



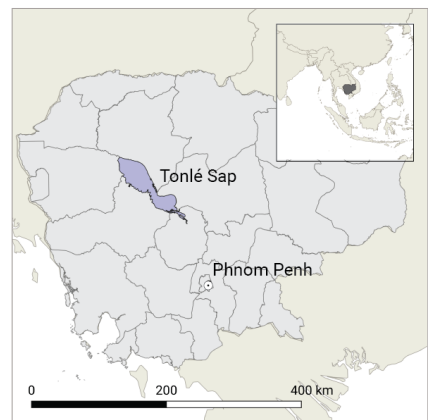
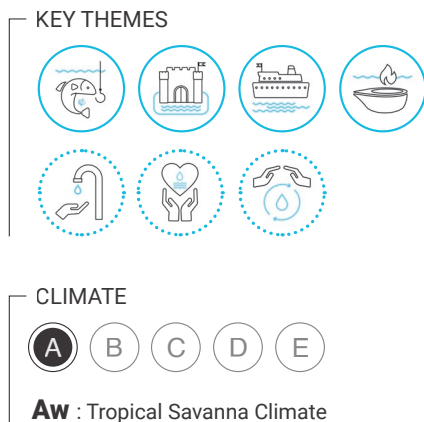
# The Floating Urbanism of Cambodia's Tonlé Sap

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*For decades, the floating villages of Tonlé Sap, a lake in Cambodia, have demonstrated ingenuity by necessity and adaptability to the seasonal rhythms of nature. The villages are examples of ephemeral, floating urbanism, a response to discriminatory land tenure practices that is able to adjust to ever-increasing fluctuations in water levels exacerbated by global warming. The villages' Indigenous knowledge systems and practices (IKSP) display a distinct intelligence, in which water-based modes of living and livelihoods are connected with a resourceful understanding and use of locational assets. Conducting intensive fieldwork by boat and living in the floating villages for ten days in August 2023, the authors gained knowledge of local expertise through observation and informal interviews. They documented livelihoods and modes of settlement that suggest a pause in the neo-liberal market-driven globalism sweeping Cambodia. Here they relate their research to existing literature and studies (primarily ethnographic and policy-oriented) of the region's unique monsoon culture of floating villages with a culturally specific identity that combines hierarchy and heterarchy.*

**Keywords:** Indigenous knowledge systems and practices (IKSP), gallery forests, fishing settlements, wetness, heterarchy



< Fig.1 Clustered settlement in wetland ecotones, Kandieng (Source: Bruno De Meulder and Kelly Shannon, 2023).

### Seasonal Gradients of Wetness

The Tonlé Sap, the largest lake and wetland complex in Southeast Asia, lies in the central Cambodian plains. It is part of the vast Mekong Delta system and is often referred to as the delta's "beating heart." It is a natural flood-water reservoir, which provides protection from flooding in the wet southwest monsoon season (May–October) and ensures dry season flows (November–April) to vast areas downstream. It is renowned for a remarkable phenomenon: during the monsoon season the massively increased flows from the Mekong reverse the direction of the Tonlé Sap River and the lake's coverage expands from 2,300 to 15,000 square km and from a depth of 1.44 to 10.3 m (Kummu 2009, 1415). The distance of the maximum and minimum waterlines is approximately 10 km, although "waterline" is a relative term since the edge of the lake is a subtle gradation of wetness – from wetlands to reed beds to gallery forests to mud to sediment-heavy water – that stretches for many additional kilometers and continually moves back and forth (Evans 2002, 8; fig. 2). In and around the lake, displaced Vietnamese and Khmer fishing communities live in villages called *kompong* ("landing place" in Malay) (fig. 1). They operate as constellations and are interdependent through trade with rice-growing villages situated on slightly higher ground.

Settlements and productive landscapes on and around the lake were initially developed using Indigenous knowledge systems and practices (IKSP), which persist in numerous floating fishing villages. Throughout the settlements, there are rituals and beliefs known as *neak ta*. *Ktom neak ta* (spirit houses) are considered the physical embodiment or nesting places of negotiation between humans and the wild and between land and water. They are strategically located in relation to water and forests. The spirit houses,

always on stilts, are usually accompanied by one or several trees and not only protect the community and fishermen from the dangerous waters of Tonlé Sap, but also serve as navigational beacons (hence their common location where the river mouth meets the lake during the dry season). Today there are also mobile telephone antennas.

