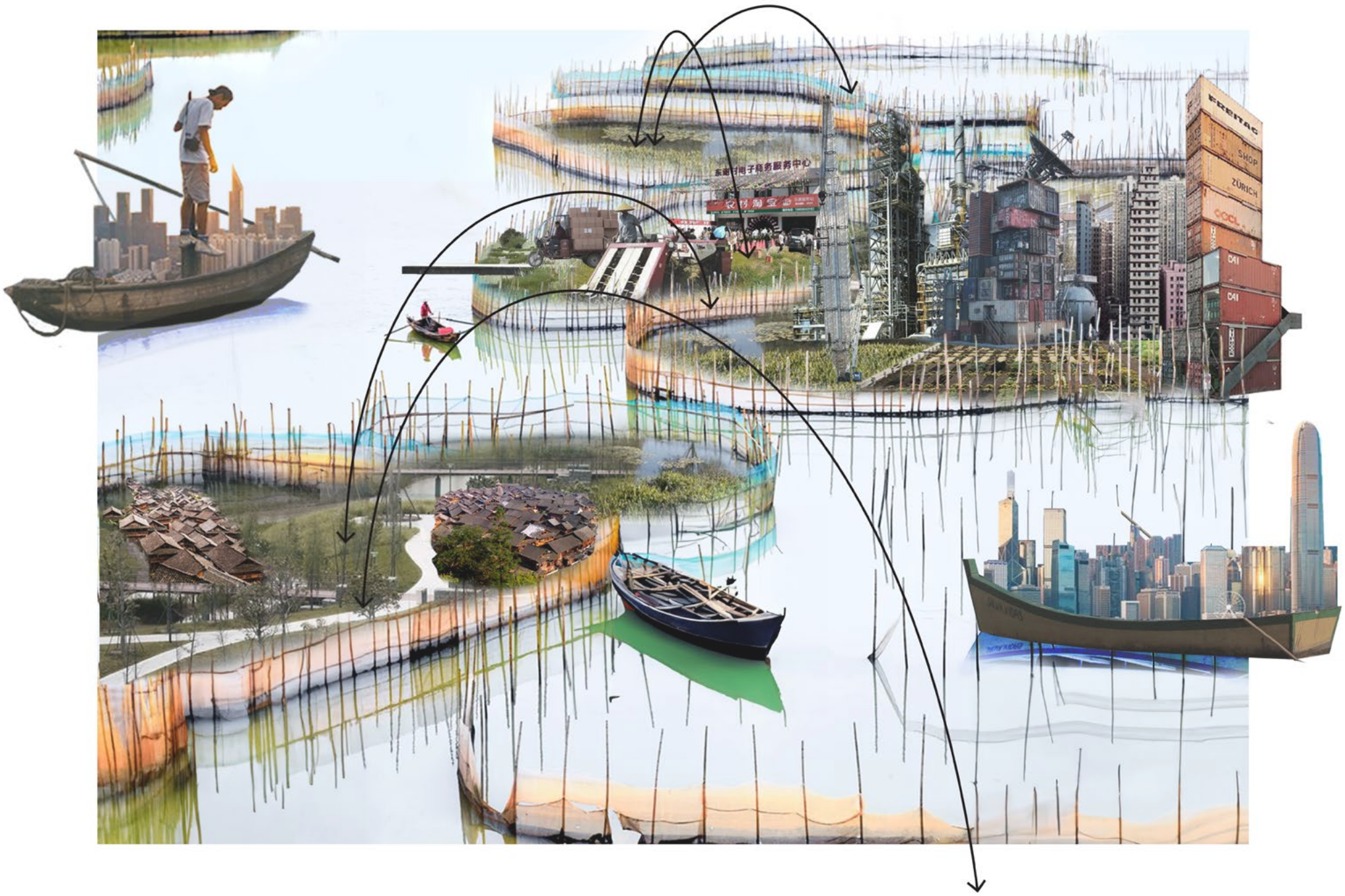

From megaprojects as the catalyst of urban development to a symbiotic model of self-directed territories in the GBA's peripheries

Megascape Symbiosis

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TUDelft

Abstract

As one of the most open and economically vibrant regions in China, the Greater Bay Area plays a significant strategic role in the country's overall development, showcasing the power of urban transformation within a diverse and socio-politically rich region. Since China's economic reform in 1978, mega projects and world-leading developments in the region have driven rapid urbanization. Despite these achievements, rapid globalization has led to negative effects on ecology and pollution in the GBA. When paired with climate change and deltaic conditions, these issues create "double-negative" effects on various layers.

Using the concept of "state entrepreneurialism" as a starting point, this project explores the role of urban mega developments in realizing the state's strategic and political objectives. It critiques the existing top-down, market-driven governance model and advocates for a paradigm shift towards localized planning approaches. These dynamics create tensions in soft locations, areas in transition which are susceptible to change and speculation.

This report outlines the shift from using megaprojects as catalysts for urban development to a more holistic framework. This new approach frames "megascapes" of place-bound strategic interventions that foster complementary relations and shifts focus from big urban cores to their surrounding territories. We define megascapes as self-directed territories consisting of functional conglomerations that respond to local sensitivities and transformations, proposing a future where soft peripheral territories are integrated into the GBA's broader regionalization model. This vision emphasizes adaptable, place-bound development and enhanced relations between ecological and economic systems to foster sustainable urban growth.

Keywords: deltaic conditions, megascapes, soft locations, place bound development, Greater Bay Area

Figure 1. The Shenzhen-Zhongshan bridge will help fuel Zhongshan's rapid development, source: Macao Magazine

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01

Introduction

Introduction

Exploring the dynamic interaction within the Greater Bay Area (GBA) of Guangdong reveals a landscape shaped by ambitious development strategies within China's unique deltaic environment. This region is a cornerstone of China's economic development, characterized by rapid growth and transformative dynamics driven by visionary strategies. However, these strategies face significant challenges due to the region's deltaic conditions, necessitating resilient infrastructure and careful environmental planning to manage risks such as flooding (Bay area, 2023; Reporter, 2024).

Strategies such as the planned Manufacturing and Innovation Corridors for economic growth also impact land use, highlighting the need to address marginalization and prioritize heritage preservation(He, 2019; Hu, 2017), as well as considering how these developments can positively impact communities. Preserving cultural identities tied to the region's productive landscape is imperative, especially with the rapid transformation of agricultural lands into industrial zones, which raises concerns about culture, sustainability, and food security (Williams, 2023).

Embracing the polycentric model of global cities, this study sheds light on the current direction of the GBA, emphasizing its strengths and often-overlooked aspects, while reframing traditional narratives to reveal opportunities within soft spaces.

This report navigates the complex trajectory of GBA development, emphasizing pathways toward a resilient and integrated Greater Bay Area ready to shape China's future urban evolution.

Figure 2. Collage combining news articles related to the GBA, highlighting current policies and tensions, sources: see sources in Bibliography.

02

Methodology
Theoretical framework

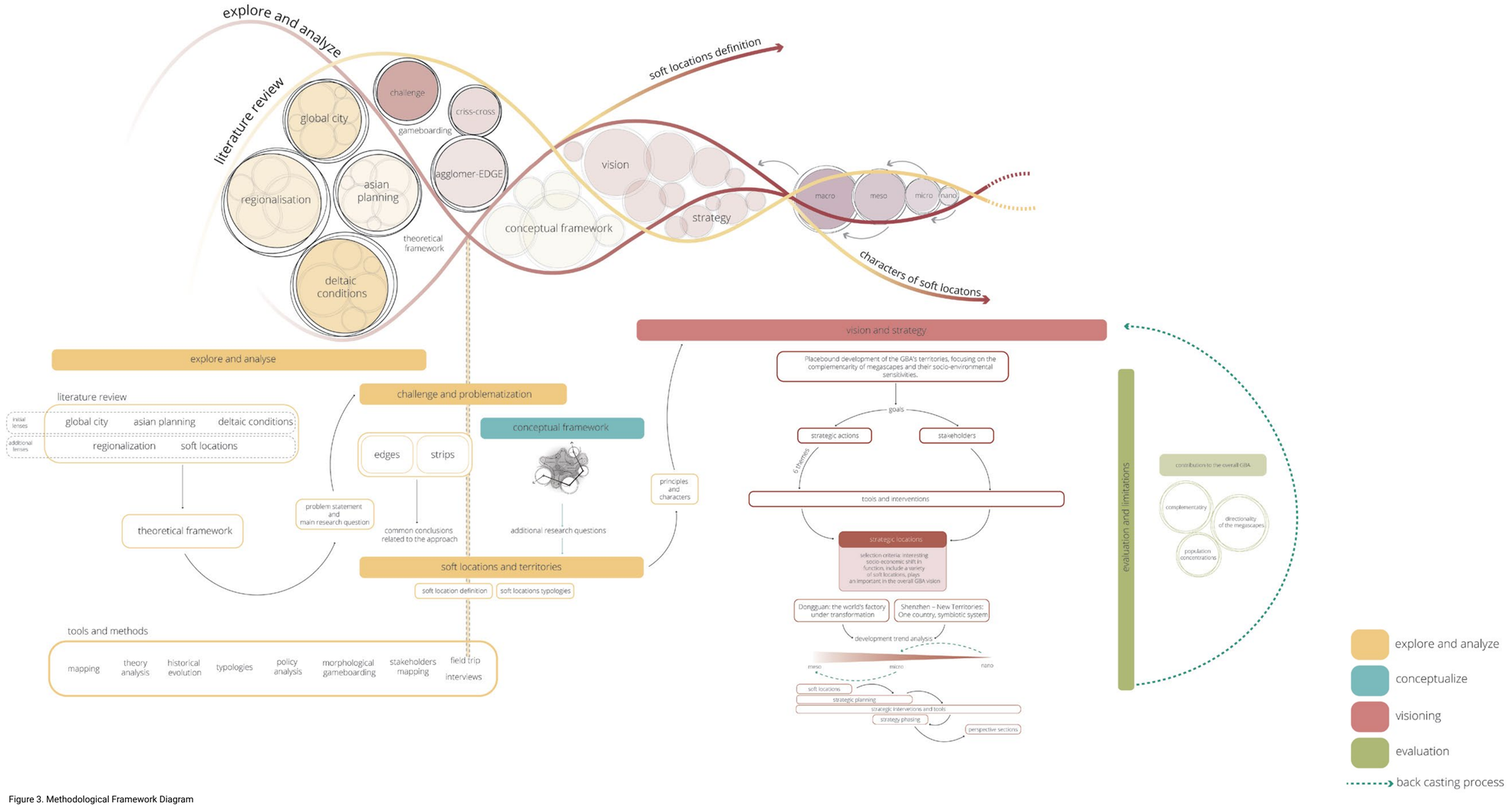


Figure 3. Methodological Framework Diagram

2.1 Methodology and Methods

This research was conducted using four key processes: research and analysis, conceptualization, strategy and design, and evaluation. To understand the complexity of our working area, we began with an extensive literature review, examining various perspectives to theoretically underpin our project. This was followed by analyzing data and policy documents to identify trends and challenges in the area.

After establishing our theoretical and contextual foundation, we framed our problem statement and research questions to guide further analysis and visioning. Our team traveled to Hong Kong, hosted by the Schools of Design at PolyU University. There, we conducted site visits, attended lectures, engaged in discussions with academics, and had brief conversations with local residents. A crucial part of our approach involved participating in the morphological game boarding methodology. We split into two teams, both addressing the same challenge but using different morphological tools (edge and strip) to understand the Greater Bay Area (GBA) context and its dynamics.
The findings, along with further research, helped contextualize our project upon returning to Delft. We defined key concepts and terms (such as soft locations and megascapes), identified key principles, and formulated additional research questions. Based on this foundation and further analysis of soft locations, we developed our vision and specific goals, along with strategic actions categorized into six themes, each corresponding to specific tools and policies that translate the strategy spatially. We selected two strategic locations to implement and test our strategy, refining our tools and interventions through various scales and adapting our methodology with each step's findings.

Finally, we zoomed out to the GBA scale to evaluate our project's contributions to the current situation and how the two systems interact and co-exist.
The main methods we used during this project included mapping, theory analysis, historical evolution analysis, typology studies, policy analysis, morphological gaming, stakeholder analysis, field trips, and interviews.

2.2 Theoretical framework

To provide a solid theoretical backbone for our project, we conducted extensive research, focusing initially on three key lenses: “asian planning,” “deltaic conditions assessment,” and “global city”. As the project progressed, more concepts and lenses, such as “regionalization process” and “urban mega developments” were incorporated to broaden the perspective and enrich the narrative. Alongside the theoretical framework, we created an analytical framework to systematically analyze and interpret data and concepts. This guided our research process and supported the development of our narrative and conclusions. Our theoretical and analytical frameworks relate to the interplay between globalization, regionalization, governance, and deltaic conditions.

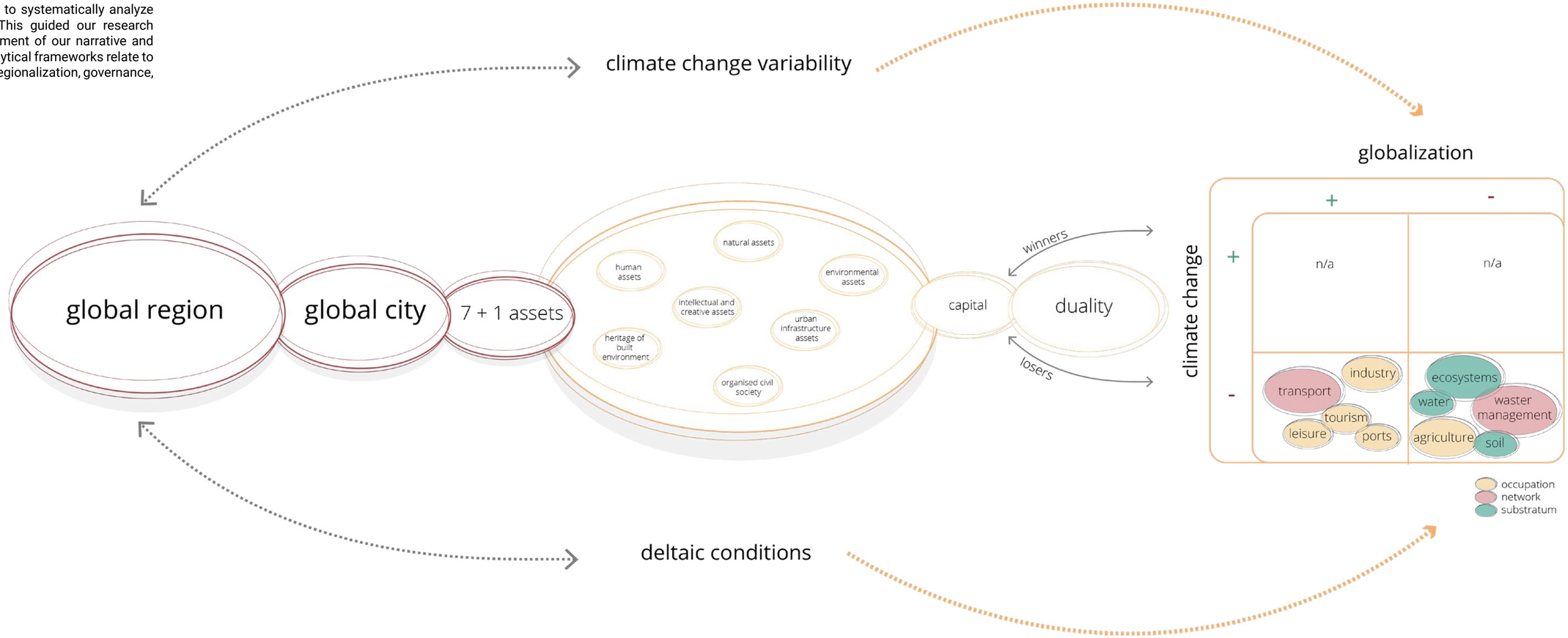


Figure 4. Theoretical framework with concepts adapted from (Cardoso & Meijers, 2021; Dammers et al., 2014; Friedmann, 2007; O’Brien & Leichenko, 2000)

2.2 Theoretical framework

Global region and regionalization

Starting point for this research was the GBA as a global region and its polycentric system with global cities that create mega agglomerations. Hall in 1966 initiated the discourse on world cities, emphasizing their disproportionate role in global business (Hall, 1966). Friedmann in 1986 expanded this by highlighting the integration of these cities with global economies and their capacity to manage global capital and production networks (Friedmann, 1986). Sassen's in 1991's seminal work further popularized the term, focusing on cities like Tokyo, New York, and London, which exemplified globalization in production and financial services (Sassen, 2013) (H. Wang et al., 2020). Global cities are characterized by their high levels of globalization and regionalization. and regionalization. "Globalization refers to a city's economic, political, and cultural dependence on the outside world"(Jönsson et al., 2000), while regionalization reflects on cooperation within spatial units like sub-districts and cities within a country that in the end create a unite system. As global cities are spreading out, places like "edge cities" pop up on the outskirts of them, and with better transportation and technology the suburbs are growing and cities as a whole become bigger and more connected (Marcuse, 2013). And because of globalization, regionalization becomes more and more prominent, and creates agglomerations of cities and networks that work together as a common economic system. This phenomenon essentially involves cities collaborating and expanding, particularly at their peripheries, similarly to the historical development of megalopolises, but on a larger scale. Within our framework, Friedmann's concept of assets-based development is being used. An alternative to the reliance on external capital fluctuations is therefore introduced, that emphasizes the long-term endogenous development (Friedmann, 2007). Key assets include human capital, organized civil society, heritage, intellectual and creative resources, natural endowments, environmental quality, and urban infrastructure (Friedmann, 2007). By investing in these assets, regions like the GBA can foster sustainable development and become adaptive to the constant changes of the global capital.

Urban mega developments, governance and deltaic conditions

Key emphasis on urban planning paradigm in China is given to urban mega developments often referred to as Mega Projects. As "projects, which are characterized by magnified cost, extreme complexity, increased risk, lofty ideals, and high visibility, while representing a significant challenge to the stakeholders, and having a significant impact on the community" (Fiori & Kovaka, 2005; Reboredo, 2021). Urban mega developments, as part of project-oriented governance, operate as the primary "language" of state entrepreneurialism, reflecting the "government's prioritization of strategic economic development objectives over the livelihood of local residents" (Wand & Wu, 2019). Thus, they create enclaves of growth leading to the fragmentation of the landscape and social "in-situ marginalization" (Z. Wang & Wu, 2019). Another phenomenon relates to rise of "exclusive citadels" and "gated-communities" in cities worldwide that reflect a growing trend of social segregation and exclusion (Marcuse, 2013). In these cities, the "prosperous" withdraw into insulated enclaves that isolate them from the broader urban environment (Marcuse, 2013). Although globalization has brought great wealth and economic development in global regions, brings negative impacts across the world, especially when paired with climate change. Climate change and globalization are both ongoing processes with unevenly distributed impacts across the world, and thus each of these processes come with winners and losers (O'Brien & Leichenko, 2000) across the substratum, network and occupation layers (Dammers et al., 2014). This duality underscores the complexity of managing a city that is both a global network center and a regional hub (Y. D. Wei & Yu, 2006). As all these processes take place in the context of deltaic conditions variability that impacts and is being impacted by Friedmann's global city assets (Friedmann, 2007), a complex system is being formed. "Complex systems are characterized by many elements and variables (subsystems), the many non-linear relations between them, and the great un- certainty about the state of the elements, the values of the variables, and the character of the relations" (Dammers et al., 2014). When a complex system, by human action or otherwise, is able to adapt to its environment and itself, it is called a CAS (Van Bilsen et al., 2010). CASs are known for their unpredictable and therefore surprising behavior. "The essence of the 'CAS-approach' is that an urbanized delta can be considered a complex and dynamic whole, consisting of various social, ecological, and physical components which constantly change and interact with one another, and which are continuously influenced by physical and socioeconomic trends in different and often unpredictable ways" (Giacomoni et al., 2013) (Dammers, et. al, 2014). In order to combat the above-mentioned challenges, an innovative practice emerging in China offers a promising perspective. Known as "Urban Double Repair," this approach emphasizes ecological restoration and the self-regulation of urban ecosystems to mitigate the adverse effects of rapid development (Urban Planning Society of China, 2022). This method will be a focal point in our project as we seek to integrate economic and environmental objectives in a balanced urban planning strategy. It is evident that Mega Projects are essential to support economic growth within China's vast urban agglomerations. The critical challenge lies in ensuring these developments adopt a holistic approach that balances top-down economic strategies with bottom-up community considerations. This dual focus aims to support economic prosperity while enhancing the quality of life for local residents.

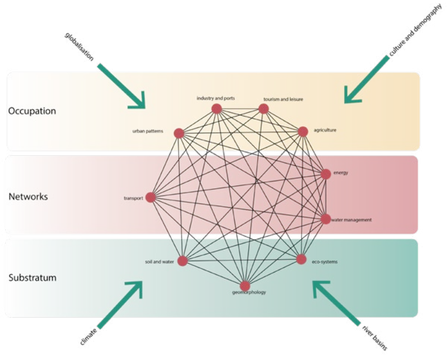


Figure 5. System, subsystems, and the environment, adapted from Dammers, et. al., 2014

2.3 Analytical framework

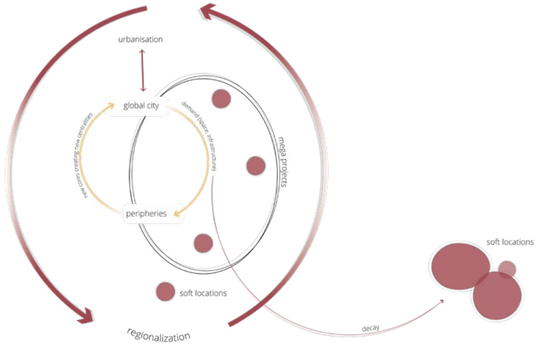


Figure 6. Analytical framework, source: theories adapted from (Marcuse, 2013; Z. Wang & Wu, 2019)

Variations in economic success among cities can be attributed to different levels of business investment and mobility. Cities that attract substantial financial inflows and businesses are often designated as "global cities," characterized by their robust economic growth and international influence. However, other cities face decaying processing and economic challenges, such as job losses due to business relo-cations to regions with lower costs (Marcuse, 2013). This phenomenon affects not only smaller urban areas but also major cities, highlighting uneven development patterns (Marcuse, 2013). Within our ana-lytical framework the term "soft location" is being introduced, although with a different definition than the traditional one. According to Marcuse (2013), the concept soft location refers to areas in cities that are not fully developed according to their zoning permits, making them suitable for change and new development. For this project, we interpret them slightly differently as "areas in waiting form with criti-cal socio-environmental conditions that are susceptible to change and under tension from the regionali-zation model". This definition will be further elaborated in Chapter 6.

03

The Greater Bay Area and its multiple realities

3.1 The GBA to the world and the rest of China

The Greater Bay Area (GBA) in Guangdong, encompassing Hong Kong and Macao, is a pivotal economic region with extensive global connections. Strategically located on China's southern coast, it serves as a vital hub for international trade, facilitated by robust marine and railroad infrastructure. The region's ports, including those in Shenzhen and Guangzhou, handle significant volumes of cargo, linking the GBA with global markets. According to a report by GoComet, these ports are crucial for China's export-driven economy, contributing substantially to regional economic growth (Hong Kong Special Administrative Region Government, 2018).

Moreover, the GBA is enhancing its connectivity through high-speed rail networks, such as the Guangzhou-Shenzhen-Hong Kong Express Rail Link, which facilitates rapid movement of goods and people across the region (Hong Kong Special Administrative Region Government, 2018). This integrated transport network strengthens the GBA's role as a major transportation hub within China and enhances its competitiveness in global trade.

The Guangdong-Hong Kong-Macao Greater Bay Area is one of China's most urbanized areas and a key component of the Belt and Road Initiative. The Seventh Session of the Guangdong Provincial Party Committee in 1994 proposed the development of the Pearl River Delta Economic Zone, which eventually expanded into the GBA comprising Hong Kong, Macao, and nine cities in Guangdong. The development plan aims not only to create a world-class urban cluster but also to establish an international center for technological innovation(Jian et al., 2021).

In conclusion, the Greater Bay Area in Guangdong plays a critical role in global trade through its robust marine and rail connections, positioning it as a key player in China's economy and enhancing its global connectivity.

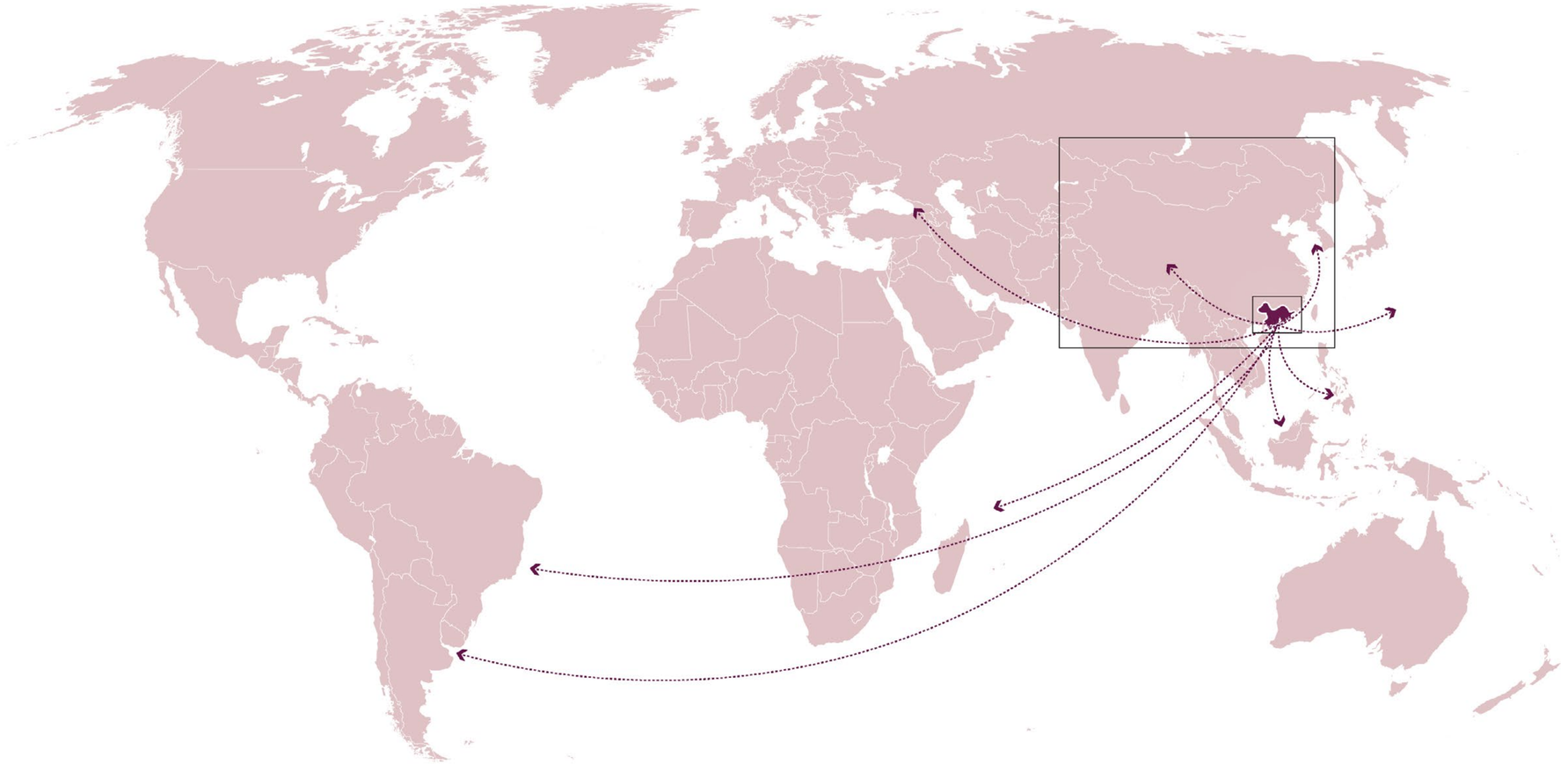
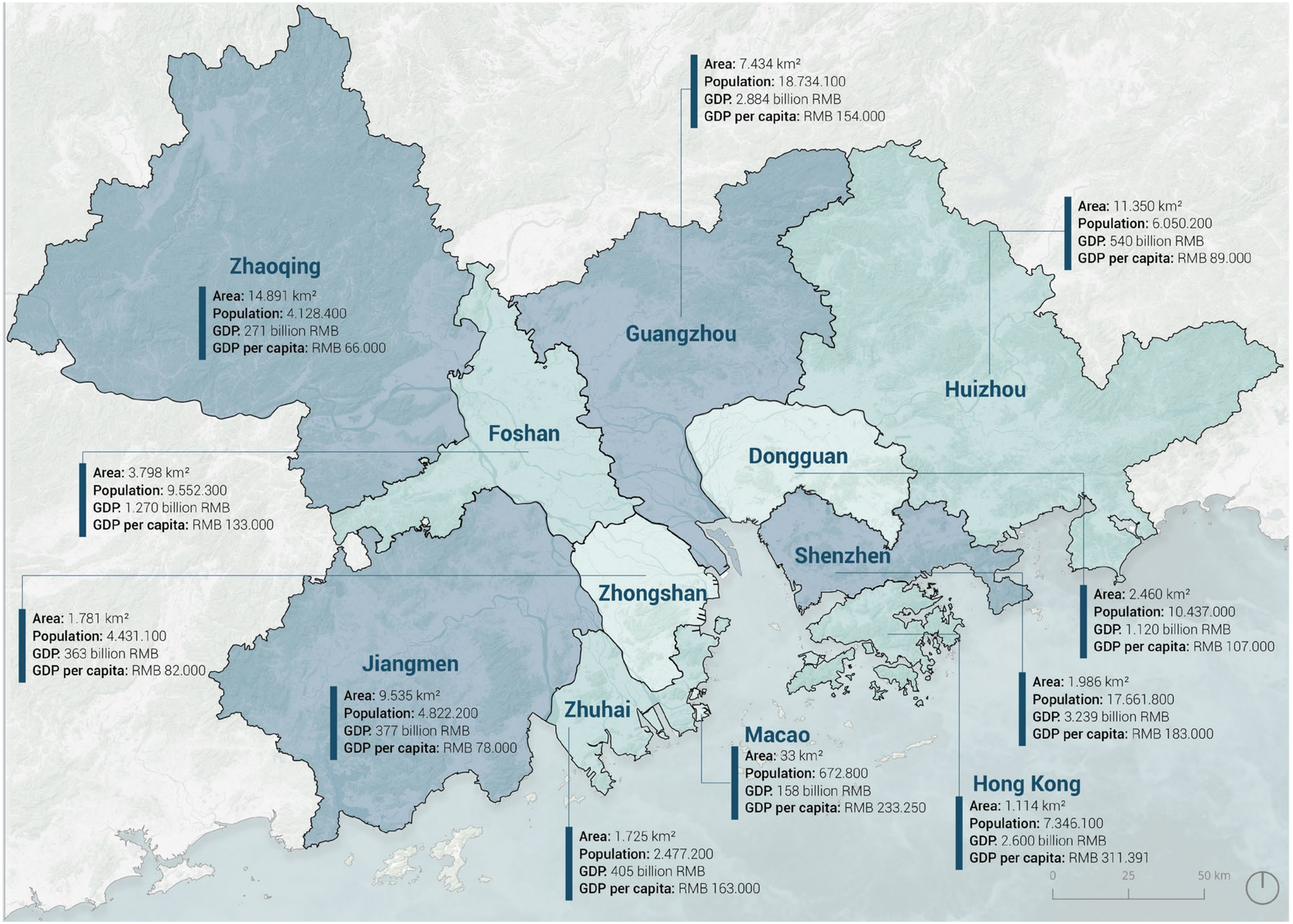


Figure 7. GBA to the world



GBA cities and characteristics

The Greater Bay Area (GBA) is a global region in South China, officially established in 2017 through a regional development initiative by the Chinese government. Its main aim is to foster economic integration and innovation by linking nine cities in Guangdong Province with the Special Administrative Regions of Hong Kong and Macau. The cities included in the GBA are Guangzhou, Shenzhen, Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen and Zhaoqing. These cities, along with Hong Kong and Macau, form a dynamic economic zone intended to compete other major bay areas globally, such as the San Francisco Bay Area and the Tokyo Bay Area. The initiative focuses on enhancing connectivity, promoting innovation, and integrating resources across the region.

Figure 8. The GBA and main characteristics of its cities, adapted from (WWF Hong Kong, 2024)

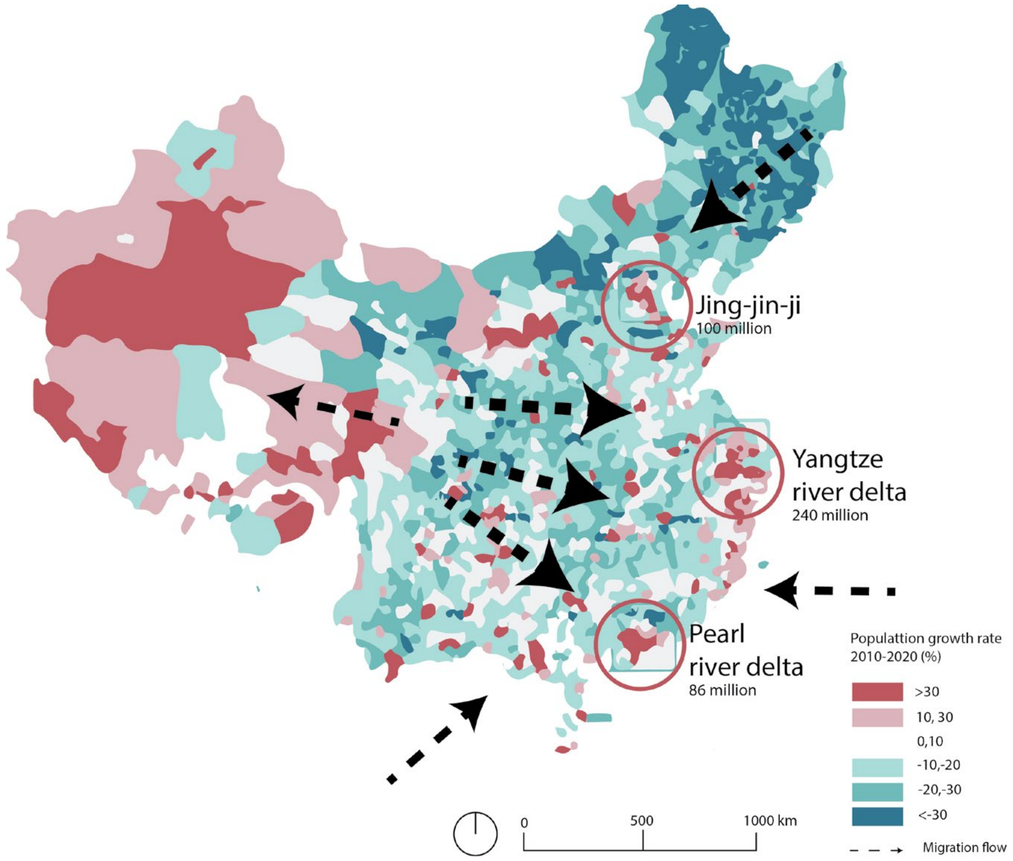


Figure 9. Mega agglomerations and migration flow in China , adapted from Dong et al., 2022

Mega agglomerations and migration flows

The population in inland China, particularly in the northern regions, experienced a significant decline between 2010 and 2020. In contrast, the population in coastal areas, particularly in the Jing-Jin-Ji, Yangtze River Delta, and Pearl River Delta, has grown significantly. Western China is showing some growth, but remains limited in absolute numbers because of its mountainous landscape and low population density in general (Dong et al., 2022). Due to urbanization trends people move mainly to these three major deltas. This highlights the crucial role of the deltas for China's demographic and economic future.

The map shows population growth in the Greater Bay Area from 1980 to 2023 and an expectation for the population in 2035 (World Population Prospects - Population Division - United Nations, n.d.). Hong Kong which historically already was a big city, has seen but a small increase since then. Shenzhen and Guangzhou however have experienced explosive population growth in the last decades. Shenzhen transformed from a small village in 1980 to a megacity thanks to its status as a special economic zone, enhanced by its proximity to Hong Kong (邓京荆, n.d.). Guangzhou, already an important trading center also benefited from its strategic location and industrial expansion (曹梓楠, n.d.).

