

MAKING WETLANDS AGRICULTURAL LANDSCAPES: THE POLITICS OF INFRASTRUCTURE

In Central Kalimantan, Indonesia, wetlands have been converted and drained through massive infrastructure canalisation since the Dutch colonial period. In the 1950s, the newly independent Indonesian state developed an irrigation system with canals and channels to increase rice cultivation and settle migrants as rice farmers in the area. In the 1990s, the Mega Rice Project (MRP), launched by President Suharto's government in order to make Indonesia self-sufficient in rice production, produced a massive canal infrastructure consisting of more than 4000 km of canals and channels, draining about one million hectares of peatland within several years (McCarthy 2013). These infrastructure projects produced massive fire hazards and other environmental damage due to the drainage of fragile peatland soils (Horton et al. 2021; Lounela 2021b). To address these environmental problems, recent public-private partnerships have produced new infrastructure initiatives to restore drained peatlands to wetlands by rewetting and revegetating them, which involve local populations. In this essay, I examine the 'politics of infrastructure' by looking at the sociomaterial connections and disconnections, and the implications of wetland infrastructure promises and failures in Central Kalimantan (Anand et al. 2018; Harvey et al. 2017; Venkatesan et al. 2018).

Today, infrastructure can be considered a key concept for analysing material systems that reflect modernity and development, and, thus, power relations. Initially, infrastructure

reflected the Enlightenment's idea of 'a world in movement and open to change where the free circulation of goods, ideas, and people created the possibility for progress' (Larkin 2013: 332). Today, we live in a world where modernity, development, and 'economic growth' interconnected with infrastructure schemes seemingly failed us, resulting in environmental damage and catastrophic climate change. This all suggest that the idea of infrastructure as a system providing a better human future demands reconsideration. In addition, infrastructure is taking on a new role as a vehicle for 'green development', 'restoration', and 'climate change mitigation' in response to the problems produced by capitalism and large-scale infrastructure development. For example, in Indonesia, President Jokowi is called the 'father of infrastructure' given his enthusiasm for massive energy and industrial infrastructure projects, as well as restoration and green energy, in addition to rebuilding a spectacular green capital on the island of Borneo and abandoning the old capital in Java (Lounela and Wilenius 2023).

Anthropological studies on infrastructure continue to increase, as we can see in this forum. Harvey, Jensen and Morita (2017: 5) have argued that infrastructure anthropology importantly shows that infrastructures 'as material assemblages produce effects and structure social relations through either planned (i.e., designed and purposefully shaped) or unplanned (i.e., unplanned and emergent) activities'. In this paper, I show that infrastructures are an 'ongoing

process of relationship building', which involve material or ecological and social aspects (Carse 2014: 5). Thus, the politics of infrastructure produce planned as well as unplanned effects in the sociomaterial landscapes (Lounela et al. 2019). This approach suggests that the division between nature and technology is somewhat illusory (Carse 2012: 540). Infrastructure-making is a two-way relationship and process given that human labour transforms nature, while nature, in turn, also modifies the result of work alongside human sociality. Here, I explore how the human-made wetland infrastructure structures social relationships embedded within the material landscape, while simultaneously the environment, in turn, shapes infrastructure, which structure social relationships and activities, producing inclusions and exclusions, often with unforeseen effects.

THE INDIGENOUS INFRASTRUCTURE, ECOLOGY, AND SOCIAL RELATIONSHIPS IN THE WETLANDS OF CENTRAL KALIMANTAN

The Ngaju Dayak are horticulturalists living in the south-central part of Indonesian Borneo. Ngaju means 'upstream' and is an exonym for various local groups who identify themselves as river people (Schiller 1997: 16). The Ngaju inhabitants in the Sei Tobun village (pseudonym) live in a swampy landscape (N. *rawa*) characterised by the fluctuating composition of land and water. In earlier times, settlements remained small and scattered along the small rivers connected to the great Kahayan River; today, the village is home to about 2800 residents. The Ngaju used to gather forest products, make small fish ponds (N. *beje*) in the

swampforests, practice swidden rice cultivation, hunt, and share some of their harvest with people living nearby (Lounela 2017).

In *rawa*, 'you had to walk barefoot', my host told me one day. In addition, people used small wooden boats and pushed them with wooden sticks while standing to travel deeper into the swampforest. Previously, the water level was high, although seasonally the water level dropped (Lounela 2021a). In addition, peat water is acidic and black, and only certain species of fish and plants have adjusted to living in this type of wetland ecology. Wetlands and the flow of water in the rivers are difficult to 'control', I was often told, and people carefully noted the movements of water in order to access their gardens or inland forests and fishing sites via waterways they made when they channelled rivers making them longer.

