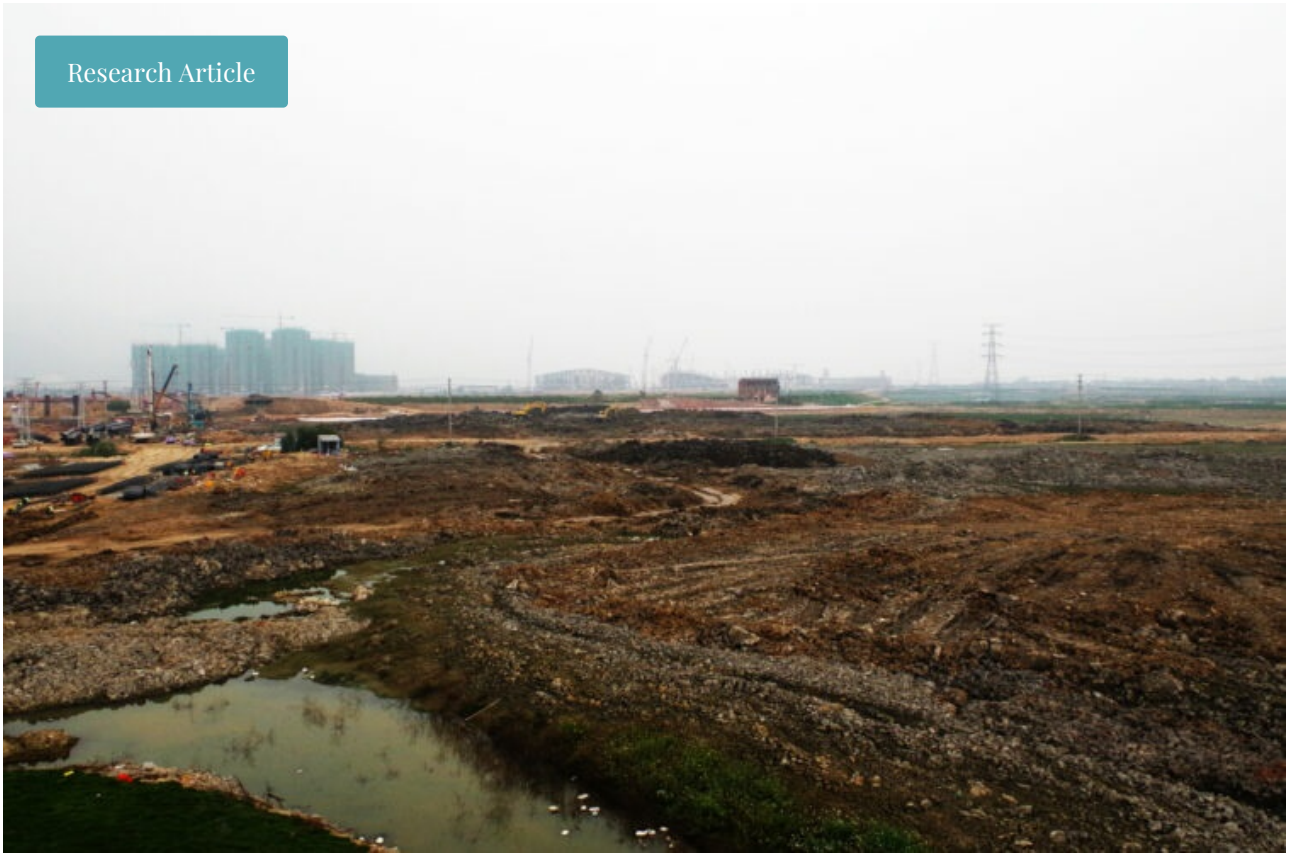
Urban Matters

Research Article



Emerging infrastructural landscapes: A research agenda

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Issue: Rethinking the Multiplicity of Urban Infrastructure

