FORUM: INFRASTRUCTURE

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INTRODUCTION

It was Europe's wake up call: the news reported that a huge gas pipeline running across the Baltic Sea from Russia to Germany had exploded (Oltermann 2022). The explosion caused a release of gas and ruptured the pipeline, abruptly stopping the flow of gas. In the aftermath of the Russian attack and war on Ukraine, we have seen time and again how infrastructure becomes the main stage for power struggles and politics (infrastructure destroyed for various reasons) on the one hand, and how today's infrastructures scale up to a global level and then back down to local arenas, affecting the lives of millions of people, on the other. While the pipeline explosion is only one recent example of the impact and mobilisation of infrastructures in today's fragile global context, it well illustrates the ways in which infrastructures create and dismantle relationships, politics, connections, and disconnections, sometimes on a massive scale.

Thus, in the 2020s, the study of infrastructures as material, ecological, informational, and political forms seems even more relevant. Infrastructures have become part of global politics in the financialisation of the world economy, violent conflicts, and ecological change, and, at the same time, the politics of infrastructures and their materialisation constitute everyday life and experiences.

Infrastructures can refer to both material and institutional structures that enable and/or constrain people's actions. They are manifested with power, affect social relations and relations with the environment, and have both intended and unintended material, social, and cultural consequences. On the one hand, people may not pay much attention to infrastructures unless certain infrastructures are not functioning properly, causing hardship in everyday life or failing to fulfil people's desires and hopes (Star 1999: 382). On the other hand, sometimes people are strikingly aware of infrastructures, such as if concrete infrastructural constructions are built near their homes.

In recent years, infrastructure has emerged as an important orientation in anthropology (Anand et al. 2018). Prior to the 1990s, as Harvey and colleagues (2017: 3) note, infrastructure was not discussed as much as it is today because infrastructure was often seen as the invisible background of social action or structure; by remaining in the background, infrastructure did not explain human activity or institutions. The turning point occurred when anthropologists in the mid-1990s proposed that the materiality of infrastructures actually 'reshapes bodies, societies, and also knowledge and discourses', which 'inverted' infrastructure to the foreground, giving rise to the emerging

study of infrastructure (Harvey et al. 2017: 3; cf. Bowker 1994).

Susan Leigh Star is one of the pioneers of the anthropological study of infrastructures that had been considered 'boring', but which she viewed as important sites of value creation and political hierarchies, using the example of computer information systems, which were often presented as invisible backdrops (Star 1999: 380). In the years that followed, several texts were published exploring the ways in which infrastructures connect the material and social spheres through political, economic, statecraft, urban development, and environmental issues, inverting infrastructure into the foreground (Venkatesan et al. 2018).

The growing interest in infrastructure in anthropology was also linked to the emergence of other approaches and subfields in anthropology being interested in the study of 'universal' structures such as the state, globalisation, colonialism, nations, and nationalism. Instead of primarily studying the particularities of specific cultures, anthropologists became more interested in studying the interactions and articulations of local cultures with global structures and movements as with when Wolf (1972) suggested studying how capitalist structures were transforming peasant lives, agricultural practices, and land tenure systems. These theoretical discussions on, for instance, globalisation had an impact on the reconfiguration of approaches in anthropology and ethnographic methodologies (Marcus and Fisher 1986). However, anthropologists continued to 'maintain a legacy of attention to social relations, meaning, identity, and cultural differentiation' when discussing change and larger structures and when entering new field sites (such as technological, digital infrastructures) (Harvey and Knox 2015:2).

We suggest that recent anthropological research interest in infrastructure relates not only to the emergence of large-scale infrastructure construction, which has become a huge site of investment worldwide, but also to a (renewed) interest in materiality in relation to climate change and environmental, food, energy, and water crises (Harvey 2018: 4), as well as to new forms of relationality in anthropology. Virtual technologies, for example, connect and mobilise relationships and information in radically new ways. These new forms shape people's everyday lives, creating unexpected sociomaterial connections, dependencies, and entanglements. New infrastructural forms, thus, raise important material, temporal, and social questions.

Take, for example, green energy infrastructures such as windmills and their rapid acceleration and expansion globally to stop greenhouse gas emissions and mitigate climate change, and the contradictory effects it may have on local landscapes (Zanotelli and Tallé 2019). New energy infrastructures are material infrastructures, systems that affect landscapes and social life in those landscapes, changing the ways humans see and sense landscapes and the ways in which people relate to them. In addition, energy infrastructures have economic effects, not to mention the dependency on electricity infrastructures, which are listed on stock markets but are subject to disruptions (as we saw in Finland in 2023 when the price of electricity skyrocketed).