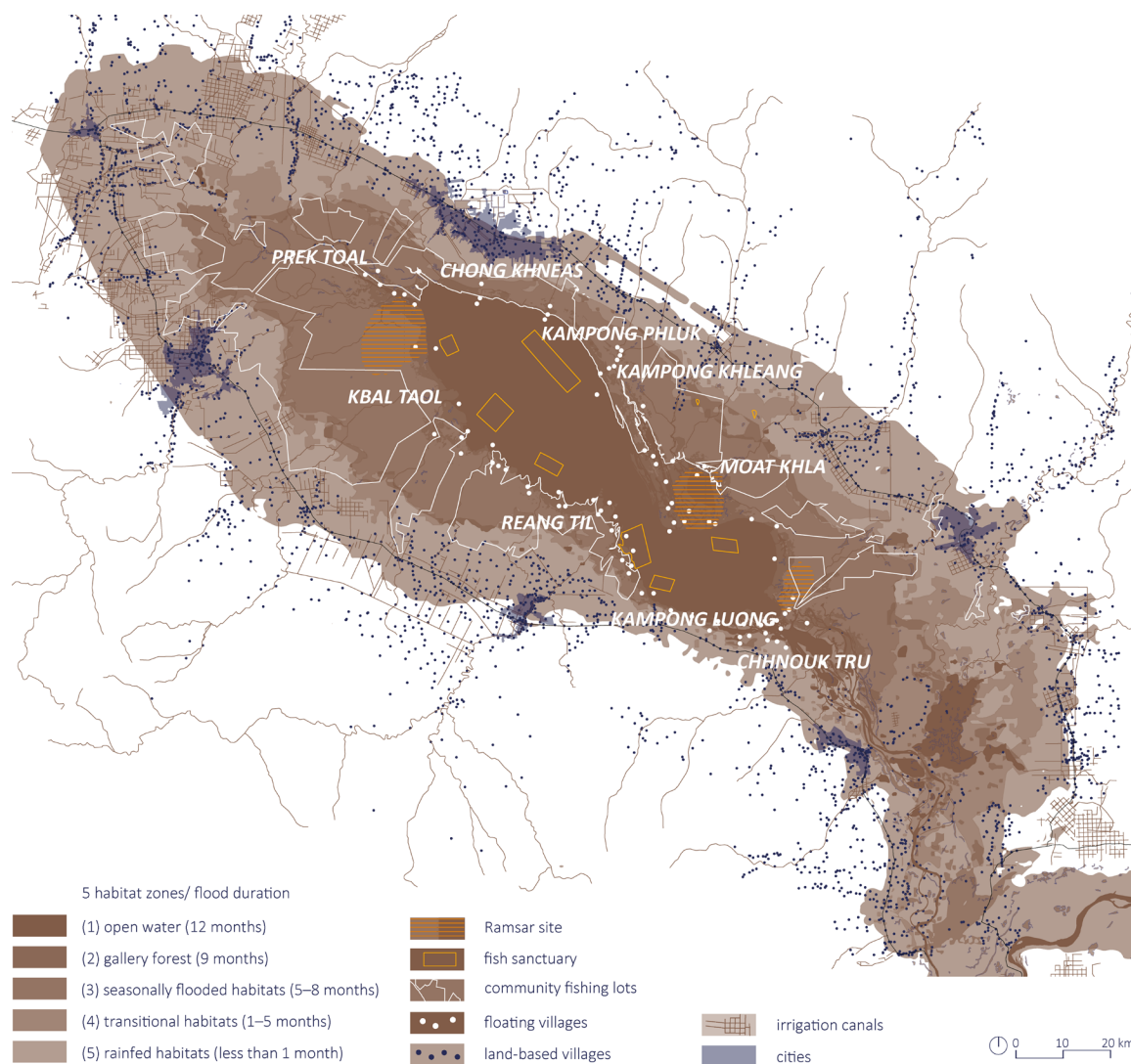
The depth of the lake and the ecology of the plains to the east and west of the lake vary significantly due to the geological evolution and sedimentation of the territory (Carbonnel 1972; Molyvann 2003). The Tonlé Sap Lake was long considered a backwater swamp connected to the Mekong River via the Tonlé Sap River. The area southeast of the lake has accumulated massive amounts of sediment over millennia, resulting in the expansive and connective hydrology of the Mekong Delta since the Holocene.