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Introduction

On March 23rd, 2021, a 400-meter long and 46-meter wide cargo ship blocked the Suez Canal. Within a few hours, a major global trading route had turned into a planetary bottleneck: more than 300 cargo ships halted, and shipping companies had to hurriedly rearrange their routes, provoking an 8 percent bump in crude oil prices. With the media emphasizing the fragility of global supply chains, few paid much attention to the ground on which this accident occurred. Despite its image, the Suez Canal is not just a water corridor, but one of "the new world capitals" (Renia and Katsikis, 2019, p. 752). 12 percent of global trade passes through here, and even though the entire area is inhabited by only 750,000 people, the establishment of the Suez Canal Economic Zone in 2002 foresaw the development of 461 square kilometers as home to two industrial and logistics sites, two new towns, and four ports. Hence, what was barren desert until the mid-19th century is now turning into an urbanized infrastructure: a mix of human-generated technologies, housing developments, domesticated landscapes, and ecological reserves.



Figure 01. Suez Canal Traffic Jam. Credit: ESA, Copernicus Sentinel data

While the same may be true for most of the Earth's surface, the radical effects of such transformations are most evident in new infrastructural landscapes such as the Suez Canal. Infrastructural landscapes are territories where infrastructures act as the primary agents in regulating the relationships between different objects and subjects (Easterling, 2014), and where infrastructures operate as a constitutive part of the environment, or "the systemic field of biophysical resources, sociotechnological services, and exchange spaces, held together by a mesh of hardware and software that calibrates and conditions urban economies" (Belanger, 2016, p. 71).

Drawing on current literature in the field of urban studies, this paper sheds light on and discusses three types of landscapes shaped by global infrastructures: landscapes of storage, landscapes of exploitation, andlandscapes of regulation. These landscapes deserve attention, since they are viewed as theatres of environmental violence, labor

exploitation, and stark inequalities, which is the realm of global capitalism and neoliberal policies (see Rodgers and O'Neill, 2012). While this would be more than enough to spark a debate on the reconceptualization and redesign of these spaces, infrastructural landscapes also demand constant readaptation. Owing to rapid technological obsolescence, economic disruption, catastrophic climate changes, and other external shocks, these places need a continual transformation to meet ever more demanding ecological, financial, and socio-political requirements. Again, the Suez Canal is emblematic in this sense, and this does not only refer to the constant maintenance required to keep global trade flowing, but also to the ongoing construction of new landscapes to accommodate free economic zones, spaces for production and logistics, and a new heterogeneous population made up of a low-paid labor force, rich businesspeople, and wealthy tourists (Rehan, 2014). This need for constant change, while problematic to some extent, can also be considered as a stimulus for envisioning new design approaches. For instance, could infrastructural landscapes be remodeled as inclusive spaces? Could they be envisioned as sites for new socio-environmental relations? And are there ways to care for infrastructural landscapes while avoiding a merely techno-managerial restructuring "aimed at reinforcing the body politic against threatening outsiders … so that life as we know it can go on" (Swyngedouw, 2017, p. 20)?

To address these questions, the first step is to depict the new infrastructural landscapes. These are still lumped together regardless of their specificities, yet their exploration and description are vitally important to make the heterogeneity of such spaces visible.

Landscapes of storage

Similar to the Suez Canal Economic Zone, in 2014, a cooperation agreement between China and Kazakhstan was sealed to build a new Dubai: Khorgas Gateway. This has turned a stretch of the Taklamakan desert, 2,500 kilometers from the nearest sea, into the largest dry port in the world. Huge terminals handling up to 18,000 containers a day have appeared on each side of the border, with gigantic cranes for conveying containers onto two national rail systems operating on different track gauges. In addition, an area of 10,000 square meters is dedicated to container storage. Khorgas Gateway is intended, however, to be more than just a ground for the movement of goods. Next to the container area is the Khorgas International Center for Border Cooperation, that is, a Special Economic Zone consisting of 608.56 hectares that were cleared to host large-scale factories, massive malls, universities, amusement parks, golf clubs, and business centers. Moreover, the overall plan for Khorgas encompasses Nurkent: a new town offering housing, schools, kindergartens, shops, and all of the facilities required to make the dry port work properly. As declared by the CEO of Khorgas Gateway, this "middle of nowhere" will soon become the main oasis of global trade.