In addition to material infrastructures, anthropologists have also paid attention to institutional or organisational infrastructures. They can be defined as 'institutions that are required to maintain the functioning of societies and organisations', and they often play crucial roles in enabling or preventing people to do or not to do certain things (Korpela 2016: 115).

For example, the use of passports forms an institutional infrastructure that, on the one hand, enables states to control and facilitate people's cross-border mobilities. On the other hand, this passport infrastructure prevents certain people from crossing borders when they do not possess appropriate passports (Korpela 2016: 120–123).

Infrastructures mediate power relations and politics, creating connections and disconnections, but also distributing injustices and 'abjects' (Anand 2012). Anthropologists are interested in how people participate in the making of material and institutional infrastructures and how they perceive, understand, experience, and make sense of them. Anthropologists are also interested in how infrastructures affect people's everyday lives, and which new challenges people encounter with infrastructures due to urbanisation and climate change among other issues.

This forum explores some of the key insights and orientations of recent infrastructure discussions in anthropology. The papers in this forum were originally prepared as oral presentations for the workshop titled 'Anthropology and Infrastructures', organised at Tampere University in May 2022.[1]

THE POLITICS OF INFRASTRUCTURE

Today, many anthropologists discuss infrastructures as manifestations of power, asking how they affect relations and the formation of authority. It is generally agreed that an infrastructure does not just 'exist', but that it creates effects and perceptions and is embedded in power relations.

Brian Larkin (2013), for example, discusses how infrastructures such as roads and railways are more than technical objects because they mobilise affects that can be political: frustration, desire, and pride, among others. Infrastructures may represent 'the possibility of being modern' or foreclosing the possibility from development, which gives rise to the affects of abjection (Larkin 2013: 333), as Nikhil Anand (2012) has also shown. The politics of infrastructure (through the effects it creates) go back to the Enlightenment idea of a 'world in movement and open to change where the free circulation of goods, ideas, and people created the possibility of progress (Mattelart 1996, 2000)' (Larkin 2013: 332).

In other words, it is about social progress and politics. In Marxist terms, infrastructural technologies 'enacted the course of history itself' (Larkin 2013: 332). Infrastructures in terms of modernity and development are presented as linear and progressive, a kind of rational way in which governments build the nation-state, provide services, and facilitate the flow of goods. However, as many infrastructure anthropologists have noted, infrastructures create connections and disconnections as well as relationships, and distribute resources and justices, raising questions such as who is responsible and what outcomes are achieved, as well as who benefits and who becomes vulnerable or marginalised (Anand 2012).

The Foucauldian approach to infrastructure provides a different angle by looking at the biopolitics or governance and its implications. In this regard, anthropologists ask how certain forms of governance organise populations and territories through technological spheres as if they were distant from political institutions (Mitchell 2011). They might also ask how specific knowledge forms produce new forms of governance (Karhunmaa and Käkönen, this volume). Along this line of thinking, infrastructures reveal 'forms of political rationality that underlie technological projects and which give rise to an "apparatus

of governability" (Foucault 2010: 70)' (cited in Larkin 2013: 328).

In this sense, infrastructures assemble states into certain forms of governance that include calculative rationality and administrative techniques (Collier 2011). Stephen Collier presents an interesting case related to the constitution of the biopolitics of power through infrastructure. He shows how budgets, for instance, are as important as technical systems: they reflect and illuminate modes of reasoning and the changing rationalities of biopolitical governance. In other words, both material and institutional infrastructures can be crucial.

Many of the contributors to this forum have approached infrastructure through the definition proposed by Brian Larkin in his seminal 2013 article, 'The politics and poetics of infrastructure'. Larkin (2013: 328) proposes that 'infrastructures are built networks that facilitate the flow of goods, people or ideas and allow for their exchange over space'. Larkin goes on to state that 'infrastructures are matter that enable the movement of other matter. Their peculiar ontology lies in the fact that they are things and also the relation between things' (Larkin 2013: 329). In this sense, infrastructures are unruly, he says, suggesting that infrastructures could be studied as built things, knowledge things, and human things, and their relations as networks.

Penny Harvey, Casper Bruun Jensen and Atsuro Morita (2017: 10) have suggested that infrastructural politics can be analysed in terms of complications rather than in terms of the biopolitics and governance: 'From the point of view of *complication*, infrastructures are shaped by multiple agents with competing interests and capacities, engaged in an indefinite set of distributed interactions over extended periods of time. The characteristics of infrastructure emerge out of these interactions, making it exceedingly unlikely that they will function according to the plans of *anyone* in particular (cf. Latour 1996)'.