The lake (and the entirety of the delta system) is facing dramatic changes and threats, particularly concerning its ecological health and biodiversity, and these are severely affecting the inhabitants. Water flows are being disrupted by aggressive dam-building upstream and by the construction of irrigation schemes (with large embankments and reservoirs), buildings and roads. Along with the consequences of global warming such as increasing atmospheric and water temperatures, frequency of extreme weather events and variability of rainfall (Nuorteva et al. 2010), changes in the hydrology of the Lower Mekong Basin are wreaking havoc on the annual flood pulse, adversely affecting fish migration and floodplain habitats. Meanwhile, local inhabitants who live in permanently floating villages on the lake and Tonlé Sap tributaries are caught in a dilemma. On the one hand, socioeconomic development has led to livelihood diversification (people have moved away from

relying only on subsistence fishing) and access to social services. On the other hand, entire villages are at risk of disappearing altogether as trapped sediment upstream results in a loss of fertility, which undermines fish and farming livelihoods, and flooded forests are predicted to become permanently inundated (and die).

The sociocultural constructs of the floating villages and the lake’s stilt villages are existentially threatened. An entire water-based cultural herit-

age is in jeopardy. Most worrying is an enormous new “smart” Cambodian-Chinese project of the Danong Agricultural Development Group, which promises to transform many parts of the Tonlé Sap floodplain into a “Fish and Rice Corridor,” through an infrastructure investment of \$12.7 billion, and to include “agro-industrial management and operations” on 750,000 ha of land in four of the lake’s provinces (Battambang, Pursat, Siem Reap and Kampong Thom) (Socheata 2023). In pursuit of specific investor interests,



^ Fig. 2 Tonlé Sap ecologies, water landscape systems, floating villages and nearby land-based settlements (Source: RUA, 2021. Based on Open Development Cambodia and other national databases).

this project of “agro-industrial management and operations” mirrors policies of the French colonial regime (1863–1954). As a result, local heritage values and traditional water management practices will be greatly changed, as they have previously, or they will cease to exist.

### Shifting Morphology and Floating Typologies

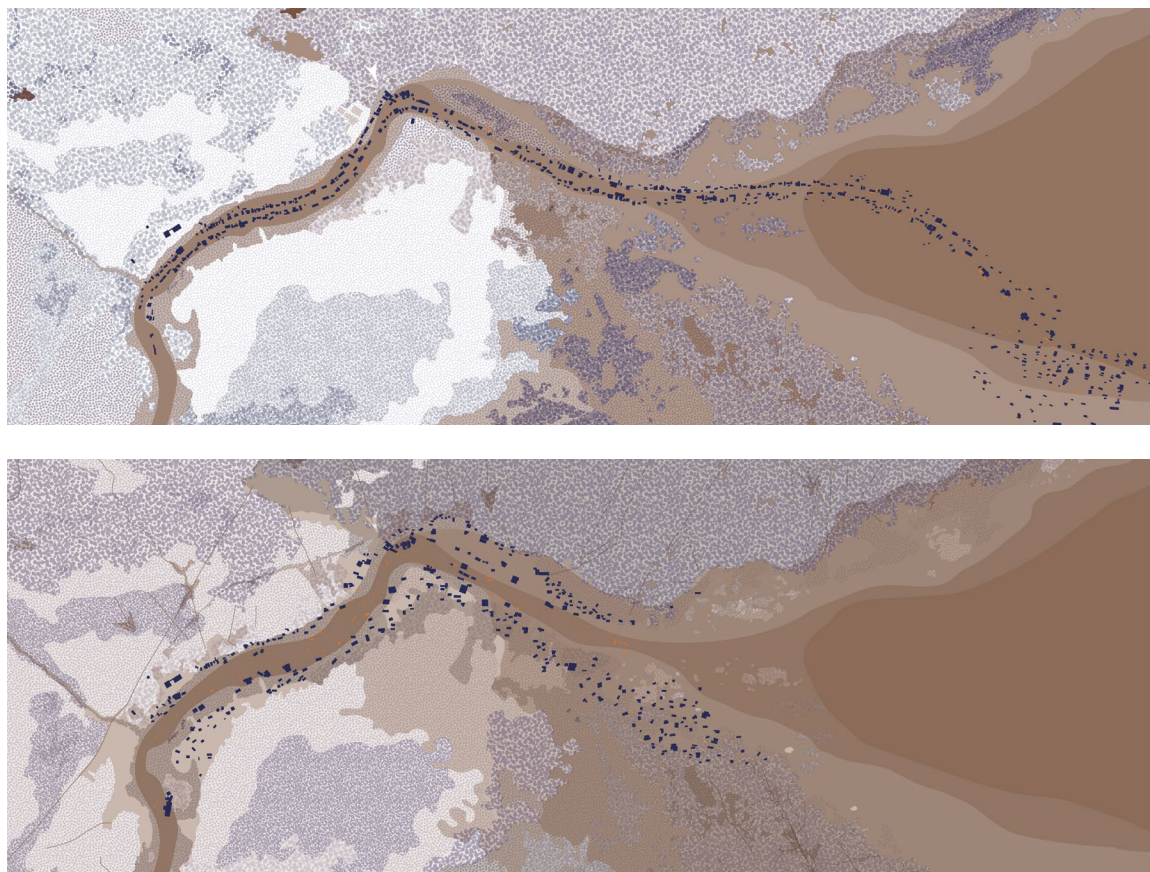
It has been speculated that the movement of trade goods across the lake and accompanying ancient ports and settlements has existed since Angkorian times (802–1431 AD) (Pottier et al. 2012). Floating settlements developed as a result of the French colonial system of fishing lots (primarily operated by Vietnamese) and expanded with Chinese-owned commercial fish lots (Gottesman 2004). Although fish lots have subsequently been outlawed, numerous floating villages engaged in subsistence fishing survive. Since their establishment, the floating villages of the Tonlé Sap – ranging from a few to hundreds of families – shift locations in response to changing water levels.

