can never be sure that other states would reciprocate the action or goodwill (Interviewee 109, personal communication, October 07, 2019). However sound impossible, reciprocity stands a better chance to lessen the economic and environmental externalities of dams building on the LMB countries (Coclanis, 2019). Reciprocity happens only when there are demonstrable actions toward the region to demonstrate goodwill to regional benefits (Interviewee 109, personal communication, October 07, 2019).

**Table 8** Type cooperation and benefits on international rivers.

Type	The challenge	The opportunities
Type 1: increasing benefits <i>to the river</i>	Degraded water quality, watersheds, wetlands, and biodiversity	Improved water quality, river flow characteristics, soil conservation, biodiversity, and overall sustainability.

Type 2: increasing benefits <i>from the river</i>	Increasing demands for water, suboptimal water resources management and development	Improved water resources management for hydropower and agricultural production, flood-drought management, navigation, environmental conservation, water quality, and recreation.
Type 3: reducing costs <i>because of the river</i>	Tense regional relations and political economy impacts	Policy shift to cooperation and development, away from dispute/conflict; from food (and energy) self-sufficiency to food (and energy) security; reduced dispute/conflict risk and military expenditure.
Type 4: increasing benefits <i>beyond the river</i>	Regional fragmentation	Integration of regional infrastructure, markets, and trade

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*Note.* Reprinted from “Beyond the river: the benefits of cooperation on international rivers” by C.W. Sadoff and D. Grey, 2002, *Water Policy*, 4, p. 393. Copyright 2002 by Elsevier Science Ltd.

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To enhance the government’s negotiation position, given the increasing complex interdependence, the Mekong countries could employ the strategy of issue linkage to link water issue with trade preferences, and investment incentive as ways to influence the decision to develop the hydropower dam which has the potentially drastic implications (Interview 112, personal communication, October 18, 2019). Growing interdependence may facilitate issue-linkage and produce reciprocal acts. With caution in mind, issue-linkage and interdependence is a ‘double-edged sword’, and a stronger country may employ issue-linkage as a strategy to extract squeeze concessions from the weaker one (Ho, 2017).

Undoubtedly, diverse, often antagonistic, states’ interests represent the different pursuit of policies. To safeguard its national interests, Cambodia, and Vietnam

could enhance their bargaining chips through building its own renewable energy and increasing its direct purchase power through prioritizing tributary dam projects with less negative impacts on the Tonle Sap Mekong Delta (Weatherby & Eyler, 2017). This joint Cambodia-Vietnam engagement could determine the siting, operation, and management of planned dams in Laos (Eyler & Weatherby, 2019). The Cambodia government should identify the relative advantages and disadvantages of Laos, Thailand, Cambodia, and Vietnam in terms of upstream dams, as well as the relative advantage if these countries have a coalition (Interview 112, personal communication, October 18, 2019). Most importantly, the government needs to acknowledge that the Mekong's hydropower potential has been substantially overstated (Coclanis, 2019). Hydropower dams, by 2040, will account for only 6 to 8% of the total energy supply in the Mekong (Cronin, 2013 & Cronin and Weatherby, 2015).

There are many uncertainties embedded in each country's willingness to cooperate. Trust is a prerequisite for cooperation (Zhang, 2019). Confidence-building can only be built through long term transparency regarding data sharing, and intentions of future infrastructure, which necessitates countries' long-term engagement (Polh, 2014). The intensification of the trust crisis between the Mekong countries and China may potentially trigger an all-out 'water war' (Zhang, 2019). Therefore, both upstream and downstream countries need to take the responsibilities, not the attribute blame (Zhang, 2019 and Zhong, Tian, Hua, Grey & Glimont, 2016). Mekong countries, including China, could come together to establish an Information sharing hub, which synthesizes all the data getting from various inter-governmental programs together to optimize resource efficiency and further cooperation (Interviewee 111, personal, October 17, 2019).

In conclusion, the insufficient commitment to regional cooperation, short-sighted national policies, and pressure from the politically connected interest groups are formidable challenges toward realizing the preferred future scenario (Cronin & Hamlin, 2012). This National Water Security policy is a prerequisite to constitute an integrated approach to safeguard future water demand. Water security is about

sustainability, ensuring that our people are resilient to shocks. In order to realize the preferred scenario, it necessitates robust policies and governance framework, incorporating different institutions and stakeholders in order to tackle the multifaceted issues over transboundary waters jointly; and this will provide for the possibility of multiple actions at different levels of action and intervention (Pohl, 2014).