In other words, even when infrastructural projects have ideological aims or may be used as tools of governance, their outcomes are always much more complicated and diverse. Even when states and those in power make explicit plans, the outcomes are often somewhat different, creating an interesting area of studies into the 'complications' of infrastructure. Thus, in studying the politics of infrastructure, anthropologists look behind the technology and materialities of infrastructure, focusing on the interests and capacities of agents across space and time. Technical or technological managers may emphasise plans and their implementation, and the functions of these plans and built infrastructures. By contrast, anthropologists explore the processes of infrastructure-making and the relations, power positions, and connections that emerge through these processes, the interests and actors behind these plans, the intended and unintended effects they have, and how people perceive and experience them. For example, plans arouse dreams and desires for a better life, and when they materialise in infrastructures, they create new dependencies, and when closed off they can create affects of humiliation or despair. These complications are deeply political.

The politics of infrastructure are well-illustrated in this forum by Lalli Metsola, who writes about urban infrastructures in Namibia. He shows that, while the immediate purpose of particular vital infrastructures is to solve practical problems, the social, transactional, and political patterns that they entail lead to profoundly relational, co-constructed infrastructures and everyday governance. These vital infrastructures create new dependencies, but also interactions and mutual relationships. The making of vital infrastructures emphasises

the human agency and the ways in which infrastructures create differentiated positions.

ENVIRONMENTAL INFRASTRUCTURES

In an introduction to the debate on the anthropology of infrastructure, 'Attention to Infrastructure Offers a Welcome Reconfiguration of Anthropological Approaches to the Political', Penny Harvey (2018: 4) points out that some anthropologists have criticised infrastructure studies as 'too specific and coherent an entity (unwelcome for the way it erases and side-lines other concerns) and as far too vague and open-ended (infrastructure can refer to so many different things that it holds neither conceptual worth nor analytical purchase)'. The core tension in infrastructure politics, she argues, is between the material form and the connective capacity of those forms (or things) (ibid.).

As noted above, the infrastructure approach has increasingly been used to study environmental issues and ecological formation—that is, infrastructures are not just built materialities, but they are 'material conditions of possibility for life', thus opening up the possibility of including the nonhuman and moving beyond distinctions between human, natural, and cultural (Harvey 2018: 5). In this way, anthropologists overcome the Western dichotomy between nature and culture or materiality and sociality, a long-debated question in anthropology (Descola and Pálsson 1996).

In early anthropology, environment, like infrastructure, served as the background to the study of people. However, there has been a move to bring both infrastructure and landscape to the fore, always leaving open the question of how to do this. There is also the problem of how to distinguish infrastructure from environment when both are relational backgrounds, along with how to separate the conceptual from the empirical when studying environmental infrastructure (Harvey et al. 2017: 211). As such, infrastructures and environments are intertwined in many different ways.

Environmental infrastructures are strongly linked to knowledge production, such as expert knowledge and scientific concepts, plans, and designs that draw on specific forms of knowledge. In this forum, Kamilla Karhunmaa and Mira Käkönen explore how negotiations and agreements on climate change mitigation form a knowledge infrastructure that is hugely important in enabling particular forms of climate governance (see also knowledge and water infrastructures in Morita 2017). By focusing on the carbon-offsetting trajectories, they discuss the ongoing effects of such knowledge infrastructures long after they have officially ceased to exist or take effect.

Water infrastructures provide an interesting example regarding how infrastructuring the environment creates connections and disconnections, as the example of shifting and multiscalar channel making by Lounela exemplifies (Lounela this volume; see Lounela 2021). In this forum, Anu Lounela explores how the human-made wetland infrastructure structures social relations, while, at the same time, the environment in turn shapes infrastructure, producing inclusions and exclusions as overlapping social orders that are constantly negotiated and contested among people. Environmental infrastructures, thus, reflect and produce different knowledge and political regimes that become entangled in wetland landscapes, making it difficult to separate environment and infrastructure from each other.

Ashley Carse (2014: 6), who studies canal building in relation to forests, notes that infrastructures produce environments and

environments produce infrastructures. This means that infrastructures seek to organise landscapes to reflect the plans, designs, and politics of technical systems, but that ecologies and populations do not necessarily bend to these designs and plans. This, according to Carse (2014: 6), gives rise to a political ecology of infrastructures 'with winners and losers'. In her view, almost all environments are modified by human labour, suggesting that labour dissolves the boundary between nature and infrastructure (i.e., technology). Political ecology helps to understand how nature becomes infrastructure and a system that has 'significant potential to produce ecological distribution conflicts around social and spatially asymmetrical access' (Carse 2012: 544).