The floating villages have been through numerous iterations of colonial and postcolonial policies and programs, all paralleled by subversive, non-planned forms of self-organization, while residents adeptly exploit the region’s environmental idiosyncrasies. The villages are “outside” of government planning systems and the configurations of both their buildings and their fish nets are reflective of local customs. They are often out of reach of authorities and survive “under the radar.” The IKSP has developed in this context.

As Tijen Roshko (2011) explains and as we observed during our fieldwork, entire villages typically move three to six times annually, either into the lake or retreating to river mouths. In the

dry season, the villages are loosely dispersed in the lake, with fishing occurring in and along the shores of the lake and streams as well as along the edge of protected natural areas. In the wet season, the villages retreat further and further into local tributaries to avoid the danger posed by storms and waves on the open water. The villages have a compact morphology and fishing takes place in all areas where the water is high enough, including in the flooded habitats of grasslands, shrublands and gallery forests.

The villages that are collectively known as *Prek Toal*, at the mouth of the Sangkae River in the northwesternmost area of the lake, exemplify these seasonal movements. The area is simultaneously part of one of three core protected areas (the other two being Boeung Tonlé Chhmar and Strung Sen) of the one declared in 2001, UNESCO Tonlé Sap Biosphere Reserve and one of the lake’s most intensive fishing areas (Sithirith 2011). During the dry season, *Prek Toal* extends linearly into the lake and culminates with an egg-shaped concentration favoring the southwestern shore. The string of settlement begins in the west, in the river close to a *wat* (Khmer temple) and school – both on tall stilts and nestled into the gallery forest. Rhythmically spaced houses, aligned with the direction of the river’s flow, are punctuated by larger clusters with commercial functions. There is a concentration of larger houses in the river’s bend and mouth. A church, pulled out deep into the lake with the village, marks the point where the linear arrangement, which defines a water highway, dissolves into a dispersed pattern. During the wet season, the floating houses retreat into vegetally protected wetlands and into the river. The string of houses and commercial structures is more condensed and almost all the houses anchor along the riverside, following the tree line. Commerce remains in the more open water of the river to take advantage of passing traffic. At



^ Fig. 3 Seasonal migration. *Kbal Taol* villages in the dry season (above, March 2017) and wet season (below, January 2014) (Source: RUA, 2021, based on Google Earth Pro imagery).

the river mouth, clearings in the gallery forest accommodate clusters of houses (fig. 3).

