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From Centrality to Coordination: Reassessing ASEAN's Role in Mekong Water Governance Amid U.S.–China Strategic Competition

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ABSTRACT

The Mekong sub-region has emerged as a critical arena at the intersection of environmental sustainability, water governance, and great-power competition. Home to a large population dependent on the basin's water resources and constituting one of the world's most biodiverse ecosystems, the Mekong River Basin is increasingly shaped by external powers—notably China through the Belt and Road Initiative (BRI) and the Lancang-Mekong Cooperation (LMC), and the United States through the Lower Mekong Initiative (LMI) and the Mekong–U.S. Partnership (MUSP). Drawing on systematic literature review and comparative policy analysis, this article examines the strategic adjustments made since 2016 and their implications for ASEAN. Using the Funan Techo Canal project in Cambodia and Cambodia's withdrawal from the Cambodia–Laos–Vietnam Development Triangle Area (CLV-DTA) as its central case study, the paper demonstrates that the challenges of Mekong water governance stem from structural institutional asymmetries between upstream and downstream states, compounded by deepening fragmentation among ASEAN member states. The findings indicate that ASEAN can integrate sustainability into Mekong governance, but doing so requires clarifying project classification criteria, establishing new sub-regional coordination mechanisms, and strengthening independent monitoring capacity—rather than relying on declaratory cooperation alone.

Keywords: Mekong Sub-Region; ASEAN; United States; China; Water Governance; Strategic Competition; Institutional Asymmetry

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1. Introduction

The Mekong River is one of Asia's most important transboundary river systems, flowing through China, Myanmar, Laos, Thailand, Cambodia, and Vietnam before emptying into the South China Sea. With more than 70 million people directly dependent on its waters for subsistence, food, energy, and livelihoods, the Mekong is also among the world's most biodiverse river systems [1]. Yet the basin faces mounting pressure from hydropower development, climate change, and geopolitical tensions among riparian states and external powers [2]. Since the 1990s, the Mekong sub-region has attracted increasing interest from extra-regional powers. China has expanded its influence through the Greater Mekong Subregion Economic Cooperation Programme (GMS), the Belt and Road Initiative (BRI), and the Lancang-Mekong Cooperation (LMC). The United States has engaged through the Lower Mekong Initiative (LMI) and, more recently, the Mekong–U.S. Partnership (MUSP). Other actors—Japan, South Korea, India, and Australia—have also intensified their engagement, generating a dense network of overlapping cooperative frameworks. The "structural incapacity" of the 1995 Mekong Agreement and the Mekong River Commission (MRC) is illustrated by recent developments surrounding the Funan Techo Canal project in Cambodia. The ambiguity in the delineation between "tributary" and "mainstream" projects under the 1995 Agreement has allowed a project of considerable scale and impact to proceed without undergoing the full inter-state consultation process that the mechanism was originally designed to require [3].

For ASEAN, the Mekong sub-region represents both an opportunity and a challenge. On one hand, the engagement of external powers brings capital, technology, and development momentum to riparian member states [2]. On the other hand, great-power competition—particularly between the United States and China—risks fragmenting member state positions and thereby threatening ASEAN's unity and strategic autonomy [4]. The Mekong issue is therefore not merely an environmental or water management concern; it constitutes a test of ASEAN's capacity to maintain its central role amid great-power rivalry.

This study approaches the Mekong River Basin from an integrated ecological–economic–political perspective, situated within the broader Indo-Pacific context. The article makes three principal contributions: first, it elucidates the linkages among water, energy, food, and the environment (the WEFE nexus) within the context of U.S.–China strategic competition; second, it identifies pathways for ASEAN to strengthen its institutional capacity and coordinating role in Mekong governance; and third, it draws comparative lessons from other transboundary river basins—the Nile, the Danube, and the Indus—to identify governance mechanisms applicable to the Mekong.

2. Literature Review

Scholarship on the Mekong sub-region has long emphasized the complexity of transboundary water governance, ecological sustainability, and the growing influence of external powers. Barbarossa and Schmitt [5] argue that large-scale hydropower development endangers biodiversity, while climate change intensifies pressures on riparian communities through drought and flooding. The construction of large dams upstream—such as the cascade on the Lancang mainstream—has significantly attenuated the amplitude and timing of natural flood pulses in the Lower Mekong, resulting in a long-term reduction of the flood-inundated areas essential to the basin's ecological equilibrium [6,7]. Soukhaphon et al. [8] identify the inherent challenges of managing shared water resources when upstream hydropower projects alter downstream flows, directly threatening food security and livelihoods. However, Haefner [9] contends that the MRC's reliance on voluntary compliance mechanisms has curtailed the organisation's effectiveness, particularly given that China is not a full member. Other mechanisms—such as the ADB-led GMS programme and the Ayeyawady–Chao Phraya–Mekong Economic Cooperation Strategy (ACMECS)—have prioritised economic integration over ecological sustainability. The emergence of the LMC in 2015 reflects China's ambition to institutionalise its leadership role while simultaneously diminishing the MRC's standing [10].