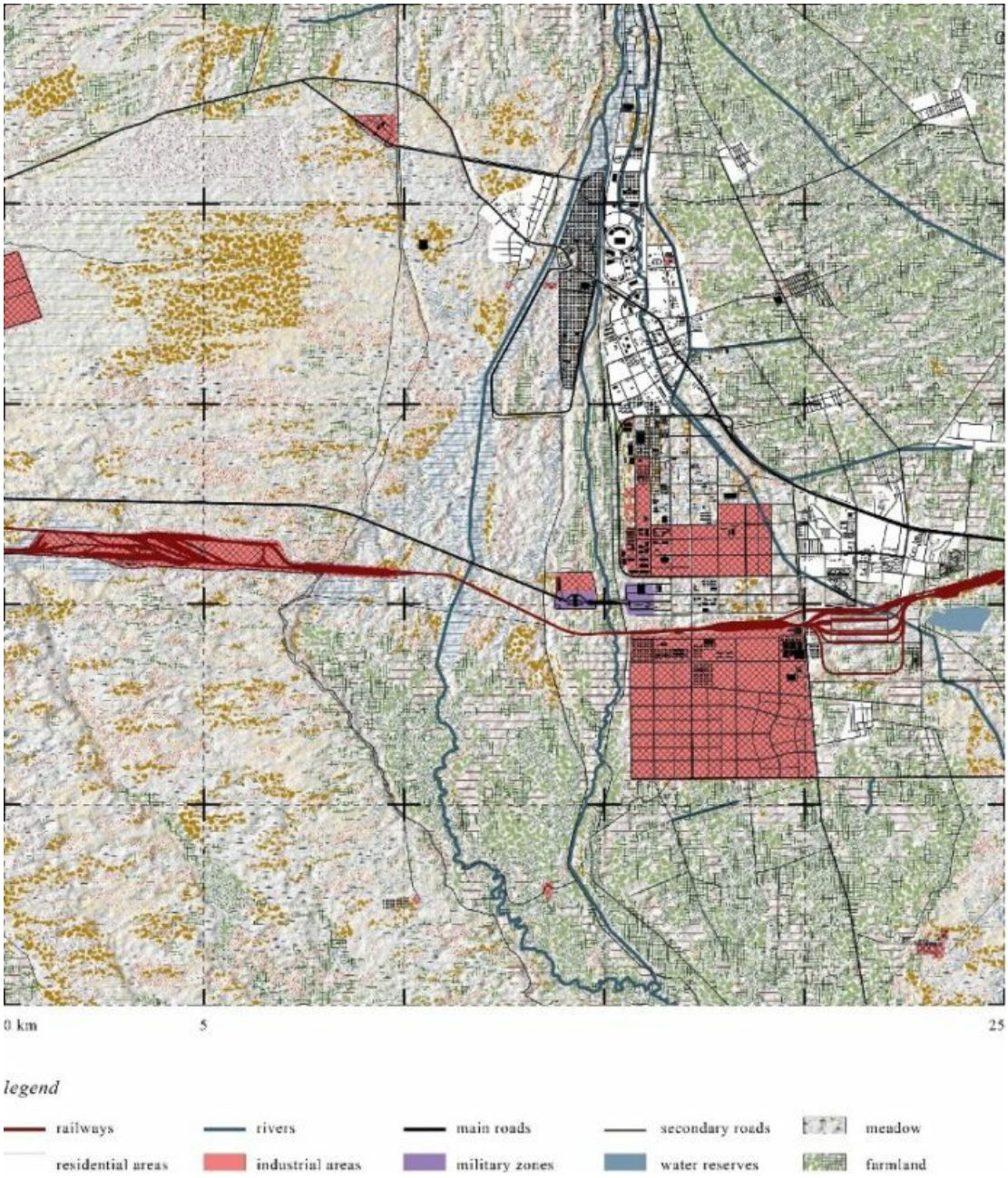


Figure 02. Khorgas Gateway. Leonardo Ramondetti

Like other logistics zones worldwide, Khorgas Gateway reveals how infrastructural spaces are redefining their status. Even in the late 1990s, these were merely technical enclaves all over the world meant to integrate the global economy (Brenner, 1998). On the contrary, today they are fully-fledged cities that include an ever-wider range of activities and can accommodate a myriad of uses. A 3D virtual tour of Khorgas Gateway reveals this new condition. The plots of land range from 300×300 to 500×500 meters, have access to roads, and come readily equipped with utilities such as electricity, water, sewerage, fiber optic network, internet connection, and 24-hour security. Inside, each area is completely customizable, and it can be freely used as an industrial zone or warehouse, or for tertiary activities, even residential purposes.

However, despite their new status, these landscapes of storage are still designed to be nothing more than "backup space[s] available to be used when necessary" (Sampieri, 2019). They are enclosed areas, within which a standardized infrastructural grid acts as a

motherboard, storing and supporting the correct functioning of different programs that rarely interface with one another. This simplified blueprint is now applied everywhere: from the Murmansk Economic Zone above the Artic Circle to the Tierra del Fuego Free Trade Zone in southern Argentina. Engaging critically with these landscapes of storage means envisaging these spaces differently, reorganizing such an urbanism-on-demand, and ensuring these zones do not become decoupled from their surroundings.

Landscapes of exploitation

1,500 kilometers southwest of Khorgas lies Kabul. Here, the withdrawal of NATO forces and the return of the Taliban raised widespread concern in the West. Besides the social, humanitarian, and democratic future of the country, there is also the question of the at-least-one-trillion dollars' worth of unexploited mineral deposits, particularly lithium, copper and, above all, rare-earth minerals. Regarding the last, China is eager to retain its near monopoly thanks to Bayan Obo, the largest mine in the world. Located in Inner Mongolia, this highly developed mining industry has turned 200 square kilometers of the Gobi Desert into a production site replete with roads and railways in addition to towns that house about 30,000 inhabitants. In other words, it is a branch of the ever-widening circuit of commodity exchange.