The proximity of these cities has created powerful economic environment, making them attractive to migrants in search of better opportunities in the delta. Population growth in the Greater Bay Area is expected to continue until 2035 (World Population Prospects - Population Division - United Nations, n.d.) , showing the region's importance as a core area for China's economic development. The explosive population growth and future projections shows how the GBA is important for China's demographic and economic future.

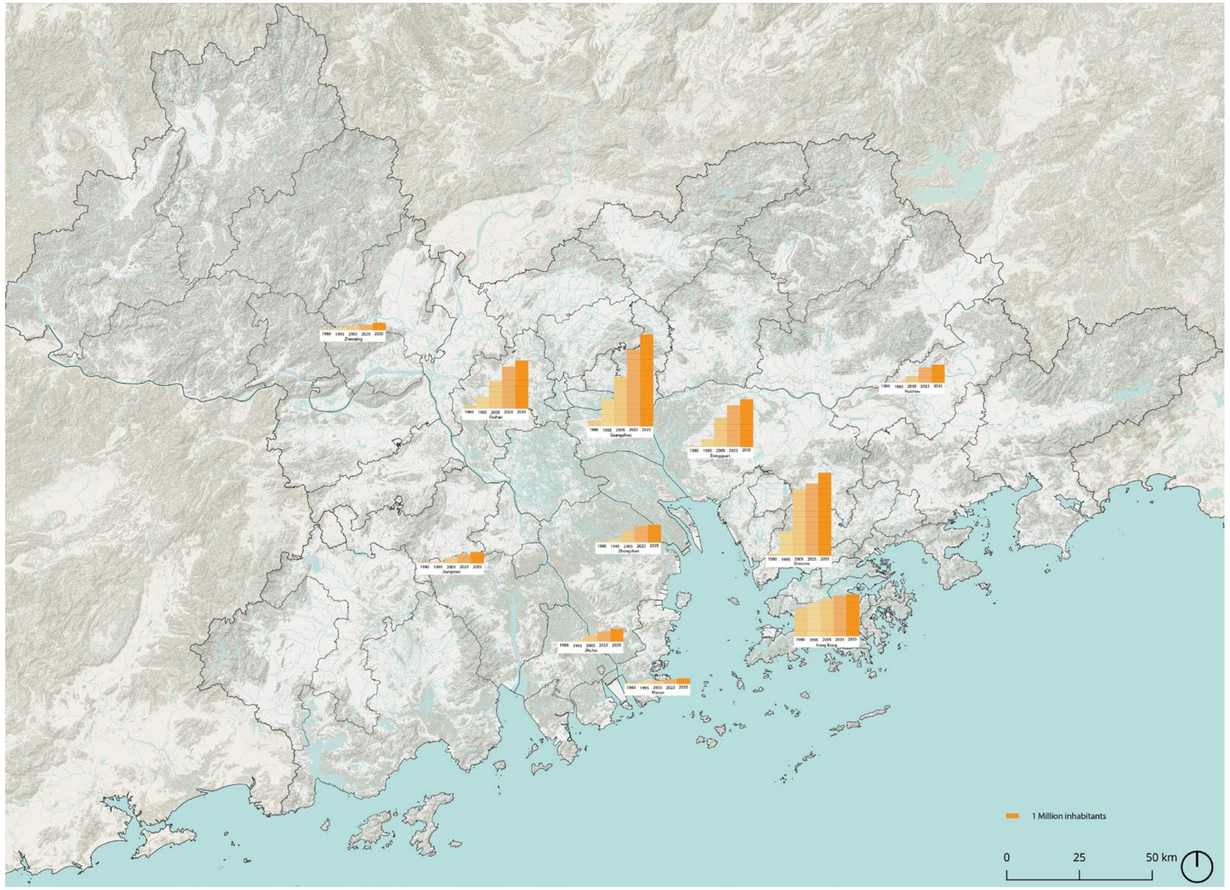
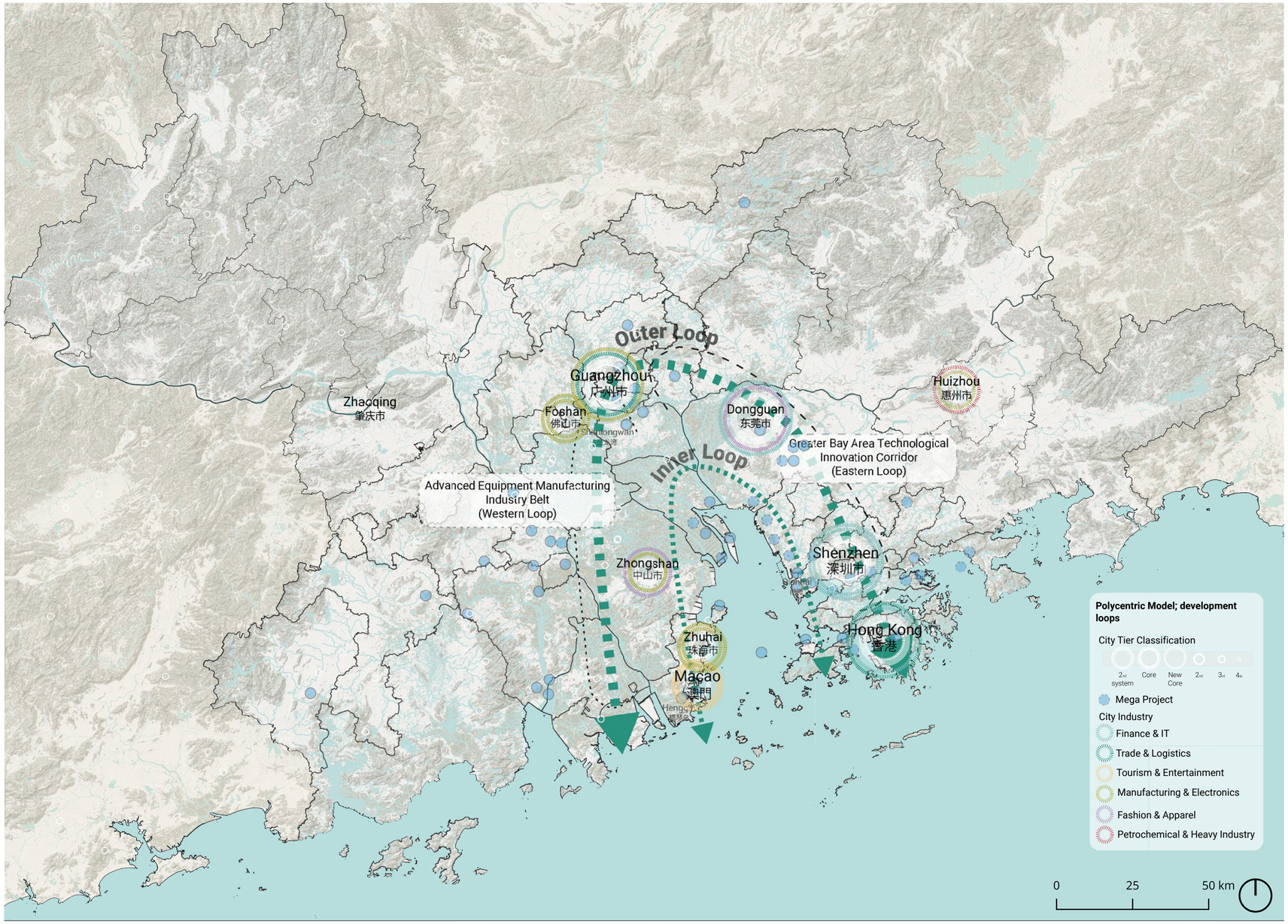


Figure 10. Population growth GBA (World Population Prospects - Population Division - United Nations, n.d.)



Regionalization and polycentric model

China's city hierarchy is a classification system that ranks cities based on various factors such as population, economic strength, political importance, and overall development. This system helps in understanding the administrative and economic structure of different regions. In Guangdong, one of China's most economically vibrant provinces, the city hierarchy reflects its dynamic urban landscape (Wong, 2019).

The JLL report, "Redefining the Greater Bay Area's Industrial Network and Spatial Distribution," highlights new urban planning concepts aimed at driving regional economic growth. The Greater Bay Area (GBA) adopts a double-ring development model, integrating both modern services and advanced manufacturing(Zeng, 2021).

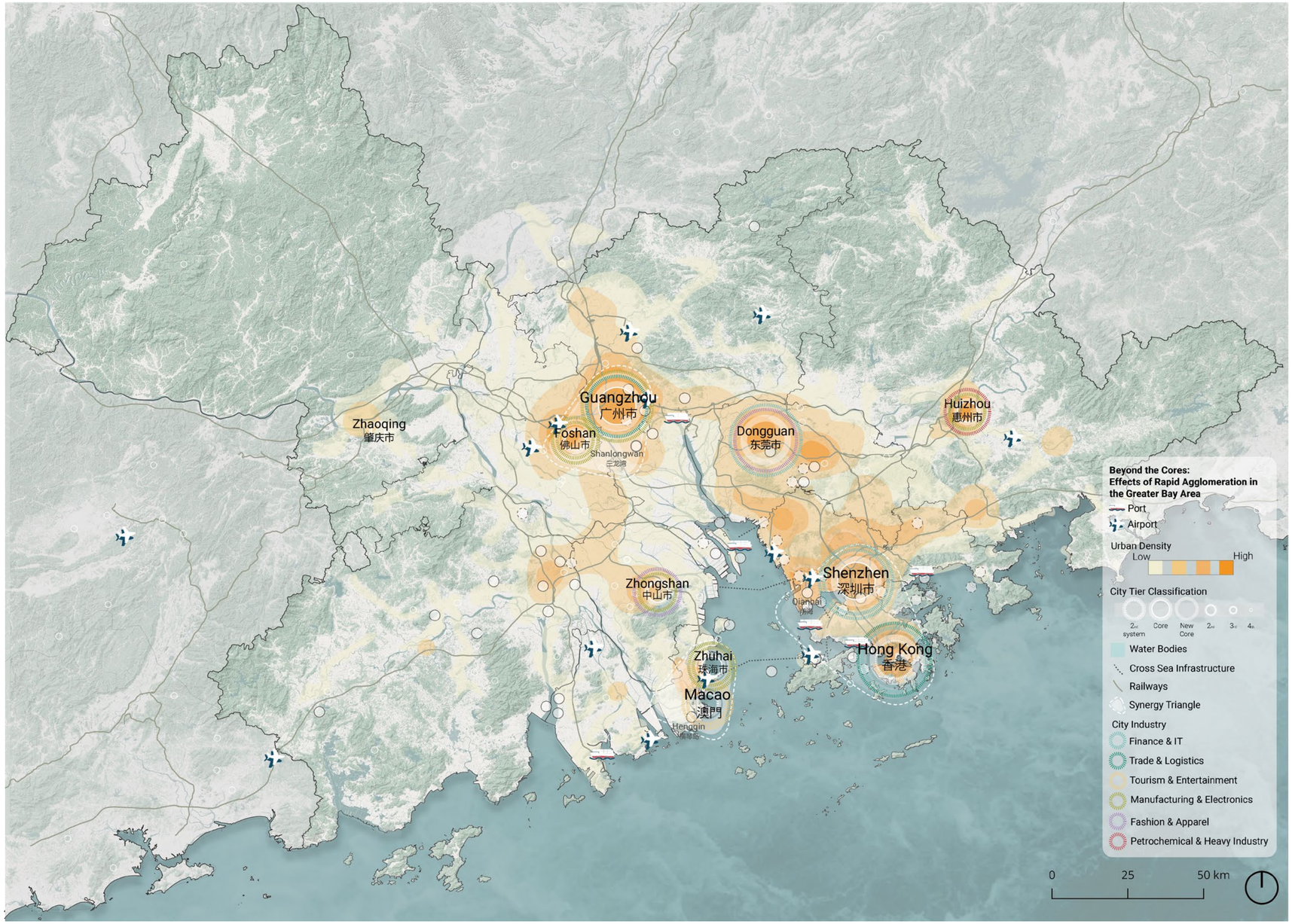
The outer ring of the GBA consists of two distinct areas:

East Ring: Known as the Guangzhou-Shenzhen Science and Technology Innovation Corridor, this area focuses on innovation and technology-driven industries. It connects major innovation hubs in Guangzhou and Shenzhen, promoting research and development, high-tech industries, and cutting-edge technological advancements.

West Ring: This area, referred to as the Advanced Equipment Manufacturing Industrial Belt, is centered on heavy industry and advanced manufacturing. Located on the west bank of the Pearl River, it supports the production of high-value machinery, automotive components, and other industrial equipment.

Together, the inner ring and outer ring form a semi-circular development axis around the bay, integrating secondary and tertiary sectors to establish new economic growth engines. Core cities within the GBA are adopting a multi-centric development model, expanding economic boundaries and enhancing competitiveness through multiple CBDs located at strategic intersections. This synergy between manufacturing and innovation fosters a robust, high-tech industrial hub that leverages the GBA's competitive advantages and infrastructure

Figure 11. City character and tier system, created with data from (Wong, 2019; Zeng, 2021)



Global cities and territory

As previously mentioned, the global cities in the Greater Bay Area are key hubs of innovation and economic activity, driving the region's growth and significantly contributing to China's overall development. Each city specializes in different industries, creating a diverse economic model. The expansion of urban cores often leads to the formation of dense clusters that consume surrounding territories. With the gradual transformation of the area, these cities are becoming increasingly powerful and important in sectors such as finance, IT, manufacturing, and electronics. Recognizing the potential of these partnerships, new relations are emerging, as highlighted in the 2030 Vision for Guangdong Province.

"Time-space compression (space and time collapse to facilitate flexible accumulation) has given rise to accessible catch-phrases such as "the global village" and "this is a small world." Yet for many of the inhabitants of the global city, the "shrinking world" phenomenon is deeply literal: the lived space of everday life is shrinking to make room for rezoning, construction of infrastructures, space modification — all in the name of urban development." Huang (2004)

Figure 12. Regionalization model and the peripheries of the GBA

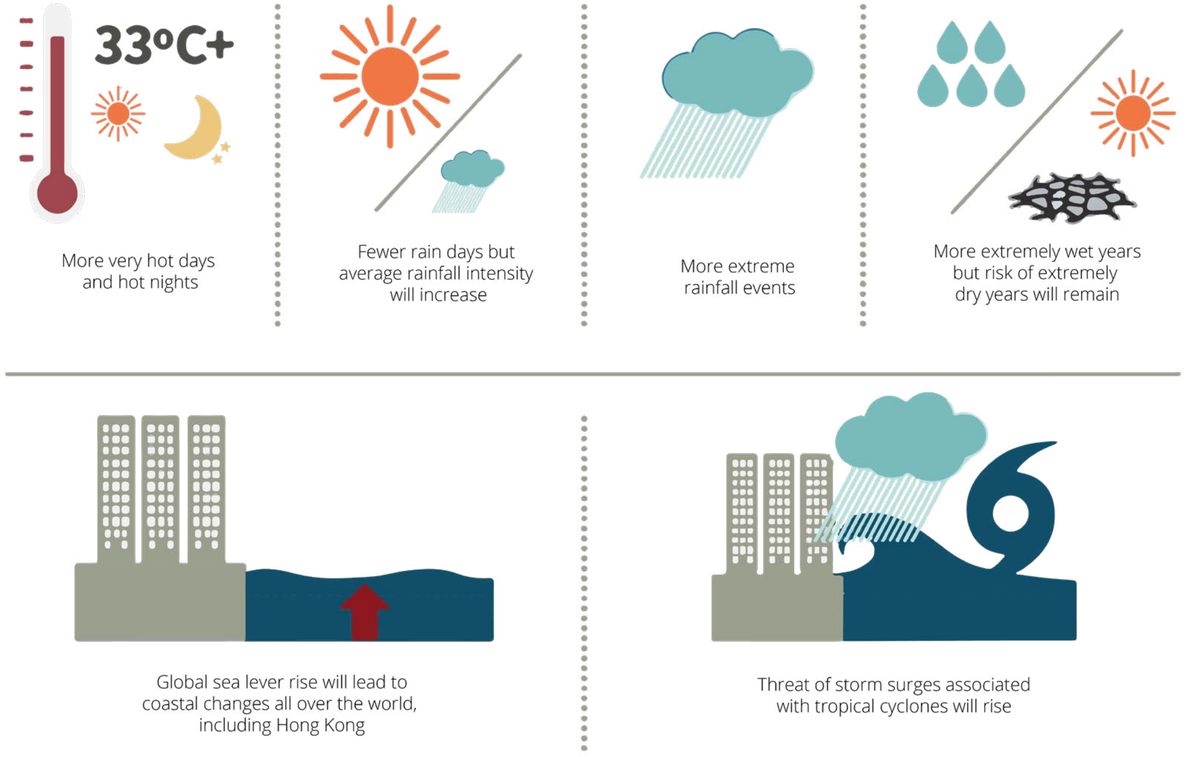


Figure 13. Climate change challenging the PRD, adapted from (Francesch-Huidobro, 2019)

3.2 Environmental and Deltaic Conditions

In recent years, large cities worldwide have frequently experienced surface water flooding after intense downpours that exceed drainage capacities, leading to disruptions, property damage, and even loss of lives. Rapid urbanization and economic growth in developing Asian countries have exacerbated exposure to flood hazards, particularly in low-lying cities facing increasing risks from extreme precipitations likely worsened by climate change (Jian et al., 2021). Mega cities like Guangzhou and Shenzhen have over 20-40% of their urban settlements in high flood hazard zones, highlighting the need for robust flood hazard assessments and better flood mitigation systems (Jian et al., 2021).

The Intergovernmental Panel on Climate Change has highlighted increasing risks from extreme precipitations in urban areas. Rapid urbanization has altered land use and cover in cities, increasing susceptibility to flood risk. Central cities like Hong Kong, Macao, Shenzhen, and Guangzhou have high exposure due to lowland populations and assets, though high adaptive capacities can reduce potential vulnerability (Yang et al., 2015).

Climate change and land use/cover change (LUCC) are key drivers of regional hydrological processes, and their impacts are crucial for sustainable ecosystem development, land use planning, and water management (Tan et al., 2022). Climate change affects LUCC, and vice versa, creating complex interactions and feedbacks in hydrological models. Urbanization-induced LUCC directly and indirectly affects regional climate, complicating these interactions (Tan et al., 2022).

These trends, along with continuing urbanization in flood-prone areas, are expected to increase flood frequency and severity in the PRD area (Yang et al., 2015).Changes in precipitation and temperature due to climate change will further impact hydrological processes, emphasizing the need for adaptive urban planning (Tan et al., 2022).

In the 2019 Outline Development Plan, two key principles emphasized are the commitment to sustainable development and ecological preservation (Principle 3) along with the enhancement of public well-being (Principle 5). Located in Guangdong province, the Greater Bay Area (GBA) is heavily engaged in ecological conservation efforts. The province boasts over 1,362 nature reserves spanning 2.9 million hectares, which constitutes 16% of its total area. Initiatives include creating ecological corridors for migratory birds and restoring mangrove habitats, with notable projects in places like Futian, Shenzhen (WWF Hong Kong, 2024).

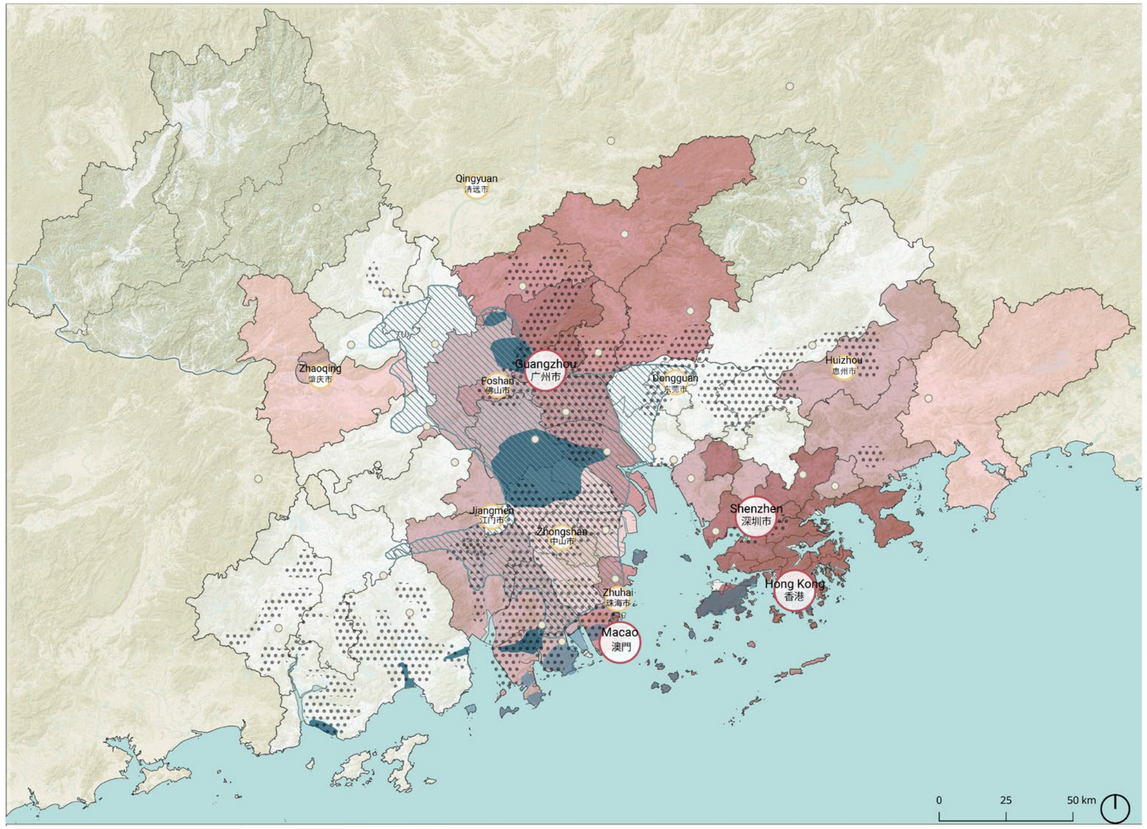


Figure 14. Flooding vulnerability in relation to the average income, made by the authors with data from (Carmona et al., 2014; Jian et al., 2021)

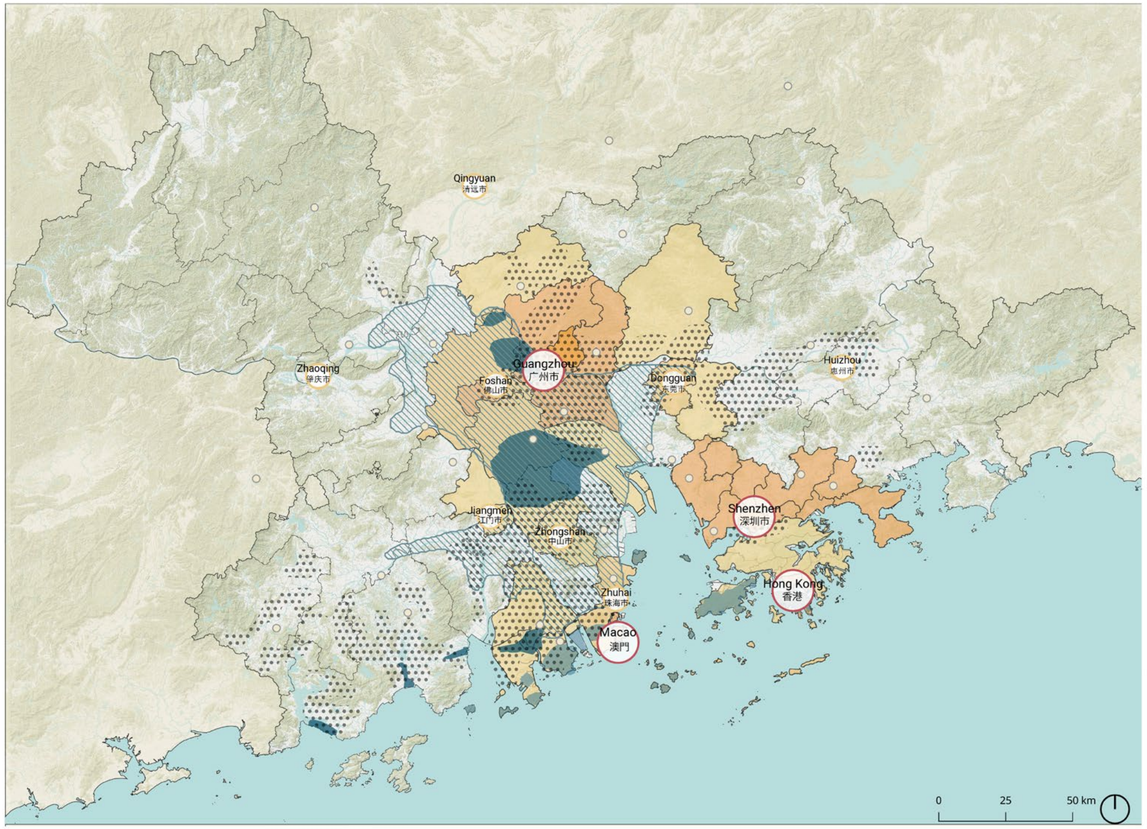


Figure 15. Flooding vulnerability in relation to the population density, made by the authors with data from (Carmona et al., 2014; Jian et al., 2021)

As previously mentioned, the GBA faces various forms of flooding risks: fluvial, pluvial, and coastal floods. Local conditions such as morphology, substratum, urbanization, population density, and climate affect the susceptibility of areas to specific types of flooding. In the GBA, the most common type is pluvial flooding, particularly flash floods and surface water flooding. This risk is significant in both high- and low-income areas, but it is much higher in densely populated regions. The frequent occurrence of flooding in these high-density areas underscores the importance of effective water management solutions to safeguard livelihoods.

Flooding vulnerabilty
- 15 cm SLR
- 50 cm SLR
- 100 cm SLR
- High pluvial flood hazard

Average income
- 5082 - 5801
- 5801 - 6201
- 6201 - 7092
- 7092 - 9382
- 9382 - 14447

Figure 16. Flash flood risk sign

Figure 17. Hard edges

Figure 18. Area of high flood risk sign

Flooding vulnerabilty
- 15 cm SLR
- 50 cm SLR
- 100 cm SLR
- High pluvial flood hazard

Population density
- 0 - 45
- 45 - 100
- 100 - 200
- 200 - 800
- 800 - 1606

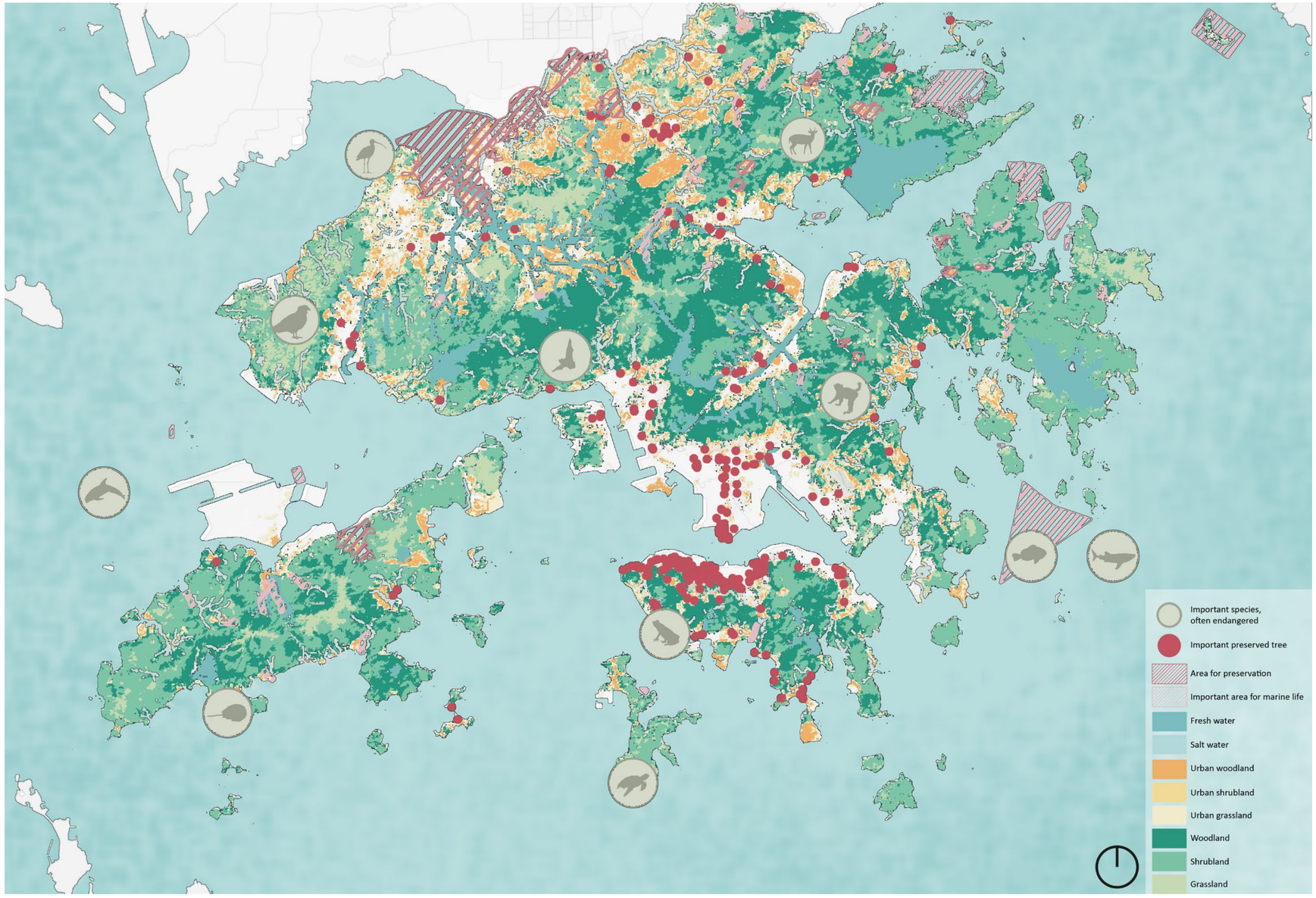


Figure 19. Hong Kong biodiversity map, created with data from (Liu, 2017), (CSDI Hong Kong, n.d.), (PolyU, 2014)

Biodiversity of Hong Kong

The biodiversity map of Hong Kong showcases the rich and diverse, yet fragile ecosystems which are being negatively impacted by globalization. The map showcases different important animal species that are being threatened.

For example, loss of wetlands threatens many smaller species and causes water birds to retreat as they are no longer able to find food (FOE Hong Kong, 2023). The white dolphin, which had one of the largest remaining groups living in this region, is disappearing due to the airport that has been dredged out from the sea (WWF, 2009). The rise of skyscrapers in Shenzhen threatens the migration routes of many waterbirds (Leung, 2019). Sea turtles only have one remaining site where they lay their eggs (AFCD, 2021) and horseshoe crabs, who's ethically extracted blood is essential for testing new medicine, are being overfished as seafood according to the Ocean Park Conservation Foundation (OPCF Hong Kong, 2014).

Attempts have been made to lower the negative impact on these animals, like a dolphin feeding area next to the airport (Hong Kong International Airport, 2021), but their effectiveness is minimal.

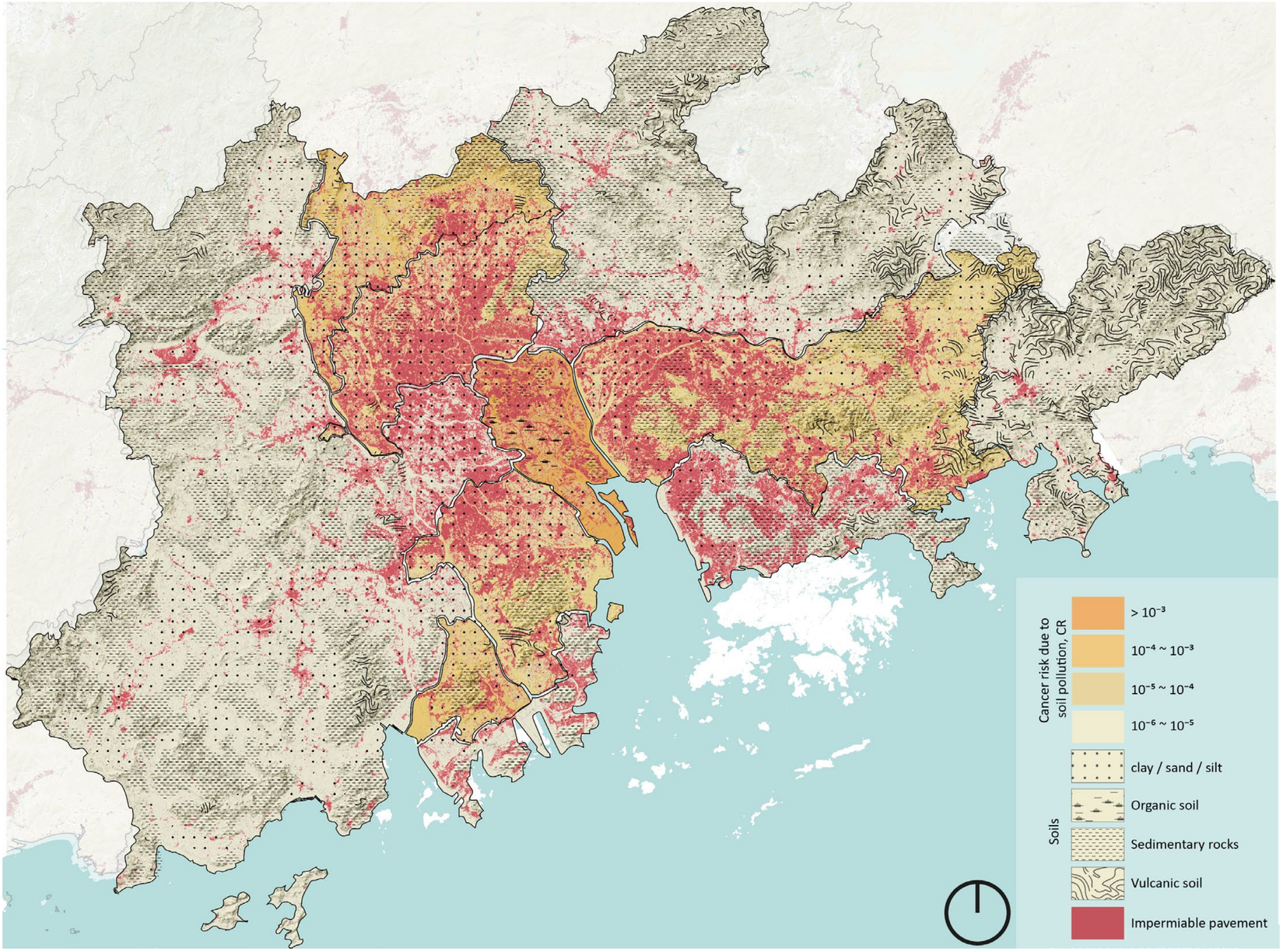
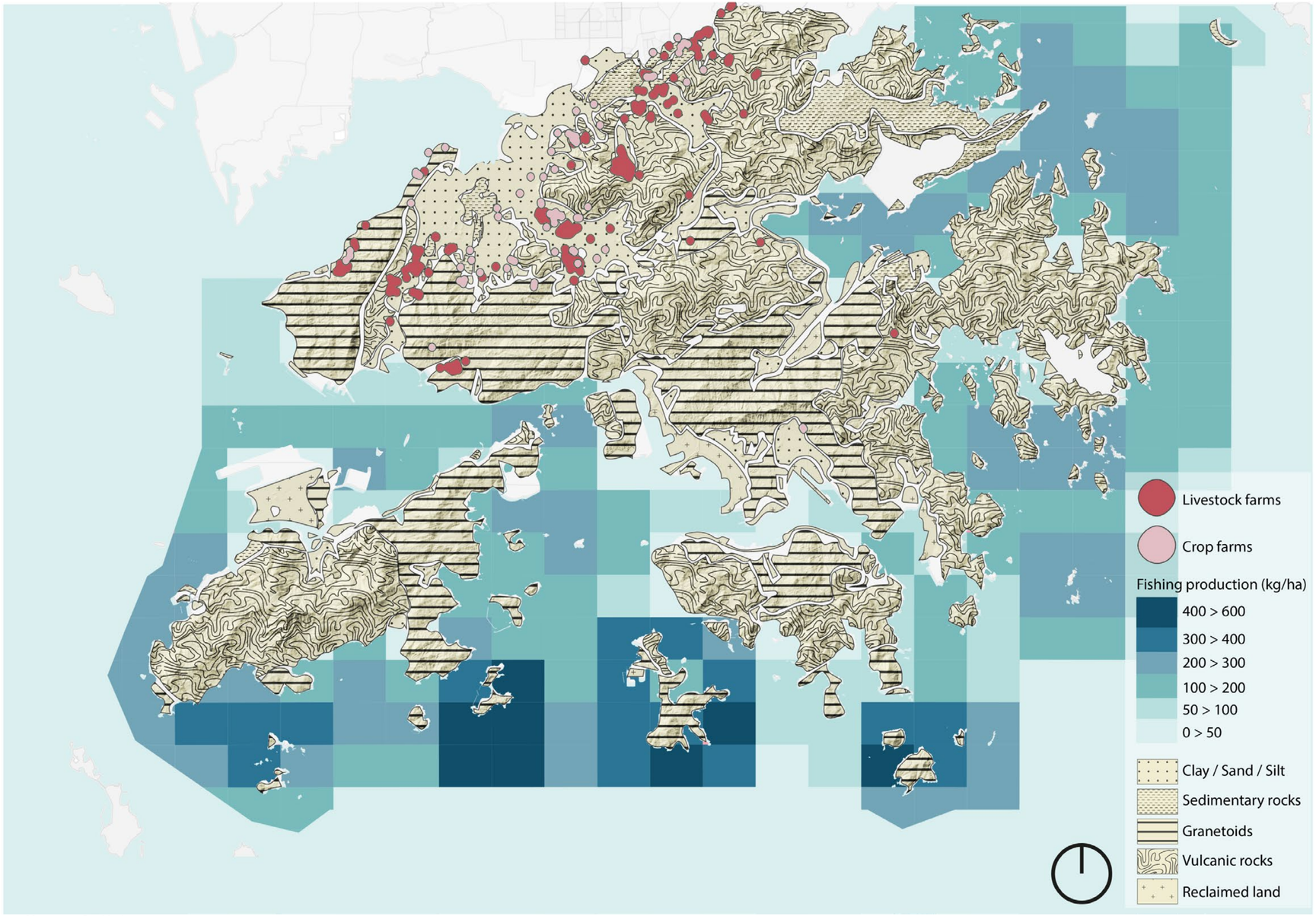


Figure 20. Soil pollution map, created with data from (□□□ & Qingxia Zong, 2017), (Chen et al., 2021)

Greater Bay soil pollution

The greater bay area has a diverse distribution of soil types. Soil parent materials consist of different igneous and metamorphic rocks, washed up soils and organic soils (Chen et al., 2021). As a result of rapid urbanization, these soils have become polluted with heavy metals. In total, 26% of the soils in the GBA exceed the norms, posing a serious health risk. The soil pollution map shows which regions pose an increased cancer risk due to this pollution, and an increased risk of developing chronic diseases. The heavy metals that polluted the soils include As, Cd, Cu and Hg elements (宗庆霞 & Qingxia Zong, 2017).