China's BRI and LMC have been widely analysed as instruments of geopolitical influence. Van et al. [11] and Santasombat and Lee [12] characterise the BRI as a vehicle for China to augment its economic and political power, with Mekong infrastructure projects serving both developmental

and strategic objectives. Vineles [13] demonstrates that nearly half of the BRI projects received by ASEAN member states in 2018 were concentrated in the Mekong countries, underscoring the sub-region's strategic priority for Beijing. In response to China's expanding infrastructure footprint, the United States launched the LMI in 2009 and subsequently upgraded it to the MUSP in 2020, positioning it as a core component of the Free and Open Indo-Pacific strategy [14]. The U.S. Mission to ASEAN [15] emphasises that the LMI's focus on governance, education, and environmental standards contrasts sharply with the large-scale infrastructure model, while MUSP has broadened this agenda to encompass energy security, transnational crime prevention, and pandemic recovery [16]. Ba [17] argues that U.S. engagement has remained reactive and diffuse, yet its emphasis on transparency and multilateralism offers a noteworthy alternative cooperative model. In this context, ASEAN's role has become increasingly significant. Recent analyses of "twin chessboard" dynamics in U.S.–China competition suggest that rivalry has extended into "low politics" domains such as the Mekong, compelling smaller ASEAN states to navigate issue-specific multilateral mechanisms [18]. China's unilateral construction of large dams in the upper Mekong is viewed as a major geopolitical shift that has fundamentally altered the strategic autonomy of Southeast Asian states [19]. As the Mekong has become a new flashpoint through which external powers seek to establish exclusive spheres of influence, Mekong states and ASEAN have pursued strategic autonomy through "omni-enmeshment" and inclusive institutional balancing [20].

Several gaps remain in the existing literature. First, many studies treat environmental sustainability and geopolitical competition as distinct domains, despite the fact that the Mekong basin is simultaneously an ecosystem and a geopolitical arena; very few integrate these two dimensions to assess how strategic competition directly shapes water governance and ecological resilience. Second, while the roles of external powers have been extensively studied, ASEAN's institutional capacity and potential leadership role in Mekong governance remain underexplored—existing studies tend to portray ASEAN as a passive actor rather than examining how it might embed sustainability into its frameworks and consolidate its centrality in the Indo-Pacific. Third, comparative perspectives remain limited: although lessons from other transboundary basins—the Nile, Danube, and Indus—are clearly relevant, few studies systematically apply these cases to the Mekong to identify transferable governance mechanisms. This study aims to address these gaps by combining the water–energy–food–environment (WEFE) nexus framework with a socio-hydrological approach, thereby examining simultaneously the ecological and geopolitical dimensions of the Mekong basin, while situating Mekong governance within a comparative perspective alongside other transboundary river basins.

3. Methodology

This study approaches the Mekong River Basin as a paradigmatic case of transboundary water resource governance under conditions of simultaneous developmental aspirations and geopolitical competition. To analyse the multiple dimensions of the issue comprehensively, it combines three complementary methods: systematic literature review, comparative policy analysis, and institutionally oriented normative analysis.

The first step involved a systematic review of academic literature, official documents, and reports from relevant organisations. Academic sources include works published in specialised journals—Water Resources Research, Hydrology and Earth System Sciences, Water Policy, One Earth, and Ecology and Society—focusing on hydrology, basin ecology, and the impacts of hydropower development. Geopolitical and international relations scholarship—including analyses of the BRI, LMC, LMI, and MUSP by Busbarat [21], Ba [17], Gong [14], and Nguyen et al. [4]—was mobilised to construct a picture of external power engagement. Official sources include ASEAN documents, MRC materials, U.S. Department of State documents, Chinese government documents, and reports from the U.S. Mission to ASEAN [15] and the East-West Center [16]. This review aimed to identify the central issues in Mekong governance, highlight gaps in existing research, and situate the Mekong basin within broader debates on sustainability and regional cooperation.

The second step applies comparative policy analysis along two axes. On one axis, the study contrasts the two engagement models of China and the United States in

the Mekong basin, situated in relation to the differentiated responses of ASEAN member states. On the other axis, the study extends the comparative lens beyond the basin, juxtaposing the Mekong with three other transboundary river systems: the Danube, the Nile, and the Indus. These three cases were selected because each represents a distinct governance model. The International Commission for the Protection of the Danube River (ICPDR) exemplifies a multilateral institution with relatively developed mechanisms for data sharing, ecological protection, and dispute resolution. The controversy surrounding Ethiopia's Grand Ethiopian Renaissance Dam on the Nile illustrates the consequences of the absence of a binding legal framework between upstream and downstream states—a situation bearing significant parallels to China's position on the Mekong mainstream. The Indus Waters Treaty demonstrates the feasibility of sustaining a legally binding water-sharing agreement despite prolonged political tensions between its signatories. The lessons drawn from these three cases provide a basis for evaluating the current institutional architecture of the Mekong and identifying applicable governance mechanisms.

The third step involves institutional analysis combined with normative orientation. At the analytical level, the study examines the structure and capacity of relevant frameworks—the MRC and the 1995 Mekong Agreement, AMBDC, ACMECS, and AOIP—in relation to the externally driven MLC and MUSP. At the normative level, the study combines the water–energy–food–environment (WEFE) nexus framework with a socio-hydrological approach—whereby hydrological systems and human societies are understood as co-evolving entities that cannot be studied in isolation [22]—both to describe existing conditions and to identify concrete pathways for ASEAN to embed sustainability into Mekong governance.