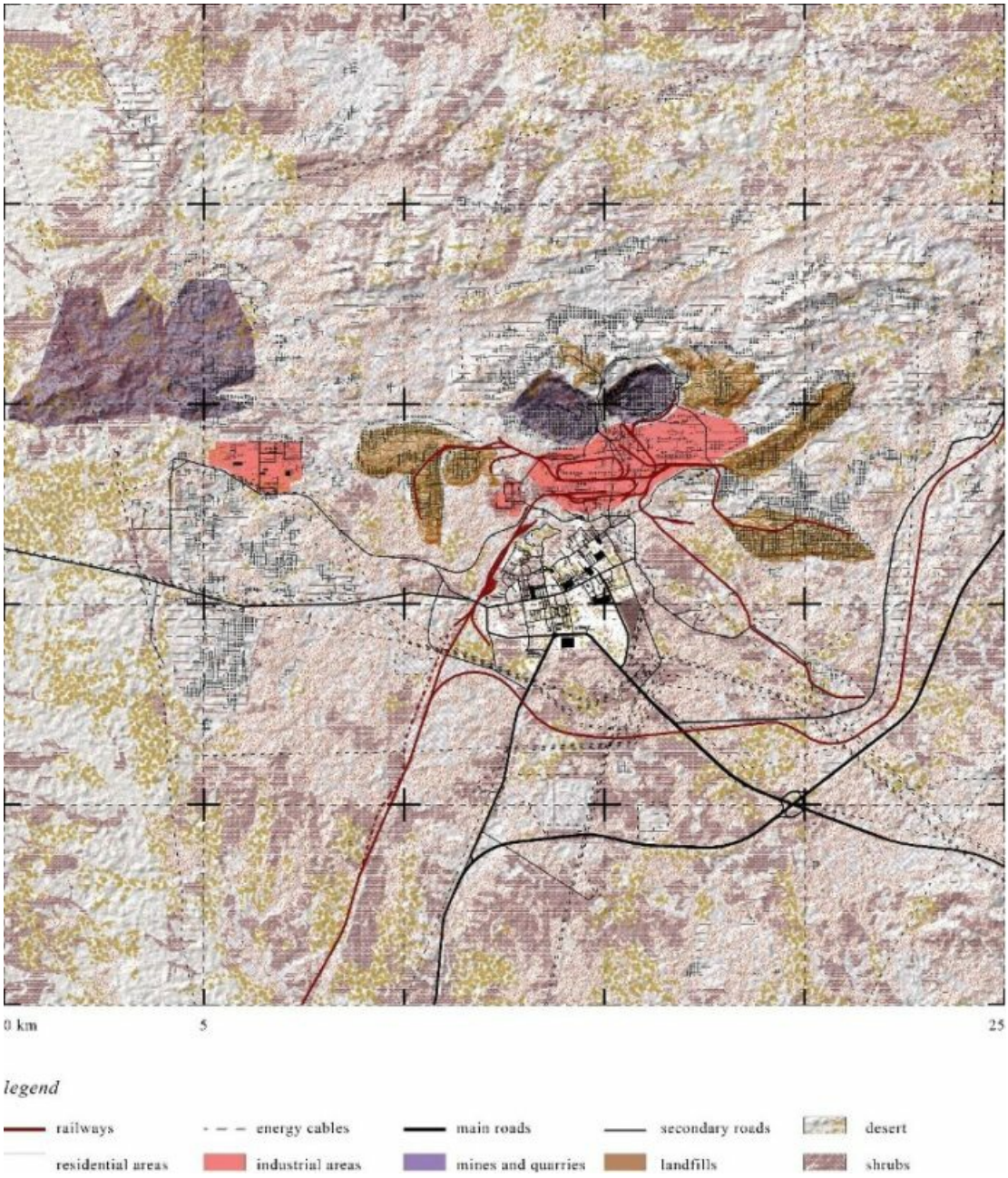


Figure 03. Bayan Obo. Leonardo Ramondetti

Bayan Obo is only one of the many remote areas of the world that have been recently integrated into the global supply chain. The deserts and forests of Latin America are exploited to the point that raw materials and energy exceed 60 percent of total exports in Chile, Colombia, and Peru. It is not just mining and power production, but also the Plantationocene (Haraway, 2015), or extensive cultivations of soy and corn farms in the American Midwest, massive palm oil plantations in Malaysia, expanses of tomato greenhouses in Almeria, and many others all over the planet.

These are all landscapes of exploitation resulting from trade liberalization and new infrastructural networks that ensure cost-effective access to every market. Such conditions turn landscape into a fungible asset, allowing the segmentation of production and its horizontal spread to exploit every location on the basis of the best performance it can offer (Jones and Kierzkowski, 2012).

Engaging with landscapes of exploitation means being aware that, in bringing about economic optimization, such development also raises environmental and social concerns. The ecological footprint of the landscapes of exploitation is gigantic. For instance, as documented by Arboleda (2020), large scale mining sites require between 460 and 1,060 liters of water per gram of mineral and produce between 50 and 140 million tons of solid waste per year. Their total emissions are, on average, 40 percent greater than those of any megacity in the global South. Moreover, the impact of mining and monoculture farming on these lands makes their reclamation nearly impossible. Finally, most of these activities rely on low-paid migrant workers and lead to the displacement of local communities. Within this picture, design activities cannot be confined to remedial actions or reclamation, but one must rethink the organization of these spaces and consider them as more than just sites to be plundered.