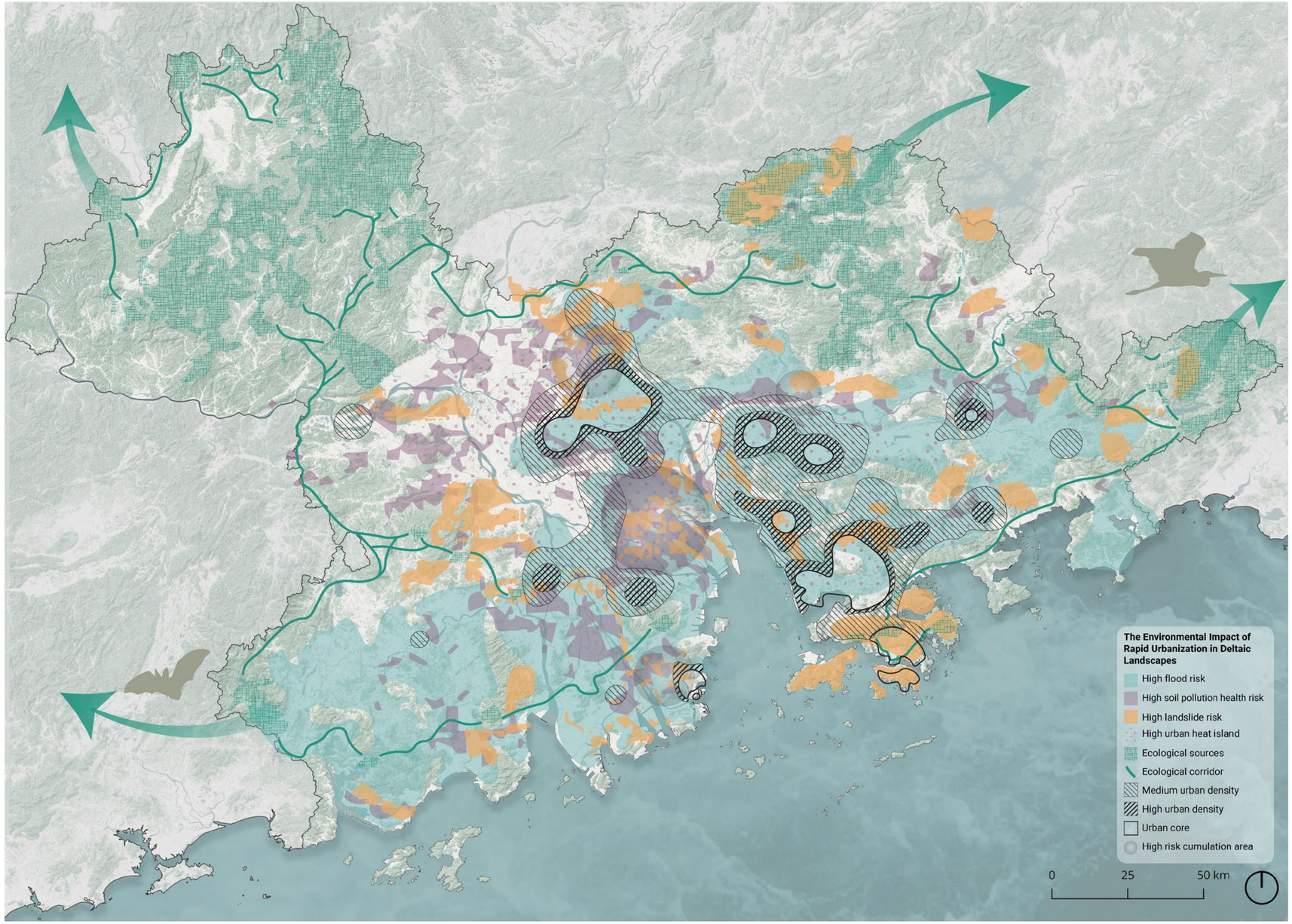


Hong Kong soil & food production

The soils in Hong Kong are mainly volcanic rocks and sedimentary rocks (Sewell & Tang, 2013). The soil & food production map overlays the livestock and crop farms together with the different soil types. By doing this, it becomes clear that these farms are all located on a relatively small piece of land where fertile clay soils exist. A significant portion of this fertile land is not available for agriculture as they are within protected natural areas (CSDI Hong Kong, n.d.).

The soil & food production map also shows the distribution of fish production in kg/ha (CSDI Hong Kong, n.d.). Fisheries are a large industry in this area which are extra vulnerable to climate change effects which could have a large impact on the economy of the entire region (O'Brien & Leichenko, 2000).

Figure 22. Hong Kong soil & food production map, created with data from (CSDI Hong Kong, n.d.), (Pappin et al., 2004)



Critical environmental conditions due to globalization in deltaic context

The second quest map investigates the deltaic landscape conditions. Different environmental threats are highlighted such as areas with a high risk of floods (Jian et al., 2021) and landslides (Francesch-Huidobro, 2019). There are also environmental threats caused by urbanization itself, like soil pollution (宗庆霞 & Qingxia Zong, 2017) and the urban heat island (Deng et al., 2022).

It is interesting how the areas where all the threats co-exist, leading to double-exposure (O'Brien & Leichenko, 2000), are always located right next to the dense urban cores. This map also showcases ecologically important sources and the migration routes between them, which are also under pressure from urbanization (H. Jiang et al., 2021).

"In light of globalization-related development trends and the increasing importance of coastal areas for the Chinese economy as whole, climatic change may have severe economic impacts. From an ecosystem perspective, coastal areas of China are thus likely to experience the negative consequences of both economic globalization and climate change." (O'Brien, K.L.,2000)"

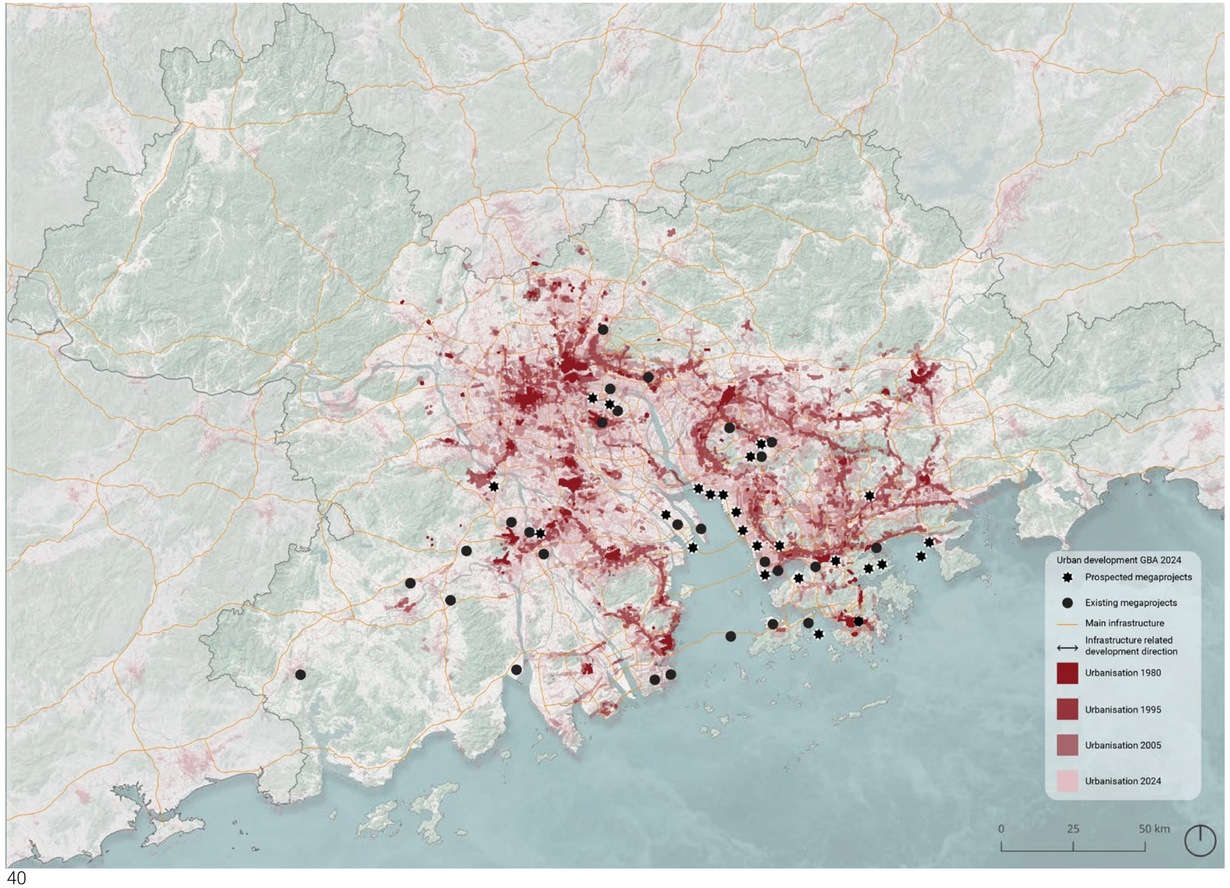
Figure 23. Environmental conditions in the GBA, map made by the authors with data from (Jian et al., 2021), (Francesch-Huidobro, 2019) , (□□□ & Qingxia Zong, 2017), (Deng et al., 2022) , (Jian et al., 2021)

3.4 State Entrepreneurialism

Infrastructure and urbanization trends

The Greater Bay Area's spatial distribution results from its polycentric model that supports the interactions and interdependencies between its central city nodes. Throughout the years, the shifting functionality and the economic drivers of the GBA's centers led to infrastructure investments to allow the distribution of people and goods (D. Wei et al., 2023). In parallel, large-scale urban development projects were facilitated by these investments to ensure their inclusivity in the polycentric system. This has resulted in the interlinked growth of traffic networks and megaprojects, leading to an urban development directed by these factors.

Figure 24. The GBA's urbanization footprint between 1980 and 2024 related to mega projects and infrastructure development, made by the authors with data from (Wei et al., 2023)



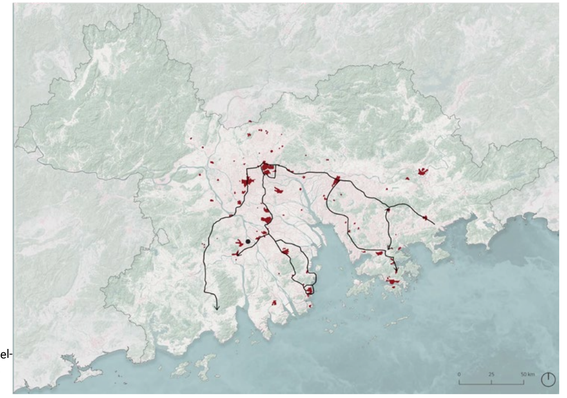


Figure 26. Urbanization footprint in 1980 and infrastructure related development direction in 1980, made by the authors with data from (Wei et al., 2023)

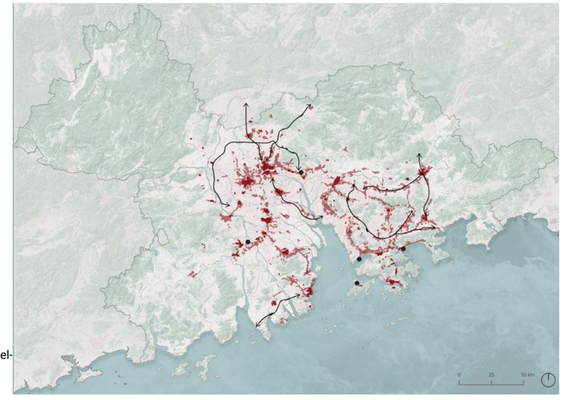


Figure 27. Urbanization footprint in 1980 and infrastructure related development direction in 1995, made by the authors with data from (Wei et al., 2023)

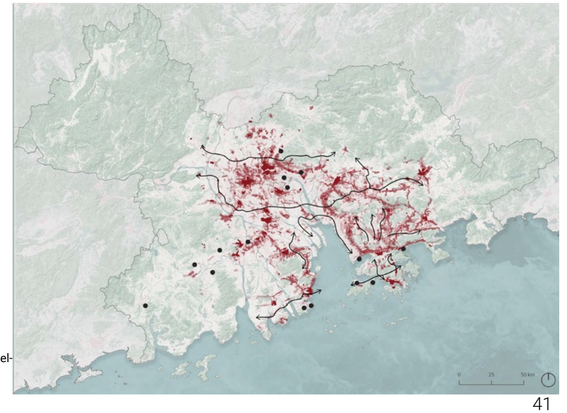


Figure 25. Urbanization footprint in 1980 and infrastructure related development direction in 2005, made by the authors with data from (Wei et al., 2023)

Understanding the area of influence of mega developments

The Qianhai Cooperation Zone, a transformative urban mega development located in Shenzhen, has undergone significant evolution since its initial planning stages. In 1984, the area around the bay was characterized by low-density urban settlements, consisting mainly of fishing villages and agricultural activities along a natural, green-buffered coastline. By 1997, land reclamation efforts had commenced, laying the groundwork for Qianhai's development. This period marked the beginning of urban expansion towards the shoreline, leading to a reduction in vernacular agriculture, fisheries, and natural areas, while the existing urban fabric began to densify. Fast forward to 2024, the Qianhai Coop Zone is fully realized on reclaimed land, epitomizing rapid urbanization with mid to high-density developments. The natural environment has been significantly diminished, now confined to two small, fragmented, and enclosed green zones, highlighting the extensive urban transformation that has taken place.

This is one of many cases in the area where mega-developments act as catalysts for urban growth that extends beyond their initial blueprints. This development process subsequently affects the morphological and environmental conditions of a larger urban area. Although mega-projects might follow socio-environmental considerations and design values consistent with the GBA's vision, the overall urban impact they impose on surrounding areas cannot be guaranteed. This phenomenon presents a challenge for the GBA's development plans.

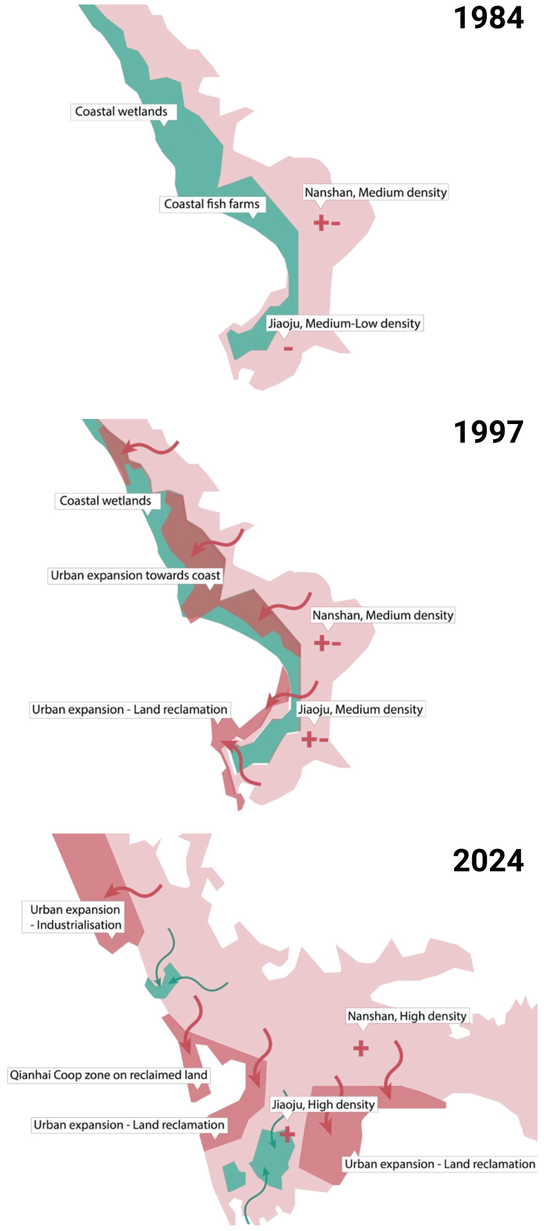


Figure 28. Peripheral impact on urbanisation by megaproject in Shenzhen Qianhai, adapted from (Google Timelapse, 2024.)

Figure 29. Qianhai Bay: People, Infrastructure, Development

Figure 30. Qianhai Bay: Human perspective and new development

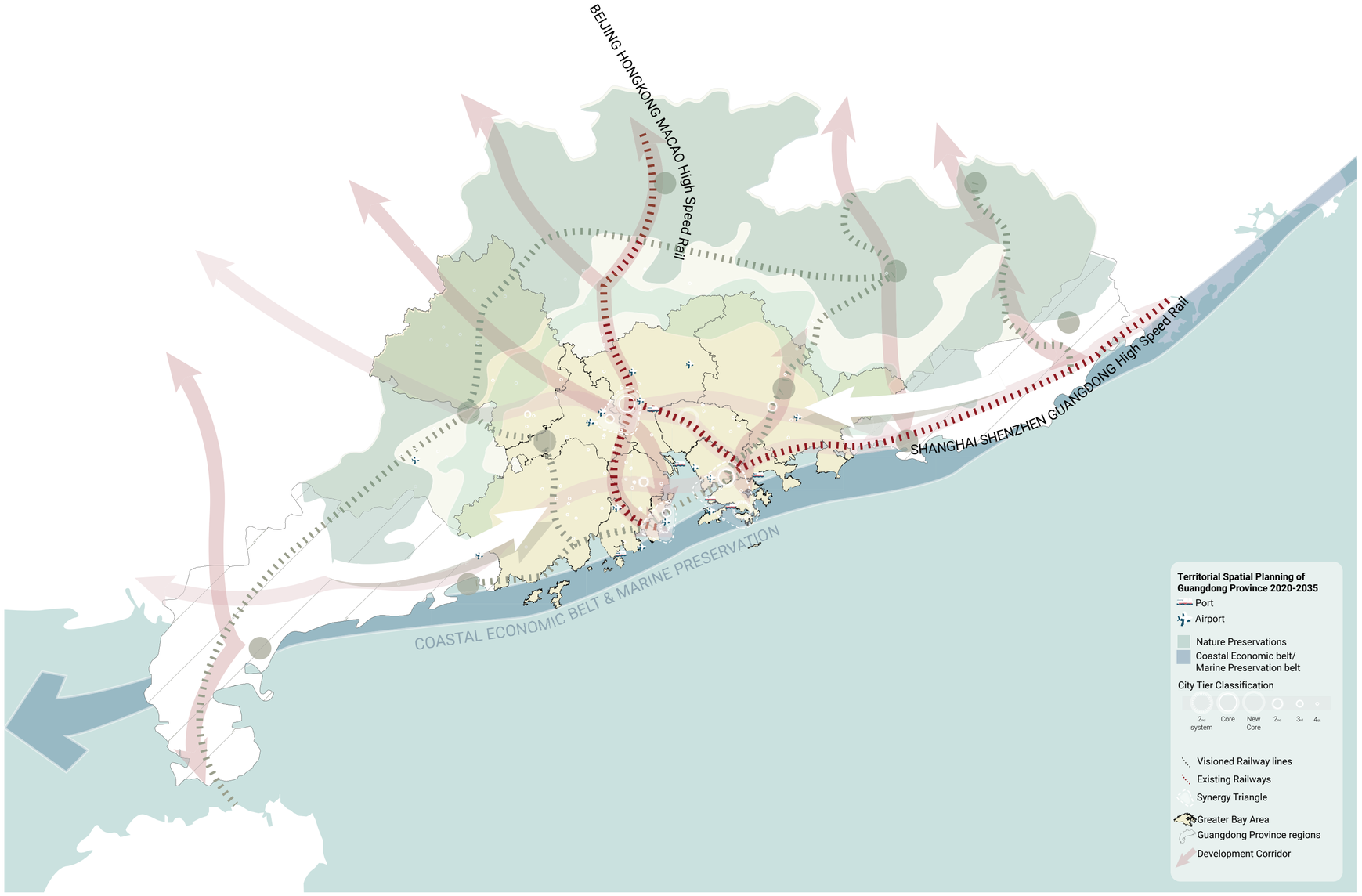


Figure 31. Territorial Spatial Planning of Guangdong Province GBA (Greater Bay Area development Office, 2019)

Guangdong Province Vision for the GBA

Guangdong Province, often regarded as China's economic powerhouse, is set to play a pivotal role in the country's future development. President Xi Jinping highlighted the province as a "window" reflecting China's transformation into a new era. The "Territorial Spatial Planning of Guangdong Province" document outlines the province's ambitious plans for economic growth, infrastructural development, and ecological preservation, with a particular focus on the Greater Bay Area (GBA).

Strategic vision

Guangdong's development plan spans 15 years, aiming to position the province as a leader in economic innovation and globalization. The province is expected to serve as a model of economic freedom and strength, showcasing China's ability to build a robust and open economy. This strategic vision is anchored in the development of key urban centers like Beijing, Shanghai and Guangdong, leveraging their unique positions to drive global innovation.

The vision focuses on urban hierarchy and globalization, land and sea strategies, as well as quality life and preservation as key themes in the area's development. Regarding urban hierarchy and globalization Guangdong is prioritized for its strategic coastal location, facilitating international trade and investment. Guangdong is expected to set benchmarks in economic and technological advancements, demonstrating China's capabilities to the world. Related to land and sea strategies, the area is focusing on maritime development. This includes enhancing port facilities and promoting sea-based economic activities, which are crucial for supporting the inland economic zones. Additionally, enhancing the quality of public services, protecting natural and historical sites, along with fostering sustainable urban environments are also core components of the GBA vision regarding quality life and preservation. The vision aims to achieve a balance between economic growth and the preservation of ecological and cultural resources.

To bring the Guangdong vision to life, strategies related to economic development are being implemented. These strategies consider ecological and environmental aspects as well as issues of accessibility and infrastructural development.

Economic development strategies

Core and Peripheral Development:

The Greater Bay Area (GBA), being the core of Guangdong, is the focal point of present and future economic activities. Surrounding regions, including the coastal west and east, will support the GBA's development through complementary industrial activities and infrastructure development that links the core with the rest of Guangdong.

Port Expansion and Transportation:

The vision plans underscore the importance of expanding port facilities and transportation networks. This aim is set to enhance connectivity within the coastal region and potentially transforming Guangdong a global trade hub.

Innovation and Industrial Diversification:

Traditional industries will be complemented with innovative sectors transforming the economic landscape. This diversification is intended to foster resilience and sustained growth.

Border Relations:

Under the "one country, two systems" framework, Guangdong will collaborate closely with Hong Kong and Macao, integrating these regions into the broader economic plan while respecting their unique administrative systems.

Figure 32. Rail road development plans (Greater Bay Area development office, 2019)

Ecological and environmental considerations

Sea Chain Protection:

Ensuring the protection of marine environments is a priority in Guangdong's vision. This includes safeguarding habitats and promoting sustainable maritime activities.

Green Belts and Corridors:

Two major ecological strips are planned to protect the outer ring habitats, particularly mountainous areas that are less suitable for development. These green belts will serve as buffers against environmental degradation.

Connectivity and infrastructure

High-Speed Rail Networks:

The construction of high-speed railways is crucial for enhancing regional connectivity. These railways will link Guangdong with major cities like Beijing and Shanghai, facilitating economic and human capital flows.

Comprehensive Transportation Networks:

Beyond railways, the plan includes expanding highways, ports, and airports. This integrated approach ensures seamless movement of goods and people, vital for economic dynamism.
Coastal and Inland Connectivity: Special focus is given to connecting coastal regions with inland areas, creating an economic corridor that supports diverse industries and promotes balanced regional development.

Figure 33. The GBA as part of China's development plans (Greater Bay Area Development Office, 2019)

GBA vision - Conclusions

Guangdong's Territorial Spatial Planning reflects a holistic approach to development, balancing economic ambition with ecological stewardship and social inclusivity. By leveraging its strategic coastal position and fostering innovation, Guangdong is set to lead China's next phase of economic transformation. The emphasis on connectivity, both within the province and with other major cities, underscores the importance of integration in achieving sustainable growth. This comprehensive plan not only aims to elevate Guangdong to new heights but also serves as a blueprint for China's broader development strategy (Greater Bay Area development office, 2019).

Hong Kong has always been a dynamic and turbulent region, evolving from a fishing village to an English colony, and eventually to a Special Administrative Region of China (Abbas, 2002). Under the “One Country, Two Systems” model, Hong Kong maintains its own economic, social, and legal systems despite being part of China (One Country, Two Systems, 2021). Currently, Hong Kong is on the verge of another significant transformation, marked by the increasing influence of mainland China. By 2047, the border between Hong Kong and Shenzhen, which has long separated the two regions, is set to dissolve (Bolchover & Hasdell, 2017).

Amidst these changes, Hong Kong faces numerous challenges, including an aging population, outdated infrastructure, and issues of social and environmental justice (Hong Kong 2030+, 2021). The development vision for Hong Kong emphasizes strengthening the existing main core—comprising the harbour, airport, and key economic hubs—and creating a new core by transforming the New Territories into the Northern Metropolis. This transformation will be facilitated by “floating” corridors that enhance economic, knowledge, and innovation linkages. (Hong Kong 2030+, 2021).

Given the heavy urbanization and limited space for development in the main core, efforts will focus on retrofitting and revitalizing existing structures. In contrast, new developments will primarily occur on reclaimed and extended land areas, particularly around the international airport and a new artificial island (Airport city and CBD 3, Figure x) (Hong Kong 2030+, 2021). The most significant changes are anticipated in the New Territories, where the Northern Metropolis vision aims to activate existing urban cores with a series of new infrastructural mega projects, extending development along the border with mainland China.

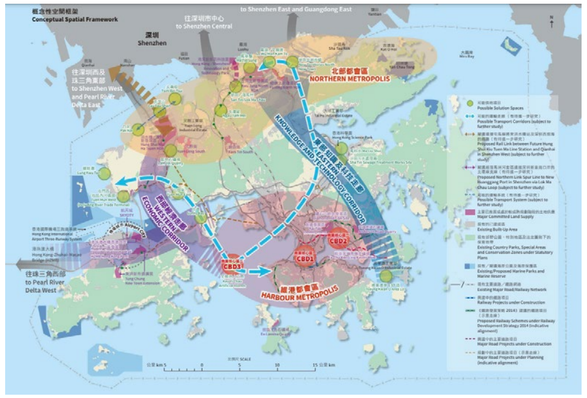


Figure 34. Conceptual spatial framework (Hong Kong 2030+, 2021)

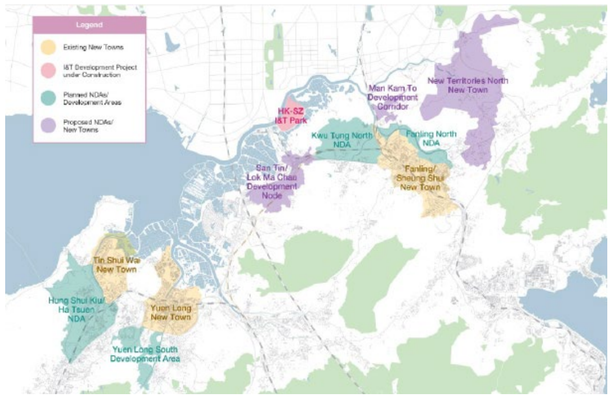


Figure 35. Strategic locations in the Northern Metropolis’ development (Ling, 2024)

Figure 36. Two cities, three circles strategy for the Northern Metropolis (Ling, 2024)

The Northern Metropolis development will prioritize three key areas: ecology and eco-tourism, cooperation, and innovation and technology (Hong Kong 2030+, 2021). The most transformative of these is the “Northern Technopole,” which will focus on innovative industries and research and development, closely linked with Shenzhen’s practices in mainland China. A neutral cooperation R&D centre on an artificial island at the border will facilitate joint efforts between Hong Kong and Shenzhen institutions, symbolizing the merging of functions and the gradual dissolution of the northern border (Hong Kong 2030+, 2021).

These developments will significantly impact Hong Kong’s dynamics and its relationship with the surrounding landscape. The critical question remains: how will these prospective changes affect the landscape’s qualities, nature, culture, heritage, local communities, and Hong Kong’s unique independent character?

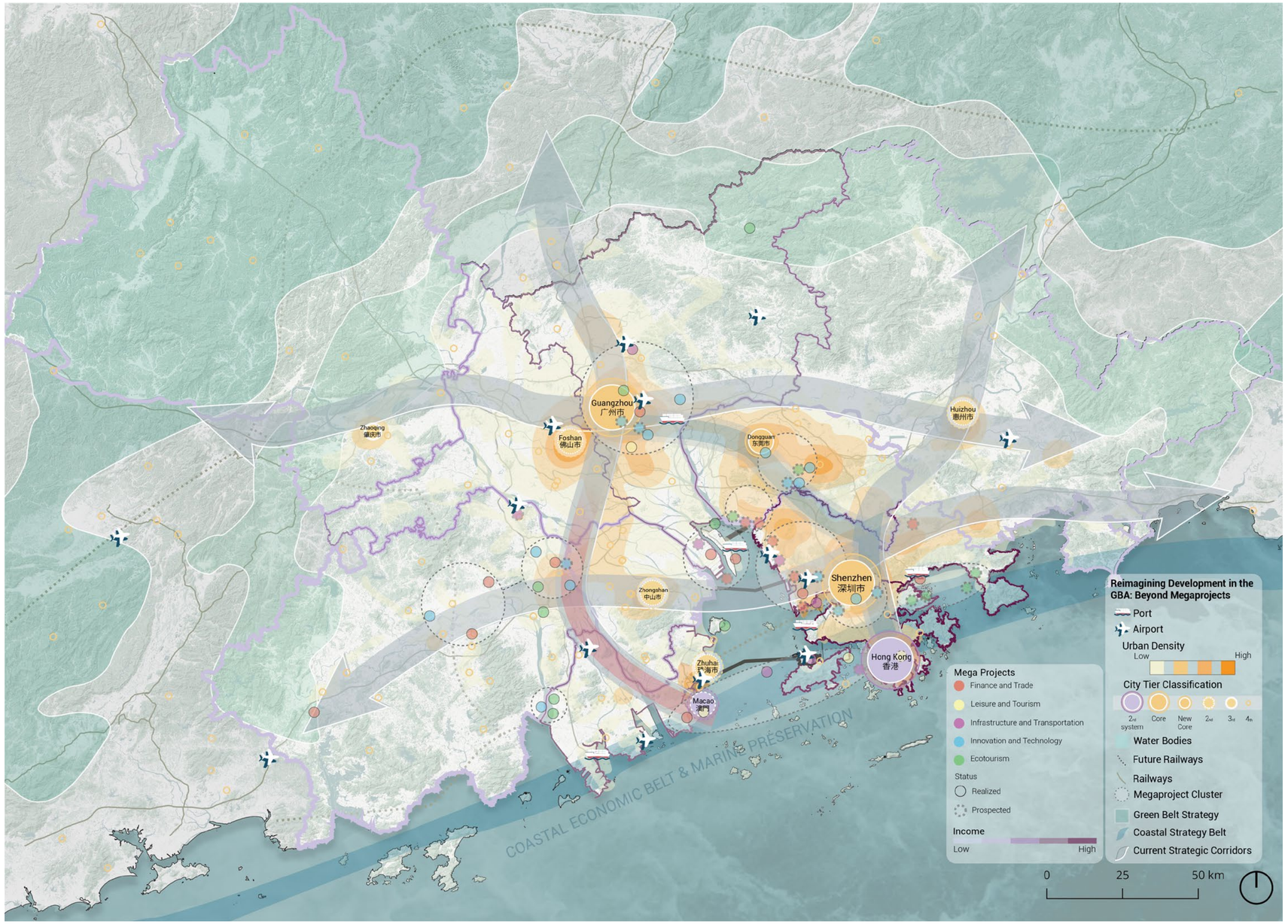


Figure 37. Tensions formed in the GBA's peripheries

Concentrated development: the current model of urbanisation

With the GBA's densely urbanized cores facing scarcity of space for development, the focus is shifting to territories adjacent to them. Clusters of mega-projects appear in such areas and near infrastructure corridors, without taking into account local context, and gain a character that operates for the main urban cores. The peripheries, lacking the carrying capacities to withstand mega developments as they are currently planned, are exposed to concentrated development and put under high pressure.

Is concentrated development the holistic method to move the GBA forward?

"The initiation of mega-projects is generally to make up for the shortcomings or deficiencies of the existing carrying capacity of cities, the purpose is to improve the economic, social or ecological carrying capacity. However, the construction and operation of mega-projects may not always be successful, it depends on the existing and potential carrying capacity of cities, any mismatch will lead the project to failure." Lixia Zheng (2020)

3.5 Soft locations and edge city: context

Soft locations-existing definitions

With megaprojects acting as a catalyst to the Greater Bay Area's development and the prospected plans focusing on the peripheral territories of the main city cores, attention should be driven to the areas most prone to transformation in the near future. Areas that have not yet exceeded their limits set by zoning permits are considered in zoning planning "soft" sites since they can still face transformations. (Peter Marcuse) Additionally, areas flexible due to the lack of rigid legal structure, that allow planning to occur through interrelations of formal and informal networks, create another form of "soft" spaces. (Allmendinger & Haughton, 2009) Opportunity Areas are also recognised as "soft" spaces within the context of development-driven urban environments. Their adaptation acts as a strategic stitching between local transformations and regional growth under an overarching goal. (Ferm et al., 2022) These definitions allow us to interpret changes in the peripheries of the GBA both as tension on the local sensitivities but also as an opportunity for interconnected growth across various locations and scales. Simultaneously, an initial understanding is gained on criteria that determine what "soft locations" are in the GBA.

Decentralization and the edge theory

Urbanization is happening where businesses are spreading out but still sticking together, this trend is called concentrated decentralisation. This happens both in and out of city centres leading to polycentric city forms. This means cities are growing overall, with more businesses setting up outside downtown areas while economically downtowns become less important (Marcuse, 2013).