Small rivers—locally, *sei* or *saka*—crossing the peatland were opened further by digging channels to mark rights to land. Rivers were also associated with forming socialities which emerged simultaneously with working on wetland drainage and rivers and making it into an agricultural infrastructure. Family groups, sometimes said to be clans, distributed inheritance rights along the lengthened rivers in the wetland landscape, and responsibilities and rights were defined through kinship and genealogy (Lounela 2021a.) Thus, the Ngaju people built the channel infrastructure for drainage, marking property rights in order to further expand and reach swampforests and territorialise the land. At the same time, the rivers transformed into small channels, accompanying the formation of kin groups securing tenure rights to land, demonstrating that working nature as infrastructure also creates relationships (Carse 2012).

INFRASTRUCTURE POLITICS: EXCLUSIONS AND INCLUSIONS IN THE MAKING OF AN EXTRACTIVE INFRASTRUCTURE

The concept of ‘infrastructure politics’ refers to how power relations embedded in the infrastructures produce inclusions and exclusions in a variety of ways, in addition to being a question of ‘life worlds’ that infrastructure sustains or destroys (Venkatesan et al. 2018: 5). In this section, I explore how a state and corporations—which are interlinked in Indonesia—produce exclusions and inclusions through resource extraction and related infrastructure built on the wetlands.

There is a long history of colonial and sovereign states harnessing wetlands to create property rights, to territorialise ‘remote’ and ‘waste’ swamplands and their populations, and to convert them into agricultural sites in Southeast Asia and around the globe (Scott 1998, 2009; Lounela 2021a; Nygren and Lounela 2023). In Central Kalimantan, the Dutch colonial rule, for example, pushed mobile indigenous people to settle down in the nineteenth century to create more ordered settlements and property rights. Simultaneously, Dutch colonial rule formally regulated land that had no formal ownership as state land (Kelly and Peluso 2015: 484). These policies drove people to seek ways to mark their land rights by terrestrialising the wetlands through drainage and by planting crops and trees on land; at the same time, Dutch colonial rule created canal waterways for transportation and rice cultivation in the area (Nygren and Lounela 2023).

In the 1960s, timber companies began expanding into the swamp landscape by logging timber for the timber industry on a massive scale, increasing again in the 1970s and 1980s

(McCarthy 2007). The expansion of large companies into forest areas through large-scale logging led people to participate in the logging operations by forming small logging groups in the hope of making money. The logging groups (normally consisting of about five people) would sell the timber to the sawmills. These small groups transported timber along hand-dug channels (*tatas*) and rails along the banks of the Kahayan River. Such infrastructures were part of producing new property relations as some men claimed rights to these waterways, and in some cases claimed that these waterways also marked their land rights.

In 1996, the Mega Rice Project (MRP)—a state scheme aimed at making Indonesia self-sufficient in rice production—started to build a huge canal infrastructure (of more than 4000 km) across the villages, swamps, and peat bogs in an area of more than one million hectares in Central Kalimantan (McCarthy 2013). According to the government discourse, the MRP would become a productive rice-growing and agricultural landscape. Subsequently, many Ngaju Dayak imagined the project would bring prosperity and new livelihoods. Yet, civil society groups and some local actors considered the project damaging to the environment and negatively affecting local livelihoods. However, opposing the state scheme was considered dangerous under authoritarian rule (Lounela 2015). This demonstrates how highly political infrastructures are in Central Kalimantan and in general (Venkatesan et al. 2018), promising development and hope (Li 1999), while also often failing and becoming the sites of struggle (Harvey et al. 2017; see also Anand et al. 2018).

The MRP left behind a severely disturbed landscape. However, environmental damage opened up the landscape to nature conservation projects, and industrial plantations, especially oil palm, spread rapidly in the province. Just

recently, President Jokowi promoted a new food estate project falling under the responsibility of the armed forces (The Jakarta Post 2020).

As multiple actors, each with their own development or resource interests, sought to take over the management and development of wetlands, local people also sought to secure access to the land by expanding infrastructure drainage. In 2005, the provincial governor, a Ngaju Dayak himself, encouraged the Ngaju people to widen and deepen their rivers with excavators and cultivate rubber along the channels to stop the expansion of oil palm plantations on their customary lands and to secure land for future generations with support from the regional government. Increasingly, the rivers were infrastructured into channels called *handel*. The former river social organisations primarily based on kin relations were now formalised as channel or *handel* groups with clear membership rules and rotating leadership. At the same time, new people were integrated into the groups as the residents sold land to external actors and people outside the groups (Lounela 2021a).