Landscapes of regulation

Raw materials, such as rare-earth minerals, lithium, and copper, have gained increasing importance because of the global green-energy transition. However, just as critical are the rules for regulating the new infrastructural realm, which increasingly affect how the space is modelled and lived in. A case in point is the Sino-Singapore Tianjin Eco-City (SSTEC), a model for the sustainable metropolis of the 21st century. The plan, drafted in 2009, envisages the urbanization of 30 square kilometers over the next 15 years to be home to 350,000 inhabitants. Here, green spaces account for more than 50 percent of the total surface, solar panels should provide 60 percent of the energy, and a huge 150,000-ton treatment plant can purify blackwater and clean up to 50 percent of graywater. Aside from the technical devices to be adopted, the success of this pilot project relies on the rules and the standards outlined in the *Eco-City Assessment and Best Practices Program* established by the Ministry of Housing and Urban-Rural Development. This includes the 61 performance indicators based on which the China Academy of Urban Planning and Design designed the 'eco-cell:' a precise urban layout that establishes functional, dimensional and density criteria for building eco-cities anywhere (Williams, 2017).

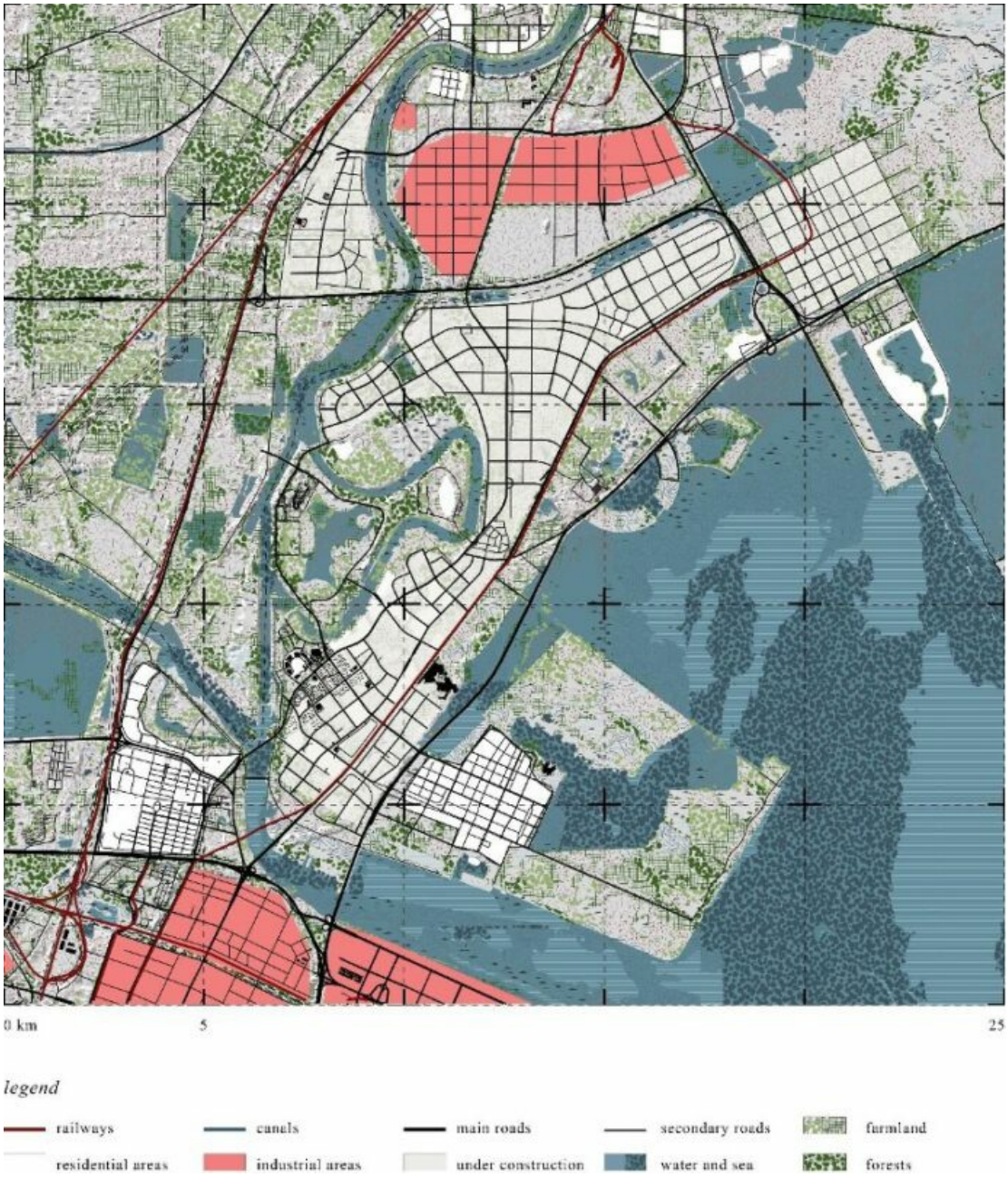


Figure 04. Sino-Singapore Tianjin Eco-City. Leonardo Ramondetti

Today, standards, rules, and indicators, such as those set out for the SSTEC, are influential landscapes of regulation. These sets of rules (i.e., SEED, LEED and ISO 37120) are anything but ephemeral: they define each and every infrastructure, establishing "an extensive yet mundane and, to now, rather silent force of social rationalization across the globe" (Mendel, 2006, pp. 162-163). To make this possible, the space and its components are reduced to a set of measurable, reproducible, and manageable variables. Perfect examples of such datafication are the recent techniques of space matrix, mixed-use index, and space syntax, as well as the extensive usage of responsive technologies, and the establishment of global city indicators to perform computational analyses of city performance.

The resulting dissolution of material forms into flows of information not only reduces urban complexity, but "make[s] ownership of the city available to those who can pay for the data" (Easterling, 2021, p. 71). In a contemporary neo-liberal context, where public