The way cities and suburbs are growing and connecting to each other is changing because of things like better transportation and technology. New places called "edge cities" are popping up on the outskirts of the city, where people live and work separately from the main city but still have similar amenities. This is part of a bigger trend where entire regions are becoming more connected economically and socially (Marcuse, 2013).

Overlaying the existing and prospected large-scale development projects (megaprojects) with the GDP of the GBA's administrative boundaries reveals a trend in their development. Megaprojects are established on the edges of wealthier districts and in close proximity to each other. The occurrent clusters of megaprojects reflect the reality of competitive cores in the area's polycentric model. (These Are the Megaprojects in China's $1 Trillion Infrastructure Plan, 2022)

Nowadays megaproject-oriented development of urban environments is facing worldwide criticism. On one hand, multiple cases indicate that large-scale development projects tend to overcome their budget leading to taxation that leave local citizens to expect insignificant economic benefits from them. (Situ, 2022) On the other hand, this Cost-Benefit Analysis on megaproject evaluation does not showcase the same results as the Whole Life Costs approach. In the latter case, the impact of megaprojects on the existing societal structures and local economies becomes prominent. (Korytárová & Hromádka, 2014) In the context of the GBA, it is crucial to consider the rise in land value that occurs from megaprojects and to question how this growth can exceed the local capacities of the citizens.

In order to understand megaproject dynamics in the GBA we correlate GDP and Land Value. This indicates three groups of areas with different roles in the urban development process. Areas with both high GDP and land value are considered driving forces in urban growth as they stimulate development near them. On the contrary, areas with lower GDPs that remain high land value are understood as possible areas in stasis that face low possibility of adapting to the current development processes. Lastly, we identify as soft locations areas with high GDP and low land value. In this case, the areas showcase high flexibility for development and attract investment interest. This classification allows us to conclude that on an administrative level certain districts show a more "soft" character and have a higher potential for new mega-project-driven development. Additionally, districts that border clusters of existing and projected megaprojects fall under the category of possible areas in stasis.

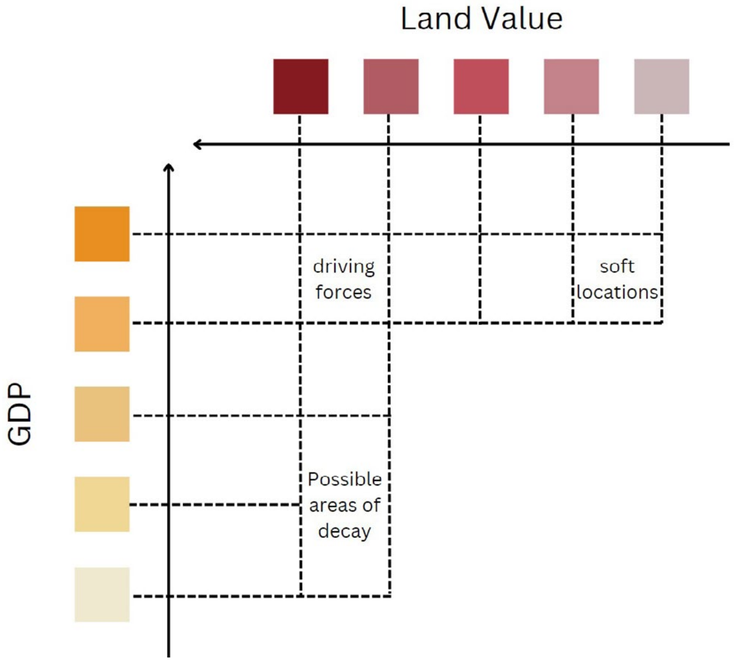


Figure 39. Mega project dynamics

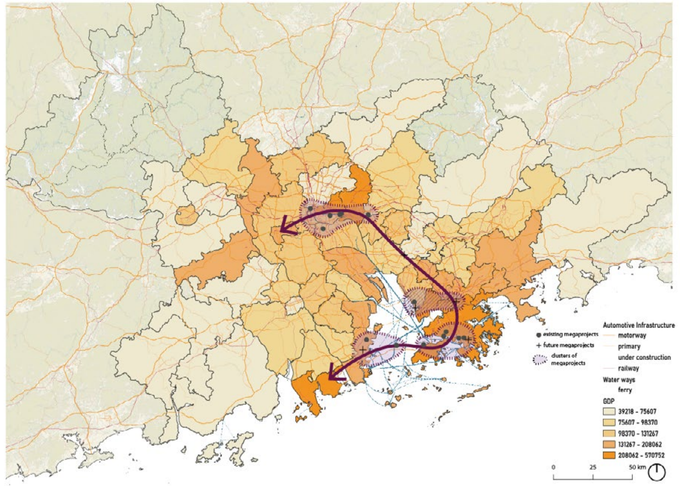
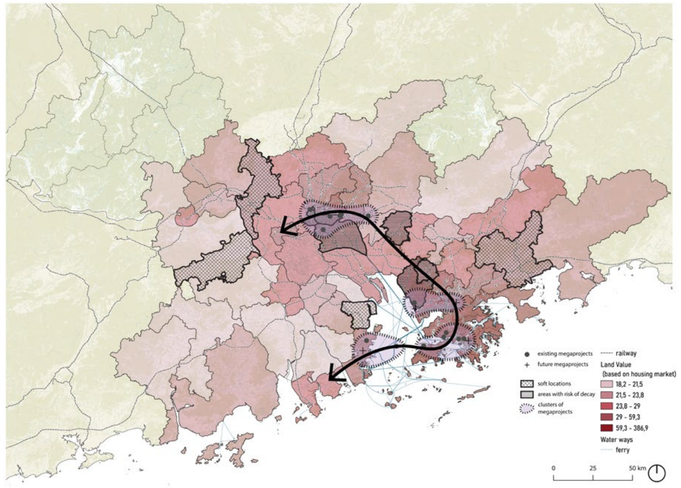


Figure 38. Mega Project agglomerations: result of the profit-oriented development

Figure 40. Emergence of soft locations and the role of second-tier cities



04

Problem statement and challenge

4.1 Problem statement

The GBA's regionalization model has offered rapid development to the area. However, it has specific space and resources demands and the urban cores have reached their capacities. The existing mega agglomerations' model, driven by megaprojects, an emphasis on nodes and neglection of their territories from development plans, has exacerbated environmental and socio-economic tensions to the soft locations between and around them. Moreover, the existing metropolization model leads to the marginalization of the areas in this "waiting form". At the same time, the current governance framework emphasizes in top-down initiatives and urban mega-development, and has a market-driven identity (Huang, 2004) ("state entrepreneurialism" (Z. Wang & Wu, 2019)). But especially post-COVID, this model is questioned, prompting a reconsideration of whether master planning alone can effectively address these issues without resulting to a just "gentrified" area. There is a pressing need for a paradigm shift in planning and governance to address these complex regional dynamics effectively.

4.2 Research questions

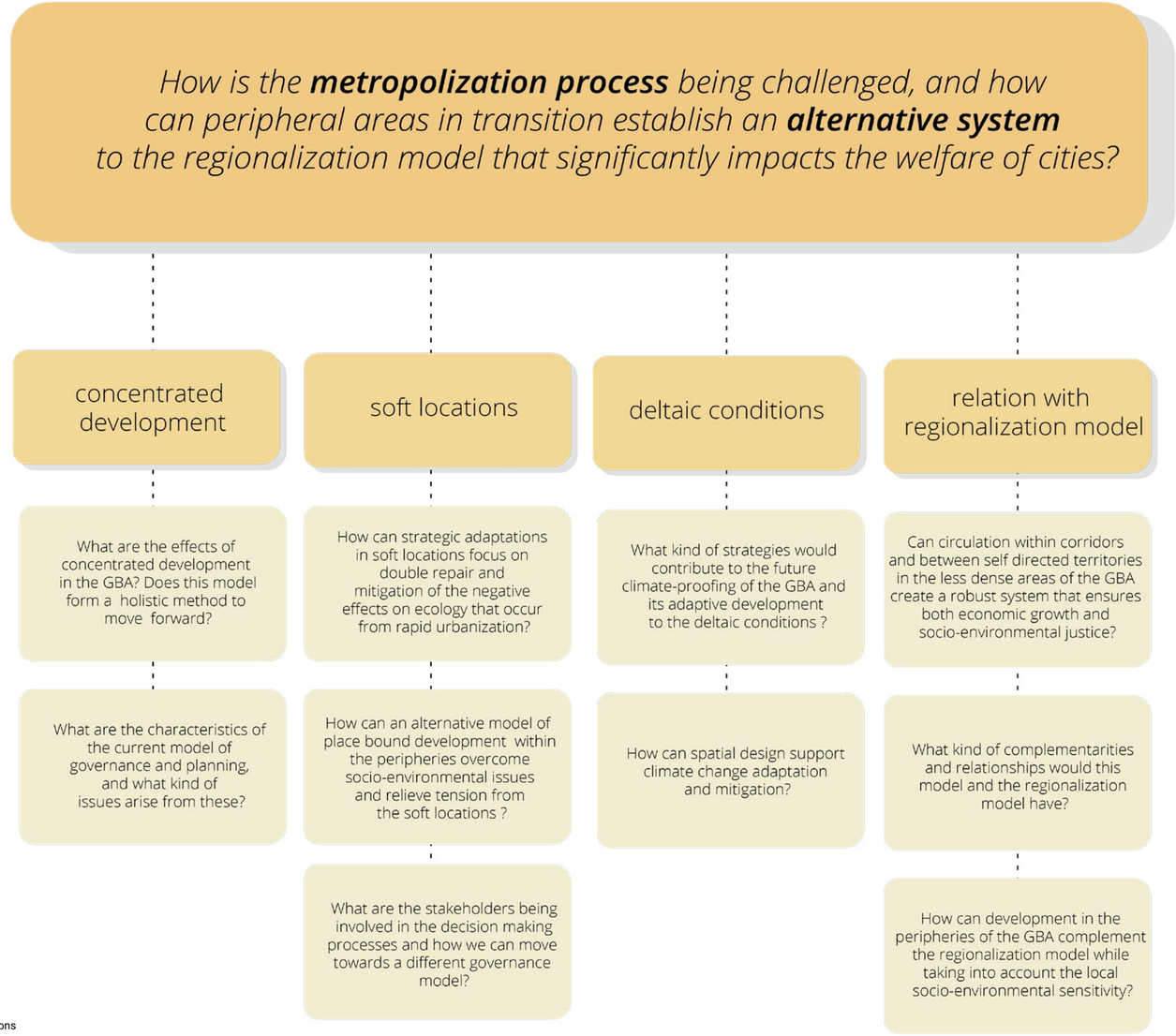


Figure 41. Main research question and sub-questions

05

Gameboarding: Agglomer-EDGE and CrissCross

Figure 42. Rubber band negotiations, source: Midjourney

5.1 Agglomer-EDGE

Alternative mega-development processes in a morphological game of negotiations.

In this game of negotiations, three players with clashing interests—each equipped with a unique edge type and distinct priorities in economic, ecological, and social criteria—compete strategically. Central to the gameboard are megaprojects and mega urban developments, existing and planned, which play a crucial role in GBA's planning processes and vision. The game contains three distinct scenarios, each consisting of three rounds that feature varying power dynamics among the players and introduce exogenous factors. These elements create critical uncertainties and diverse realities, framing different values for each player. Throughout the game, the players use units of 1km2 to establish their edges of development. At the same time, they negotiate with each other, losing units for projects that demand greater effort and planning, while gaining units to ensure liveability standards are always maintained within the mega developments. Overall, the game aims to test how soft locations and areas in-between are being impacted and shaped by various development dynamics.

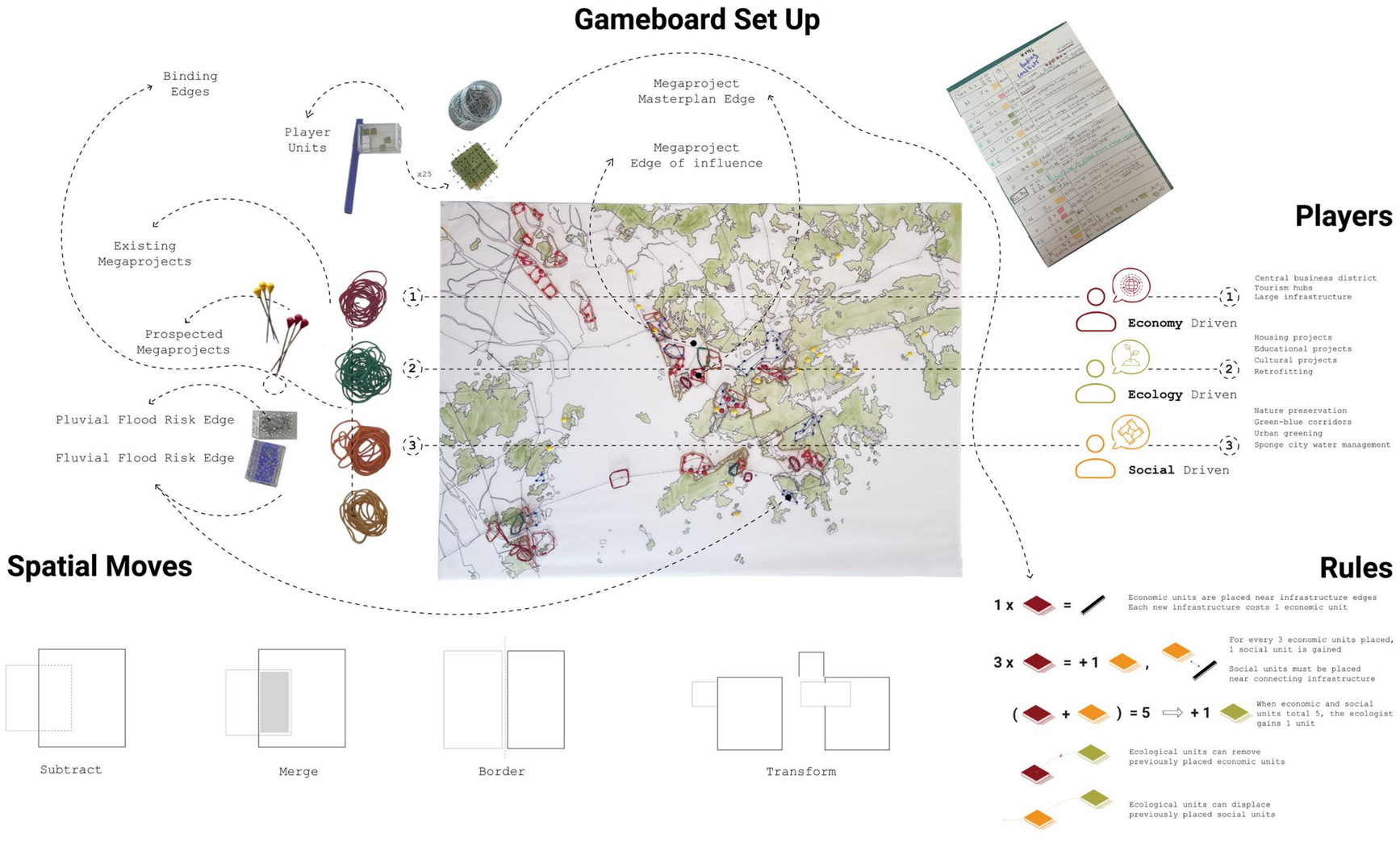


Figure 43. Collage representation of the gameboard set up

Base rules and moves

Every player is given a set amount of units, with the maximum being 25 and the minimum being 9 units. The division of the units is done according to the defined power dynamics of each scenario. The player with the most amount of units instigates the iteration, followed by the one with 16 units and lastly the one with 9 units. After placing them the units are traced in order to define the edge they form. When borders meet a choice can be made to either substract, merge or border the edges, defining the spatial relations.

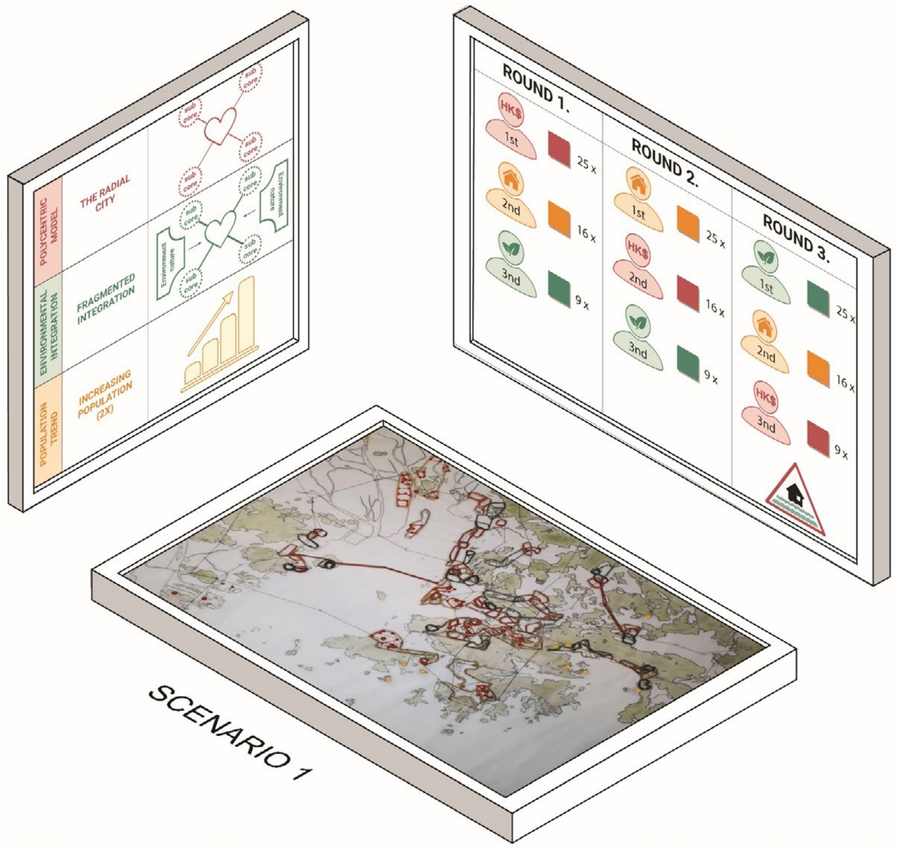


Figure 44. Axonometric diagram of the first game iteration

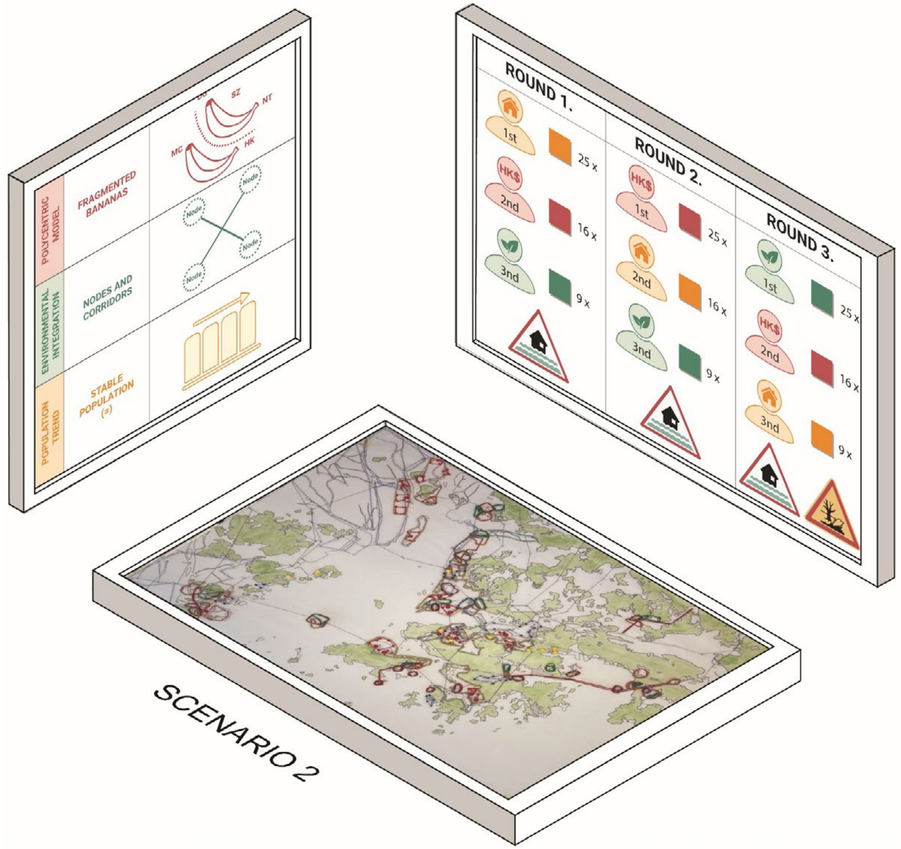


Figure 45. Axonometric diagram of the second game iteration

Scenario 1 - Past Trends

In the first scenario, the players navigate the landscape of China's Greater Bay Area from the perspective of the current trend: Economy driven. The game unfolds over three rounds: Round 1. Now-15 years, Round 2. 15-30 years, and Round 3. 30-45 years. The player managing economic development leads, while those overseeing social and ecological aspects react to economic shifts. By the third round, climate change introduces flood risks, rendering certain areas unplayable without ecological interventions. The game revolves around three core categories that decide the goal for each player: urban development method, environmental approach, and population trend. In the first game, following the current trends, urbanization radiates from central cores resulting in an increasing population, and creating fragmented ecological development that must integrate with economic infrastructure.

Scenario 2 - Future Trends

In the second scenario of the game, the focus shifts to a future based on current development plans for China's Greater Bay Area, which seeks to change the past development trends. The economic and urban development goal aims to create two "bananas": a robust urban link from Hong Kong to Macau emphasizing tourism and international trade, and another from the northern territories to central Guangdong centred on innovation and technology. Ecological development has more space but remains fragmented, connected by corridors. The third game-condition is a stable population. With a stable population housing demand levels out. Thereby, the social perspective leads the game, prioritizing liveability and social projects, while economic and ecological players react to these initiatives. Climate risks confine the playing field from round 1, with the addition of (soil) pollution in the third round.

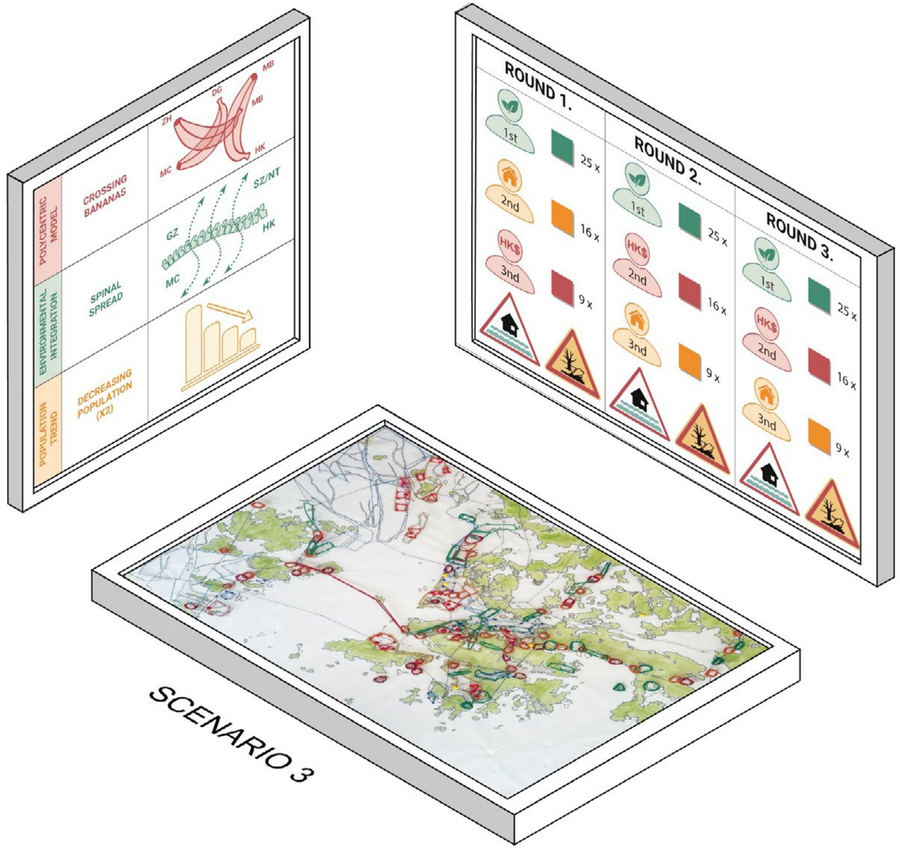


Figure 46. Axonometric diagram of the third game iteration

Scenario 3 - Ecological Perspective

In the third and final scenario of the urban planning game, the focus is on climate and ecological protection and regeneration. The player responsible for ecological development leads, with economic and social players reacting. Economic and social players aim to build an interwoven network of three “bananas,” strategically connecting and ensuring economic resilience with fewer moves. With a decreasing population, the leading ecological player can develop and overtake areas from the social player, creating an ecological spine branching throughout the Greater Bay Area. Climate and (soil) pollution confides the gameboard from round 1, with the ecologic driven player seeking to combat them from the get-go.

Conclusions

Through this morphological game, conflicts and interrelations are managed with the players’ interactions showcase action-reaction processes, highlighting the complexity of negotiations. As the game progresses, the focus of development shifts, with edge conditions defining alternative configurations different from the current ones. These edge conditions vary, including mono-edge and multi-edge overlaps with different intensities, creating diverse clusters of development. In cases of more edges overlapping, more powerful centres were created, shaping concentration, dispersion, and chained (sequences of edges) models. Edges serve as critical points where multiple conditions meet and act as negotiating boundaries or gateway lines where diverse functions meet. The three scenarios reveal both stronger and less effective outcomes. Some edges clusters were created in more than one scenario, but their qualities are different, sometimes focusing on a more economic-driven development or a more balanced socio-economic and environmental approach. For instance, the Shenzhen – Qianhai – Dongguan corridor appeared in all three scenarios with different edge characteristics. The same applies for the union of Northern Metropolis and Shenzhen. Therefore, the soft areas in-between gain new values. However, the findings are limited by the specific area and the decision-making bound to the game’s map.

Figure 48. Edges overlapping during the gameboard’s iteration

Quantifying the results

During the games, the different players created multiple combinations and clusters. The results were mainly impacted from the power dynamics and the negotiations conducted by the players during the rounds. Although the economy player had more units while playing specific rounds, due to the negotiations and the rule for supporting liveability standards, the total km of edges never exceeded both social and ecological edges. The edges created from the social-driven and ecology-driven players were more balanced and varied between the games and the rounds. Related to the units that were lost or gained, as “planned” the economy-driven player lost units in all games, with the majority on the second. Both social and ecological units were increased similarly.

Figure 47. Total km of edges created and units’ loss/gain due to negotiations

	Total km of edges			Units lost or gained due to negotiations		
	S1	S2	S3	S1	S2	S3
Economy	108	120	127,5	-4	-9	-7
Social	104	95,5	170,5	+12	+12	+4
Ecology	60,5	96	290	+15	+15	+6

Overlaps				
S1	Economy x social	17,59%	10,00%	7,84%
	Economy x ecology	13,89%	13,33%	8,63%
	Economy x ecology x social	3,70%	7,50%	3,92%
S2	Social x economy	38,46%	13,61%	5,87%
	Social x ecology	11,54%	14,66%	11,14%
	Social x economy x ecology	3,85%	8,38%	1,76%
S3	Ecology x social	24,79%	16,67%	3,79%
	Ecology x economy	19,83%	14,58%	6,55%
	Ecology x social x economy	6,61%	10,42%	0%

Figure 49 . Overlapping edges

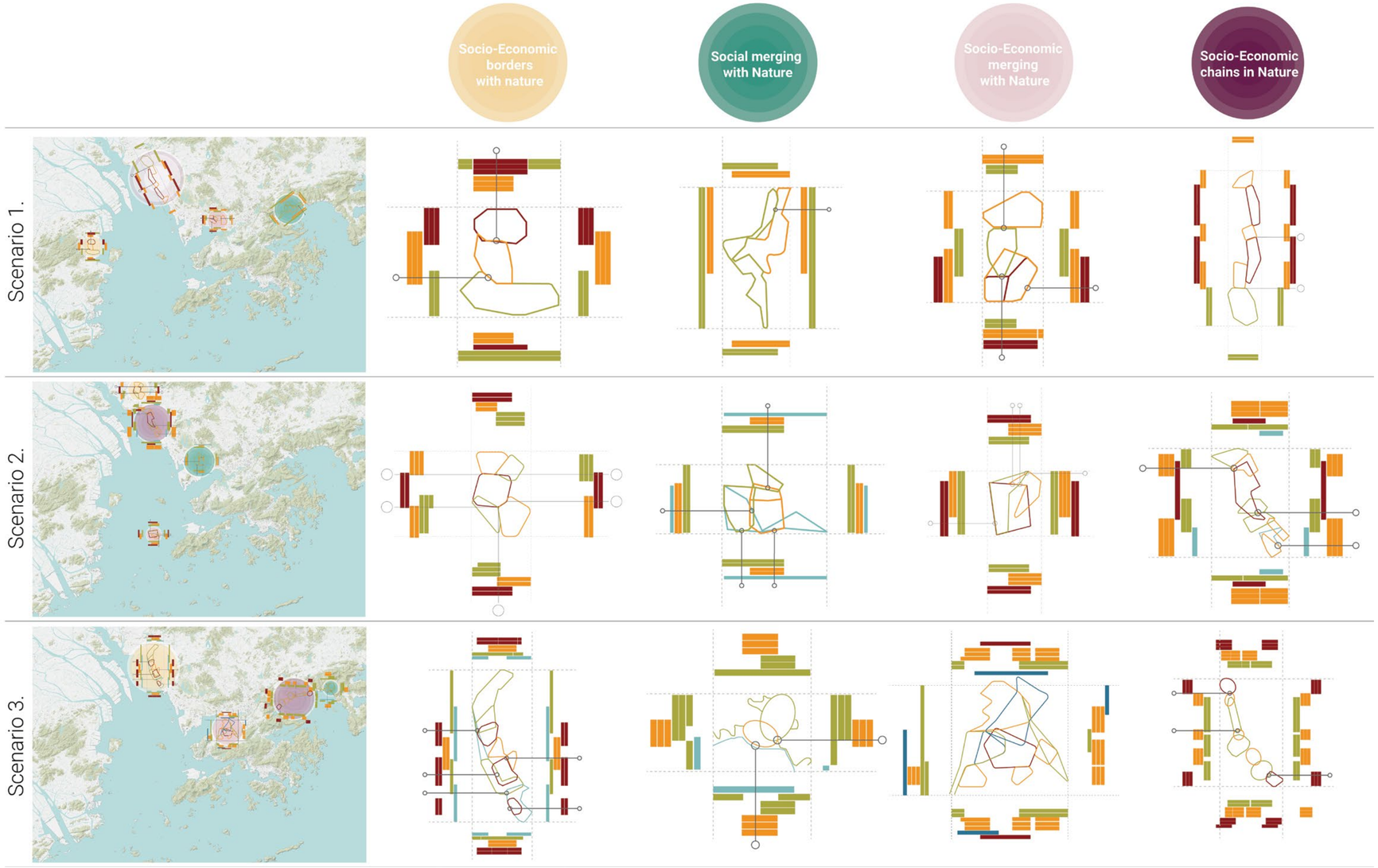


Figure 50 . Edge configurations classifications

Edge Configurations

Adjacent socio-economic and ecological edges

Clusters with distinct economic cores adjacent to social and ecological edges. In the scenarios, the edge configurations create either linear or radial forms.

Socio-ecological edge configuration

Edge configurations that solely consist of social and ecological edges that meet adjacently or integrated. These are formed exclusively when corresponding infrastructure enables access to economic cores.

Integrated multidisciplinary edge configuration

Configurations with integrated socio-economic-ecological edges. This is the result of negotiating for space and liveability standards on strategic locations for the area's development.

Socio-economic-ecological chains

Linear configurations consisting of economic, ecological, and social edges appear adjacent or integrated. Through the iterations, their economic edges function as cores or linking elements. This typology is formulated either between strategic locations or as an attempt to connect areas to the primary cores of the polycentric model.

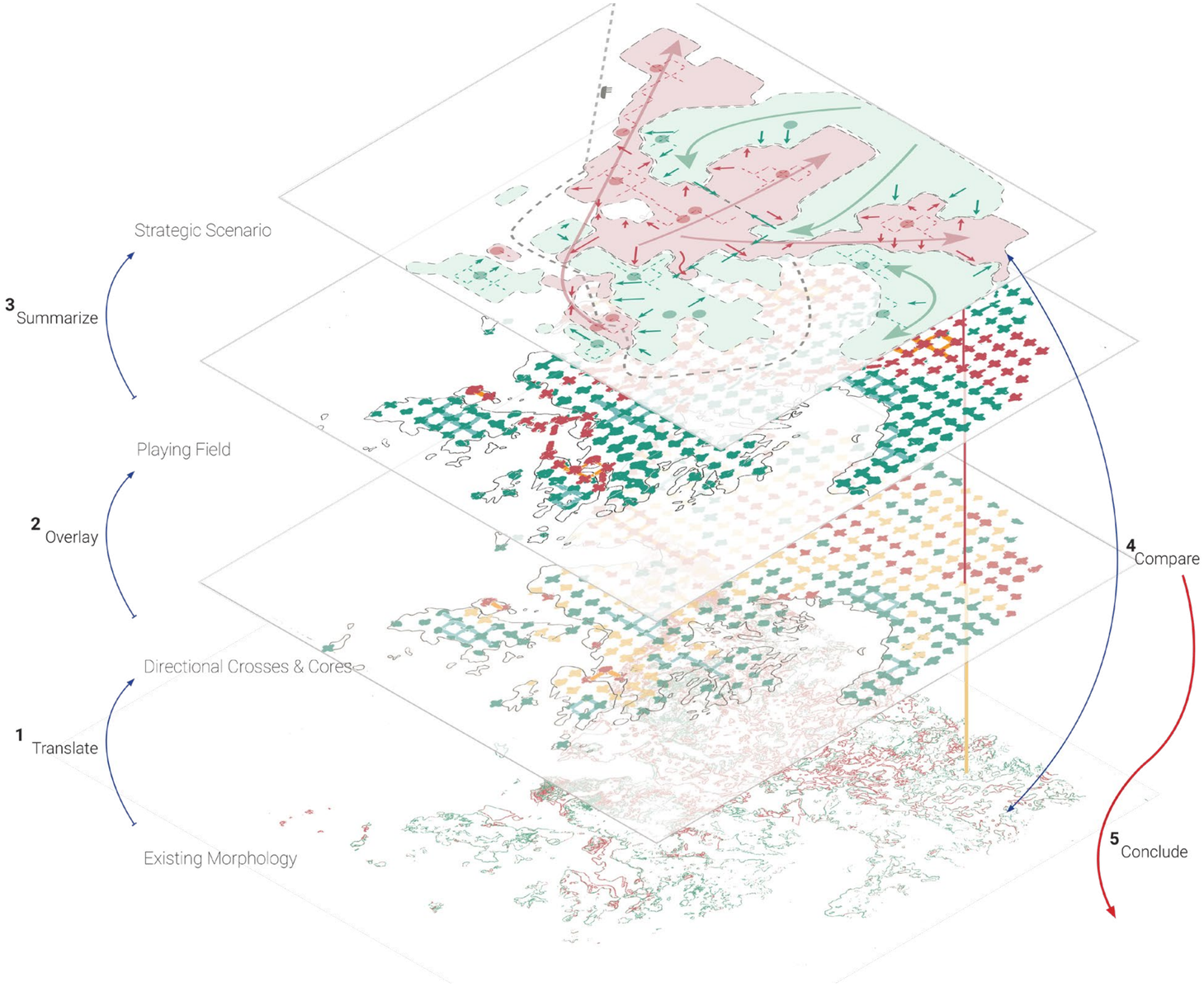


Figure 51. The multi-layered methodology

5.2 Criss cross

Criss cross is a two-player turn-based strategy game in which an urbanist and ecologist try to re-define the soft locations in the Hong Kong / Shenzhen region. Negotiation is necessary to reach an outcome that benefits both stakeholders.

Layered methodology

To be able to define how soft locations relate to the global city while also contributing to the biodiversity in the GBA, the game is played through multiple layers. In this approach the existing morphology forms the basis. These forms are then translated into a baseboard with crosses. As an overlay on the baseboard, the game will be played multiple times, created a different outcome each time. After the games are played, the outcomes are analyzed and translated into strategic scenarios. These scenarios are then compared to the existing morphology, and reflected upon to create sensible conclusions.

