



The Impact of Chinese Dam Construction on the Mekong Downstream: Implications for Vietnam

By Ryan CLARKE and Edward PARK

The growing number of dams in the Mekong River in Yunnan province has drawn increasing attention from China's ASEAN downstream neighbours (see **Figure 1**). China's dam construction, combined with a perceived lack of communication with downstream Mekong countries, has raised concerns regarding acute water stress.

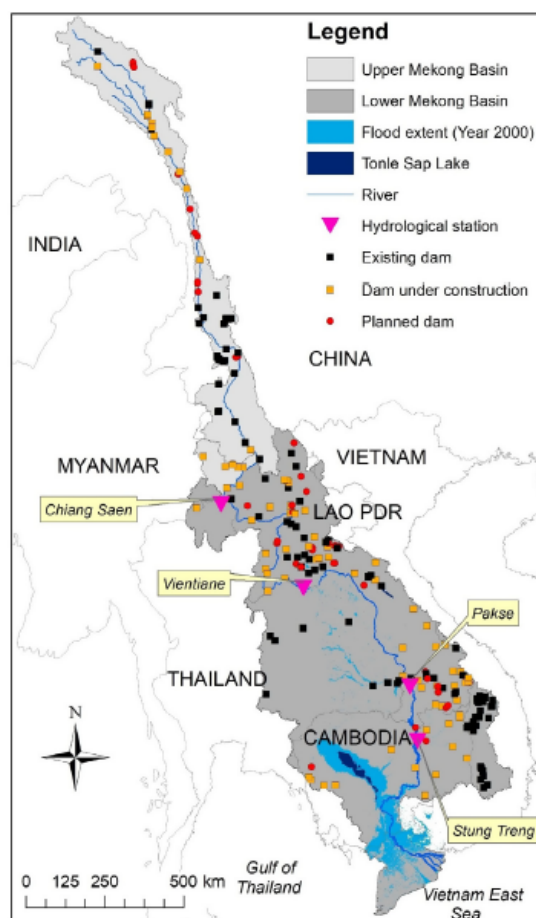
Recent research shows that only about 17% of the Mekong's water (or mean annual discharge) originates from China. The remainder of the Mekong's water supply comes from surface water (rivers, lakes and reservoirs), groundwater and precipitation within downstream Southeast Asian countries.¹

Nonetheless, downstream Mekong countries such as Laos, Cambodia and Vietnam continue to experience periodic water stress, with Vietnam experiencing the most acute effects that can sometimes be severe enough to cause substantial agricultural and aquacultural damage. The likely explanation for the shortage is the poorly coordinated dam construction and operation schemes within these downstream Mekong countries, and the poorly structured water sharing agreements between key downstream nations.² This represents an intra-ASEAN challenge that

¹ For example, see Wang, Y, Feng, L, Liu, J, Hou, X and Chen, D. (2020). "Changes of Inundation Area and Water Turbidity of Tonle Sap Lake: Responses to Climate Changes or Upstream Dam Construction?" *Environmental Research Letters*, 15(9), 0940a1.

has some directly executable remedies provided that there is political will and focus to achieve them.

FIGURE 1 GEOGRAPHIC DISTRIBUTION OF DAMS ON THE MEKONG RIVER



Source: Hecht, J S, Lacombe, G, Arias, M E, Dang, T D and Piman, T. (2019). "Hydropower Dams of the Mekong River Basin: A Review of Their Hydrological Impacts". *Journal of Hydrology*, 568, 285-300.

THE MORE CRITICAL PROBLEM THAN WATER SUPPLY IS BLOCKAGE OF RIVER SEDIMENT FLOW: IMPLICATIONS FOR SOUTHWESTERN VIETNAM

While Chinese dams have a negligible impact on the downstream *water* flow of the Mekong, they have blocked over 90% of downstream river *sediment* flow. This is generating a major problem for Vietnam, particularly in the southwest Vietnamese Mekong Delta (VMD) region. VMD is not a natural extension of the continental shelf, but the result of a gradual build-up of deposited river sediment from the Mekong.