It is a set of converging factors that are conducive to conflict; thereby, countries need to be aware of these potential upsets. This issue of the future water swirls around each country's national interests, and the interwoven challenges and undue costs will be piling up in the future. It is an economic-over-environment discussion in developing countries. They claimed that hydropower is one of the strategies to mitigate natural disasters like the controlling flood, expanding the irrigated cropland, and increasing the water availability during the dry season (Ratner, 2003). The combined effects of a series of dam development would further complicate the already fragile transboundary dynamics, stirring fear from the downstream countries, nevertheless.

## References

- Ariffin, E. (2018, August 19). Cambodia's hydropower dilemma. *The Asean Post*. Retrieved from <https://theaseanpost.com/article/cambodias-hydropower-dilemma>
- Baker, C. G. (2012). *Dams, power and security in the Mekong: A non-traditional security assessment of hydro-development in the Mekong River Basin*. Retrieved from [https://www.rsis.edu.sg/wp-content/uploads/rsis-pubs/NTS/HTML-Newsletter/Report/pdf/NTS-Asia\\_Christopher%20G.%20Baker.pdf](https://www.rsis.edu.sg/wp-content/uploads/rsis-pubs/NTS/HTML-Newsletter/Report/pdf/NTS-Asia_Christopher%20G.%20Baker.pdf)
- Bangkok Post. (2019, June 12). *Chinese companies to build 400 MW power plants in Cambodia*. Retrieved from <https://www.bangkokpost.com/world/1693880/chinese-companies-to-build-400-mw-power-plants-in-cambodia>
- Bennett, L., Ragland, S., & Yolles, P. (1998). Facilitating international agreements through an interconnected Game approach: The case of river basins. In R. Just, & S. Netanyahu (Eds.), *Conflict and Cooperation on Trans-Boundary Water Resources* (Vol. 11, pp. 61-85). Springer US.
- Biba, S. (2018). China's 'old' and 'new' Mekong River politics: the Lancang-Mekong Cooperation from a comparative benefit-sharing perspective. *Water International*, 43(5), 622-641.
- Brauer, R., & Kliem, F. (2017). Coercive Water-Diplomacy playing politics with the Mekong. *Konrad Adenauer Stiftung (KAS)*. Retrieved from [https://www.kas.de/documents/252038/253252/7\\_dokument\\_dok\\_pdf\\_50363\\_2.pdf/c82d2f4e-6ef5-3bad-c444-38e7739f7637?version=1.0&t=1539648475479](https://www.kas.de/documents/252038/253252/7_dokument_dok_pdf_50363_2.pdf/c82d2f4e-6ef5-3bad-c444-38e7739f7637?version=1.0&t=1539648475479)
- Brochmann, M., & Gleditsch, N. (2012). Shared rivers and conflict: A reconsideration. *Political Geography*, 519-527.
- Brousseau, K. (2016, June 06). Inside the energy crisis rocking Venezuela. *International Rivers*. Retrieved from <https://www.internationalrivers.org/blogs/433/inside-the-energy-crisis-rocking-venezuela-guest-blog>
- Brunner, J., Eyler, B., Weatherby, C. Kendy, E. & Avila, N. (2018, January 18). Enhancing regional water cooperation. *The Phnom Penh Post*. Retrieved from <https://www.phnompenhpost.com/opinion/enhancing-regional-water-cooperation>
- Busbarat, P. (2018). Grabbing the forgotten: China's leadership consolidation in Mainland Southeast Asia through the Mekong-Lancang Cooperation. *ISEAS*. Retrieved from [https://www.researchgate.net/publication/322976496\\_Grabbing\\_the\\_Forgotten\\_China's\\_Leadership\\_Consolidation\\_in\\_Mainland\\_Southeast\\_Asia\\_through\\_the\\_Mekong-Lancang\\_Cooperation](https://www.researchgate.net/publication/322976496_Grabbing_the_Forgotten_China's_Leadership_Consolidation_in_Mainland_Southeast_Asia_through_the_Mekong-Lancang_Cooperation)
- Cervera, V. D. V. (2018). Water management plans in Panama: From IWRM to water security. *WIT Transactions on the built Environment*, 179(12), 333-344.
- Chea, V. (2019, July 25). Local fish yields on the rise. *Khmer Times*. Retrieved from <https://www.khmertimeskh.com/50626839/local-fish-yields-on-the-rise>
- Chea, V. (2020, January 08). Laos links 195 MW power to Cambodia. *Khmer Times*. Retrieved from <https://www.khmertimeskh.com/50677525/laos-links-195mw-power-to-cambodia>
- Chellaney, B. (2014). Water, power, and competition in Asia. *Asian Survey*, 5 (4), 621-650.
- Chellaney, B. (2019, August 2). Damming the Mekong Basin to environmental hell. *Project Syndicate*. Retrieved from <https://www.project-syndicate.org/commentary/china-dams-mekong-basin-exacerbate-drought-by-brahma-chellaney-2019-08>
- Chheang, V. (2017). Cambodian and diplomacy of small state. *The Phnom Penh Post*. Retrieved from <https://www.khmertimeskh.com/65572/cambodia-and-the-diplomacy-of-small-states/>