Tuomas Tammisto, in this forum, explores the oil palm plantation as an infrastructural system with different components, where the plan (protocol) serves a specific extractive logic supporting the potential agency of this system, but what the systems do and enable may be very different from what the planners imagine. Infrastructure is like a grid (see Scott 1998) of roads, pipelines, mills, and tree plantations that together form a highly infrastructural space, and further components of this system. Rather than simply facilitating flows, plantation infrastructures also have bottlenecks that disrupt flows. Furthermore, the smooth functioning of the oil palm infrastructure hinges on the activity of the people, especially, the plantation workers, Tammisto argues. This is where people's agency and potential become important.

In general, environmental infrastructures or infrastructuring environments form systems that have special potentials and capacities and involve active forms. They produce knowledge and are shaped by specific forms of knowledge, which give rise to specific forms of governance.

INSTITUTIONAL/ ORGANISATIONAL INFRA-STRUCTURES AS COLLAGES OF MULTIPLE ACTORS AND CONTESTED AIMS

People's agency becomes crucial also when investigating infrastructures, which are combinations of technological and institutional structures or networks materialised in the landscapes or social worlds. Such institutional infrastructures not only 'facilitate the flow of goods, people or ideas and allow for their exchange over space' (Larkin 2013: 328), they also affect how people deal—and are able to deal—with certain events, situations, and processes in their lives. In other words, institutional infrastructures shape people's lives and actions. They have often been formulated without a master plan through the course of time. They may be institutions with very long historical roots or ad hoc developments with various (state-driven, private, and commercial) actors involved. These infrastructures often consist of a fragmented field of actors resulting in a complex and somewhat confusing network, where the parts form an entity that was never planned as such, and individuals then need to navigate these structures—that are in a constant process of change (Gupta 2018: 62)—the best they can. National and political interests often play significant roles in these infrastructural processes, yet the nation-state is far from the sole actor in these institutional fields and the entanglement of the local and global may be complex and even controversial (Harvey et al. 2017: 5). Consequently, the infrastructural domains may become contested and confusing for the individuals who need them or are requested to use them. Examples of such crucial institutional infrastructures include, amongst

others, the already mentioned international system of international passports, social security systems in welfare states, education systems as well as various other systems with which states, organisations or corporations organise, support, and control people's lives and actions.

In this forum, both Laura Huttunen and Anna Matyska discuss infrastructures related to the search for missing persons. Their analyses show the complex and confusing realities of these technological and organisational infrastructures involving various actors with somewhat differing aims and agendas. Yet, their existence and actions have significant consequences in the lives of people who search for their disappeared family members or friends. Huttunen discusses infrastructures related to the search and identification of disappeared or missing people in the context of the Bosnian War and the present-day Mediterranean. She argues that global politics, trust, and material affordances play a key role in these processes, where, in some cases, there are significant financial and institutional resources invested in the search, while, in other cases, such investments—and even interest—are strikingly missing. Matyska discusses the expansion of tracing infrastructure related to the rising sociopolitical recognition of people's disappearances in Poland. She argues that there are multiple actors with somewhat competing interests in the field, which results in the tracing infrastructure always being an imperfect work-in-progress.

The processual nature of institutional infrastructures also becomes visible in Mari Korpela's text, where she investigates the institutional infrastructure of schools in the lives of internationally mobile children. She argues that the incompatibility of school systems in different countries can pose a tangible challenge to children who move between countries because of their parents' work. The institutional infrastructure of children's education often functions on the premise of a rigid nation-bound timeframe, determining how an individual progresses in the system, but internationally mobile children's educational paths are characterised by disruptions rather than a smooth progress (cf. Devine and Boudreault-Fournier 2021: 5).

To conclude, in all of these institutional infrastructures, resources and knowledge circulate, organise, and guide people's actions and lives, but the directions and distribution are not straightforward and various actors involved may have different interests and goals, and some of the outcomes may also be unintended. A significant element is also the political will—or the lack of it—to solve challenges in the smooth functioning of these infrastructures. Yet, competing interests or disruptions in their functions may have severe consequences in individual's lives.

Infrastructures matter, perhaps more than ever. Infrastructure projects today are often large-scale projects that shape the environment, transform and change power relations, and create social relationships that are materialised in landscapes or social worlds. Infrastructures also create new dependencies (electricity and energy, water, internet, and social security) that make human life vulnerable to forces it cannot control or influence. Moreover, infrastructures can have rather tangible (and sometimes unexpected) effects on individuals' lives and actions. We, therefore, propose that it is of the utmost importance to conduct studies on infrastructures, making them and their effects visible through anthropological research.

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NOTES

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