The Funan Techo Canal case in Cambodia and Cambodia's withdrawal from the CLV-DTA serve as the study's central case study, as this episode allows simultaneous observation, within a specific timeframe, of the three dimensions on which the study focuses: institutional asymmetry, transboundary ecological impacts, and geopolitical consequences for ASEAN.

Several methodological limitations should be acknowledged. The study relies primarily on secondary data and document analysis; empirical data on the actual impacts of the Funan Techo Canal remain limited given that the project was not yet completed at the time of writing. Furthermore, ASEAN's internal fragmentation is analysed principally at the state level; while the voices of local communities and civil society are acknowledged as important, they have not been fully integrated owing to constraints on available source material.

4. Results and Discussion

4.1. The Mekong River and its Strategic Significance for ASEAN

Stretching more than 4,800 km from the Tibetan Plateau through China, Myanmar, Laos, Thailand, Cambodia, and Vietnam, the Mekong River is one of Asia's most important transboundary rivers and the lifeblood of mainland Southeast Asia. The basin sustains one of the world's most productive inland fisheries, irrigates millions of hectares of agricultural land, and provides livelihoods for more than 70 million people in the Lower Mekong Basin [1]. The river's immense ecological and economic value renders it indispensable to the ASEAN member states of mainland Southeast Asia—particularly Cambodia, Laos, Thailand, and Vietnam—where food security, energy production, and socioeconomic development are directly tied to the Mekong's flows [4].

Ecologically, the Mekong basin is a biodiversity hotspot, home to more than 1,200 fish species and countless endemic flora and fauna, making it one of the world's most biodiverse river systems [7]. The Lower Mekong Basin is experiencing severe sediment deficits caused by upstream reservoirs. This "sediment starvation," compounded by climate change and sea-level rise, is directly exacerbating coastal erosion and saltwater intrusion, posing serious threats to the region's substantial agricultural output. Economically, the Mekong is a critical artery for trade, connectivity, and energy: it supports navigation, irrigation-dependent agriculture, and the increasingly exploited hydropower potential needed to meet rising energy demand. Laos's ambition to become "the battery of Southeast Asia" through hydropower exports exemplifies the river's role in regional energy security [21]. Yet these developments also generate tensions among downstream states, raising

questions about equitable resource sharing and long-term sustainability. The WEFE nexus is clearly evident here: hydropower dams can generate electricity while disrupting fisheries and agriculture, producing trade-offs that ASEAN must manage through integrated approaches. **Table 1** summarises the scale of these impacts, illustrating the magnitude of change in sediment flows, fisheries value, and saltwater intrusion relative to pre-dam conditions.

Table 1. Hydropower Impacts on the Mekong River.

Factor	Pre-Dam Baseline	Post-Dam Estimate
Sediment flow to Mekong Delta	100%	Reduction of up to 96%
Annual fisheries value	USD 17 billion	30–40% decline (estimated)
Saltwater intrusion (Ham Luong River, 2020)	60 km inland	71 km inland

Source: Compiled by the authors based on Liu et al. [6], Haefner [9], Gong [14], and East-West Center [16].

Socially and culturally, the Mekong is deeply interwoven with Southeast Asian identity. Riparian communities depend on the river's seasonal rhythms for agriculture, fishing, and cultural practices. The concept of socio-hydrology—the study of interactions between human societies and hydrological systems—is particularly relevant in the Mekong context [22]. Understanding how communities adapt to flooding, drought, and ecological change offers valuable insights into resilience and sustainability. ASEAN's role in promoting community-based resource management and integrating local knowledge into regional planning is essential to ensuring that development projects respect cultural traditions and social dynamics.

Geopolitically, the Mekong has become a frontline of strategic competition between China and the United States [23]. China's BRI and LMC emphasise infrastructure investment and connectivity, while U.S. initiatives such as the LMI and MUSP emphasise transparency, environmental safeguards, and multilateral cooperation [15,17]. These competing approaches mirror the broader strategic competition across the Indo-Pacific, with the Mekong serving as a microcosm of great-power rivalry. For ASEAN, the Mekong is not merely a river but a strategic space in which external influences intersect with regional development—and ASEAN's capacity to serve as a convener and stabiliser in Mekong governance will determine whether external engagement reinforces or undermines regional cohesion. **Table 2** summarises the key initiatives shaping the basin, contrasting the lead actors, thematic focus, and strategic implications for the region. Lessons from other transboundary basins—the Nile, Danube, and Indus (examined in greater depth in Subsection 4.5)—indicate that institutional design, data-sharing mechanisms, and dispute resolution mechanisms play a central role in transforming a river basin from a potential source of conflict into a platform for cooperation. This is precisely the trajectory ASEAN can pursue in positioning the Mekong as a model of sustainable water governance in the Indo-Pacific.

Table 2. Comparative Initiatives in the Mekong Basin.

Initiative	Lead Actor	Focus Areas	Key Projects	Strategic Implications
BRI/MLC	China	Infrastructure, hydropower	Dams, transport corridors	Dependency networks, leverage
LMI/MUSP	United States	Governance, transparency, environment	Capacity building, energy security	Alternative model, multilateralism
AMBDC/ACMECS	ASEAN	Regional cooperation, development	Economic integration projects	Reinforcing ASEAN centrality

Source: Compiled by the authors based on Busbarat [21], Ba [17], and U.S. Mission to ASEAN [15].