Other villages, such as the one in Kampong Khneas (in the mid-section of the western shore), migrate less dramatically within a river mouth at the edge of a flooded forest. In the wet season, houses cluster around trees, to which they are fastened with a rope. Some households have an additional platform adjacent to the house that they use for work and today many houses are equipped with solar panels. Commerce and services, recognizable by the size of the platform, align one trajectory of the main water route (fig. 4).

### Hierarchy and Heterarchy

The morphology of the floating villages is both hierarchical and heterarchical. It is based on customs and beliefs but also adjusts to the seasons and water flows. Village alignment follows social rules, with different ethnic groups (Khmer, Vietnamese, Chinese and Cham) tending to cluster near their respective wats, churches, temples and mosques. In Khmer settlements, the material wealth of a house has been considered secondary to “the location of a residence and its proximity to sacred sites (which) acted as more significant indicators of power and status” (Edwards 2007, 43). Houses are grouped together, with

extended families tethering their floating houses to one another. Near these family clusters, you can often find small-scale fish or crocodile farms, floating animal pens and work surfaces as well as bamboo or vegetal fenced enclosures. The family's fleet of fishing boats and canoes is also typically located nearby. The floating houses are built on wooden platforms and kept buoyant with steel barrels, large ceramic vessels and bundles of plastic bottles. They usually have an open veranda at the front and cooking and toilet/shower facilities at the back. There are also inhabited boat typologies, with a variety of sizes all of which combine living spaces with that of net and fish storage. The quality of building materials and craftsmanship varies from house to house, but they are primarily post-and-beam constructions made of wood, bamboo and other lightweight materials that allow easy mobility. The houses range in size from 3 to 8 meters wide and 6 to 20 meters long (Sithirith 2007, 8).

The largest floating settlement in the lake, Kampong Luong, reveals a wet season ordering sys-

tem. A double row of larger houses with commercial areas (shops, tailors, mechanics and barbers) align to form a busy water highway that starts in the estuary and extends into the lake. In this line of housing, there is no ethnic differentiation. Behind this area, there is an ethnically grouped heterarchical assembly of house clusters that fit within a creek and lake following minimal rules of neighborliness, such as keeping a respectful distance and leaving passage. On opposite edges of the lake, two towers mark the river for navigation purposes and connect the village to the outside world: each tower is a *neak ta*, a treehouse for the spirit world, and a mobile phone antenna for twenty-first century communication (fig. 5).

Along the northeastern shore of the lake and along the Strung Sen River, there is another settlement pattern characterized by clusters of floating houses that form Indigenous "water squares." There are two rows of buildings along each shore. The first is nestled in low-lying scrub and trees along the shore, the area with



^ Fig. 4 Settling in the river mouth and among trees, Kampong Khneas (Source: Bruno De Meulder and Kelly Shannon, 2023).



^ Fig. 5 Settling in the river mouth and among trees, Kampong Khneas (Source: Bruno De Meulder and Kelly Shannon, 2023).



^ Fig. 6 A system of water squares, Kamong Svay (Source: Bruno De Meulder and Kelly Shannon, 2023).



the most abundant vegetation. Between the houses and the scrub, you can find large stocks of big ceramic vessels that are used as floats for the houses. A smattering of clearings host vegetable gardens. The second row of houses, often accompanied by small functional buildings such as workspaces, fish cages and occasional floating gardens, is positioned closer to the center of the river. This configuration results in a rhythm of water squares, which are often defined by extended family clusters. There is a hierarchy among these squares, with the largest marked by tall stilt buildings such as the wat and school and the largest houses of the village (fig. 6).

### Valuing Indigenous Knowledge Systems and Practices (IKSP)

In the past decade, the Cambodian government has increased regulations for the use of common pool resources, primarily in response to overfishing and to protect biodiversity. One downside of these policies has been extreme inequality in access rights and other privileges that have been enforced by extractivist (neo-) liberal policies since the late nineteenth century. These inequalities are expanding in scope and scale as a result of planned Chinese investments. It is uncertain whether the floating villages, which form a marginal world between the formal and informal, legal and illegal, and on and off the map, can withstand another round of regulatory impositions and survive with their resilient self-organization in the lake's margins. The growing recognition, lived realities and the reinvigoration of IKSP in many parts of the globe highlight the urgent need for alternative approaches to human settlement and engagement with the world. In particular, there is a need for approaches that are attuned to context-specific assets and limitations. IKSP offers a *leitbild*

with the double meaning of this German notion: a guiding image (as in a policy strategy or governance model) as well as a mission statement (the vision that defines actions, plans and programs) (De Meulder and Shannon 2022).