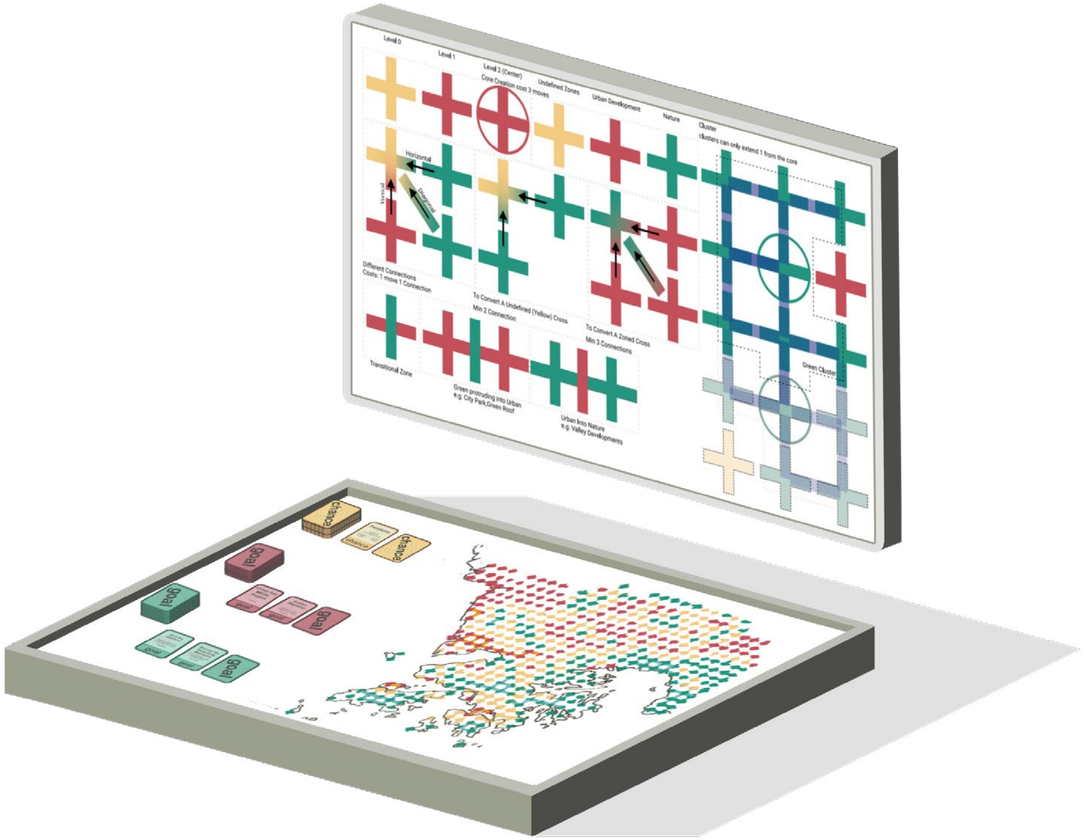


Figure 52. The starting board and the rules

Baseboard

For the baseboard of our game, we utilized the morphological value of crosses to translate the location into a game board. The board is divided into a grid of 3x3km areas on which the crosses are placed. The soft spots were first marked with yellow crosses. These are the areas on the grid which had neither a strong urban character nor a strong ecological one. The rest of the area is further defined by red crosses, standing for strong urban spaces, and green crosses, representing strong ecological spaces. The prominent cores in the area are indicated with a circle around the crosses. These cores indicate a strong defined and hard to change spatial character of the area. Sometimes this is due to the morphology of the terrain. Around these cores, clusters are portrayed to indicate a strong spatial influence. Urban clusters are indicated with orange lines, while ecological clusters use blue lines.

Game rules

1. Each turn, a player has 3 available moves. The player can place down strips to take over crosses. Each placed strip will cost one move. Thus naturally, bridging over uses one move while taking over a cross uses two moves.

2. In order to take over a yellow cross the player has to have two existing connections. Taking over an opponent's cross requires three connections. In order to achieve these connections, diagonal connections can be made. Players can negotiate to share a cross together.

3. The player can create a new core for 3 moves, thus costing the player an entire turn. These cores will be more difficult to take over for the opposite player, and from these cores, clusters can be expanded.

4. The players are being guided by goal cards that tell you what strategy to follow. You start the game with two goal cards, and a random new card is drawn each time you complete a goal.

5. Each 10 turns, a random chance card is drawn. These cards can impact crosses on the board either positively or negatively.

6. Your final score is calculated by adding up the number of your crosses (1 point), cores (2 points), corridors (1/2 point) and the bonuses you gained from completing goal cards.

Figure 53. The playing cards

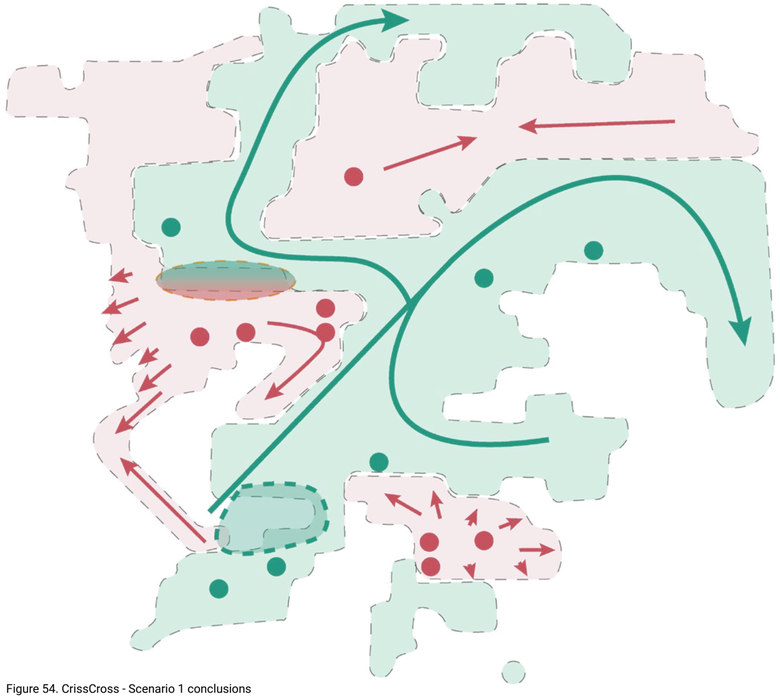


Figure 54. CrissCross - Scenario 1 conclusions

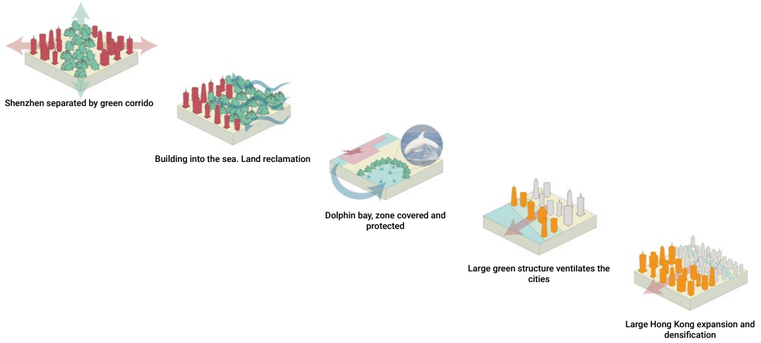


Figure 55. CrissCross - Scenario 1 explanatory tiles

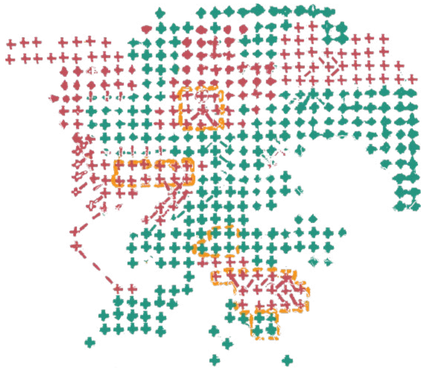


Figure 56. CrissCross - Scenario 1

Scenario 1

This scenario is focused on connecting different green areas with each other through the use of major green corridors, in an attempt to raise the biodiversity through easier migration routes and areas where different species can interact creating new ecosystem dynamics. A large green corridor got created that stretches all the way from the airport to the bay, and has an arm going into Shenzhen, separating the city completely into two parts. This will create a corridor where wind can flow into the city and lower the urban heat island effect. A large dolphin bay got created to give the white dolphin a new home where they are less effected by the airport. The effectiveness of this is debatable as the animals might not want to migrate to this area at all, but it was an effort worth working out for one scenario. On the urban side, Shenzhen is merging with the Northern Territories and expanding into the sea, reclaiming land for a cross-sea megaproject towards Neilingding island, creating a strong character for the Deep Bay. Hong Kong is separated from the Northern Territories and focused on a large expansion towards the east.

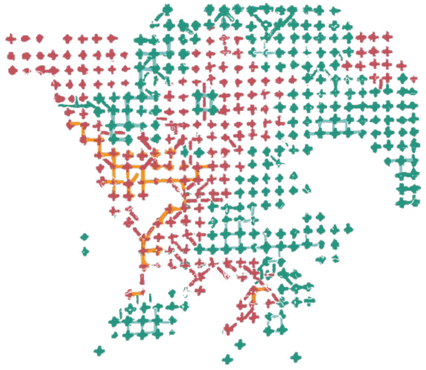


Figure 57. CrissCross - Scenario 2

Scenario 2

The Green Umbrella

Scenario 2 is focused on creating a very strong urban coastal region with large urban clusters connected to each other. The green structure forms the shape of a green umbrella, forming a corridor from the bay that splits off in two different directions, wrapping inside the urban form of Shenzhen and along the bay. In contrast to scenario 1, the corridor does not stretch all the way to the airport and instead starts from the eastern side of Hong Kong this time. This green connection is crucial to connect the ecosystems of Hong Kong with the rest of the Greater Bay Area. A large urban corridor gets created all the way from Hong Kong along the coastline of Shenzhen. Meanwhile, Huiyang gets seperated and shrinks in the north-east as the green umbrella expands. The border between Hong Kong and Shenzhen will disappear entirely because of the substantial growth of the new Territories. Green pockets will stay within the city to tackle the urban heat island effect, and there is a directionality from the northern residential district towards Shenzhen where the residents find new job opportunities.

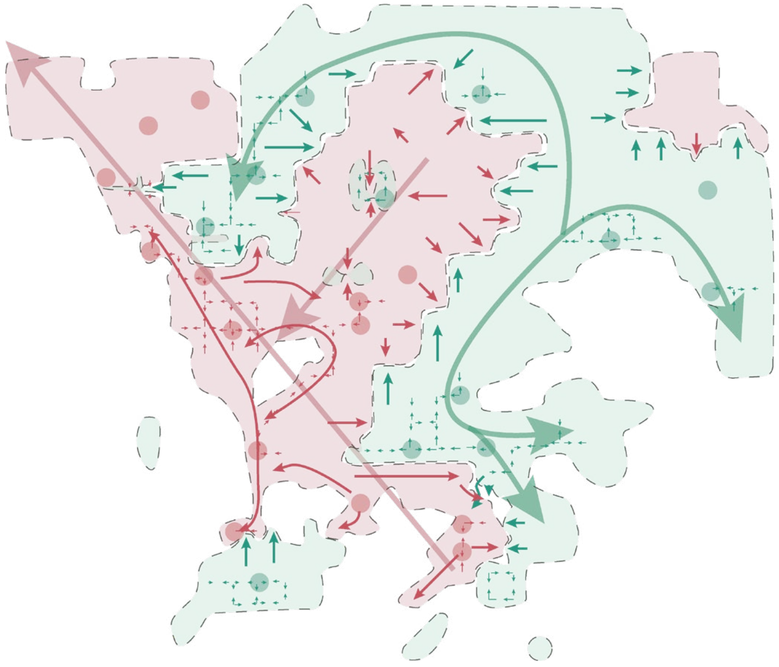


Figure 58. CrissCross - Scenario 2 Conclusions

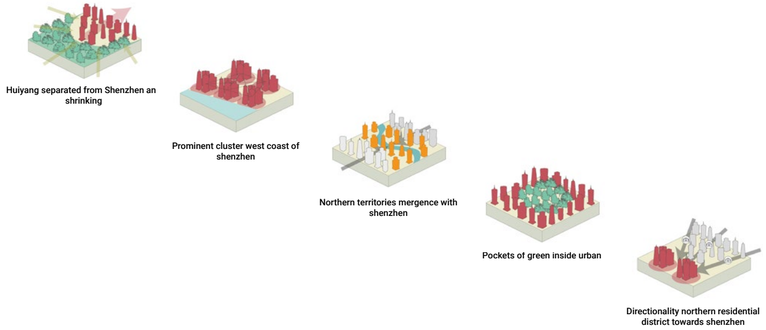


Figure 59. CrissCross - Scenario 2 explanatory tiles

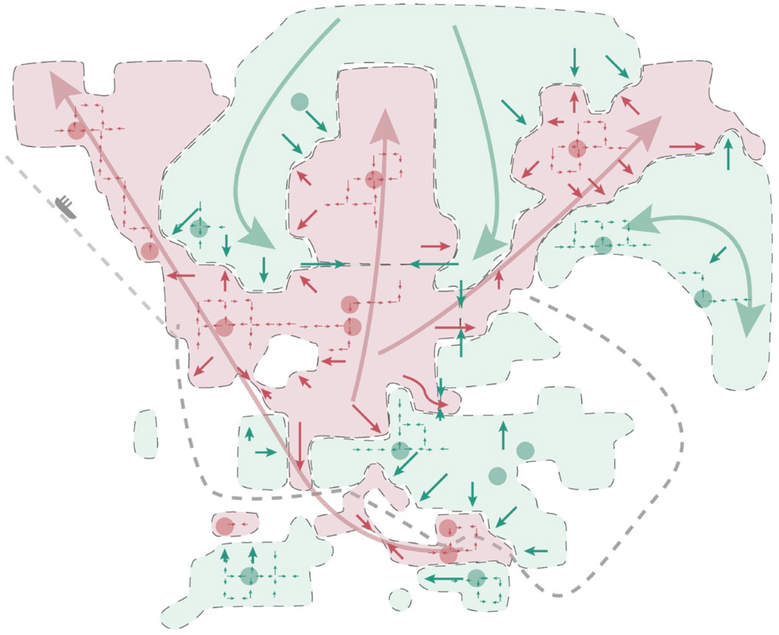


Figure 60. CrissCross - Scenario 3 conclusions

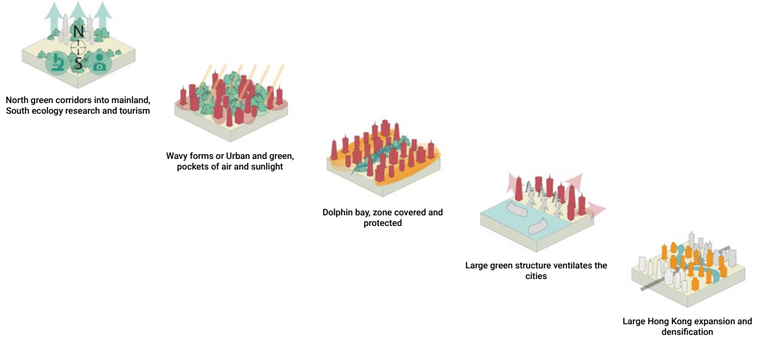


Figure 61. CrissCross - Scenario 3 explanatory tiles

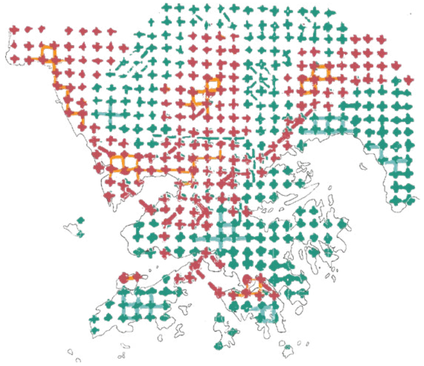


Figure 62. CrissCross - Scenario 3

Scenario 3

Urban Waves

Scenario 3 is the most different scenario of them all. It is also the scenario that took most inspiration from the current development plans that exist in the area. In this last scenario there is a strong urban cluster in Shenzhen reaching out in multiple directions, thus connecting the different urban areas with each other, each having its own identity. Green pockets in between these different areas create pockets of sunlight and airflow to lower the urban heat island effect using a polycentric approach. Small green corridors pierce the urban fabric to create essential migration routes. Without these, the ecology of Hong Kong would become entirely separated which will likely lead to a fast decline of Hong Kong's biodiversity. Of the three scenarios, this is the only scenario which didn't let nature take over Yantian Port, and instead it grew into an important gateway into the urban fabric. This seems to be the most realistic approach to the port of all scenario's, but it is of high urgency to keep the ecological connections around it intact. Shenzhen merges with the new Territories in this scenario, and an urban corridor connects this all the way to Hong Kong, making the hard border disappear. The connection here is not as extreme as in scenario 2.

Figure 63.
Drawing conclusions from the gameboard

Figure 64.
Gameboard results after the 1st iteration

5.3. Shared conclusions

Both games resulted in three different scenarios each, and thus we ended up with six different possible future scenarios for the GBA. What is notable is that the re-defining of the corridor along and beyond the border of Hong Kong and Shenzhen becomes an important aspect in each of these six scenarios. This is an area that has a high potential to strengthen future developments, and which appears to be vulnerable to rapid change.

The game boarding process also helped us to get a clear grasp on the different edge conditions in the area and how they may develop, which invited us to do more specific and in-depth research. It became clear that in our following steps we needed to take into account different perspectives and territorial conditions, while including various stakeholders in the development process in order to achieve spatial quality and durability.

06

Soft territories and stakeholders

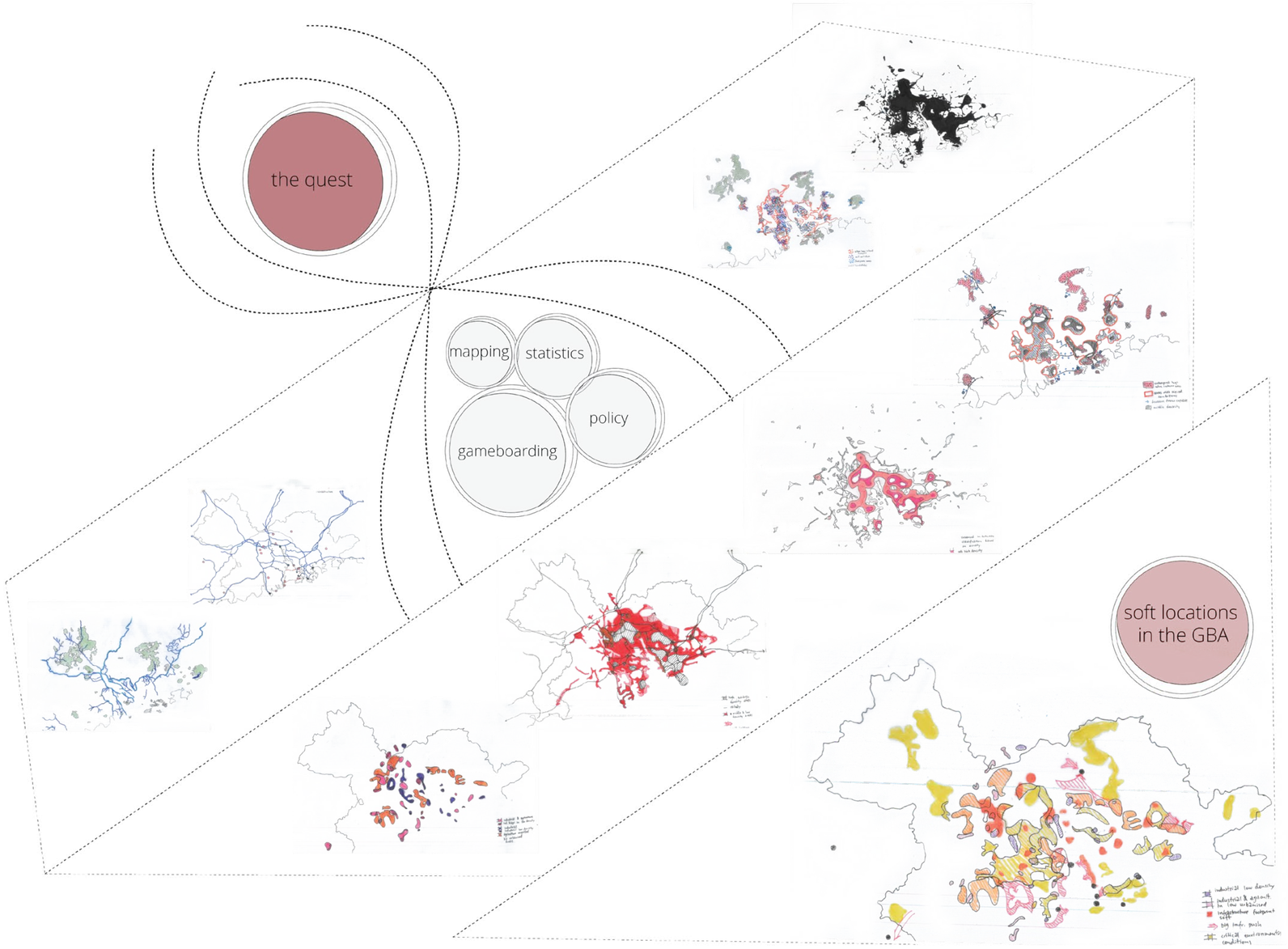


Figure 65. Methodological framework used to identify soft location typologies.

6.1 Identifying Typologies

A methodology for typology identification and classification of soft locations in the GBA.

To support our gameboarding findings and to translate the previously identified challenges in the GBA into a vision for the area's development we were called to incorporate elements both from the PolyU Morphological Game and the Delft Design method. A series of mapping and correlating data, statistics, policies and news followed the morphological game and led to a spatial analysis of the GBA's soft locations. For the purpose of this research we define soft locations as "areas in waiting form with critical socio-environmental conditions that are susceptible to change and under tension from the regionalization model". Through this methodology we identified soft locations spatially and classified them through scales. Within middle and low density peripheries 7 main typologies were identified in the macro scale and were then adapted through scales. This resulted in a total of 12 identified typologies.

Soft Locations

"Areas in **waiting form** with **critical socio-environmental conditions** that are **susceptible to change and under tension** from the regionalisation model"

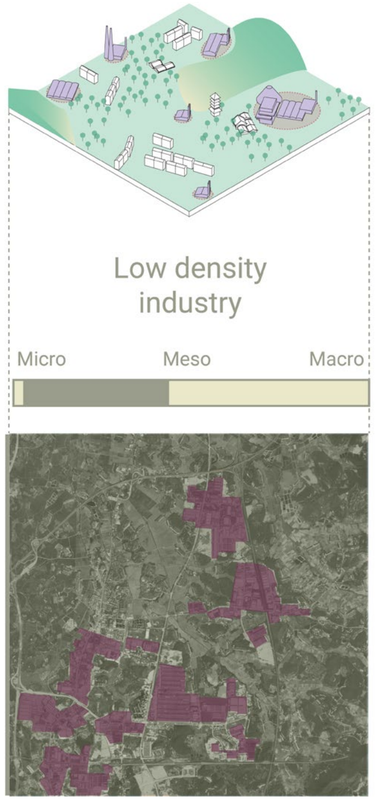


Figure 66. Typology " low density industry" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Low density industrial areas are recognised as soft locations due to the expected rise in manufacturing that will be intensifying their urbanisation.

Figure 67. Typology "industry mixed with agriculture" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Similarly, low-density industrial and agricultural areas are considered soft locations as the intensification of manufacturing poses a greater threat to the specific agricultural land.

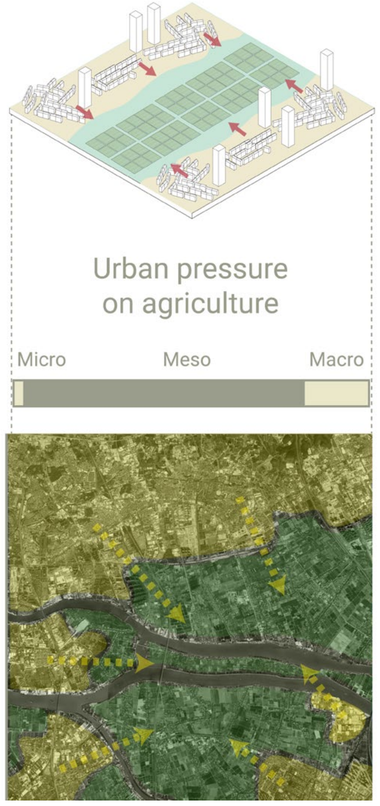


Figure 68. Typology "Pressured agriculture" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Additionally, agricultural land engulfed by urbanisation forms another typology where urban areas tend to take up space at the expense of agriculture.

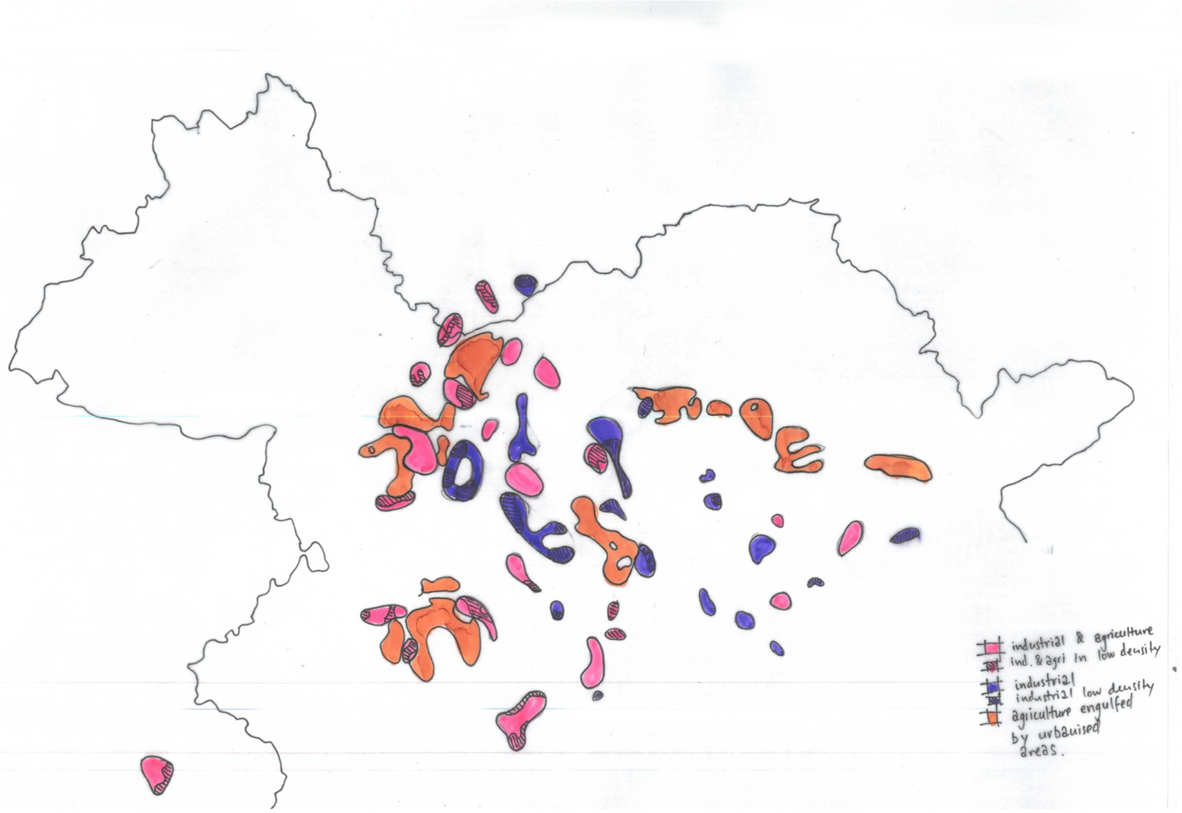
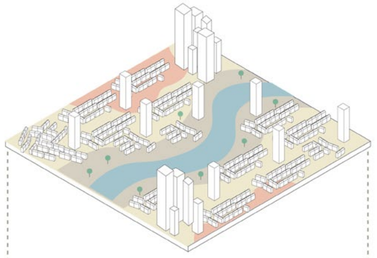


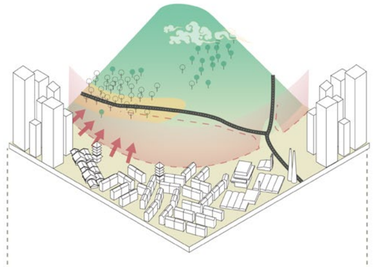
Figure 69. Hand-drawn spatial representations of soft typologies related to productive landscape.



Critical environmental conditions

Micro Meso Macro

Figure 70 Typology "Critical environmental conditions" axonometric diagram, scalebar and satellite image, Source: Google Earth Pro. (2024)



Pressured ecology

Micro Meso Macro

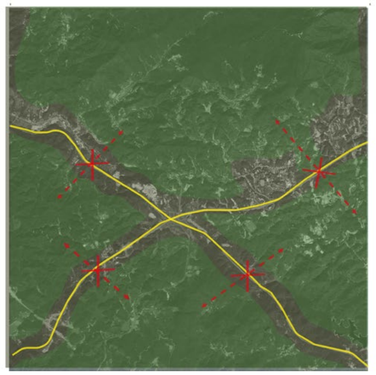


Figure 71. Typology "Pressured ecology" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Areas that simultaneously face multiple environmental, health and security challenges simultaneously form the typology of soft locations with critical environmental conditions.

When infrastructure or urban environments interfere and disconnect ecological sources the typology of pressured ecology is formed.

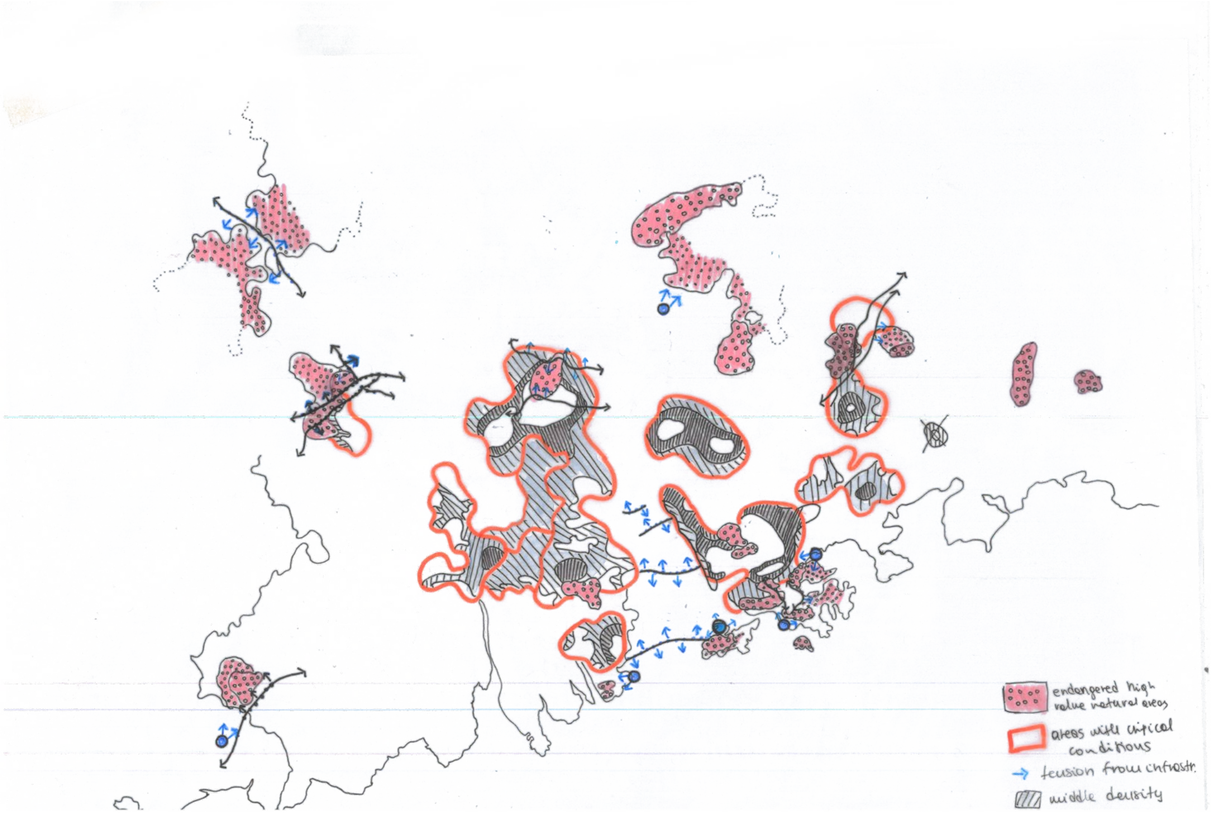


Figure 72. Hand-drawn spatial representations of soft typologies related to pollution and environmental degradation.

Impeded
by infrastructure

Micro Meso Macro

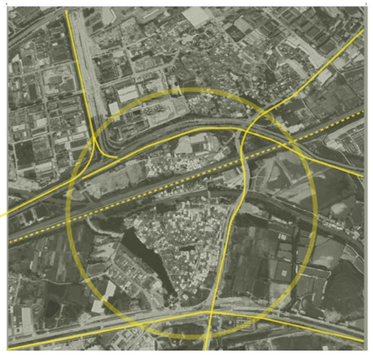
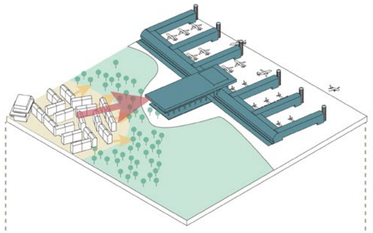


Figure 73 Typology "Impeded by infrastructure" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)



Urban expansion towards
heavy infrastructure

Micro Meso Macro

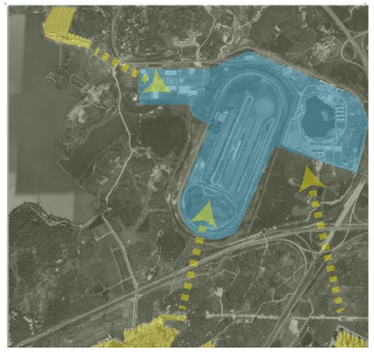


Figure 74. Typology "Urban expansion towards heavy infrastructure" axonometric diagram, scalebar and satellite image., source: Google Earth Pro. (2024)

The physical footprint of infrastructure creates a soft typology in nodal areas of the GBA peripheries when it segregates people and spaces.

Middle or low-density areas near heavy infrastructure are anticipated to experience urban expansion and therefore create an additional type of soft location.

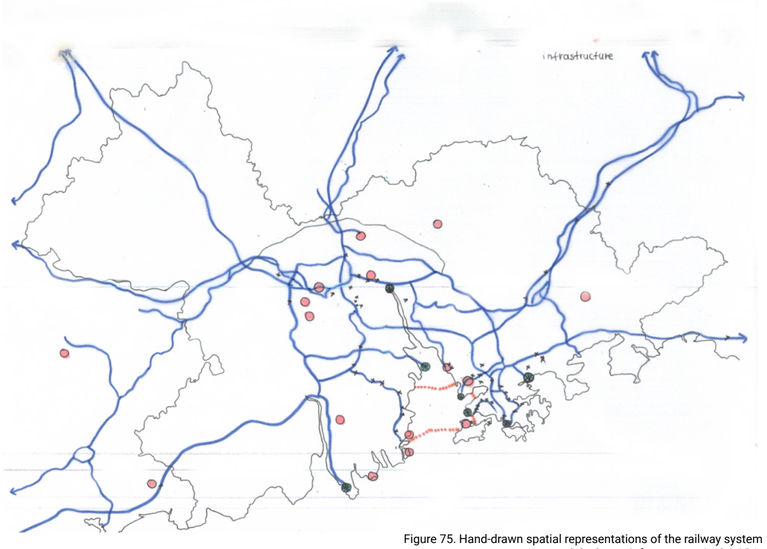


Figure 75. Hand-drawn spatial representations of the railway system and the heavy infrastructure in the GBA.

Figure 76. Hand-drawn spatial representations of middle and low density areas in the GBA combined with soft typologies related to infrastructure.

Soft typologies through scales

Our definition of soft locations necessitates that as our research dives into investigating smaller scales the soft location typologies diversify. Between a meso and a micro scales we identify 5 new typologies.