4.2. Ecological, Socioeconomic, and Geopolitical Pressures in the Mekong Basin

The Mekong basin faces a convergence of ecological, socioeconomic, and geopolitical challenges that make it one of the most complex regions in Asia. Ecologically, hydropower development is the most pressing concern. Numerous dams constructed upstream by China and downstream by Laos and Cambodia have altered natural flow regimes, disrupted sediment transport, and threatened fisheries that sustain millions of people. Barbarossa and Schmitt [5] emphasise that these projects undermine biodiversity and food security, while Nguyen et al. [4] highlight the difficulty of achieving water governance cooperation when upstream states prioritise national energy needs over regional sustainability. Climate change intensifies these pressures: ris-

ing temperatures, erratic precipitation, and sea-level rise in the Mekong Delta are exacerbating droughts, floods, and saltwater intrusion [23]. The region is experiencing a rapid decline in terrestrial water storage, driven by increasing temperatures, altered precipitation patterns, and heightened evapotranspiration—processes that simultaneously accelerate glacial melt and fundamentally alter upstream hydrological dynamics [24].

Socioeconomic challenges are no less significant. The Mekong sub-region is home to more than 326 million people, 40% of whom are under 25, making it a dynamic but vulnerable labour market [25]. Rapid urbanisation and industrialisation have increased demand for energy and infrastructure, while agriculture's dependence on river flows remains high. The fisheries sector alone contributes approximately USD 17 billion annually to the regional economy [16], yet this resource is increasingly threatened by overexploitation and ecological degradation. The tension between development and sustainability is evident in the continued reliance on hydropower as the primary engine of economic growth, despite its substantial long-term environmental costs.

Geopolitically, the Mekong has become a strategic battleground between China and the United States [26,27]. China's BRI and LMC emphasise infrastructure connectivity, energy projects, and economic integration, yet scholars such as Busbarat [21] and Gong [28] argue that these initiatives simultaneously create dependency networks that enhance Beijing's political leverage. The United States, by contrast, has reinvigorated the LMI and MUSP, focusing on transparency, environmental standards, and multilateral cooperation [15,16].

This parallel competition risks fragmenting ASEAN's unity, as Mekong states align their positions with different external powers, potentially undermining collective governance. ASEAN faces profound internal differentiation: Cambodia and Laos are heavily dependent on Chinese investment, while Vietnam and Thailand remain more receptive to U.S. initiatives. Vietnam actively promoted MUSP as a counterweight to China, leveraging its 2020 ASEAN Chairmanship to elevate Mekong issues—a stance that contrasts sharply with the heavy reliance of Cambodia and Laos on China-built infrastructure [29]. This situation underscores ASEAN's urgent need to strike a careful balance between development and ecological sustainability amid external competition. The basin's environmental vulnerability, the region's socioeconomic dependence on the river, and the ongoing great-power rivalry collectively underscore the importance of multilateral approaches at this juncture—not merely to foster harmony, but to ensure that the Mekong basin remains a space of cooperation rather than confrontation.

One of the most extensively studied ecological consequences of dam construction on the Mekong is the attenuation of the "flood pulse"—the seasonal inundation mechanism that delivers nutrients to floodplains and drives the biological productivity of the system, particularly at Tonle Sap. Recent research confirms that the proliferation of dams has significantly "dampened" this pulse, delayed the onset of the wet season, and fundamentally altered the river's hydrological regime [30]. A direct consequence is downstream sediment starvation: mainstream dams regulate flows and trap suspended sediment that is vital to downstream agriculture, particularly in the Mekong Delta. Geomorphological modelling indicates that, if the full planned dam network were completed, cumulative sediment trapping could reduce historical sediment delivery to the Delta by up to 96% [31]—a finding subsequently confirmed and extended in a policy-oriented article in Science, which identified this sediment deficit as a direct driver of increased land subsidence and coastal erosion in the Vietnamese Mekong Delta [32]. Significantly, two of the first mainstream dams—Xayaburi and Don Sahong—entered commercial operation in 2019 [33], marking the point at which these projected impacts began to materialise in practice rather than remaining model-based projections.

The consequences of sediment starvation are most starkly apparent in extreme saltwater intrusion events. Park et al. [34] document that the 2019–2020 intrusion event was the most severe in a century, with saline water persisting approximately one month longer than average; in the Ham Luong River alone, intrusion reached 71 km inland—surpassing the 2016 record by 11 km. In response, Vietnam's policy prioritising "freshwater over saltwater" to protect rice production has led to the construction of large-scale sluice gate systems—most notably the Ba Lai structure—to seal off river mouths [26]. However, as Tran and Pittock [27] argue, this engineered adaptation to one climate risk has disturbed

the natural hydrological balance: closing off areas of acid sulphate wetlands has interrupted natural salt-flushing mechanisms, generating serious water quality and soil degradation problems [26]. This illustrates a broader trade-off at the heart of the WEFE nexus underscored in this study—an engineering measure designed to address one environmental risk (saltwater intrusion) may generate another (soil and water degradation).