### Policy Recommendations

- IKSP, as living heritage that is not nostalgic, reveals possibilities of settling with nature. New development such as irrigation schemes, transportation infrastructure and settlement/productive systems in the monsoon regime of Cambodia can benefit from a nuanced understanding of IKSP, which offers guidelines for where (and where *not*) to develop based on the wisdom of age-old systems of environmental stewardship that continuously adapt to changing conditions. IKSP offers an inspirational opening to renewed forms of environmental ethics and responsibility for healing massive disturbances of human and non-human habitats. A deep understanding of the floating village's culture of hierarchy and heterarchy could aid Cambodia's government in its pursuit of sustainable development in light of SDGs 11,13,14 and 15.

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## References

- Carbonnel, Jean-Pierre. 1972. *Le quaternaire Cambodgien, structure et stratigraphie* [The Cambodian quaternary, structure and stratigraphy]. Paris: Mémoire Orstom.
- De Meulder, Bruno, and Kelly Shannon. 2022. "Cambodia's Tonlé Sap Lake: Iterating between Disruptive Water Engineering and TEK." *Landscape Architecture* 29, no. 2: 12–25. <https://doi.org/10.14085/j.fjyl.2022.02.0012.14>.
- Edwards, Penny. 2007. *Cambodge: The Cultivation of a Nation, 1860–1945*. Honolulu: University of Hawai'i Press.
- Evans, Damian. 2002. "Pixels, Ponds and People: Urban Form at Angkor from Radar Imaging." Honors thesis, University of Sydney.
- Gottesman, Evan. 2004. *Cambodia after the Khmer Rouge: Inside the Politics of Nation Building*. Chiang Mai: Silkworm Books.
- Kummu, Matti. 2009. "Water Management in Angkor: Human Impacts on Hydrology and Sediment Transport." *Journal of Environmental Management* 90, 1413–21.
- Molyvann, Vann. 2003. *Modern Khmer Cities*. Phnom Penh: Reyum Publishing.
- Nuorteva, Paula, Marko Keskinen and Olli Varis. 2010. "Water, Livelihoods and Climate Change Adaptation in the Tonlé Sap Lake Area, Cambodia: Learning from the Past to Understand the Future." *Journal of Water and Climate Change* 1, no. 1: 87–101. <https://doi.org/10.2166/wcc.2010.010>.
- Pottier, Christophe, Dan Penny, Mitch Hendrickson and Elizabeth Anne Carter. 2012. "Unearthing an Atlantean Myth in Angkor: Geoarchaeological Investigation of the 'Underwater Road' Crossing the Tonlé Sap Lake, Cambodia." *Journal of Archaeological Science* 39, no. 8: 2604–11. <https://doi.org/10.1016/j.jas.2012.04.005>.
- Roshko, Tijen. 2011. "The Floating Dwellings of Chong Kneas, Cambodia." *Buildings and Landscapes* 18, no. 2: 43–59. <https://doi.org/10.1353/bdl.2011.0026>.
- Sithirith, Mak. 2007. "Fishing Economy of Stand-stilt Community in Tonlé Sap: A Case Study in Kampong Phluk." [https://www.academia.edu/3718591/Fishing\\_Economy\\_of\\_Stand\\_stilt\\_Community\\_in\\_the\\_Tonlé\\_Sap\\_A\\_Case\\_Study\\_in\\_Kampong\\_Phluk\\_Tonlé\\_Sap?source=swp\\_share](https://www.academia.edu/3718591/Fishing_Economy_of_Stand_stilt_Community_in_the_Tonlé_Sap_A_Case_Study_in_Kampong_Phluk_Tonlé_Sap?source=swp_share).
- Sithirith, Mak. 2011. "Political Geographies of the Tonlé Sap: Power, Space and Resources." PhD diss., National University of Singapore.
- Socheata, Van. 2023. "China Firm Plans '\$12B' Smart-agri Investment." *The Phnom Penh Post*, August 15. <https://www.phnompenhpost.com/business/china-firm-plans-12b-smart-agri-investment>.



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