- Chheang, V. (2018a). Lancang Mekong Cooperation: A Cambodian perspective. *ISEAS*. Retrieved from [https://www.iseas.edu.sg/images/pdf/ISEAS\\_Perspective\\_2018\\_70@50.pdf](https://www.iseas.edu.sg/images/pdf/ISEAS_Perspective_2018_70@50.pdf)
- Chheang, V. (2018b, August 14). Mekong water security sets off alarm bells in the region. *Khmer Times*. Retrieved from <https://www.khmertimeskh.com/522249/mekong-water-security-sets-off-alarm-bells-in-the-region/?fbclid=IwAR1yehRyRpZPkmzyzBhhjGpDxbBWCgUQ8fQKNRPkQQuC5BqEIQh-uw2qscl>
- Coclanis, P. A. (2019). Approaching the Mekong in a time of turbulence. In M.A. Steward & P. A. Coclanis. (Ed), *Water and Power* (pp 219-234), Switzerland, CH: Springer.
- Cronin, R. (2009). Mekong Dams and the Perils of Peace. *Global Politics and Strategy*, 51 (6), 147-160.
- Cronin, R. (2013). Hydropower dams on the Mekong: Old dreams, new dangers. *Asia Policy*, 16, pp 32–38.
- Cronin, R. & Hamlin, T. (2012). Mekong turning point: Shared river for a shared future. *Stimson Centre*. Retrieved from [https://www.files.ethz.ch/isn/141531/SRSF\\_Web\\_2.pdf](https://www.files.ethz.ch/isn/141531/SRSF_Web_2.pdf)
- Cronin, R., Eyler, B. & Weatherby, C. (2016). Letter from the Mekong: A call for strategic, basin-wide energy planning in Laos. *The Stimson Center*. Retrieved from <https://www.stimson.org/sites/default/files/file-attachments/Letters-Mekong-Call-Strategic-Basin-Energy-Planning-Laos.pdf>
- Cronin, R. & Weatherby C. (2015). Letter from the Mekong: Time for a new narrative on Mekong hydropower. *The Stimson Center*. Retrieved from [https://www.files.ethz.ch/isn/194459/Letters\\_from\\_the\\_Mekong\\_Oct\\_2015.pdf](https://www.files.ethz.ch/isn/194459/Letters_from_the_Mekong_Oct_2015.pdf)
- Dharmadhikary, S. (2017). Environmental flows in the context of transboundary rivers 2017. *International Rivers*. Retrieved from [https://www.internationalrivers.org/sites/default/files/attached-files/environment\\_flows\\_in\\_the\\_context\\_of\\_transboundary\\_rivers.pdf](https://www.internationalrivers.org/sites/default/files/attached-files/environment_flows_in_the_context_of_transboundary_rivers.pdf)
- Elhance, A. (1999). *Hydropolitics in the third world: Conflict and cooperation in international river basins*. Washington, D.C: United States Institute of Peace Press.
- Eyler, B. & Weatherby, C. (2019). Letter from the Mekong: Toward sustainable water-food-energy future in Cambodia. *The Stimson Center*. Retrieved from [https://www.stimson.org/sites/default/files/file-attachments/WEB-FEB\\_Cambodia%20Report.pdf](https://www.stimson.org/sites/default/files/file-attachments/WEB-FEB_Cambodia%20Report.pdf)
- Feng, Y., Wang, W., Suman, D., Yu, S., & He, D. (2019). Water cooperation priorities in the Lancang-Mekong River Basin based on cooperative events since the Mekong River Commission establishment. *Springer*, 29(1),58-69.
- FAO. (2011). Irrigation in Southern and Eastern Asia in figures. Retrieved from [http://www.fao.org/nr/water/aquastat/basins/mekong/mekong-CP\\_eng.pdf](http://www.fao.org/nr/water/aquastat/basins/mekong/mekong-CP_eng.pdf)
- Fawthrop, T. (2018, March 28). Mekong: More dams, more damage. *The Interpreter*. Retrieved from <https://www.lowyinstitute.org/the-interpreter/mekong-more-dams-more-damage>
- Gabriele, G. (2018). Power and geopolitics along the Mekong: The Laos-Vietnam Negotiation on Xayaburi Dam. *Journal of Current Southeast Asian Affairs*, 37(2), pp 63-97.
- Geheb, K., & Suhardiman, D. (2019). The political ecology of hydropower in the Mekong River Basin. *Current Opinion in Environmental Sustainability*, 37, 8–13.
- Giovannini, G. (2018). Power and geopolitics along the Mekong: The Laos–Vietnam negotiation on the Xayaburi Dam. *Journal of Current Southeast Asian Affairs*, 37 (2), 63–93.
- Gleick, P. H. (1993). Water and conflict: Freshwater resources and international security. *International Security*, 18 (1), 79-112.
- Global Hunger Index. (2019). *Cambodia*. Retrieved from <https://www.globalhungerindex.org/pdf/en/2019/Cambodia.pdf>