These impacts translate into measurable socioeconomic consequences. Prolonged drought and saltwater intrusion are disrupting traditional agricultural and aquaculture production systems across the Ca Mau Peninsula, particularly in areas transitioning to shrimp–rice, shrimp–forest, industrial shrimp, and coastal fruit-tree farming models; cropping calendars are disrupted, disease risks are elevated, household incomes are reduced, and potable water security is threatened in communities dependent on rainwater or shallow groundwater [35]. The scale of such losses was demonstrated during the 2015–2016 El Niño drought, when approximately 215,445 ha of rice were severely affected by saltwater intrusion, with direct economic losses estimated at approximately VND 7,517 billion (equivalent to approximately USD 337 million at the then-prevailing exchange rate) [36]. These figures illustrate that the ecological impacts described above are far from abstract: they translate directly into economic losses and livelihood risks affecting hundreds of thousands of households—thereby reinforcing the practical case for placing Mekong governance at the centre of ASEAN's policy agenda, rather than treating it as a purely technical matter for individual states to manage in isolation.

4.3. China's and the United States' Strategies in the Mekong Basin

Since 2016, both China and the United States have made significant strategic adjustments in the Mekong basin, reflecting the intensification of U.S.–China strategic competition and the sub-region's growing importance within each power's Indo-Pacific strategy. The two engagement models differ substantially in both form and strategic objective, generating two competing templates of engagement in the region.

China's engagement in the Mekong is primarily channelled through two mutually reinforcing frameworks: the BRI at the global level, and the LMC at the sub-regional level, established in 2015. Unlike the MRC—of which China is not a full member—the LMC positions Beijing at the centre of a "5+1" cooperative mechanism with all Lower Mekong states, enabling China to—as Busbarat [21] observes—institutionalise its leadership role while diminishing the MRC's standing. Financially, the LMC operates through the LMC Special Fund, concentrating resources on infrastructure connectivity, production capacity, and transboundary water resource management. On the ground, China's influence is most visible through the cascade of dams on the Lancang mainstream in Yunnan, which serve not only China's domestic electricity needs but also—as numerous studies have demonstrated—provide Beijing with the capacity to regulate downstream flows, generating a form of "hydrological leverage" over riparian states. Gong [28] has recently analysed how China deploys a "security-development nexus" within the LMC framework, whereby regional security issues—such as combating transboundary crime on the Mekong—are embedded in the water cooperation agenda, thereby extending China's influence into conventional security domains while posing challenges for ASEAN in maintaining its own consensus-based multilateral frameworks.

In terms of investment scale, nearly half of the BRI projects received by ASEAN member states in 2018 were concentrated in the Mekong countries [13], reflecting the high priority Beijing accords to the sub-region. Unlike U.S. engagement, which is typically conditioned on transparency and environmental norms, Chinese projects tend to be bilateral, rapidly disbursed, and subject to fewer requirements for independent environmental impact assessment—a characteristic that helps explain why Cambodia and Laos, the two states most dependent on Chinese capital, are also those most flexible in applying MRC consultation procedures.

U.S. engagement in the Mekong has evolved considerably since 2016, reflecting both the intensification of U.S.–China competition and Washington's broader Indo-Pacific vision. The LMI, launched in 2009, initially focused on governance, education, health, and environmental sustainability; under the Trump and subsequently the Biden administrations, this engagement was reinvigorated and embedded within the Free and Open Indo-Pacific

Strategy. The U.S. Mission to ASEAN [15] reports that the United States allocated more than USD 4.3 billion in development assistance to Mekong-related initiatives over the preceding decade. The establishment of MUSP in 2020 marked a turning point, upgrading the LMI into a more comprehensive framework integrating economic recovery, energy security, transnational crime prevention, and environmental governance [16].

A defining characteristic of the U.S. strategy is its emphasis on transparency, multilateralism, and environmental standards. Unlike China's state-led financing model for dams and highways, LMI projects typically involve collaboration with universities, private firms, and scientific agencies—for instance, partnerships with Intel, Harvard University, and the U.S. Geological Survey to develop innovative solutions for water management and environmental assessment. Financially, during the 2014–2019 period, the COMET programme invested USD 12.3 million in education and training, the CTIP programme allocated USD 35 million to counter-trafficking, and the Asia EDGE initiative (launched in 2018) directed USD 16.3 million toward clean energy projects. In 2020, MUSP announced new funding of USD 156.4 million, comprising USD 52 million for COVID-19 economic recovery, USD 55 million for transnational crime prevention, USD 33 million for energy market development, and USD 6.6 million for infrastructure improvement [15]. In June 2024, USAID signed a direct grant agreement of USD 5 million with the MRC Secretariat to establish a new Mekong Basin Partnership, supporting implementation of the MRC's Basin Development Strategy 2021–2030 [37]. Institutionally, the United States has sought to embed Mekong cooperation within broader multilateral frameworks. The "Friends of the Lower Mekong" (FLM) group, established in 2011, has brought together partners including Japan, South Korea, Australia, the EU, ADB, and the World Bank to support Mekong development. This multilateral orientation contrasts sharply with China's approach through the LMC—a mechanism that positions Beijing's leadership at the centre with limited participation by other actors.