infrastructural systems are splintered into 'premium networked spaces' customized to meet the needs of the most powerful users, this turns standards into a means of enclosing spaces, reinforcing discrimination, and restricting practices (Graham and Marvin, 2001). Thus, engaging with landscapes of regulation signifies regarding design activities and everyday practices as an opportunity to constantly challenge and negotiate the status of the infrastructural landscapes and the established body of rules.

A research agenda

The cases presented in the previous sections highlight the heterogeneous character of contemporary infrastructural landscapes. These conditions are widely discussed in contemporary urban studies, which view such spaces as disputed terrains that are subjected to constant negotiations and appropriations. However, there is still the need to address these issues through design. Urbanists and architects are crucial for engaging the materiality of the space of flows and challenging the controversial spatial connotations of infrastructural landscapes. Recent works by Belanger (2016), Couling and Hein (2020), Frichot et al. (2022), LeCavalier (2016), and Lyster (2016) turn the spotlight onto this issue. This body of studies has superseded the previous landscape urbanism approach to infrastructure, although it still lacks urban design practices. Not only is this caused by the complexity of contemporary infrastructural realms, which require the engagement of multiple disciplines and expertise, but also by the prevalence of a technocentric perspective that considers infrastructure primarily as belonging to the engineering domain. This perspective still regards each network *in se*, since its primary objectives are optimizing resources, improving efficiency, and eventually establishing universal standards. Conversely, in pursuing a deeper engagement with the infrastructures, their externalities, and the spatialities they generate, what emerges is their role in the production of complex urbanities. With respect to this relational understanding, the importance of design as speculative practice cannot be neglected. New infrastructural landscapes must be approached as an opportunity to challenge consolidated norms, question contemporary ways of production, and address today's socio-economic challenges. This requires what Frichot et al. (2022) term 'poetic pragmatics,' that is, the need to give free rein to our imagination, while remaining firmly anchored to the ground. A change in strategy is increasingly urgent, since the emerging infrastructural landscapes are, in the end, our contemporary city.

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