- Guo, J. (2013). Multi-governance of the Greater Mekong River's water resources security and China's policy choice. *Participation and Interaction*, pp 247-279.
- Grumbine, R. E., Dore, J., & Xu, J. (2012). Mekong hydropower: Driver of change and governance challenges. *Frontiers in Ecology and the Environment*, 10, pp 91-98.
- Haefner, A. (2013). Regional environmental security: cooperation and challenges in the Mekong subregion. *Global Change, Peace & Security*, 25(1), 27-41.
- Haefner, A. (2016). *Negotiating for water resources: Bridging Transboundary River Basin*. New York, NY: Routledge.
- Han, H. (2017). China, an upstream Hegemon: A destabilizer for the governance of the Mekong River? *Pacific Focus*, 37 (1), 30-55.
- Ho, S. & Pitakdumrongkit, K. (2019, January 30). Can ASEAN play a greater role in the Mekong sub-region? *The Diplomat*. Retrieved from <https://thediplomat.com/2019/01/can-asean-play-a-greater-role-in-the-mekong-subregion/>
- Ho, S. (2017). China's transboundary river policies towards Kazakhstan: issue-linkages and incentives for cooperation. *Water International*, 42(2), pp 142-162.
- Homer-Dixon, T. F. (1994). Environmental scarcities and violent conflict: Evidence from cases. *International Security*, 19 (1), 5-40 .
- Hor, K. (2017, November 29). For energy independence, government must diversify and invest: expert. *The Phnom Penh Post*. Retrieved from <https://www.phnompenhpost.com/business/energy-independence-government-must-diversify-and-invest-experts>
- Hussain, N. (2019, August 16). ASEAN joins the Indo-Pacific conversation. *East Asia Forum*. Retrieved from <https://www.eastasiaforum.org/2019/08/16/asean-joins-the-indo-pacific-conversation/>
- International Rivers. (2000, May 1). *20,000 Cambodians suffer from Yali Falls dam's construction*. Retrieved from <https://www.internationalrivers.org/resources/20-000-cambodians-suffer-from-yali-falls-dam-s-construction-2582>
- Intralawan, A., Wood, D., Frankel, R., Costanza, R., & Kubiszewski, I. (2018). Tradeoff analysis between electricity generation and ecosystem services in the Lower Mekong Basin. *Ecosystem Services*, 30, 27-35.
- Khem, S. (2013). Water sector analysis. In A. Smajgl & J. Ward (Eds.), *The water-food-energy nexus in the Mekong Region* (pp. 19-60). New York, NY: Springer.
- Khmer Times. (2019, November 8). Hun Sen says water levels may cause power cuts in Capital. Retrieved from [https://www.khmertimeskh.com/658075/hun-sen-says-water-levels-may-cause-power-cuts-in-capital/?fbclid=IwAR3S0iEXNvv-DSlv5ShSTCcb4zCj9pLAorruAtLHiZhpIP4E0\\_Li-9eMP6s](https://www.khmertimeskh.com/658075/hun-sen-says-water-levels-may-cause-power-cuts-in-capital/?fbclid=IwAR3S0iEXNvv-DSlv5ShSTCcb4zCj9pLAorruAtLHiZhpIP4E0_Li-9eMP6s)
- Khouth, S. C. (2019, March 18). Kingdom lacks up to 400MW in available electricity. *The Phnom Penh Post*. Retrieved from <https://www.phnompenhpost.com/national/kingdom-lacks-400mw-available-electricity>
- Khut, S. (2019). Drought hit 150,000 hectares of rice fields. *VOD*. Retrieved from <https://en.vodhotnews.com/drought-hits-150000-hectares-of-rice-fields%EF%BB%BF/>
- Kijewski, L. (2019, Nov 25). Officials to meet on Mekong crisis as fishing communities suffer. *Aljazeera*. Retrieved from <https://www.aljazeera.com/news/2019/11/officials-meet-mekong-crisis-fishing-communities-suffer-191125070104119.html>
- Kimura, S. & Phoumin, H. (2019). Energy outlook and energy saving potential in East Asia 2019. *Economic Research Institute for ASEAN and East Asia*. Retrieved from [http://www.eria.org/uploads/media/0.Energy\\_Outlook\\_and\\_Energy\\_Saving\\_Potential\\_2019.pdf](http://www.eria.org/uploads/media/0.Energy_Outlook_and_Energy_Saving_Potential_2019.pdf)
- Kittikhoun, A & Staubli, D, M. (2018). Water diplomacy and conflict management in the Mekong: From rivalries to cooperation. *Journal of Hydrology*, 567, 654-667.