These two engagement models reflect two distinct strategic logics. China prioritises disbursement speed, capital scale, and bilateral relationships, thereby maximising direct influence over individual recipient states. The United States prioritises norm-building, multilateral institutions, and technical cooperation, thereby shaping the "rules of the game" across the region—though at a considerably smaller financial scale. However, as Ba [17] cautions, U.S. engagement remains uneven and far less resourced than China's large-scale infrastructure investment, raising questions about its long-term sustainability and impact. For ASEAN, the coexistence of these two competing models is not merely an external backdrop—as the following section will analyse, it is the direct factor driving divergence among member state positions on Mekong governance.

4.4. ASEAN's Differentiated Responses to Great-Power Engagement

As discussed above, the two engagement models of China and the United States do not operate in a neutral space—they directly shape how ASEAN member states define their positions on Mekong governance, and in doing so pose a significant test of ASEAN's capacity to maintain regional cohesion, balance external influence, and promote sustainable development. Although ASEAN was not established as a water governance institution, the Mekong issue has become central to the organisation's agenda, given that five member states—Cambodia, Laos, Myanmar, Thailand, and Vietnam—are directly dependent on the river for food security, energy, and livelihoods [38]. The ecological health of the Mekong Delta, the basin's fisheries, and agricultural productivity are also linked to regional food supply chains and socioeconomic stability, rendering Mekong governance simultaneously a sub-regional and an ASEAN-wide concern.

It is precisely the structural difference between the two engagement models—one prioritising speed and bilateral capital flows, the other prioritising norms and multilateral institutions—that has generated two distinct interest groups within ASEAN. Cambodia and Laos, heavily dependent on BRI- and LMC-linked infrastructure investment, tend to prioritise maintaining stable bilateral relations with China over strict adherence to MRC's multilateral consultation procedures. By contrast, Vietnam and Thailand, more exposed to the transparency and multilateral norms promoted by LMI/MUSP, tend to place higher value on regional consultation mechanisms. This fragmentation is not accidental or merely historical; to a significant

degree, it is a direct product of the two competing engagement logics analysed above—a causal relationship that much existing ASEAN scholarship treats as self-evident rather than as a finding requiring explanation.

Nevertheless, ASEAN maintains institutional frameworks that can be leveraged to consolidate its role. The ASEAN Mekong Basin Development Cooperation (AMBDC), established in 1996, and ACMECS, launched in 2003, provide platforms for harmonising development priorities and integrating Mekong issues into ASEAN's broader agenda. The ASEAN Outlook on the Indo-Pacific (AOIP) is widely understood as a strategic framework for preserving ASEAN autonomy amid great-power competition: while intensifying U.S.–China rivalry risks eroding ASEAN's capacity, the AOIP was deliberately designed to reaffirm ASEAN's traditional role in leading regional cooperation [38], and to help the organisation move from a formal conception of "centrality" toward substantive strategic autonomy [39].

From an ecological perspective, ASEAN is well positioned to promote environmental sustainability within its broader development initiatives. The Mekong's fisheries, agriculture, and biodiversity are important regional food security assets, but all face pressure from hydropower development, climate change, and unsustainable exploitation [5]. ASEAN can promote sustainable investment by supporting scientific cooperation, strengthening data-sharing mechanisms, and advancing sustainable management policies—including institutional capacity building, the integration of more stringent environmental regulations, and cooperation with international financial institutions such as the ADB and World Bank. Geopolitically, ASEAN needs to learn how to manage Mekong cooperation without being drawn into U.S.–China competition. According to Ba [17] and Phan [29], ASEAN's credibility depends on its ability to maintain a neutral stance while leveraging external support for the common good. ASEAN should play a stabilising role, ensuring that Mekong cooperation contributes to regional integration rather than deepening existing divisions, and positioning itself as a dialogue platform capable of making Mekong cooperation a genuine model of sustainable multilateral governance.

In summary, ASEAN's role and influence in the Mekong basin are twofold. On the one hand, diverging interests among member states—stemming directly from the two competing engagement models of China and the United States—limit ASEAN's collective leverage. On the other hand, ASEAN's institutional capacity allows it to integrate cooperative activities, safeguard ecological security, and respond to the challenges posed by great-power competition. In this sense, the Mekong basin is simultaneously a source of tension to be managed and an opportunity for ASEAN to demonstrate its role in regional governance and sustainable development.

4.5. Institutional Asymmetry and ASEAN Centrality: The Funan Techo Canal Case

The Mekong basin exemplifies the complex interlinkages among water, energy, food, and the environment, making it a critical case for sustainable development in Southeast Asia. The intensifying strategic competition between China and the United States has heightened pressure on ASEAN to balance external influences while safeguarding ecological integrity and regional cohesion. This section examines these implications in greater depth through a case that integrates the institutional, ecological, and geopolitical dimensions discussed in the preceding sections.

Institutionally, the MRC—established in 1995—has provided a dialogue platform but remains constrained by weak enforcement capacity and voluntary compliance mechanisms. China's status as a non-full member further diminishes the organisation's effectiveness, leaving downstream states vulnerable to upstream unilateral action. Hossen et al. [40] argues that the MRC's inability to constrain dam construction reflects a structural weakness in regional governance. A central critique of the 1995 Mekong Agreement is that, while nominally promoting equitable resource use, it lacks the enforcement mechanisms necessary to realise the principle of "substantive benefit-sharing" [40]. In practice, this generates a form of "power asymmetry" in which downstream states cannot effectively challenge upstream unilateral dam-building projects.