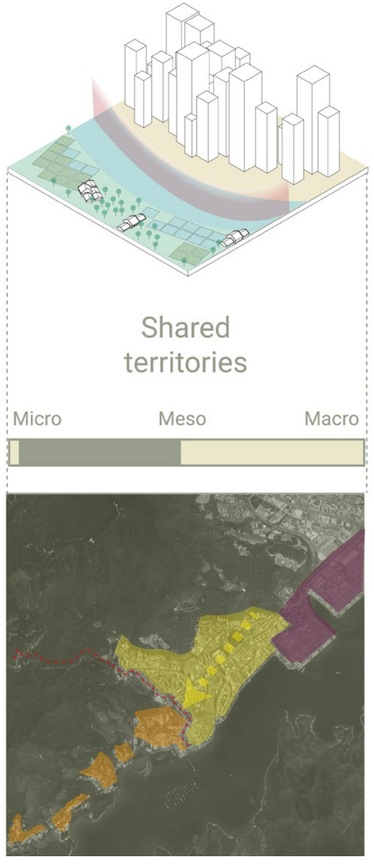


Figure 77. Typology "Shared territories" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Areas where borders meet or different stakeholders are called to negotiate over one territory, creating regular tensions, fall under the typology of shared territories.

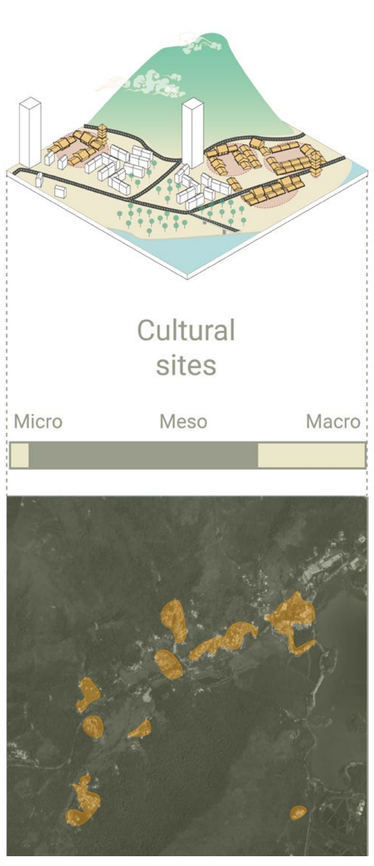


Figure 78. Typology "Cultural sites" axonometric diagram, scalebar and satellite image., source: Google Earth Pro. (2024)

Traditional practices, landscapes and villages along with other characteristics that shape an area's local identity are included in the typology of cultural sites when they are exposed to major urban transformations.

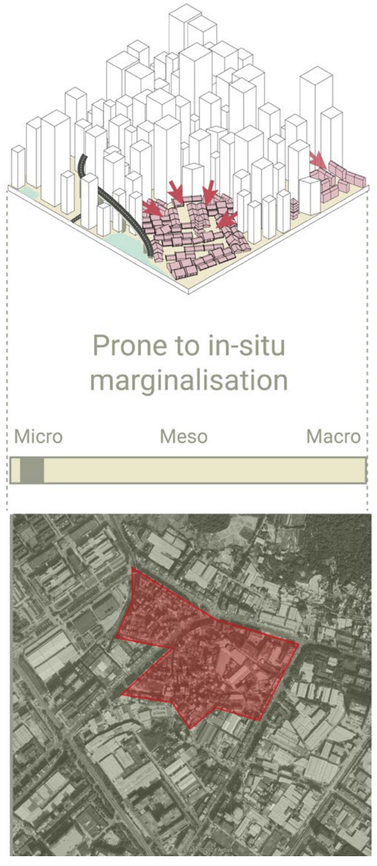


Figure 79. Typology "Prone to in-situ marginalisation" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Existing communities that are pressured by urban regeneration and infrastructural developments posing conditions that lead to fragmentation and social segregation.

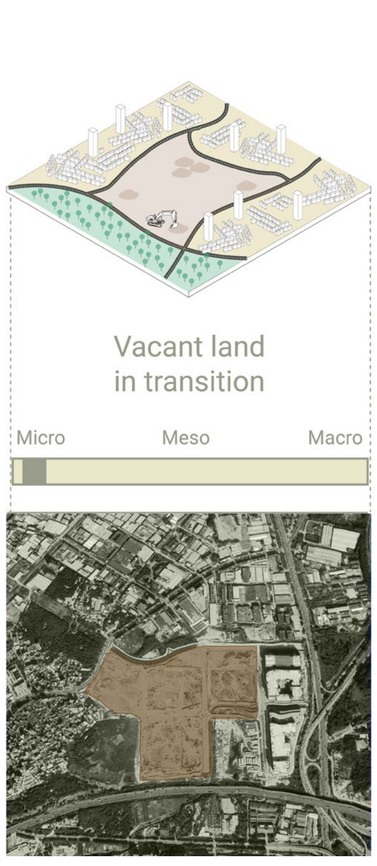


Figure 80. Typology "Vacant land in transition" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

Vacant land creates a typology of its own in the soft location classification as it is a primal example of an area up to speculation or facing transformation.

Figure 81. Typology "Phased out mine or landfill" axonometric diagram, scalebar and satellite image, source: Google Earth Pro. (2024)

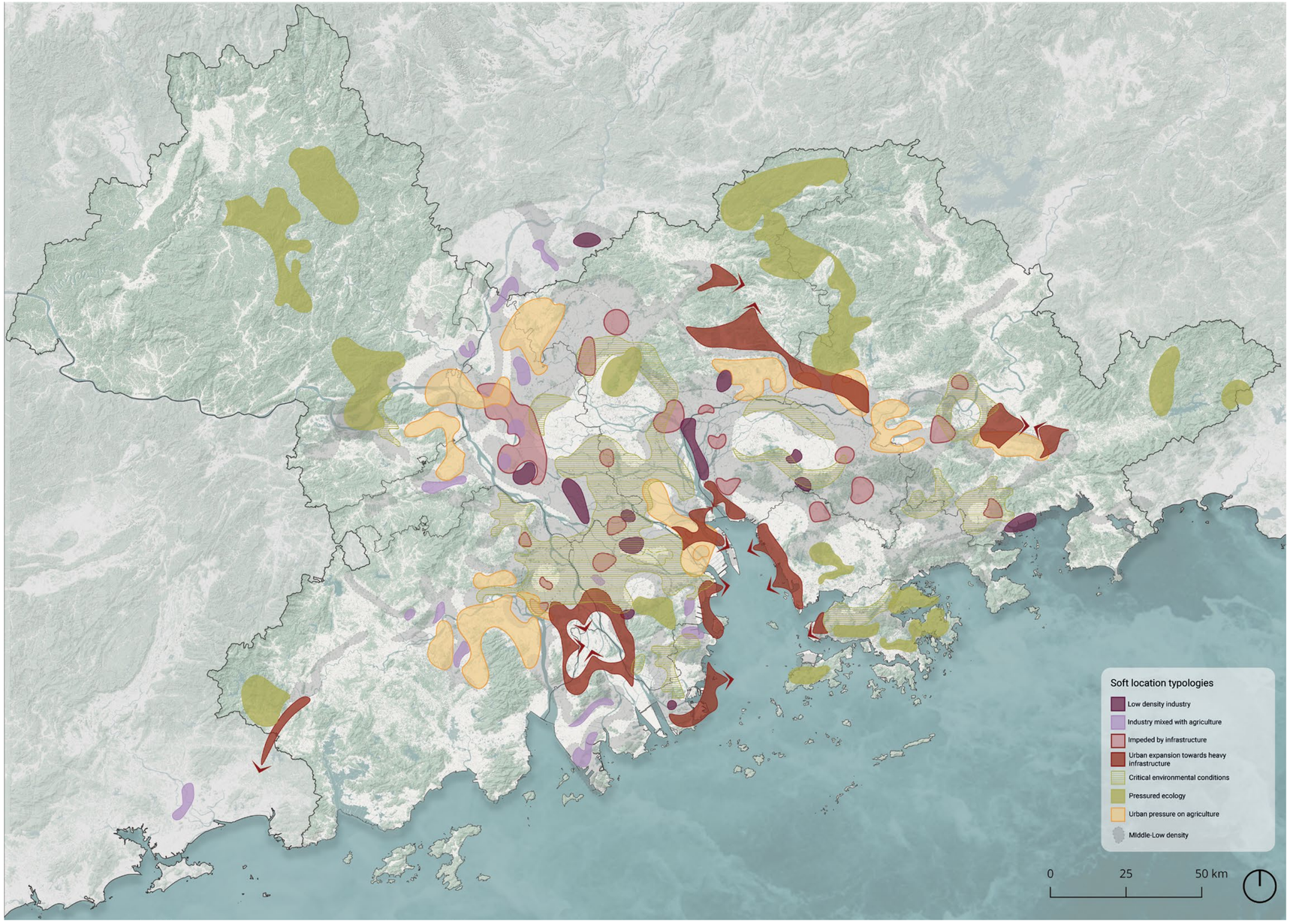
Similarly, phased out mines or landfills create a typology of soft locations due to the fact that they constitute spatial forms that have lost their original purpose, thus leaving space for reimagining them.

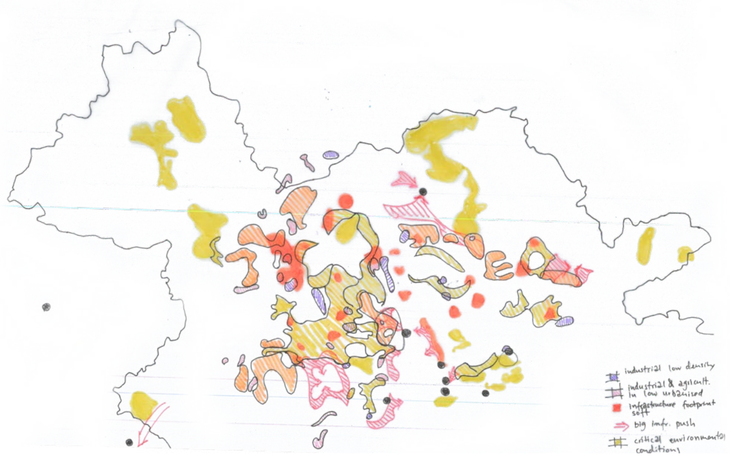
Soft location typologies in the GBA

Bearing in mind that the GBA development is shifting its focus to the peripheries, it becomes evident that more tension is put on urban areas with lower density. To envision growth and development in such areas we need to understand local identities, capacities, sensitivities and limitations based on socio-economic and environmental factors. The identification of our soft location typologies spatially in the GBA provides us a holistic perspective on what conditions need to attract our focus in the peripheral territories.

Figure 83. Soft location typologies identified spatially in the middle and low-density areas of the GBA. (left)

Figure 82. Hand-drawn spatial representations of the 7 main soft location typologies identified in the GBA.(below)





Soft territories map

The spatial overview of the soft location typologies when correlated with the existing vision's development direction allows us to organise the soft locations in two soft territories where future development will take place.

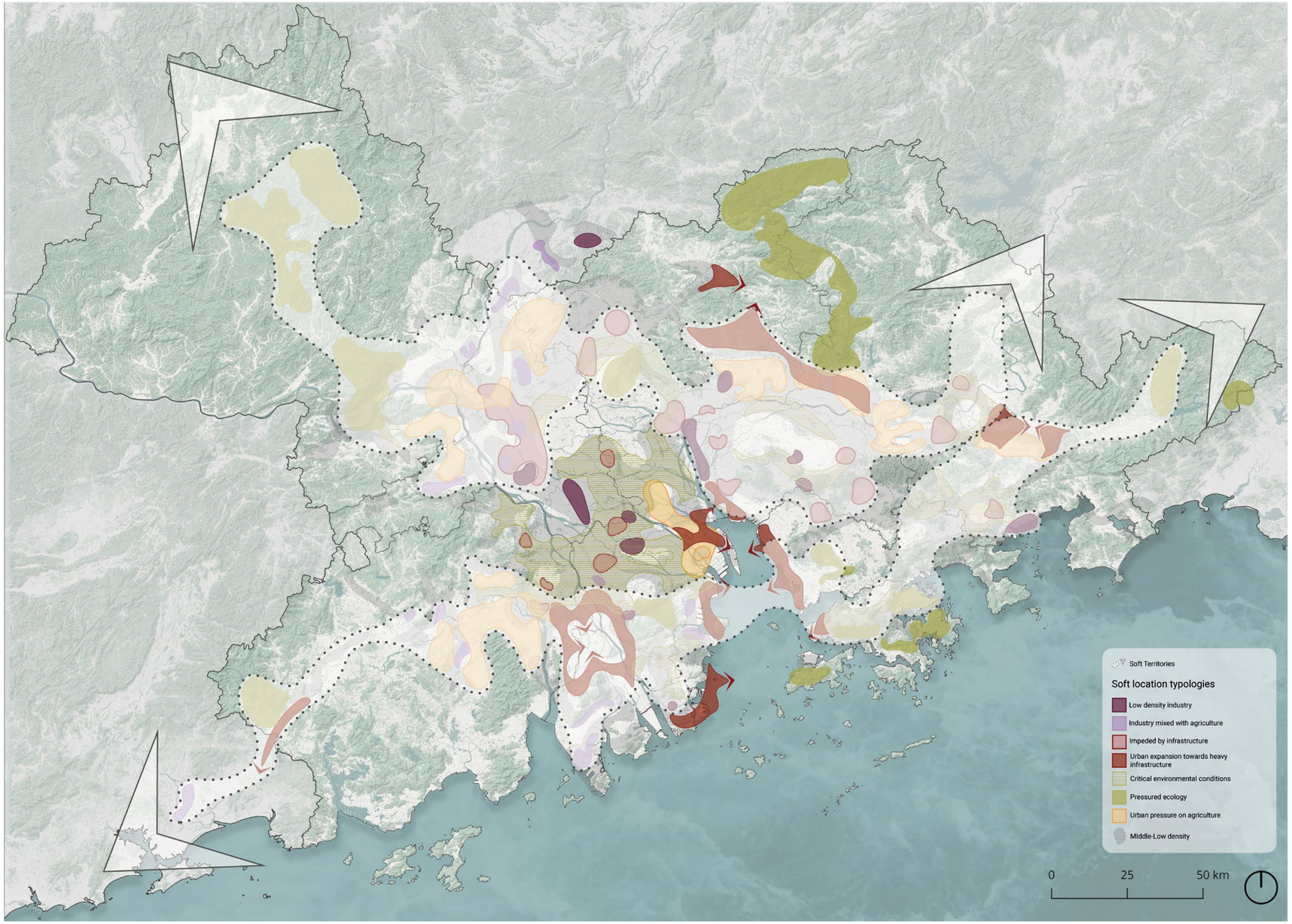


Figure 84. Soft territories identified as a development clusters based on the soft locations in the peripheries of the GBA.

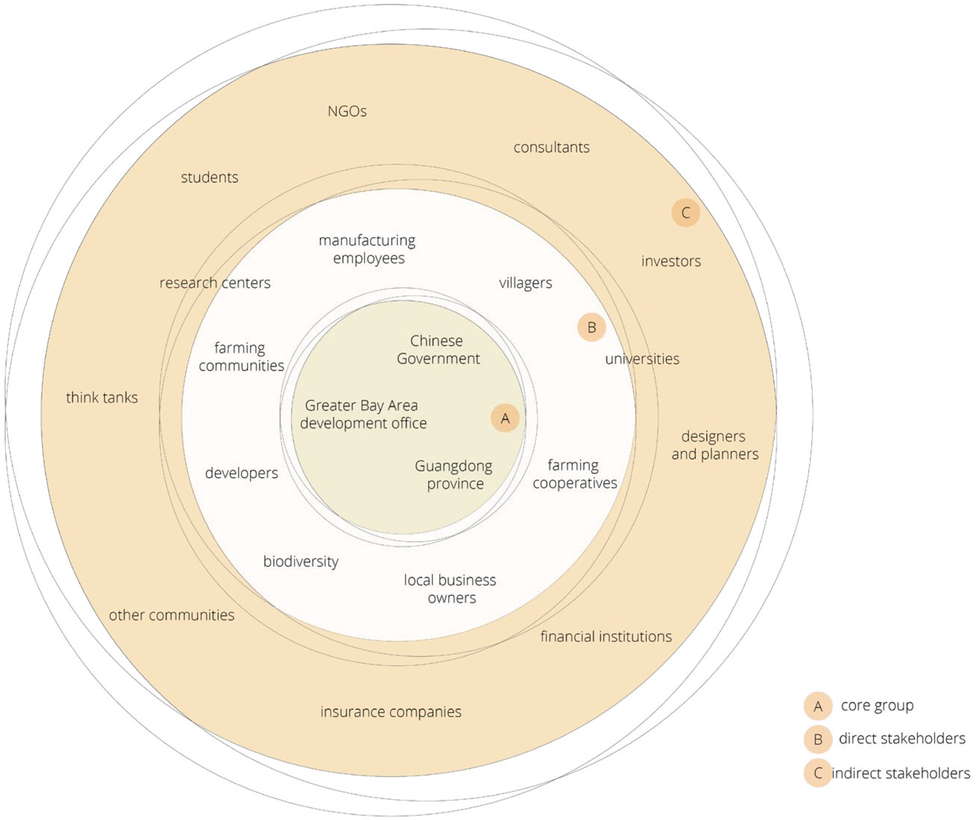


Figure 85. Stakeholders mapping

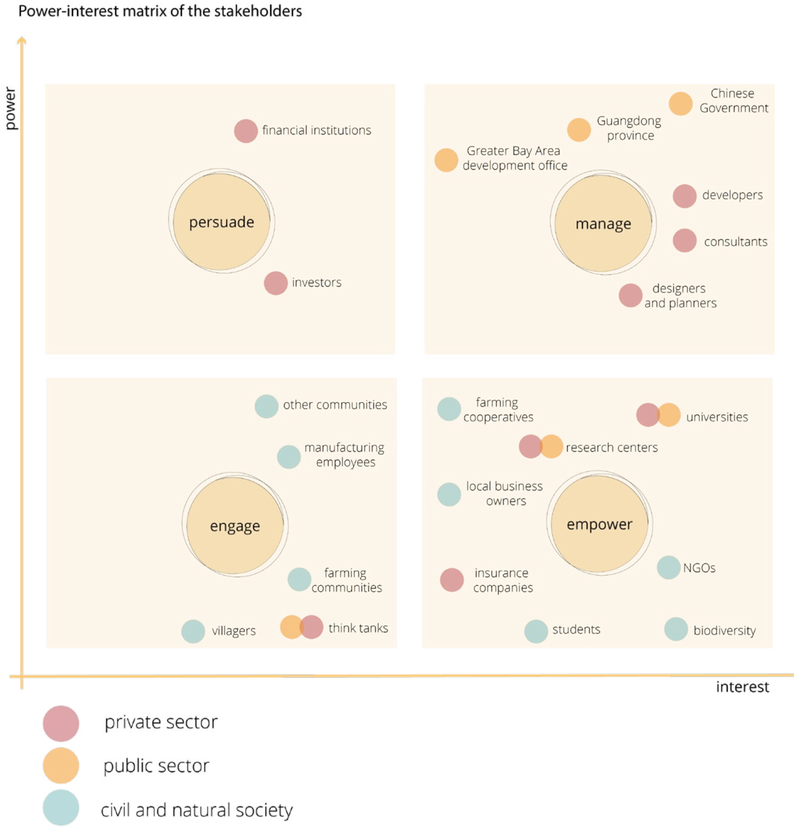


Figure 86. Power-interest matrix of the stakeholders

The adaptation to the challenges requires extensive cooperation between administrative jurisdictions and policy sectors to strengthen shared development management. Governments generally look to urban planning to resolve potential damaging competition between sectoral policies, but it is often not well-equipped for this task (Nadin & Meng, 2023). In the social dimension, a key aim is to achieve efficient and effective outcomes by incorporating ethical values like equity and justice and ensuring broad stakeholder engagement (Zhuang, 2020). Many studies highlight that rational stakeholder participation is crucial for sustainable urban development (Zhuang, 2020). Shifting to a spatial planning approach and strengthening the "cross-fertilisation" of policy demands reformed institutions, engagement of many stakeholders to build trust and ownership of a shared strategy, and reformed tools that offer discretion in complex decision environments (Nadin & Meng, 2023). Territorial cohesion can be achieved through spatial planning that coordinates sectoral policies and encourages cross-sectoral policy making. This is a longstanding challenge for Chinese and European policymakers. Adopting this approach requires institutional reforms, stakeholder engagement to build trust, and updated tools for complex decision-making (Nadin & Meng, 2023).

During this project a preliminary stakeholders mapping was conducted in order to identify the core group, direct and indirect stakeholders. Additionally, these stakeholders were evaluated regarding the scale of power and interest for the project and vision.

07

Conceptual framework and manifesto

7.1 Conceptual framework

The GBA's shifting focus to the peripheries and the identification of soft locations and their local sensitivities showcase a necessity to form an development model for the soft territories as an alternative to the existing megaproject-driven urbanisation. We propose moving from megaprojects as a catalyst to urban development to creating megascapes of place-bound strategic interventions that allow complimentary relations to occur between them. We define megascapes as self-directed territories consisting of functional conglomerations that respond to the local sensitivities of the area and the surrounding transformations. They ensure that development happens through consolidation, retrofitting, safeguarding and revitalisation of soft locations. Simultaneously, megascapes aim for the dissolution of tense edge conditions between mega agglomerations and the peripheries of the GBA and emphasise on circulation between sub cores.

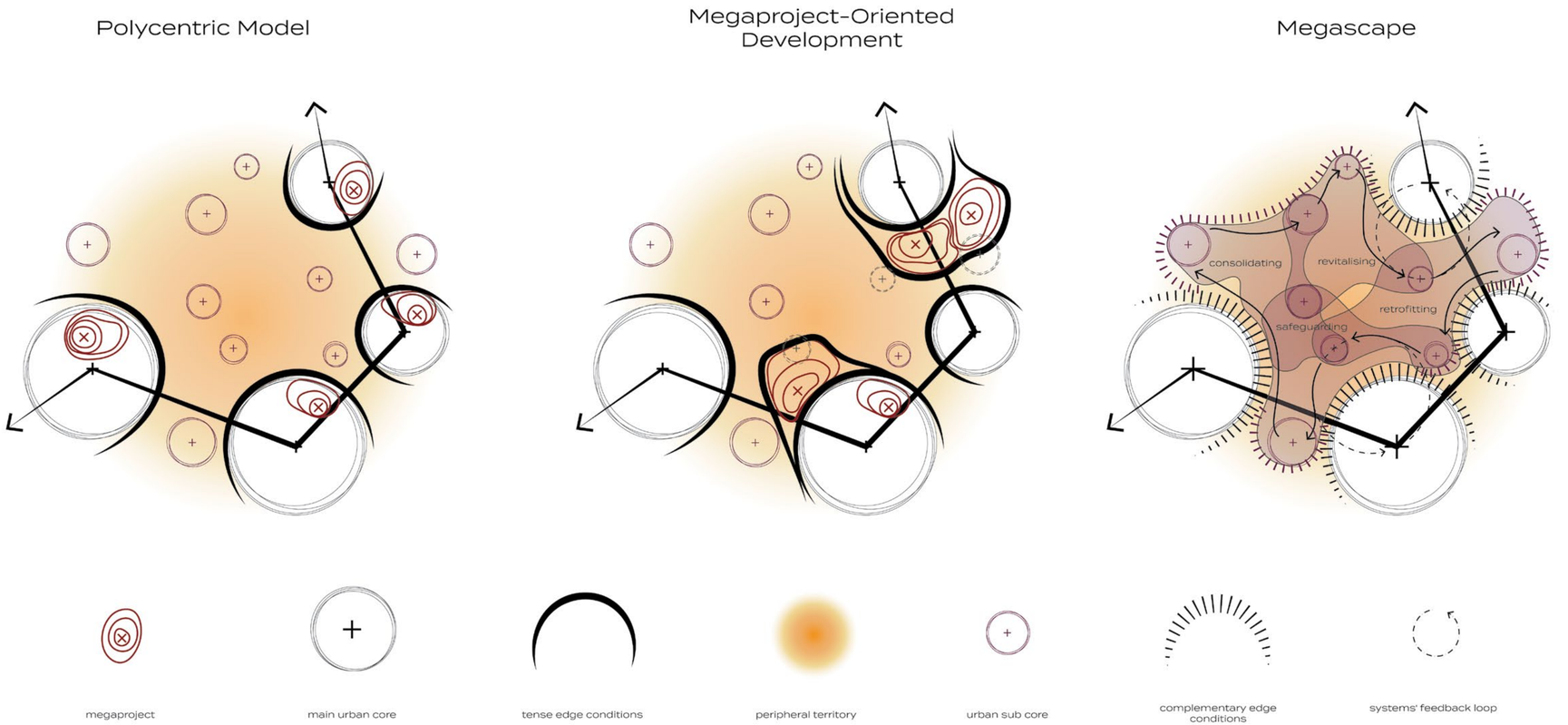


Figure 87. Conceptual framework

7.2 Manifesto

As one of China's most open and economically vibrant regions, the Greater Bay Area (GBA) plays a crucial strategic role in the country's overall development and it showcases the power of urban transformation within a diverse and socio-politically rich region. The GBA's ongoing development aligns with the "one country, two systems" principle, enhancing its unique status, which includes Special Administrative Regions (SARs) and distinct deltaic ecological conditions. The complex polycentric system, characterized by competition rather than complementarity between its subsystems, encompasses mega agglomerations hosting a network of cities with enormous economic value.

Since China's economic reform in 1978 (B. Jiang & Chen, 2023), mega projects across the Pear River Delta have driven rapid urbanization processes. And this model remained the same after the formation of Greater Bay Area in 2018 till today. However, this rapid globalization has brought negative socio-ecological impacts that when combined with climate change and deltaic conditions, these factors create "double-negative" (O'Brien & Leichenko, 2000) effects on various "layers" (Dammers et al., 2014) of the region. Mega projects, described as having magnified costs, extreme complexity, increased risk, and significant community impact, present challenges for stakeholders while driving urban development (Fiori & Kovaka, 2005; Reboredo, 2021). They reflect the government's focus on strategic economic goals over local residents' livelihoods, creating growth enclaves and leading to landscape fragmentation and social marginalization (Z. Wang & Wu, 2019).

Traditionally, large capitals have absorbed the attention of practitioners and policymakers, often neglecting areas that lack economic weight, political importance, and attractiveness (Cardoso & Meijers, 2021). However, there is a growing shift towards developing peripheral areas, which offer available space and unique qualities in contrast to the crowded urban cores of the regionalization models. These dynamics create tensions in the "soft territories", areas in transition and open to speculation, yet crucial for supporting "global cities" (Friedmann, 2007) while providing diverse local qualities.

Our approach supports the importance of soft peripheries within the globalization system, though not as a competitor but as complementary to the regionalization model. We explore dynamics between an alternative localization model of place-bound micro-projects and the status quo. To achieve this, we focus on circulation within corridors rather than multiplicities of centralities. We introduce "megascapes" as a holistic approach to megaprojects aimed to drive an equilibrium of ecological regeneration and preservation, social opportunity and expression, and economic progress. This approach enhances polycentric nodes through integrated networks and corridors that connect ecological systems, infrastructure, economic flows, livability, housing, and cultural expression, ensuring place bound development thrives with its unique qualities.

Figure 88. Manifesto collage, see sources in Bibliography

08

Place bound development of the territories in the GBA Vision

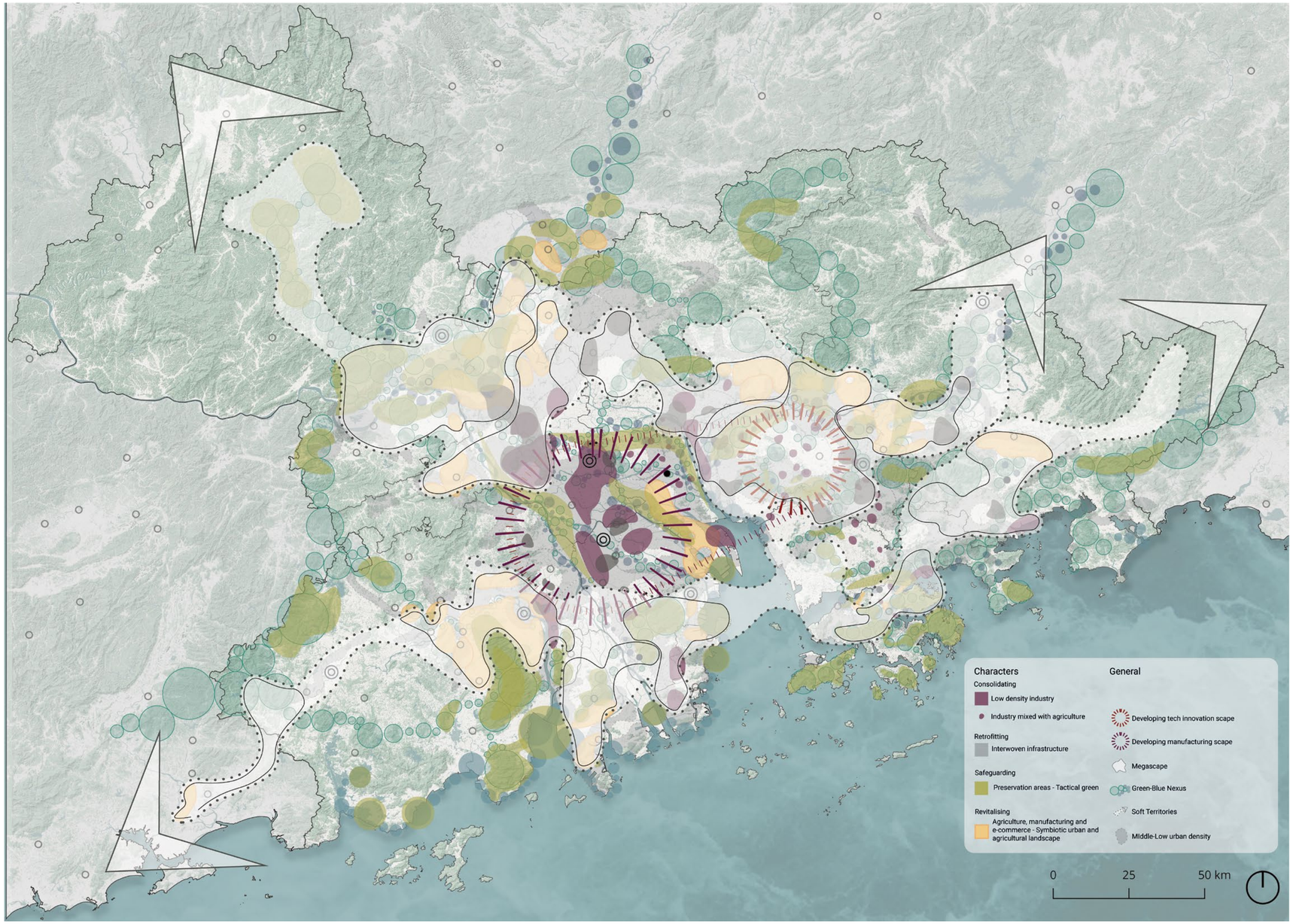


Figure 89. Vision map

8.1 GBA beyond 2030+

In 2030 and beyond, the soft peripheral territories of the GBA are the focal points of development. Our vision proposes their composition as conglomerations of megascapes that not only interelate but simultaneously form a complementary system to the regionalization model. The northern territory of the GBA focuses on a development that corelates manufacturing, innovation and trade of goods, whereas the southern development corridor emphasises on tackling ecological issues that occur from the marine development belt, international cooperation and preservation of cultural heritage. The shift from traditional manufacturing to innovation and technology industries is taken into account, leading to the inclusion of a productive landscape that links the soft territories.

The vision focuses on the transformability of soft locations and establishing new dynamics between megascapes, through formation of circulation systems in smaller scales, and in relation to mega agglomerations. This development model takes into account socio-environmental sensitivities and local capacities in order to urbanise through place-bound microprojects that do not exceed them. All of these concepts are achieved by providing a platform that allows individuals to taylor development based on local conditions and needs.

New “characters” are proposed for the soft locations and their territory to facilitate a self-directed growth within the megascapes that deals with the local complexities.

“ **Placebound development** of the GBA’s territories, focusing on the **complementarity of megascapes** and their **socio-environmental sensitivities**. ”

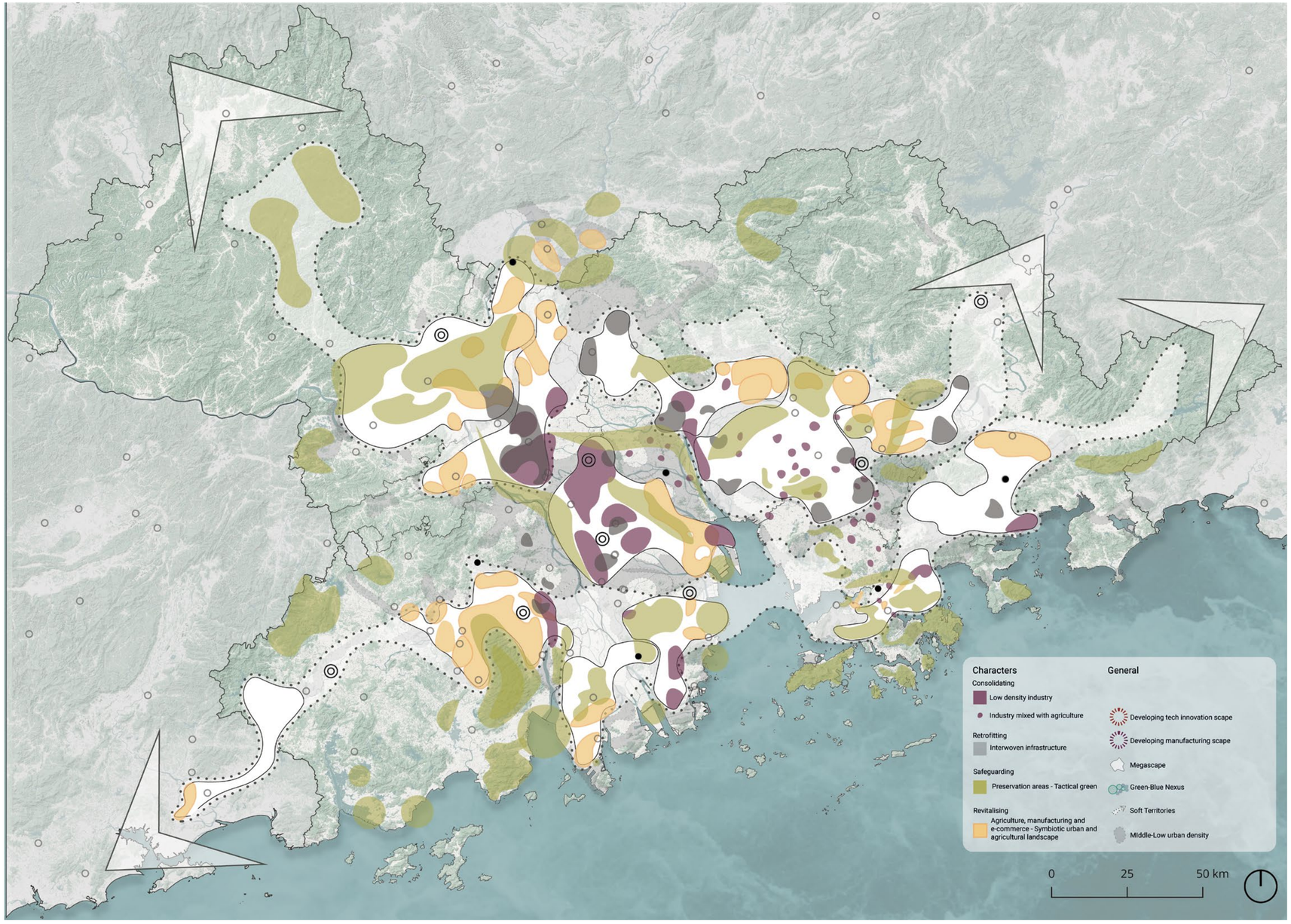


Figure 90. Character of territories in the vision map

GBA beyond 2030+ territorial characters

The characters proposed for each territory are determined by the potential that each area holds for development along with the challenges that they are currently facing. This allows for growth to be balanced and equitable. These characters propose a focal point for each territory but also promote multidisciplinarity within megascapes. They emphasize production in urbanized environments and adaptability to new land uses and critical environmental conditions.