Kossof, I. (2016, April 06). Mekong dams' annual impact put at \$450M. *The Phnom Penh Post*. Retrieved from <https://www.phnompenhpost.com/national/mekong-dams-annual-impact-put-450m>

Kritsanavarin, S. (2013). The Lower Mekong dams: A transboundary water crisis. *International River*. Retrieved from [https://www.internationalrivers.org/sites/default/files/attached-files/the\\_lower\\_mekong\\_dams\\_-\\_english.pdf](https://www.internationalrivers.org/sites/default/files/attached-files/the_lower_mekong_dams_-_english.pdf)

Lee, Y., Lee, S., & Hong, I. (2017). *Power asymmetry over hydropower development in the Mekong River Basin*. Retrieved from [https://www.researchgate.net/publication/320348432\\_Power\\_Asymmetry\\_over\\_Hydropower\\_Development\\_in\\_the\\_Mekong\\_River\\_Basin](https://www.researchgate.net/publication/320348432_Power_Asymmetry_over_Hydropower_Development_in_the_Mekong_River_Basin)

Len, C. & Thu, C. L. (2018, August 3). Dammed Mekong: Lasting challenges for the region's energy security. *The Strategist*. Retrieved from <https://www.aspistrategist.org.au/dammed-mekong-lasting-challenges-for-the-regions-energy-security/>

Lovgren, S. (2019, July 19). Mekong River at its lowest in 100 years, threatening food supply. *National Geographic*. Retrieved from [https://www.nationalgeographic.com/environment/2019/07/mekong-river-lowest-levels-100-years-food-shortages/?fbclid=IwAR0BEQcZMyhu\\_XE-6AZcda0g90QPHKw2l4zll2tiLVj1eBhxf2CLTTKksqw](https://www.nationalgeographic.com/environment/2019/07/mekong-river-lowest-levels-100-years-food-shortages/?fbclid=IwAR0BEQcZMyhu_XE-6AZcda0g90QPHKw2l4zll2tiLVj1eBhxf2CLTTKksqw)

Mak, S. (2016). Dams and state security: Damming the 3S rivers as a threat to Cambodian state security. *Asia Pacific Viewpoint*, 57(1), 60-75.

Marko, K., Kumm, M., Salmivaara, A., Someth, P., Lauri, H., Moel, H., Ward, P. & Pech, K. (2013). Tonle Sap now and in the future?: Final report of the exploring Tonle Sap futures study. *Water & Development Research Group*. Retrieved from <https://wdrg.aalto.fi/wp-content/uploads/2019/04/Exploring-Tonle-Sap-Futures-Final-Report-30august2013.pdf>

Matthews, M. (2012). Water grabbing in the Mekong basin: An analysis of the winners and losers of Thailand's hydropower development in Lao PDR. *Water Alternatives*, 5(2), 392-411.