The Funan Techo Canal case in Cambodia provides a concrete illustration of this institutional vulnerability, while simultaneously demonstrating how the institutional, ecological, and geopolitical dimensions interact within a specific event. Institutionally, the project was classified by Cambodia as a "tributary" project under the 1995 Agree-

ment—a classification that exempted it from the Prior Notification, Prior Consultation, and Agreement (PNPCA) procedure mandatory for "mainstream" projects. Construction commenced in August 2024, before independent environmental impact assessments had been completed or shared, rendering the procedural safeguards formal rather than substantive [41]. By April 2025, the MRC Secretariat confirmed that it had received only "basic information" from Cambodia and formally requested a detailed feasibility study and associated assessments to enable basin-wide impact review. Shortly after this request—and shortly after Chinese President Xi Jinping's state visit to Cambodia in mid-April 2025 to finalise the USD 1.156 billion investment by Chinese state-owned enterprise CCCC in the project—the Cambodian National Mekong Committee (CNMC) issued a communiqué indicating it was "working closely with specialised organisations to assess the feasibility of providing additional documentation" as required under the PNPCA [42].

Ecologically, the project's actual impact on dry-season flows in the Mekong Delta remains unresolved—and it is precisely this lack of transparency that is the source of deep concern for Vietnam, the furthest downstream state and the one most dependent on stable Mekong flows for agriculture and food security [43]. Geopolitically, the project has unfolded against the backdrop of a visible erosion of Vietnam's capacity to maintain a united downstream front—alongside Cambodia and Laos—to counterbalance China's upstream dam construction. Cambodia's continued pursuit of the project notwithstanding Vietnam's deep concerns is a clear manifestation of this trend.

This context is rendered sharper when juxtaposed against a near-simultaneous geopolitical development: in September 2024, Cambodian Prime Minister Hun Manet announced Cambodia's unilateral withdrawal from the Cambodia–Laos–Vietnam Development Triangle Area (CLV-DTA)—a mechanism established in 1999 to promote economic development in border regions, coordinate regional infrastructure, and manage transboundary natural resources among the three countries. The decision came in the wake of domestic protests rooted in historical land and sovereignty concerns with Vietnam, and created a significant "geopolitical vacuum" in the sub-region [44]. From that point through 2026, intra-regional capital flows to the provinces of Kratie, Stung Treng, Ratanakiri, and Mondulkiri—previously within the CLV-DTA footprint—have been largely supplanted by Chinese firms and business alliances, signalling a reorientation of the sub-region's economic trajectory from intra-bloc arrangements toward dependency on external capital.

Taken together, the Funan Techo Canal episode and the collapse of the CLV-DTA carry important implications for ASEAN centrality: if ASEAN—through the sub-regional mechanisms established by its own member states (CLV-DTA) and through a broader regional mechanism (MRC/PNPCA)—cannot effectively coordinate even within mainland Southeast Asia, then ASEAN's capacity to serve as a neutral convener between China and the United States at the basin-wide level will be correspondingly tenuous. For decades following the Indochina Wars, Vietnam occupied the role of "elder brother" to Laos and Cambodia; however, China's BRI has substantially displaced Vietnam as the primary economic patron in both countries [29]. Against this backdrop, Chapman's [45] analysis—building on Vuving's [46] characterisation of these dynamics as the "greatest geopolitical vortex" in Vietnam's international environment—generalises Vietnam's pursuit of "strategic autonomy" through managing dependencies, seeking alternatives to them, and enhancing internal capacities, as an adaptive national-level response to precisely the erosion of sub-regional multilateral mechanisms analysed here. This suggests that, in the absence of sufficiently robust regional mechanisms, ASEAN member states tend to revert to bilateral or great-power balancing strategies at the national level—a tendency that may continue to undermine the collective cohesion ASEAN requires to sustain its central role.

The Funan Techo Canal case and the CLV-DTA's collapse are not isolated events; they reflect a deeper structural feature of the Mekong basin: China's position as the uppermost upstream state confers on it a "hydro-hegemonic" role, permitting national priorities—particularly hydropower revenue—to be placed above the ecological and social needs of downstream states such as Cambodia and Vietnam [47]. Political ecology scholarship shows that development costs—such as fisheries degradation and agricultural land loss—are typically "locally borne" by downstream communities, while economic benefits are

"nationally concentrated" or exported to meet urban energy demand [48]. The concept of "hydrosocial rupture" describes how accumulated development pressures and capital-driven processes have restructured human–water relationships, generating transboundary social and environmental consequences that render traditional adaptive practices inadequate [49]. A concrete manifestation of this rupture is a paradox observed at some downstream sites: large upstream dams store water during the wet season and release it during the dry season for power generation, so measured dry-season flow volumes at some downstream points are actually higher than previously; yet, due to severe riverbed incision from sand mining and sediment loss, actual water levels in the river channel are lower than traditional reference points (riverbanks, customary fishing depths). The result is that local people perceive "less water," even though raw discharge data do not indicate this—demonstrating that single technical indicators cannot adequately capture the lived experience of riparian communities.