This sub-region of Vietnam is one of the largest food baskets of Southeast Asia and a major node for the regional food supply. The region is now experiencing increasing frequencies of soil salinisation as well as degradation (or even collapse) of natural water management and

² Yuan, L, He, W, Liao, Z, Degefu, D M, An, M, Zhang, Z and Wu, X. (2019), "Allocating Water in the Mekong River Basin during the Dry Season". *Water*, 11, 400. <https://doi.org/10.3390/w11020400>, accessed 29 November 2022.

flood control measures. There have even been recent cases of physical infrastructure degradation and/or collapse on the account of sinking.³

Vietnam finds itself in a challenging strategic situation. At the present state, the southwestern segment of its territory which is responsible for a substantial portion of rice production and fish farming (39,000 and 249,000 hectares, respectively) is projected to gradually disappear due to climate change-induced sea level rise, hydropower dam development upstream and extensive dike constructions.⁴ These resource-driven pressures will have a material impact across multiple layers of the Vietnamese economy and, by extension, its political system. It also has the potential of altering the country's geostrategic position as it is a major rice exporter.

Current trends could render a key strategic sub-region of Vietnam nearly inoperable. Vietnam would also find it difficult to obtain civil remedies through Chinese mechanisms, especially considering that the dams in question are already constructed and operational.

Vietnam faces an additional challenge in that these developments are not dramatic like the abrupt cut-off or severe curtailment of water supply. The cutting off of downstream river sediment flow and its gradual but eventually geologically catastrophic impact do not generate the same type of immediate attention due to the complex geology of Vietnam and other Southeast Asian nations that have territories which require continuous river sediment flows to maintain. Some of such areas are also responsible for critical agricultural production. This represents an acute risk exposure that appears to be underappreciated in the region.

REGIONAL/DOMESTIC VIETNAMESE OPTIONS FOR RISK MITIGATION

Overall, there are four main environmental factors that are driving sinking in the VMD:

- upstream Chinese dams;
- climate change-driven sea level rise;
- land subsidence largely due to excessive groundwater pumping; and
- riverbed sand mining

These four pressures not only present various dynamics in localised time and space, but also generate impacts at varying scales. Climate change is a 'global' issue that an individual nation cannot address. Impacts of upstream dams also cannot be resolved/controlled by Vietnam – this is a 'regional' issue and the transboundary nature of the Mekong makes the situation complex.

However, the other two factors (land subsidence and sand mining) that also contribute to the sinking of VMD can be directly addressed within Vietnam's own borders without requiring regional coordination. These are two key domain areas to observe and assess in order to determine the best modalities for in-country solutions to be implemented.

³ Ibid.

Please also see Hecht, J S, Lacombe, G, Arias, M E, Dang, T D and Piman, T. (2019). "Hydropower Dams of the Mekong River Basin: A Review of Their Hydrological Impacts". *Journal of Hydrology*, 568, 285-300.

Latrubesse, E M, Park, E, Sieh, K, Dang, T, Lin, Y N and Yun, S H. (2020). "Dam Failure and a Catastrophic Flood in the Mekong Basin (Bolaven Plateau), Southern Laos, 2018". *Geomorphology*, 362, 107221.

⁴ Triet, NVK, Dung, NV, Hoang, LP, Duy, N Le, Tran, DD, Anh, TT, Kumm, M, Merz, B and Apel, H. (2020). "Future Projections of Flood Dynamics in the Vietnamese Mekong Delta", *Science of the Total Environment*. 742, 140596. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2020.140596>, accessed 29 November 2022.

EAI COMMENTARY

The Mekong River Commission (MRC) is the primary inter-governmental that is the most actively involved in managing transboundary water issues along the Mekong. However, China is not a member of the MRC and this is unlikely to change. If China were to become a member of the MRC, it could find itself ‘surrounded’ by downstream Southeast Asian nations who have substantial complaints regarding sediment and (to a lesser extent) water flow disruption that are directly attributable to Chinese dams.

NEAR-TERM TRAJECTORIES

While Vietnam is unlikely to be successful in unblocking the flow of river sediment from the Chinese segment of the Mekong, there are several engineering solutions including increasing floodplain restoration capacity and artificial freshwater reservoir construction along the main river. These would enable Vietnam to stabilise the VMD, protect critical agricultural/aquacultural assets and ensure the environment remains habitable for its residents. The Vietnamese government can also more effectively manage and regulate two key interlinked local-scale factors of land subsidence and sand mining.

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