Mekong River Commission. (2010). *Profiles of 12 proposed mainstream development in LMB*. Retrieved from <http://www.mrcmekong.org/assets/Publications/Consultations/SEA-Hydropower/3-LMB-MSD-DriversQuick-Project-profiles-4Jun10.pdf>

Mekong River Commission. (2016). *Basin Development Strategy 2016-2020*. Retrieved from <http://www.mrcmekong.org/assets/Publications/strategies-workprog/MRC-BDP-strategy-complete-final-02.16.pdf>

Mekong River Commission. (2017). *The council study: Cumulative impact assessment of water resource development scenario*. Retrieved from <http://www.mrcmekong.org/assets/Publications/Council-Study/Council-study-Reports-discipline/180208-CIA-draft-report-final-MG-AS.pdf>

Mekong River Commission. (2018). *Council Study*. Retrieved from <http://www.mrcmekong.org/assets/Publications/Council-Study/Council-study-Reports-Thematic/ALU-Thematic-Report-22-Jan-2018.pdf>

Mekong River Commission. (2019a). *State of the basin report 2018*. Retrieved from [http://www.mrcmekong.org/assets/Publications/SOBR-v8\\_Final-for-web.pdf](http://www.mrcmekong.org/assets/Publications/SOBR-v8_Final-for-web.pdf)

Mekong River Commission. (2019b). *Drought management strategy for the Lower Mekong Basin*. Retrieved from <http://www.mrcmekong.org/assets/Publications/MRC-DMS-2020-2025-Fourth-draft-V3.0-formatted.pdf>

Middleton, C., & Allouche, J. (2016). Watershed or powershed? Critical hydropolitics, China and the 'Lancang-Mekong Cooperation Framework'. *The International Spectator*, 51 (3), 100-117.

Moore, S. (2018, June 28). China's water war. *East Asia Forum*. Retrieved from <https://www.eastasiaforum.org/2018/06/28/chinas-water-wars/>

- Nilsson, J. (2015). *Hydropower in Cambodia competing discursive story-lines of a contested development path*. Retrieved from <http://lup.lub.lu.se/luur/download?func=downloadFile&recordId=7441103&fileId=7441120>
- Nguyen, D. S. (2018). The Lancang-Mekong Cooperation Mechanism (LMCM) and its implication for the mekong sub-region. *Pacific Forum CSIS*. Retrieved from [https://www.pacforum.org/sites/default/files/issuesinsights\\_vol18wp1\\_lancang-mekong-cooperation-mechanism-lmcm.pdf](https://www.pacforum.org/sites/default/files/issuesinsights_vol18wp1_lancang-mekong-cooperation-mechanism-lmcm.pdf)
- Nguyen, Q. (2019, September 09). Southeast Asia's largest solar farm begins operations in southern Vietnam. *VNExpress*. Retrieved from <https://e.vnexpress.net/news/news/southeast-asia-s-largest-solar-farm-begins-operations-in-southern-vietnam-3979068.html>
- Nunez, A. (2019, June 10). Venezuela: The effects of El Nino threaten to paralyze the Guri dam. *Latin America Post*. Retrieved from <https://latinamericanpost.com/28433-venezuela-the-effects-of-el-nino-threaten-to-paralyze-the-guri-dam>
- Olmstead, S., & Sigman, H. (2015). Damming the commons an empirical analysis of international cooperation and conflict in dam location. *Journal of the Association of Environmental and Resource Economists*, 2 (4), 497-526.
- Osborne, M. (2016, December 9). Laos: Playing to win in Mekong hydropower game. *The Interpreter*. Retrieved from <https://www.lowyinstitute.org/the-interpreter/laos-playing-win-mekong-hydropower-game>
- Pearse-Smith, S. W. (2012). 'Water war' in the Mekong Basin?. *Asia Pacific Viewpoint*, 52 (2), 147-162 .
- Pich, C. (2018). Cambodia in the context of Mekong-Lancang cooperation: Progress and way forward. *Konrad Adenauer Stiftung (KAS)*. Retrieved from <https://www.kas.de/documents/264850/264899/PICH+CHARADINE++CAMBODIA+IN+THE+CONTEXT+OF+MEKONG-LANCANG+COOPERATION+%28MLC%29++PROGRESS+AND+WAYS+FORWARD.pdf/877f94d8-4cfa-1d0c-7a67-e5da7a4c7d0c?version=1.0&t=1547520230286>
- Piman, T., & Shrestha, M. (2017). Case study on sediment in the Mekong River Basin Current state and future trends. *Stockholm Environment Institute*. Retrieved from [https://mediamanager.sei.org/documents/Publications/Bangkok/SEI\\_2017\\_Report\\_Mekong\\_sediment\\_LoRes.pdf](https://mediamanager.sei.org/documents/Publications/Bangkok/SEI_2017_Report_Mekong_sediment_LoRes.pdf)
- Pohl, B. (2014). The rise of hydro-diplomacy: Strengthening foreign policy for transboundary water. *Adelphi*. Retrieved from [https://www.adelphi.de/en/system/files/mediathek/bilder/the\\_rise\\_of\\_hydro-diplomacy\\_adelphi.pdf](https://www.adelphi.de/en/system/files/mediathek/bilder/the_rise_of_hydro-diplomacy_adelphi.pdf)
- Pohlner, H. (2010, August 19). Chinese dam diplomacy: Leadership and geopolitics in Continental Asia. *East Asia Forum*. Retrieved from <https://www.eastasiaforum.org/2010/08/19/chinese-dam-diplomacy-leadership-and-geopolitics-in-continental-asia/>
- Poowin, B. (2016). The Lancang-Mekong Cooperation (LMC) viewed in light of the Potential Regional Leader theory. *Journal of Mekong Societies*. 12(3), 49-64.
- Ratner, B. D. (2003). The politics of regional governance in the Mekong River Basin. *Global Change, Peace & Security*, 15(1), 59-76.
- Ribka, M. & Perwita, A. (2017). Water Security in the Mekong River and Regional Stability in Southeast Asia. *AEGIS*, 2 (1).
- RFA. (2016, March 23). *China's water release unlikely to slake Vietnam's thirst*. Retrieved from <https://www.rfa.org/english/news/vietnam/chinas-water-unlikely-to-slake-vietnams-thirst-03232016154743.html>