These dynamics clarify why single technical solutions—such as constructing additional salt-blocking sluices or adjusting cropping calendars—cannot comprehensively resolve the underlying problem: the core challenge lies in institutional asymmetry between upstream and downstream states, not merely in hydrological parameters. This is precisely why lessons from other transboundary basins carry significant value. The Nile illustrates the consequences of the absence of a binding legal framework: Ethiopia's construction of the Grand Ethiopian Renaissance Dam has generated prolonged tensions with Egypt and Sudan, demonstrating that non-binding arrangements are insufficient to prevent upstream unilateral action—a situation bearing clear parallels to China's position on the Mekong mainstream. The Danube, by contrast, shows the value of robust multilateral institutions: the ICPDR has established relatively effective mechanisms for data sharing, ecological protection, and dispute resolution, demonstrating that with sufficiently strong and transparent regional institutions, a river basin can transition from a potential source of conflict to a platform for cooperation. The Indus, through the Indus Waters Treaty, demonstrates the feasibility of sustaining a legally binding water-sharing agreement despite prolonged political tensions between its signatories—suggesting that durable arrangements remain achievable for the Mekong, notwithstanding the complexity of inter-state relations.

Three transferable lessons emerge from these cases. First, institutional designs incorporating binding mechanisms—even minimally—can deter unilateral actions that threaten shared resources, as the contrast between the Nile (non-binding) and Indus (binding) cases illustrates. Second, transparency in decision-making and data sharing—as exemplified by the ICPDR model on the Danube—builds trust and can shift inter-state relations from competition to cooperation. Third, the engagement of local communities in governance is essential for mechanisms to be effective and sustainable in practice; the Amazon basin, with its approach linking environmental protection to indigenous community rights, provides an additional reference point in this regard.

On the basis of this analysis, the study proposes four concrete pathways for ASEAN to place sustainability at the centre of Mekong governance. First, ASEAN should clarify and narrow the ambiguity in the "tributary" and "mainstream" classification under the 1995 Agreement—it is precisely this ambiguity that allowed the Funan Techo Canal to circumvent PNPCA procedures, and if left unresolved, similar cases are likely to recur. Second, restoring or establishing a new sub-regional coordination mechanism to fill the void left by the CLV-DTA collapse could enable the three downstream states to maintain a minimum dialogue platform on transboundary resource issues, independent of each country's bilateral relations with external powers. Third, strengthening independent monitoring capacity—including through available remote sensing technologies—could help address the current data deficit that renders environmental impact assessments largely formal rather than substantive. Finally, embedding transparency and environmental norms—a strength of the U.S. approach—into ASEAN-led frameworks, while maintaining substantive economic relations with China, could enable ASEAN to leverage the benefits of both engagement models without having to choose between them.

5. Conclusions

This article has analysed the Mekong basin as a space in which ecological sustainability, socioeconomic development, and great-power strategic competition are

tightly intertwined, rather than constituting three separate domains as much prior scholarship has assumed. By contrasting China's and the United States' engagement models, examining internal ASEAN fragmentation, and—above all—through the Funan Techo Canal case and the CLV-DTA's collapse, the study demonstrates that the challenges of Mekong water governance cannot be resolved by technical measures alone. These challenges are rooted in structural institutional asymmetries between upstream and downstream states, asymmetries that are further amplified by geopolitical competition.

For ASEAN, the implication is clear: the organisation's central role in Mekong governance cannot be sustained through formal declarations or formulaic calls for "enhanced cooperation" alone. ASEAN should prioritise three concrete lines of action: clarifying project classification criteria under the Mekong Agreement to limit the ability to circumvent consultation procedures; establishing a new sub-regional coordination mechanism to fill the void left by the CLV-DTA, independent of each member state's bilateral relations with external powers; and strengthening independent, data-driven monitoring capacity to reduce information asymmetry—which underpins many current disputes.

At the same time, the simultaneous presence of two engagement models from China and the United States need not be solely constraining for ASEAN. If managed proactively, ASEAN can leverage the capital and implementation speed associated with Chinese-led initiatives, while absorbing the transparency and environmental norms promoted through U.S.-led initiatives—channelling great-power competition into a form of "normative competition" that benefits the region, rather than becoming a source of internal division.

Future research should prioritise field-based studies to quantify the impacts of specific projects such as the Funan Techo Canal after its completion, thereby empirically testing assumptions that currently rely heavily on indirect data. Tracking whether and how the CLV countries develop alternative sub-regional coordination mechanisms in the coming years will also serve as an important indicator of whether ASEAN can translate a formal conception of centrality into substantive coordinating capacity. If ASEAN can meet this test, the Mekong basin could become a reference model for transboundary water governance in the Indo-Pacific region.

Author Contributions

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Data Availability Statement

The data supporting the findings of this study are derived from publicly available sources, including official documents from the Mekong River Commission, ASEAN, the U.S. Mission to ASEAN, and peer-reviewed publications cited in the reference list. No new primary datasets were generated in the course of this research.

Conflicts of Interest

There is no conflict of interest

AI Use Statement

During the preparation of this manuscript, the authors used Copilot solely for language refinement. No AI

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