Drainage lowered the water level. Subsequently, after 1998, fires regularly occurred, but intensified after the new channelisation in 2006. The environmental damage and fire hazards pushed governments to try to *fix* the drained wetlands (Castree 2008), involving new infrastructural schemes. After 2010, different climate change schemes worked to fix the wetland drainage in the area (Lounela 2015, 2019). President Jokowi launched the Peat Restoration Agency (BRG) by presidential decree (PP 1/2016) in 2016. The BRG began operating in the Central Kalimantan province and Pulang Pisau district in 2017, aiming to restore 2.49 million hectares of peatland between 2017 and 2020. New infrastructures were initiated: rewetting by blocking; restoration

of vegetation with plants; revitalisation through livelihoods (Badan Restorasi Gambut 2019). The local people were expected to build wooden dams in the channels, which they previously kept open by cleaning and digging them. Damming the channels, in turn, would affect gardening, planting, fishing, and transportation in the riverine peat landscape. Thus, while some residents remained reluctant to build dams for this reason, other residents argued that restoration is necessary for preventing further fire disasters. There have been relatively large fire incidents in the village since the BRG restoration began.

The state-initiated wetland canal infrastructures, such as the MRP, were designed by specialists in collaboration with governmental actors. But, these infrastructures have carried unplanned consequences, both ecologically and socially, producing multiple socationatural effects and environmental hazards such as fires. The large-scale infrastructures connect with new, partly locally and initiated channel infrastructures, forming multilayered and hybrid wetland landscapes where different social forms seem to create multiple overlapping social organisations and social orders (Gershon 2019). Infrastructures are embedded with power relations, the ‘politics of infrastructure’, which manifest in competing infrastructure forms from the state, corporations, and local populations, and which continually remake the wetland infrastructures and, thus, socationatural relations.

CONCLUSIONS

In this paper, I have discussed the Indonesian ‘politics of infrastructure’ by looking at the making of the wetland infrastructure and its effects, promises, and failures in Central Kalimantan (Anand et al. 2018; Harvey et

al. 2017; Venkatesan et al. 2018). In doing so, I discussed how the Ngaju people have worked the wetland ecology to establish an agricultural infrastructure through drainage and plant cultivation in the context of state formation and resource politics. I have also shown how making nature into infrastructure (canals, channels, and dikes) also affects the environment, in this case by drying the wetland and making peatland susceptible to large-scale fires, thereby causing environmental disasters that harm the inhabitants of the area.

Thus, it matters what kind of nature is made into infrastructure. Infrastructure-making takes place on a specific peat ecology, consisting of trunks, leaves, plants, and acidic water that have accumulated over a very long period of time. This peat, then, becomes highly flammable when the water level falls and the peatland logged of trees.

Large-scale agricultural infrastructure such as the MRP differs from the small-scale channelisation by the Ngaju. Lengthening rivers created connections among local populations to distant gardens, enabling them to carry out agricultural or agroforestry practices in distant locations. The channel infrastructure formed a strategy to territorialise and claim rights to land, while also creating and maintaining social relationship.

After 2016, the state sought to repair and restore damaged swamps through new dams and well infrastructures to mitigate fires. The dams impeded peoples' access to the remote areas they had come to understand as their customary lands. This reterritorialisation by the state through new restoration infrastructure demonstrates how infrastructure making and politics links to changing governance systems with different resource policies. But they all have the same effect of rendering people as objects of infrastructure development.

As I have argued elsewhere (Lounela 2021a; Nygren and Lounela 2023), the processes of making nature into infrastructure reveal the changing politics and shifting values inscribed in wetland landscapes. Infrastructures are not neutral; state-initiated infrastructures, such as the Mega Rice Project, seek to create legible landscapes, which allow for extracting natural resources, but also create governance mechanisms (Scott 1998). Furthermore, local populations also create state-like infrastructures in an attempt to territorialise spaces. Multiple interests and actors produce overlapping infrastructures and social organisations. Infrastructure, thus, creates connections and disconnections as nature is worked into infrastructural forms. As an anthropological lens, infrastructure provides a view of the continuities and discontinuities of wetland-making and unmaking, and the inclusions and exclusions that occur within these processes.

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