- RFA. (2019b, April 5). *Cambodia announces hydropower, solar projects amid widespread electricity shortages*. Retrieved from <https://www.rfa.org/english/news/cambodia/plants-04052019162511.html>
- Sadoff, C. W. & Grey, D. (2002). Beyond the river: the benefits of cooperation on international rivers. *Water Policy*, 4, p. 393.
- Siciliano, G., Urban, F., Tan-Mullins, M., Pichdara, L. & Kim, S. (2016). The political ecology of large Chinese dams in Cambodia: Implication, challenges, and lessons learned from the Kamchay dam. *Water*, 8(9). p.405.
- Sim, V. (2019). Mapping Mekong cooperation complementarities and policy implications. *Asian Vision Institute*. Retrieved from <https://static1.squarespace.com/static/5c1e0cbdf93fd4d532bff977/t/5d170e0803b9810001c6bf67c/1561792010088/AVI+Perspective+Vol+1%2C+Issue+9+%28Sim+Vireak%29.pdf>
- Sadoff, C. W. & Grey, D. (2002). Beyond the river: the benefits of cooperation on international rivers. *Water Policy*, 4, p. 393.
- Sokhem, P., & Sunada, K. (2006). The Governance of the Tonle Sap Lake, Cambodia: Integration of Local, National and International Levels. *International Journal of Water Resources Development*, 22(3), 399–416.
- Sokhem, P. (2013). Water sector analysis. In A. Smagil and J. Ward. (Eds). *The water-food-energy nexus in the Mekong Region* (pp 19-60). New York, NY: Springer.
- Sun, N. (2019, March 02). Gripped by drought, Cambodian farmers struggle against changing climate. VOA. Retrieved from <https://www.voacambodia.com/a/gripped-by-drought-cambodian-farmers-struggle-against-changing-climate/4809586.html>
- Taing, V. (2019, November 1). Japan grants USD 27 million for construction of wastewater treatment station in Choeung Ek. *Khmer Times*. Retrieved from <https://www.khmertimeskh.com/50656600/japan-grants-27-million-for-construction-of-wastewater-treatment-station-in-choeung-ek/>
- The Government Public Relations Department. (2019, June 19). *Cabinet Approves the 20-Year Master Plan on Water Resource Management*. Retrieved from [https://thailand.prd.go.th/mobile\\_detail.php?cid=4&nid=8113](https://thailand.prd.go.th/mobile_detail.php?cid=4&nid=8113)
- Thmey Thmey. (2019, November 23). *The government launches support action ahead of the drought*. Retrieved from <https://cambodianess.com/article/the-government-launches-support-action-ahead-of-the-drought?fbclid=IwAR2l-3M7wnra69qiY-SYjMblMUx3EAJqMwcfmKTdoV1wFRhilchFz5Scn8>
- Thou, V. (2019a, July 05). Cambodia buys power generator from Finland. *The Phnom Penh Post*. Retrieved from <https://www.phnompenhpost.com/business/cambodia-buys-power-generator-finland>
- United Nations Development Program. (2011). *Climate change and water resources*. Retrieved from <https://www.undp.org/content/dam/cambodia/docs/HDR/2011%20CHDR%20-%20Climate%20Change%20and%20Water%20Resources.pdf>
- United Nations Development Program. (2019). Cambodia, looking to the horizon, prepares for drought. Retrieved from <https://www.adaptation-undp.org/cambodia-looking-horizon-prepares-drought>
- Urban, F., Siciliano, G., & Nordensvard, J. (2018). China's dam-builders: their role in transboundary river management in South-East Asia. *International Journal of Water Resources Development*, 34 (7), 747-770,.
- Hun, S. (2019, August 9). Mekong won't be dammed for power: EDC chief. VOD. Retrieved from <https://vodenglish.news/mekong-wont-be-dammed-for-power-edc-chief/>
- Weatherby, C. & Eyler, B. (2017). Letter from the Mekong: Mekong power shift: Emerging trends in the GMS power sector. *Stimson Centre*. Retrieved from <https://www.stimson.org/sites/default/files/Mekong%20Power%20Shift%20Emerging%20Trends%20in%20the%20GMS%20Power%20Sector.pdf>