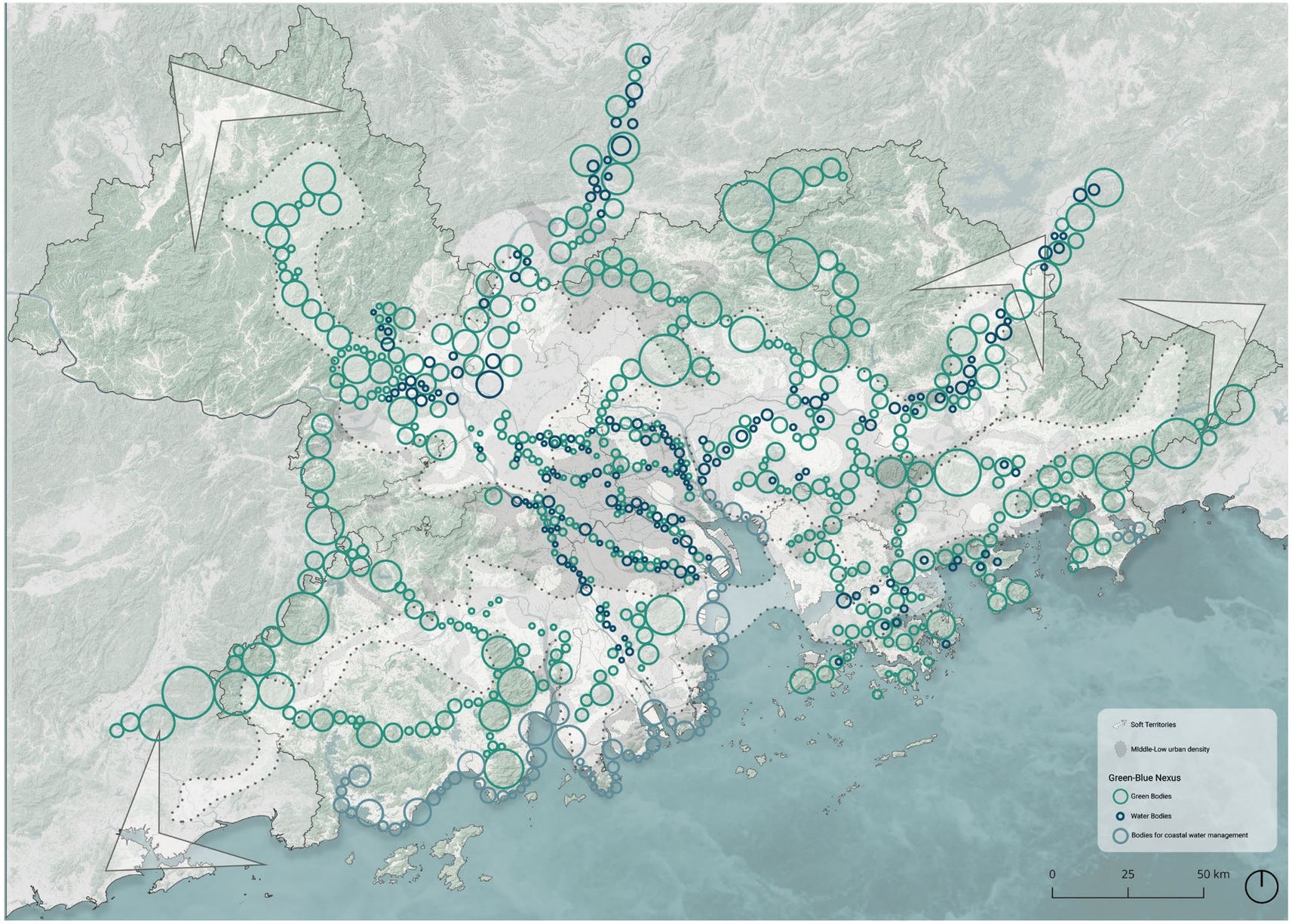


Figure 91. Green-blue nexus

GBA beyond 2030+ green-blue nexus

To envision a durable development for the GBA's future it is crucial to consider the area's biophysical conditions and needs. A green-blue nexus connects the GBA's ecological sources while weaving nature with the densely urbanised cores that focus on becoming more compact. This nexus focused on retaining water on the upstream areas and providing room for the river in the low lands that deal with critical environmental conditions. Additionally, it aims to protect not only the ecological sources but also the coastal belts that face sea level rise and salt water intrusion. By linking all of these natural bodies biodiversity migration flows are able to be formed.

8.2 Processes and characters

Alongside the main vision, we developed a set of characters. These characters were created based on the existing soft location typologies we identified in the area, as well as the principles and qualities we aim to enhance at the local level. They primarily describe processes that support integrated productive, urban, and natural landscapes. In our vision, these characters are translated into designated areas with flexible boundaries, tailored to the local socio-economic and environmental conditions.

Through the consolidation process, we focus on creating dense innovation and education cores to prevent urban sprawl while promoting knowledge sharing and partnerships between innovative industries, research centers, and educational institutions. Within this process, compact industrial clusters are formed, incorporating green-blue elements both around and within them, enhancing their qualities and amplifying their environmental impact.

The retrofitting process mainly targets upgrading existing structures in the area, promoting cultural heritage, and preventing infrastructural marginalization. Therefore, areas with high cultural value are protected and promoted, creating opportunities for eco-tourism to flourish. Instead of fragmented infrastructural nodes, we advocate for the integration of infrastructure and urban functions, ensuring necessary measures to maintain a high-quality built environment and healthy living conditions.

Safeguarding efforts focus on biodiversity preservation and mitigating critical environmental issues such as soil pollution, the urban heat island effect, and flash flood risks. One of the characters emphasizes ecological rehabilitation by expanding existing or creating new preservation areas, with regulations on activities and types of development allowed there. Additionally, tactical green initiatives are implemented, considering the specific challenges faced by the areas, while enhancing spatial quality and the living environment.

Lastly, revitalization efforts focus on socio-economic aspects, supporting local economies while considering their unique identities and critical needs. Creating clusters that combine agriculture, manufacturing, and e-commerce fosters positive conditions for more disconnected areas to grow and become part of the productive economy. Simultaneously, symbiotic urban and agricultural landscapes enhance food production integration within the urban environment.

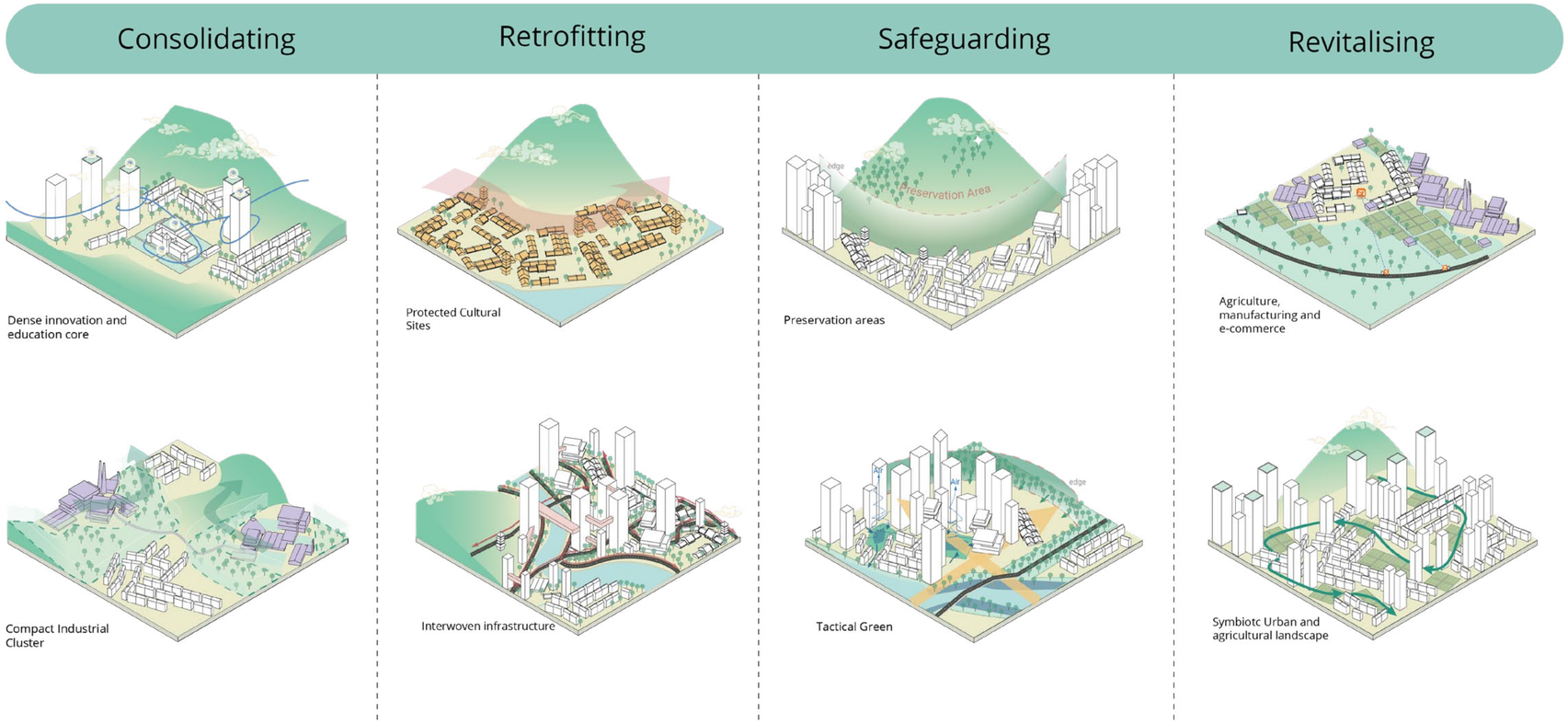


Figure 92. Processes and characters

09

An alternative future
Strategy

9.1 Strategy

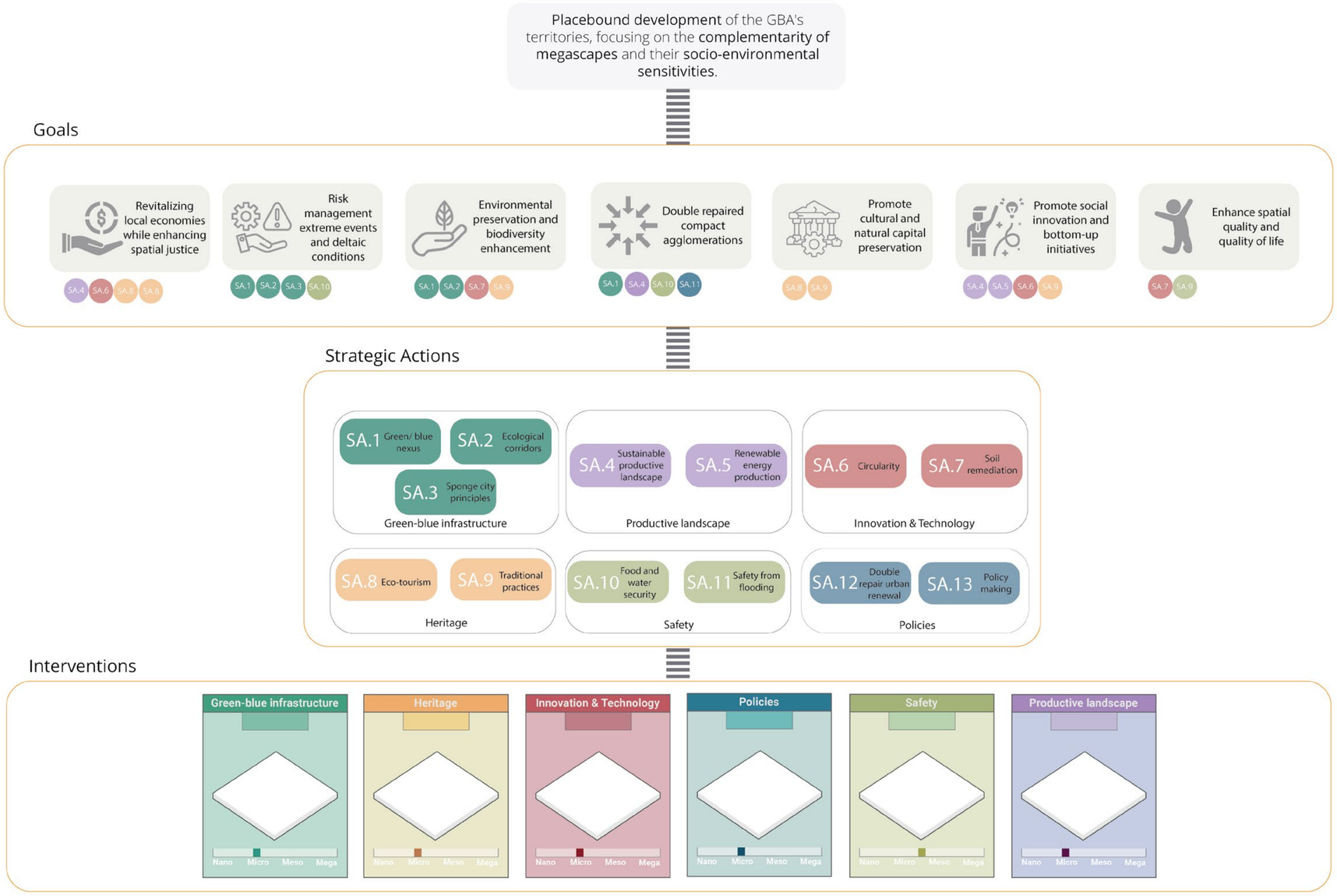


Figure 93. Strategy for the GBA

The vision describes the main goal for the future development and with our strategy we create a roadmap towards the place bound development of the GBA's territories. Our strategy consists of a set of goals, strategic actions and interventions, along with policies to engage and empower bottom-up initiatives.

With our goals we focus on:

- revitalizing local economies while enhancing spatial justice by supporting a more dispersed model of multifunctionality
- managing the risk for natural and climate extreme events and adaptating to the critical deltaic conditions
- environmental preservation and rehabilitation and enhancement of biodiversity
- creating compact agglomerations that focus on double repair initiatives while controlling the hyperdensification of the peri-urban
- promoting cultural and natural capital preservation
- promoting social innovation and bottom-up initiatives
- enhancing spatial quality and quality of life.

Each goal encompasses multiple strategic actions, emphasizing the necessity of a holistic approach. These actions are categorized into themes that align with the main elements of the strategy. Specifically, green and blue infrastructure focuses on addressing critical conditions, implementing sponge city principles, and preparing for future uncertainties. The productive landscape theme promotes sustainable agricultural and manufacturing processes along with renewable energy production. Innovation and technology aim to foster relationships between educational and research institutions and facilitate knowledge transfer to production processes. Heritage highlights the promotion of eco-tourism and traditional practices of the area. Safety is centred on creating safe environments and protecting livelihoods. Lastly, policies prioritize empowering local communities, enhancing bottom-up initiatives, and fostering inclusive planning processes.

9.2 Tools and interventions

Figure 94. Interventions and policies for the implementation of the strategy

Multiscalar approach

Crucial in the strategy is the multi-scalar approach that was developed. From the vision on the mega scale we move through scale to the micro level and the individual territorial character. During the planning process a continuous back-casting process was conducted in order to understand how transformations in the macro scale impact the micro and vice versa.

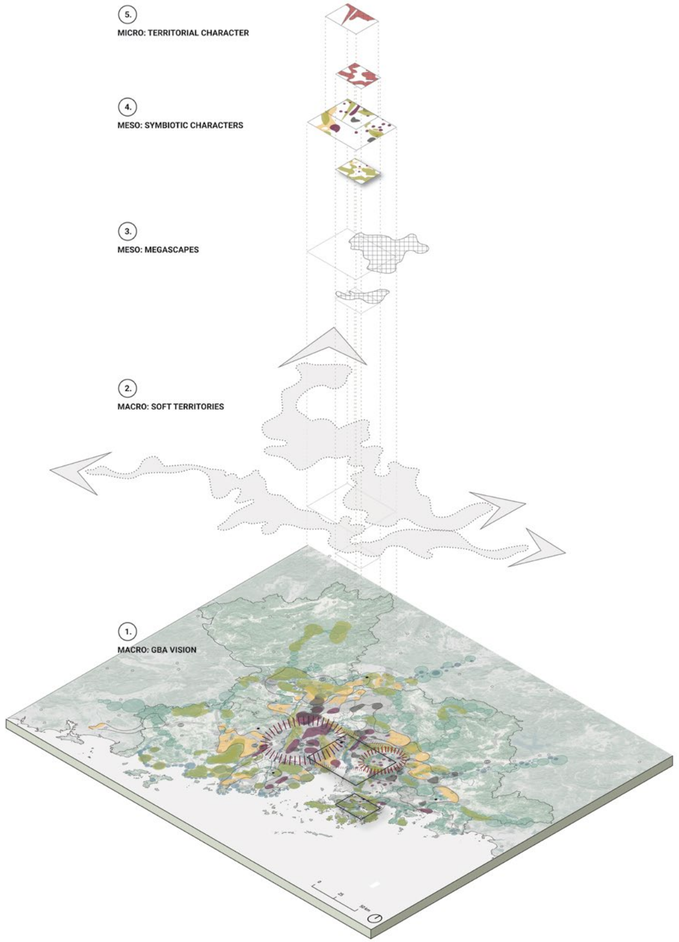


Figure 95. Multiscalar approach

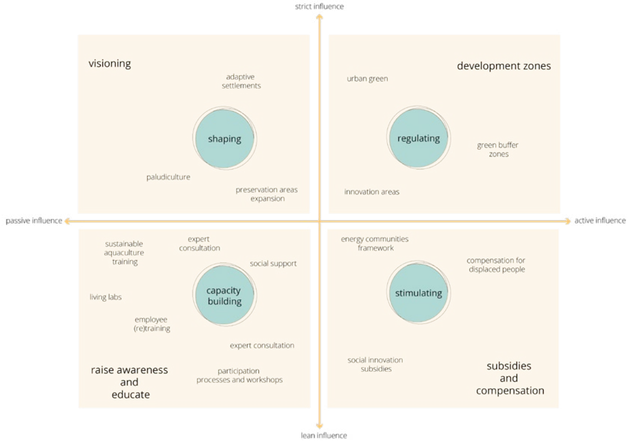


Figure 96. Planning instruments and markets, sources: Adapted from Fred Hobma's lecture on March 18th, 2024 at TU Delft Urbanism

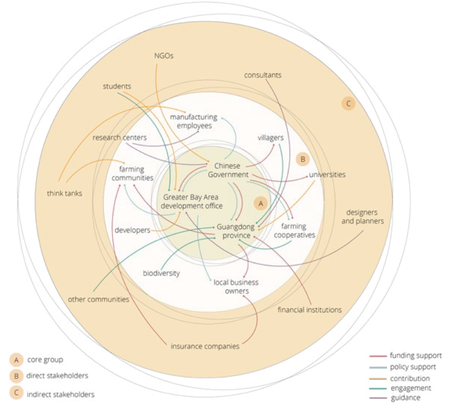


Figure 97. Stakeholders' projections

Stakeholders framework

The strategy includes interventions and policies at different scales, tools and procedures for shaping, regulating, building capacity and stimulating stakeholders in the process. On one axis, "Active Influence" means policymakers directly control characteristics affected by policy. In contrast, "Passive Influence" means policymakers indirectly influence these characteristics by creating conditions that lead to change. On the other axis, "Strict Influence" indicates policymakers retain significant control over the subject of the policy. Conversely, "Lean Influence" means policymakers delegate most control to external actors, steering change through policy while these actors implement it.

Combining these axes defines four tool types:

1. "Regulating" policies result from active and strict influences, where policymakers maintain control and actively shape characteristics.
2. "Stimulating" policies arise from active and lean influences, where policymakers release agency but remain involved in guiding change.
3. "Shaping" policies emerge from strict and passive influences, where policymakers retain control but do not actively participate in the process.
4. "Capacity Building" policies stem from lean and passive influences, where policymakers relinquish agency and delegate implementation to others, initiating new capabilities that operate independently.

Ultimately, a stakeholder projection framework was developed to define clearer roles and contributions for stakeholders in the process.

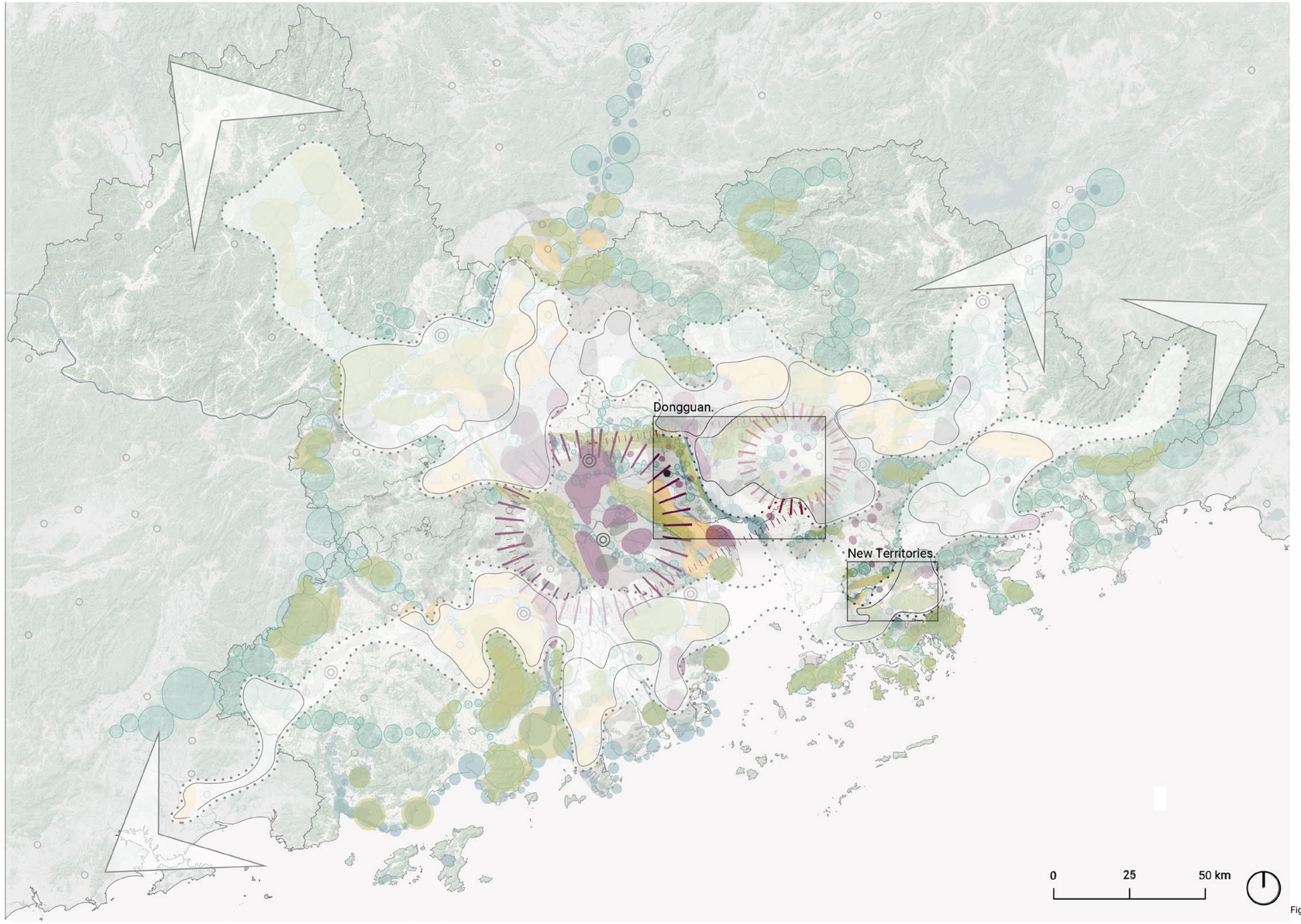


Figure 98. Strategic locations selection

9.3 Strategic Locations

Selection zoom-ins for strategic implementation

Now that the vision for the Greater Bay Area (GBA) is defined, implementing strategic interventions is crucial to actualize this vision. This requires a deeper exploration of the (peri) urban fabric to ensure that the interventions align with the large-scale implications of our vision. To this end, two key locations are identified for further analysis: the Dongguan Innovation Belt and the Hong Kong Northern Territories. These locations were selected based on three criteria. Firstly, they are areas of significant anticipated transition, from urban centres undergoing economic reform to regions experiencing socio-economic paradigm shifts. Secondly, these areas are situated within the identified soft territories, emphasizing the sustainable development of these zones. Lastly, each location represents a different composition of soft typologies, ensuring a comprehensive approach that addresses the diverse range of typologies outlined in the vision. By focusing on these areas, it can strategically drive development and innovation in the GBA, ensuring that each intervention is a holistic reflection of the region's potential and aligned with the overall vision.

Figure 99. Dongguan: the "world's factory" under transformation, see sources in Bibliography

Dongguan: the world's factory under transformation

Dongguan, a city nestled in the Greater Bay Area (GBA) estuary between the prominent cities of Shenzhen and Guangzhou, has long been an economic powerhouse in China, primarily due to its manufacturing sector. However, recent years have seen Dongguan struggling, overshadowed by its rapidly developing neighbours—Guangzhou, Jiangmen, and Shenzhen—resulting in a diminished economic position (Chang, 2019). This decline necessitates urgent development to revive Dongguan's faltering economy. Such developments will significantly impact Dongguan's soft locations, which are particularly susceptible to change. The challenge lies in ensuring that economic progress occurs symbiotically with these local soft locations, fostering sustainable growth and resilience.

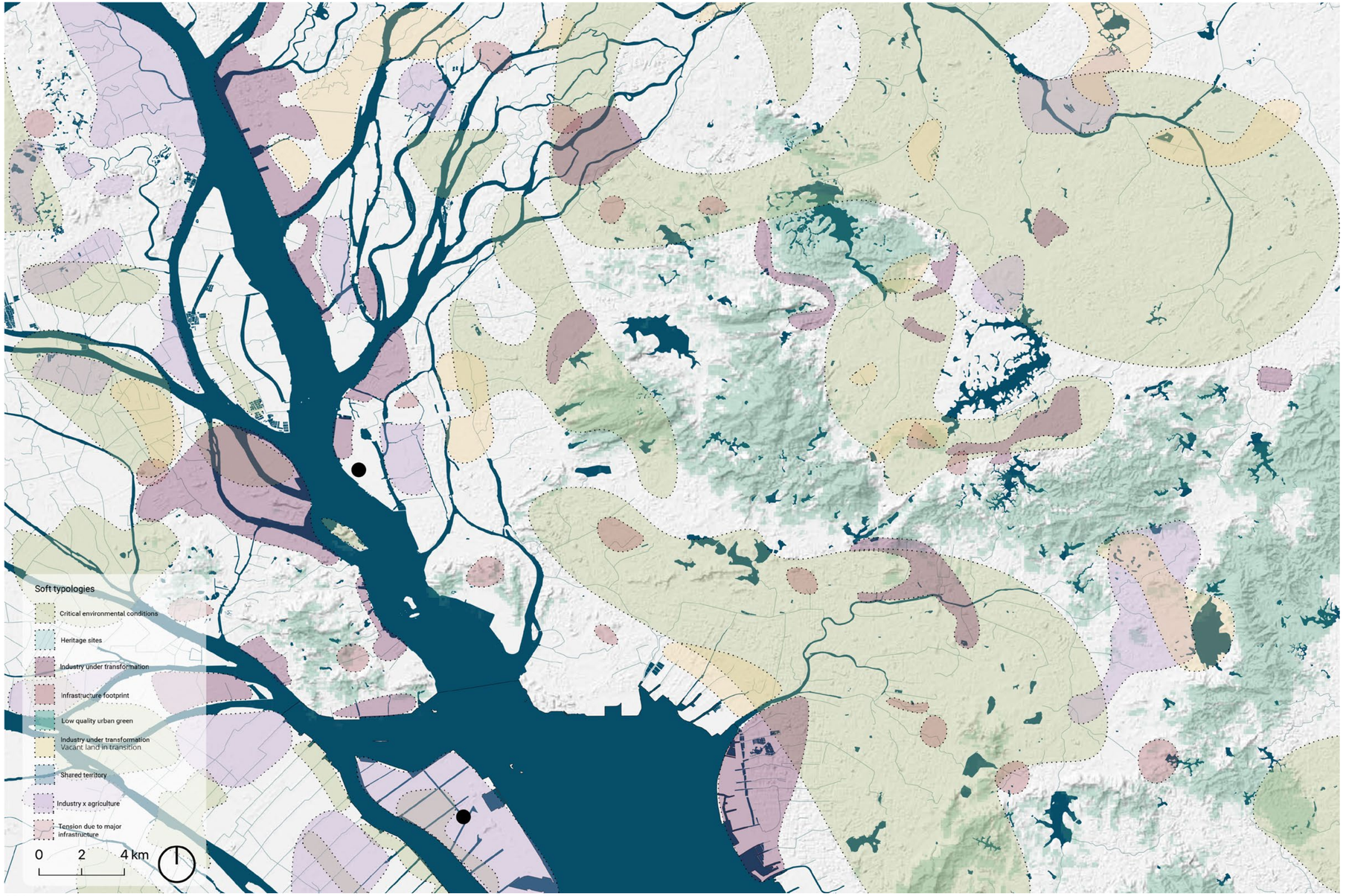


Figure 100. Dongguan: soft location mapping

Dongguan: the world's factory under transformation

Defining Dongguan's soft locations and types

Dongguan is a region enclosed by mountain ridges and the constrained Pearl River estuary shore, rich in our previously defined soft typologies. The rapid urbanization in Dongguan has led to critical environmental conditions, including urban heat, landslides, and pluvial flooding. As a manufacturing hub, the city is characterized by dispersed low-density industrial zones. However, remnants of its agricultural past remain visible, with agricultural plots interspersed within urbanized areas. Additionally, natural areas such as mountain forests and riverbanks, though fragmented and enclosed by urbanization, contribute to a fragmented green/blue system. These diverse soft typologies present both challenges and opportunities.

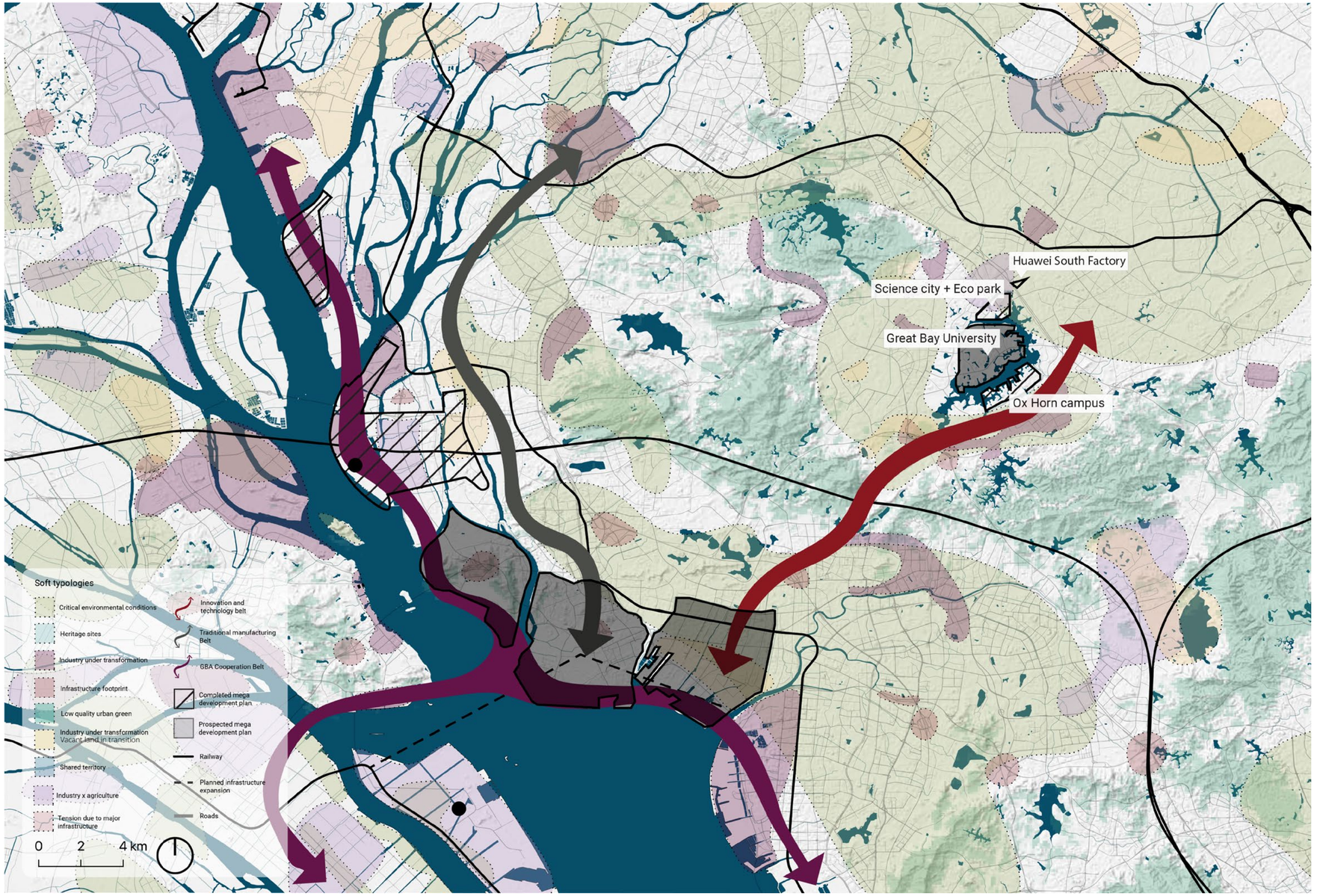


Figure 101. Dongguan: projecting its prospected development

Dongguan: the world's factory under transformation

Projecting the future developments of Dongguan

Now that the soft typologies have been defined, it's essential to outline the planned developments in Dongguan that form tensions in the urban environment. Dongguan was once a major industrial hub in China but has recently struggled and been overshadowed by nearby cities like Shenzhen, Guangzhou, and Jiangmen (Chang, 2023). To turn things around, a new economic development plan has been proposed, featuring three development belts and two key development zones (Latest Development Progress in GBA Area, 2019).

The first "cooperation" belt runs along the coastline, connecting Dongguan to the larger Greater Bay Area (GBA) economic network, linking major cities such as Guangzhou, through Qianhai, Shenzhen, Hong Kong, Jiangmen, and Macau. This belt will be supported by a new bridge and high-speed railway line crossing the estuary towards Nansha port and Jiangmen (Latest Development Progress in GBA Area, 2019). The second "traditional manufacturing" belt cuts through the urban area on the west side of the mountain ridge and aims to bolster Dongguan's manufacturing legacy. The third and most transformative "innovation and technology" belt runs through the mountains towards Songshan Lake, aiming to position Dongguan as an innovation hub. The Songshan Lake area, the core of this innovation belt, is already home to high-end facilities like Huawei's Research and Design campus, Science City, and Great Bay University, which aims to rival Stanford in creating talent for the GBA (Latest Development Progress in GBA Area, 2019).

The second development zone is the Binhaiwan Bay Area, where three reclaimed estuary peninsulas will extend the Qianhai cooperation zone into Dongguan, serving as the convergence point for all three development belts (Latest Development Progress in GBA Area, 2019).