- Wolf, A. T. (1998). Conflict and cooperation along international waterways. *Water Policy*, 1 (2), 251-265.
- Wolf, A. T. (1997). International water conflict resolution: lessons from comparative analysis. *Water Resources Development*, 13 (3), 333-365.
- Woodrow Wilson Center. (2016). *Water and security in an uncertain world*. Retrieved from <https://www.wilsoncenter.org/event/water-and-security-uncertain-world>
- World Wildlife Fund. (2016). *Mekong River in the economy*. Retrieved from <http://www.mrcmekong.org/assets/Uploads/mekong-river-in-the-economy-final.pdf>
- World Wildlife Fund. (2018). *Reconsidering the Sambor and Stung Treng hydropower projects*. Retrieved from [http://d2ouvy59p0dg6k.cloudfront.net/downloads/sambor\\_\\_stung\\_treng\\_brief\\_wwf.pdf](http://d2ouvy59p0dg6k.cloudfront.net/downloads/sambor__stung_treng_brief_wwf.pdf)
- Xinhua. (2018, December 06). *Laos to export over 14, 000 MW of electricity by 2030*. Retrieved from [http://www.xinhuanet.com/english/2018-12/06/c\\_137654847.htm](http://www.xinhuanet.com/english/2018-12/06/c_137654847.htm)
- Xinhua. (2019a, April 08). *Energy sector powering growth in Laos*. Retrieved from [http://www.xinhuanet.com/english/2019-04/08/c\\_137959657.htm](http://www.xinhuanet.com/english/2019-04/08/c_137959657.htm)
- Xing, W. (2017). Lancang-Mekong River cooperation and trans-boundary water governance: A Chinese perspective. *China Quarterly of International Strategic Studies*, 3(3), 377-393.
- Yeophantong, P. (2016). China's hydropower expansion and influence over environmental governance in Mainland Southeast Asia. In E. Goh (ed.). *Rising China's influence in developing Asia*. New York, NK: Oxford University Press.
- Yeophantong, P. (2017). China's dam diplomacy in the Mekong Region: Three game changers. In D. Blake and L. Robins (ed.), *Dynamics of Water Governance in the Mekong Region*. Petaling Jaya, PJ: Strategic Information and Research Development Center Press.
- Yoffe, S., & Wolf, A. (1999). Water, conflict and cooperation: Geographical perspectives. *Cambridge Review of International Affairs*, 12 (2), 197-213 .
- Zeitoun, M., & Warner , J. (2006). Hydro-hegemony – a framework for analysis of trans-boundary water conflicts . *Water Policy*, 435–460 .
- Zhang, L. (2019). Trust crisis and building trust in transboundary water cooperation along the Lancang-Mekong River. In M.A. Steward & P. A. Coclanis. (Ed), *Water and Power* (pp 235-251), Switzerland, CH: Springer.
- Zhong, Y., Tian, F., Hua, H., Grey, D. & Gilmont, M. (2016). River and reciprocity: perceptions and policy on international watercourses. *Water policy*, 18, pp 803-825.

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