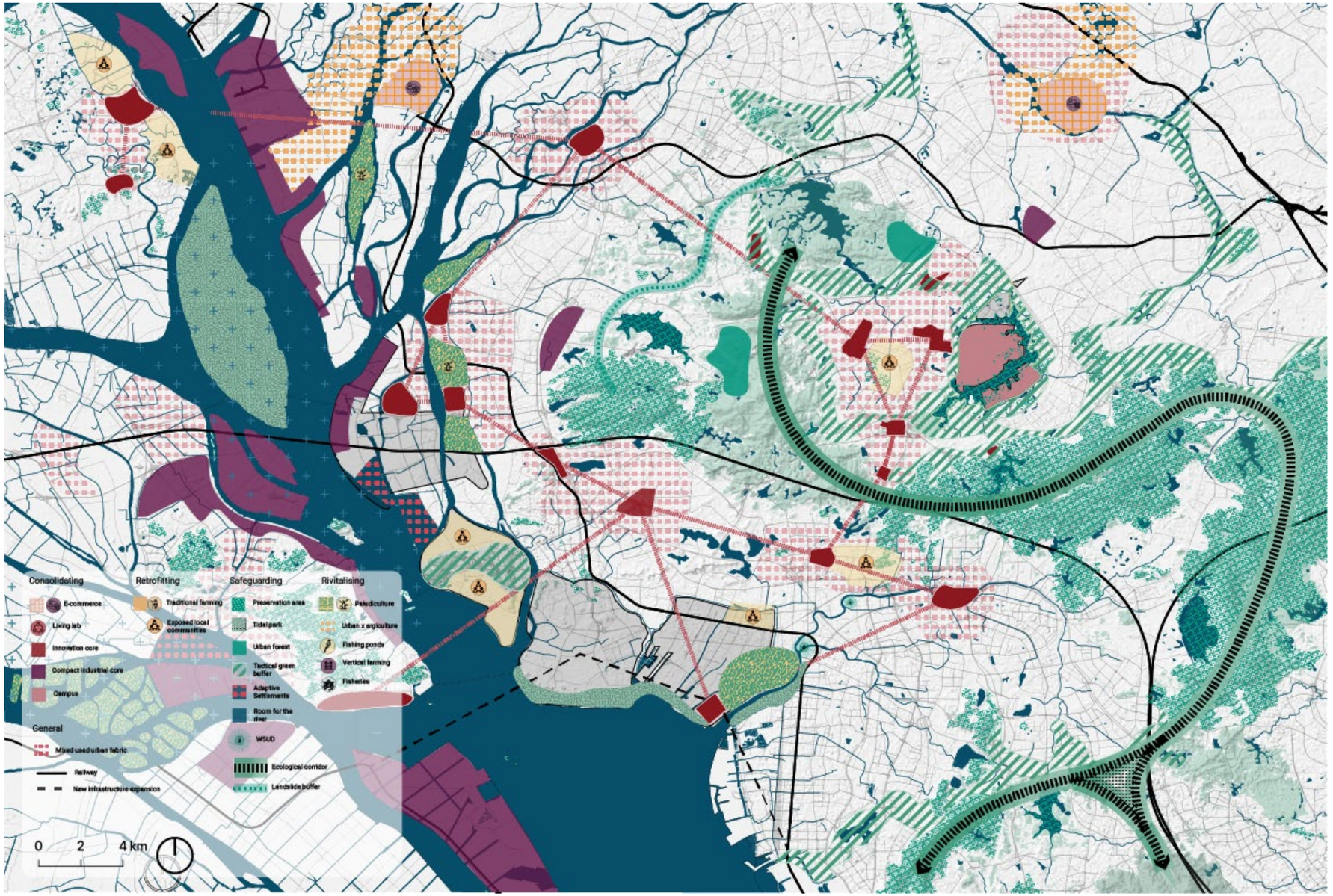


Figure 102. Envisioning Dongguan's development

Dongguan: the world's factory under transformation

Envisioning the development of 'softs' in Dongguan

In the wake of Dongguan's economic development, a strategic plan is composed to capitalize on the opportunities and strengths of the defined soft locations. This strategy proposes transforming current industrial sites into compact innovation cores, interlinked to form an intricate knowledge and economic network. Surrounding these clusters, the urban fabric will be transitioned into a multifaceted mixed-use urban tapestry, seamlessly integrating urban soft locations with the development prospects. At the same time, cultural and heritage sites will be protected, establishing protection zones for critical communities and stakeholders, such as traditional agricultural practices and heritage sites. Furthermore, the strategy aims to safeguard existing green-blue borders from further urbanization. Additionally, the fragmented green areas and the Pearl River system will be interconnected through blue-green infrastructure, enhancing connectivity between fragmented ecologies and water bodies.

Figure 103. Multiscalar strategic approach Dongguan

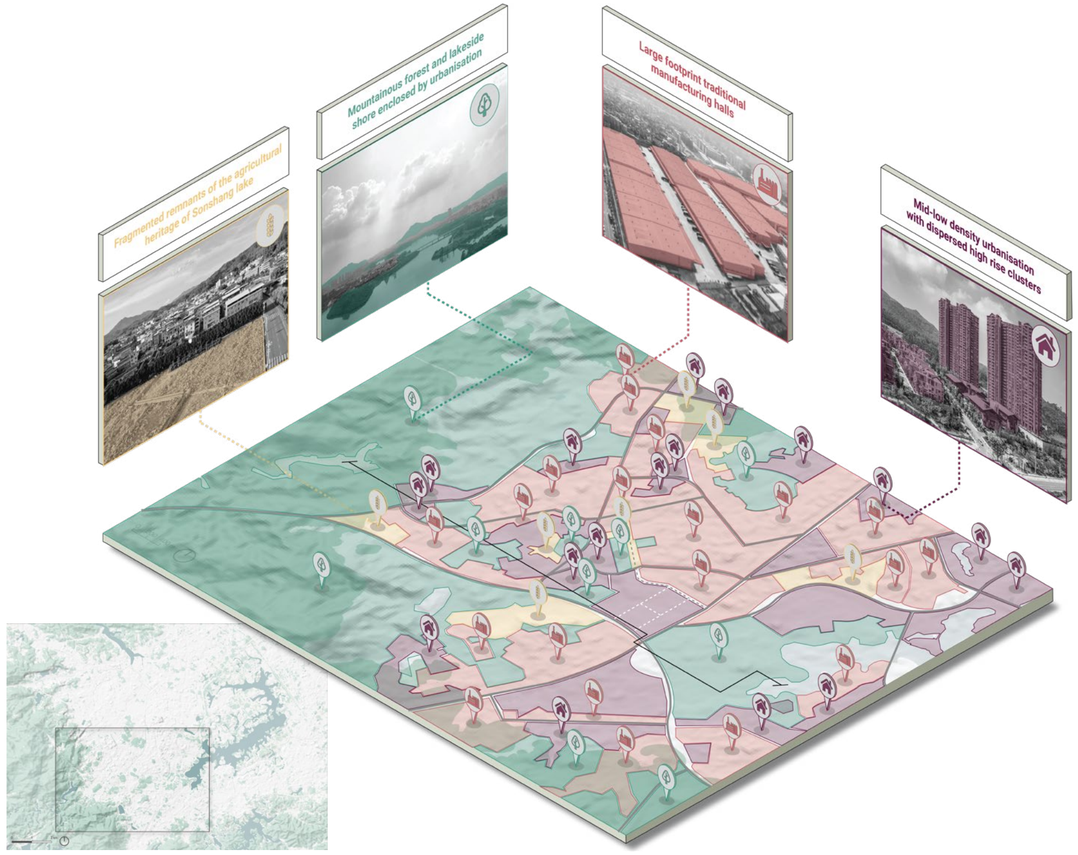


Figure 104. Nano scale: characteristics of soft locaitons

Understanding the characteristics of the soft conditions through a multi-scalar approach

To form this strategy, a multi-scalar approach is used, encompassing both the micro and nano scales. The nano scale zooms in to the distinct urban tapestry composition, revealing the specific characteristics of form and function within the soft typologies of the macro scale. This nano scale acts as a snapshot of the micro scale, capturing the essence of the entire area's characteristics and challenges. The micro scale is focused along the line of the most transitional development: the proposed innovation and technology belt in Dongguan's future vision. This area is expected to undergo the most significant socio-economic shifts in the region, thereby exerting the largest influence on the territory. A phased strategy will be implemented to ensure the principles that support the startegy outlined in the previous chapter are realized.

Defining the nano characteristics of the soft locations at nano scale

It is crucial to delve into the nano-scale characteristics of the urban form within these areas. Historically, the region around Songshan Lake was dominated by agricultural activities and natural landscapes along the lake shore and mountain ridge (Google Timelapse, 2024). Despite the wave of urbanization that has since swept through, remnants of these agricultural practices are still present within the current urban fabric. This urban tapestry primarily comprises low-density residential districts interspersed with occasional clusters of high-rise buildings, catering predominantly to the manufacturing sector. The manufacturing industry, characterized by large-footprint traditional manufacturing halls, occupies a significant portion of the area surrounding Songshan Lake. This industrial sprawl effectively encloses and fragments the natural areas along the mountain ridge and lake shore. By understanding these nuanced characteristics at a nano-scale, a phased transition strategy can be developed to harmonize the industrial presence with the preservation and enhancement of the remaining natural and agricultural landscapes, thus fostering a more integrated and sustainable urban environment at a micro-scale.

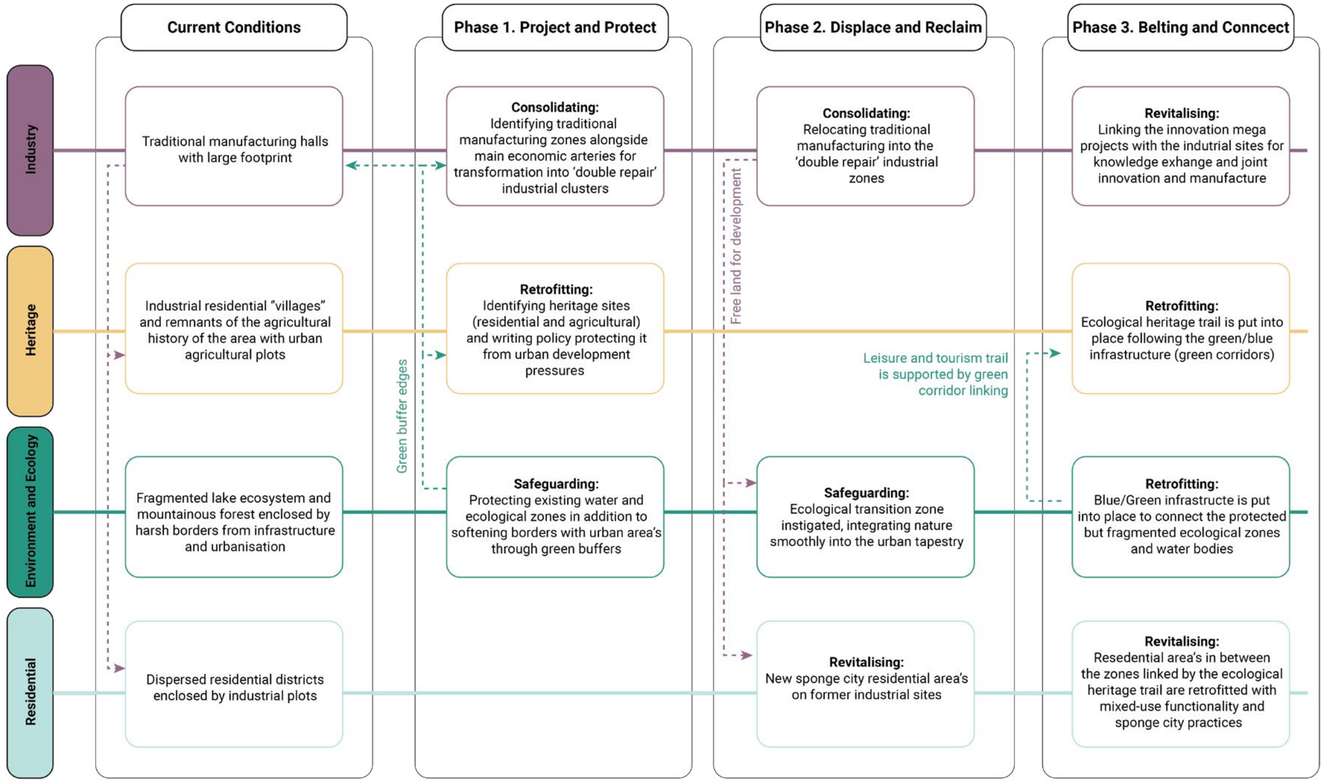


Figure 105. Phase 0 - Current conditions

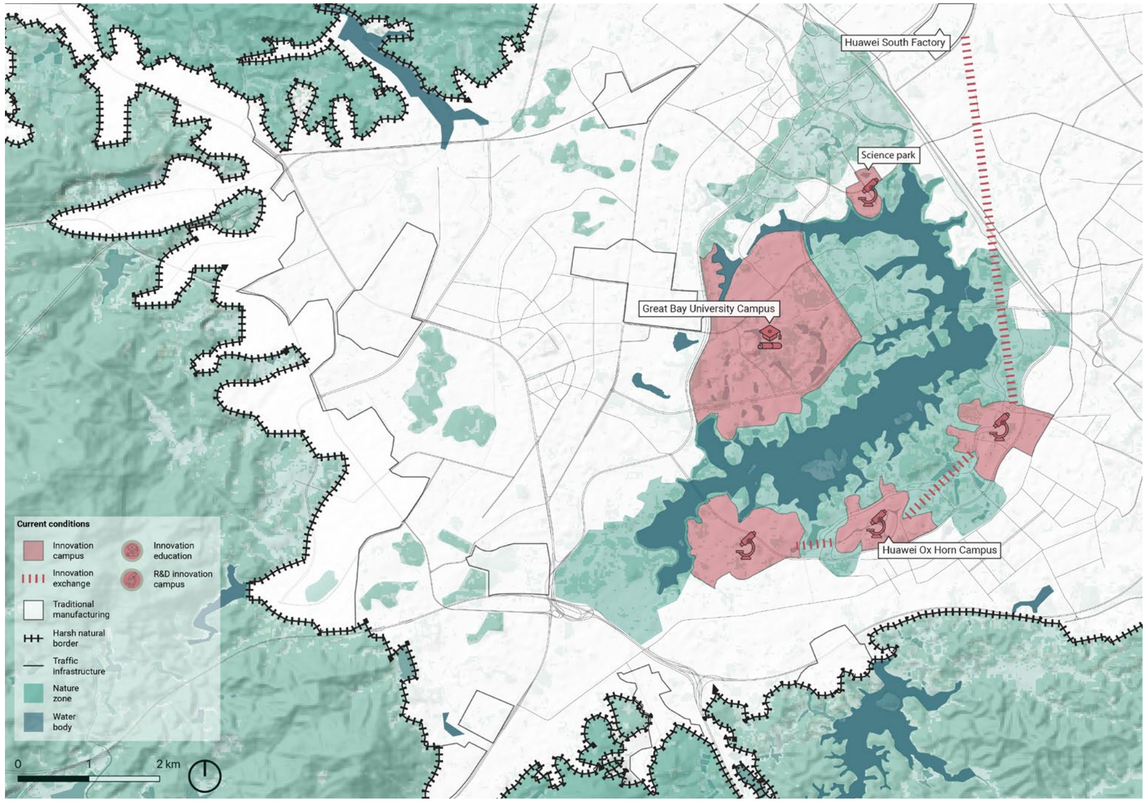


Figure 106. Microscale : Phase 0 - Spatial framework

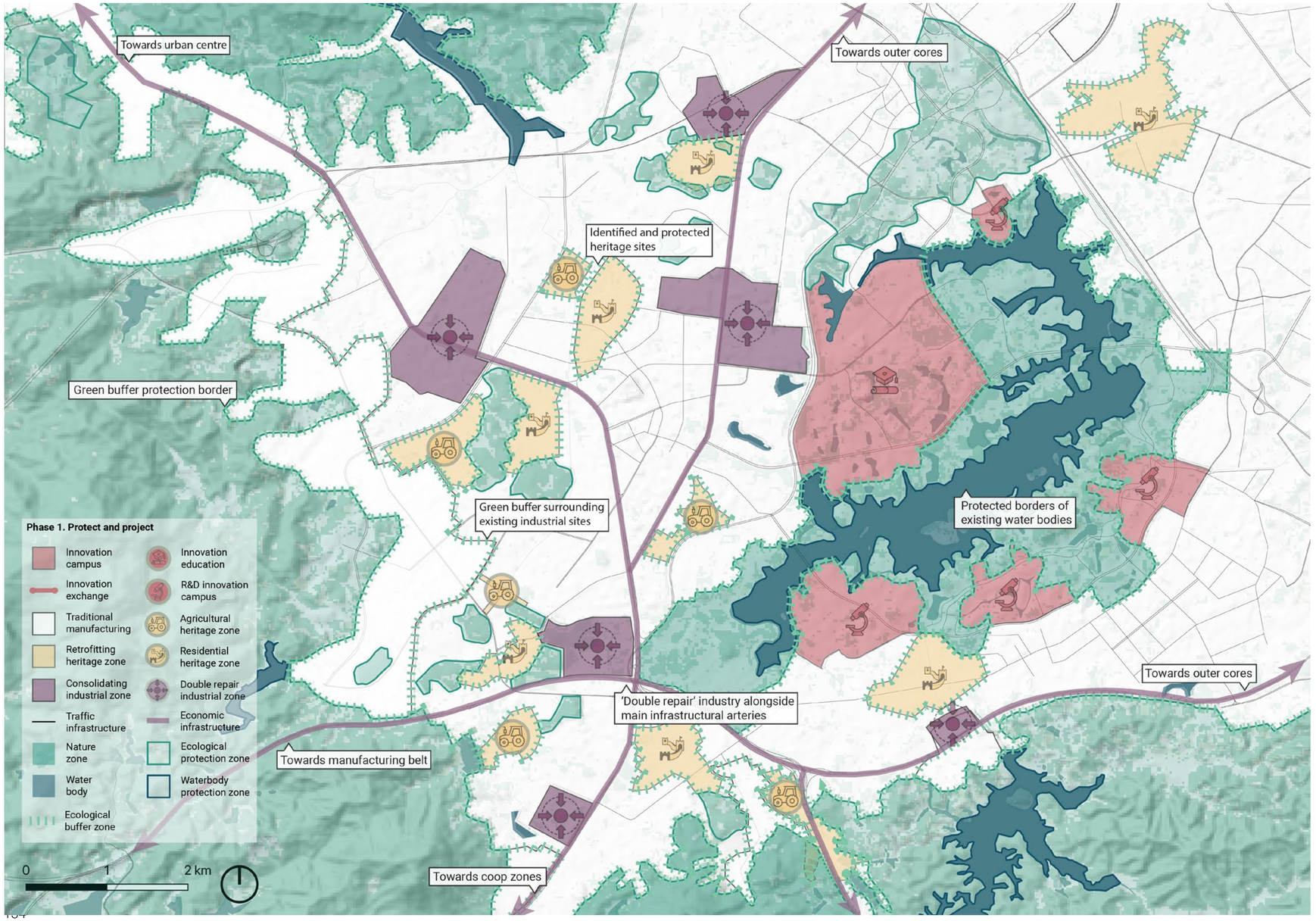


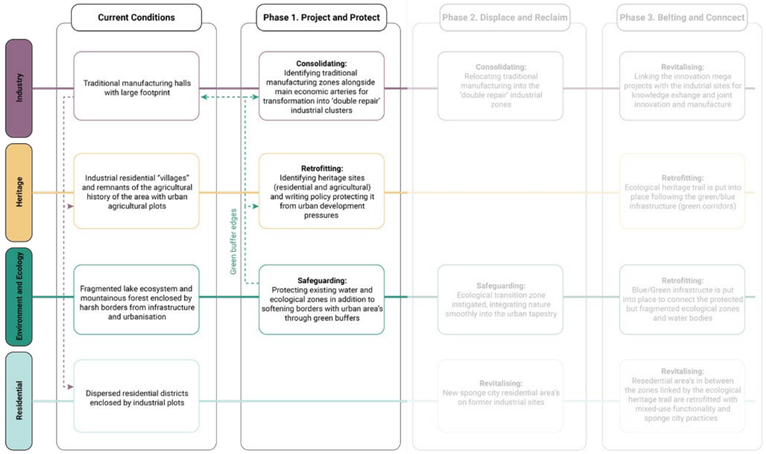
Figure 107. Phase 1 - Spatial framework

Dongguan: the world's factory under transformation

Strategic phasing - Phase 1: project and protect

The first phase aims to protect the strengths of the location by buffering borders and writing policy to safeguard existing nature, water bodies and heritage sites. Furthermore, a future is projected where traditional manufacturing zones alongside main economic arteries are transformed into 'double repair' industrial sites.

Figure 108. Phase 1 - project and protect



The second phase focuses on the displacement of industry to the developed intensified 'Double Repair' industrial sites, freeing up space to reclaim land for environmental purposes.

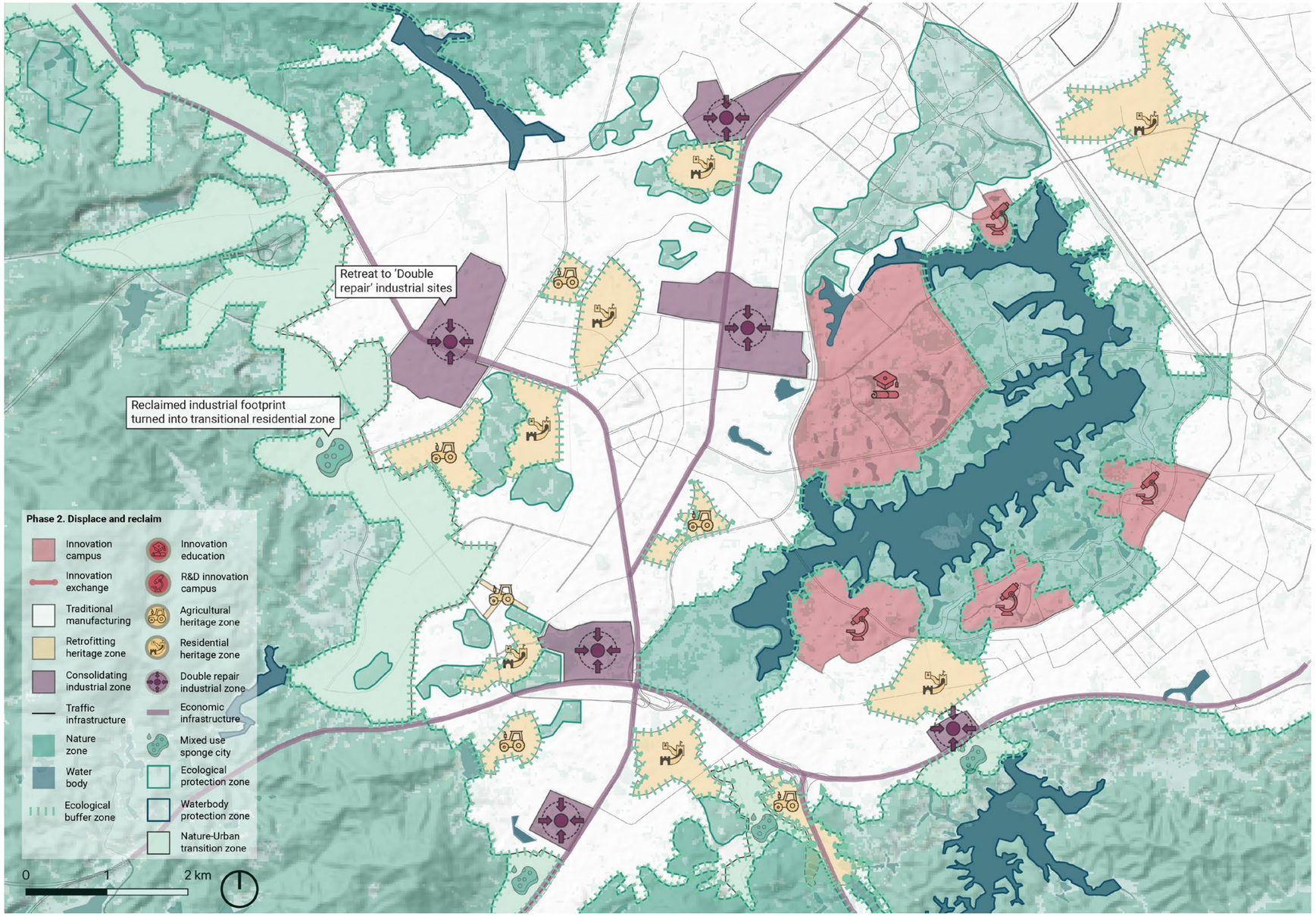


Figure 109. Phase 2 - displace and reclaim

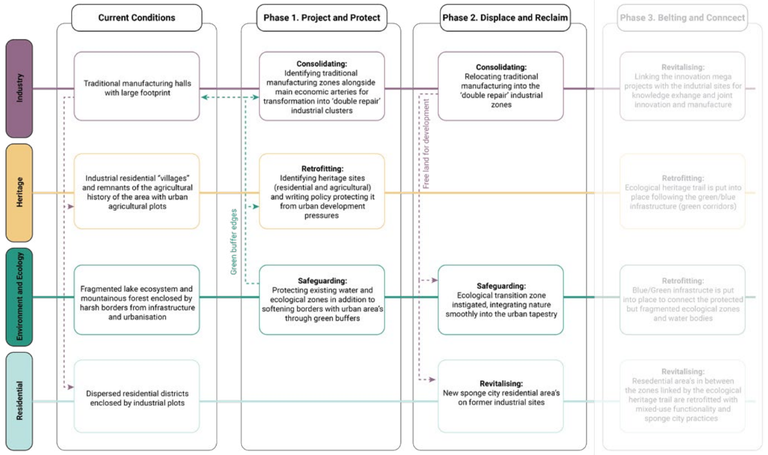


Figure 110. Phase 2 - spatial framework

Dongguan: the world's factory under transformation

Strategic phasing - Phase 3: belting and connect

Now that the existing waterbodies and natural area's are protected and expanded upon, the third phase aims to belt and connect. Green-Blue corridors link ecological zones and waterbodies allowing for free dispersion between ecosystems and water systems. Alongside the ecological corridor a heritage trail is implemented connecting the heritage sites. The peripheral zones to the new belt are integrated to fulfill mixed use residential functions.

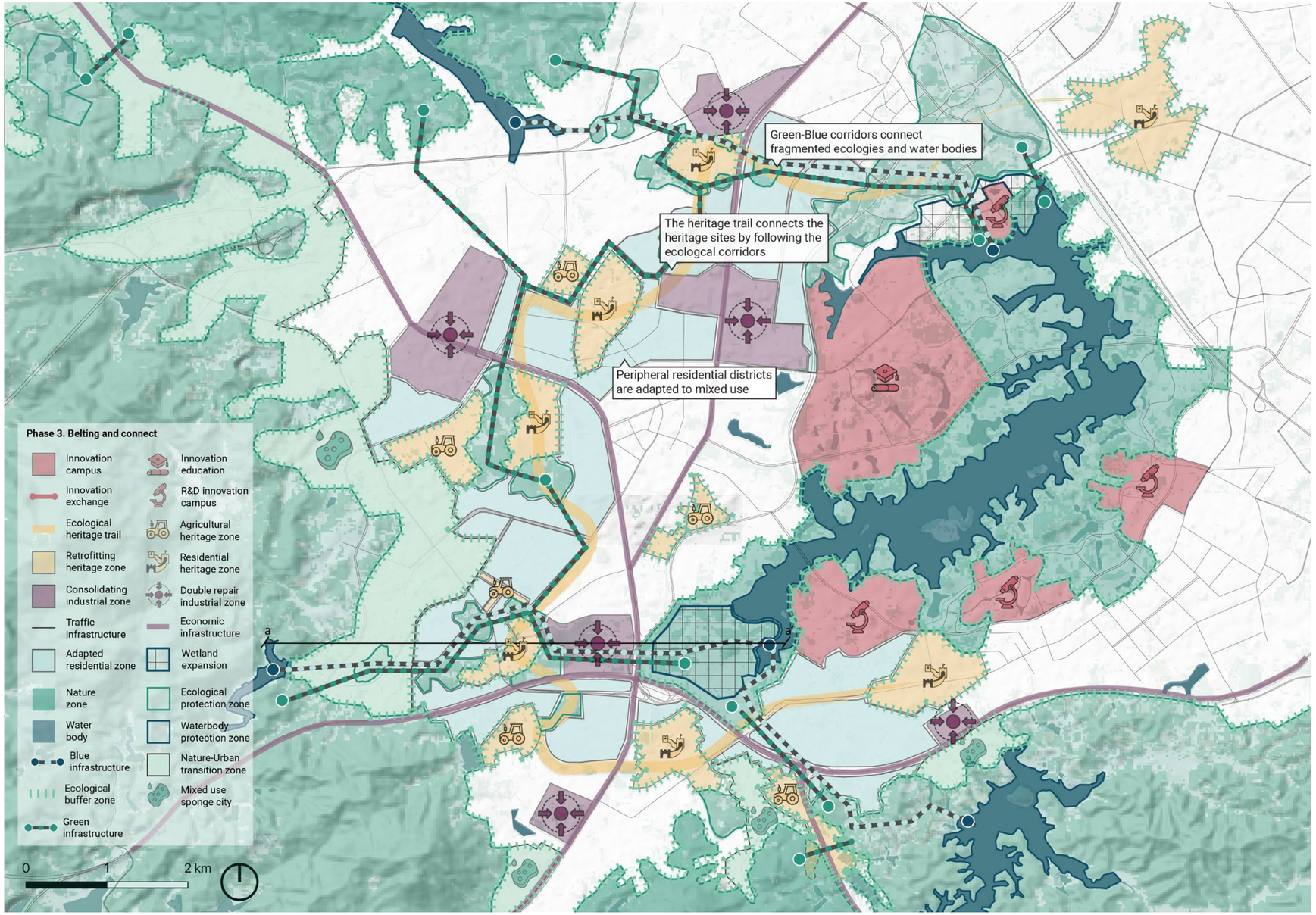


Figure 111. Phase 3 - synthetic conceptual strategy

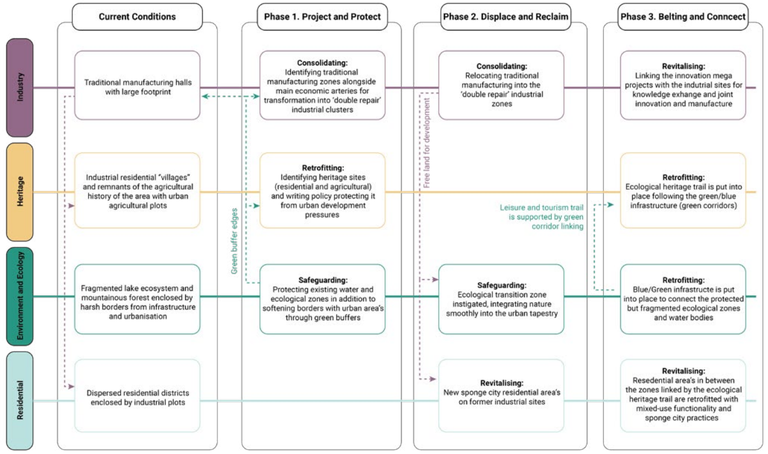


Figure 112. Phase 3 - Belting and connect

Dongguan: the world's factory under transformation

Implications of strategic interventions

In the current conditions the landscape is fractured into monofunctional urban islands split by heavy infrastructure. With the strategic interventions put into place, the landscape is transformed into an interconnected system where mixed-use environmental urban islands are interwoven.

CURRENT CONDITIONS

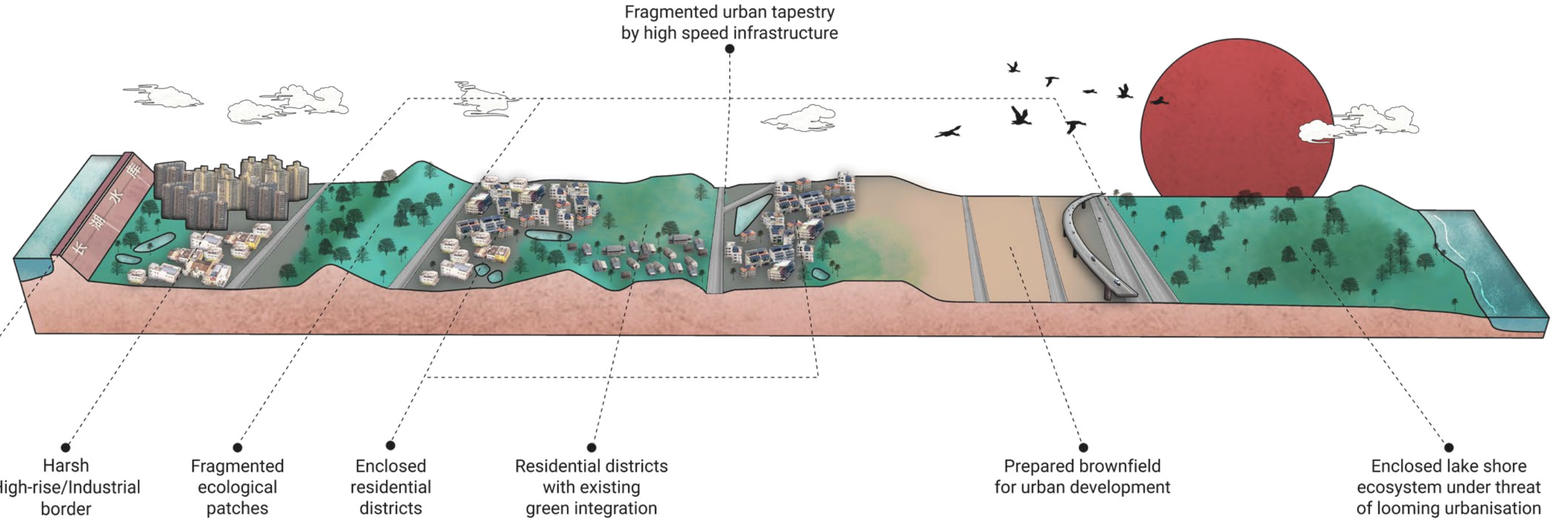


Figure 113. Section aa' current conditions

FUTURE CONDITIONS

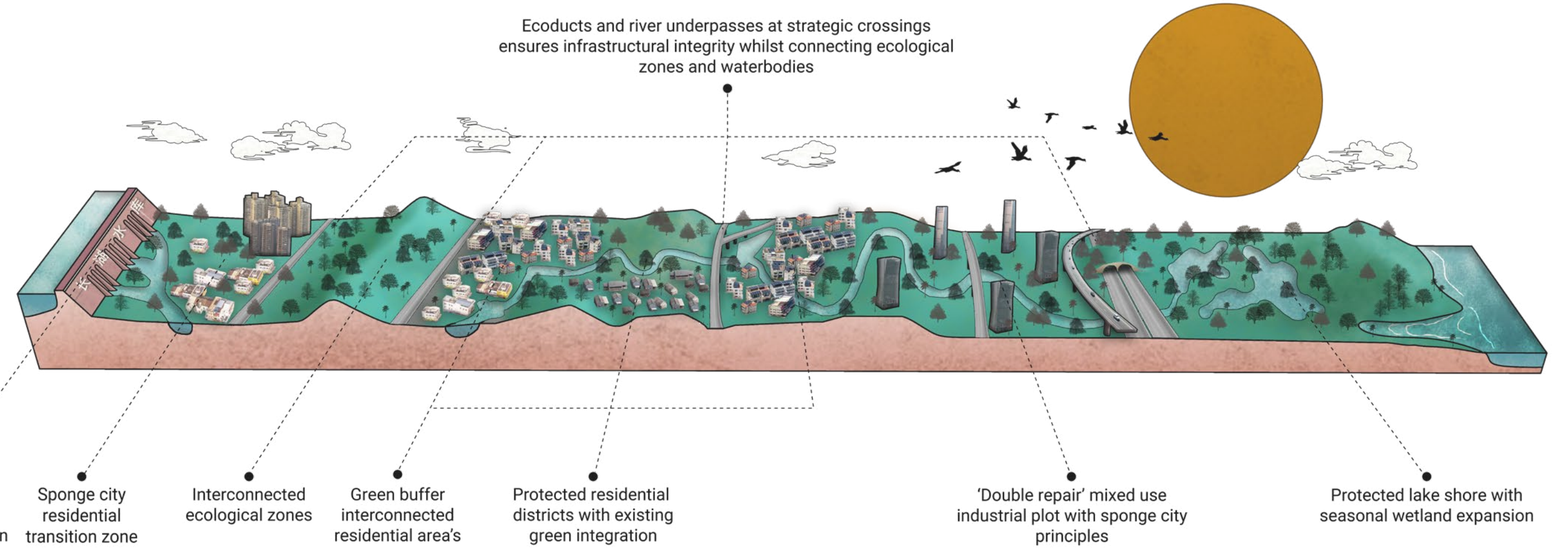


Figure 114. Section aa' future conditions

One country, symbiotic system: Shenzhen – Northen Metropolis border

The border area between Shenzhen and Hong Kong, particularly within the New Territories, represents a combination of cultural, economic, and geopolitical characteristics. This region marks the intersection between Shenzhen, a symbol of China's rapid modernization and economic growth, and Hong Kong, a global financial hub. The New Territories, occupying the northern part of Hong Kong, serve as a buffer zone and a bridge between these two dynamic cities, playing a key role in the area's further development.

Historically, this border area has evolved from a quiet rural landscape to a bustling developing area. Today, the region is characterized by its busy checkpoints, trade, and a complex web of infrastructure that manage the flow of people and goods, highlighting its strategic importance in the GBA.

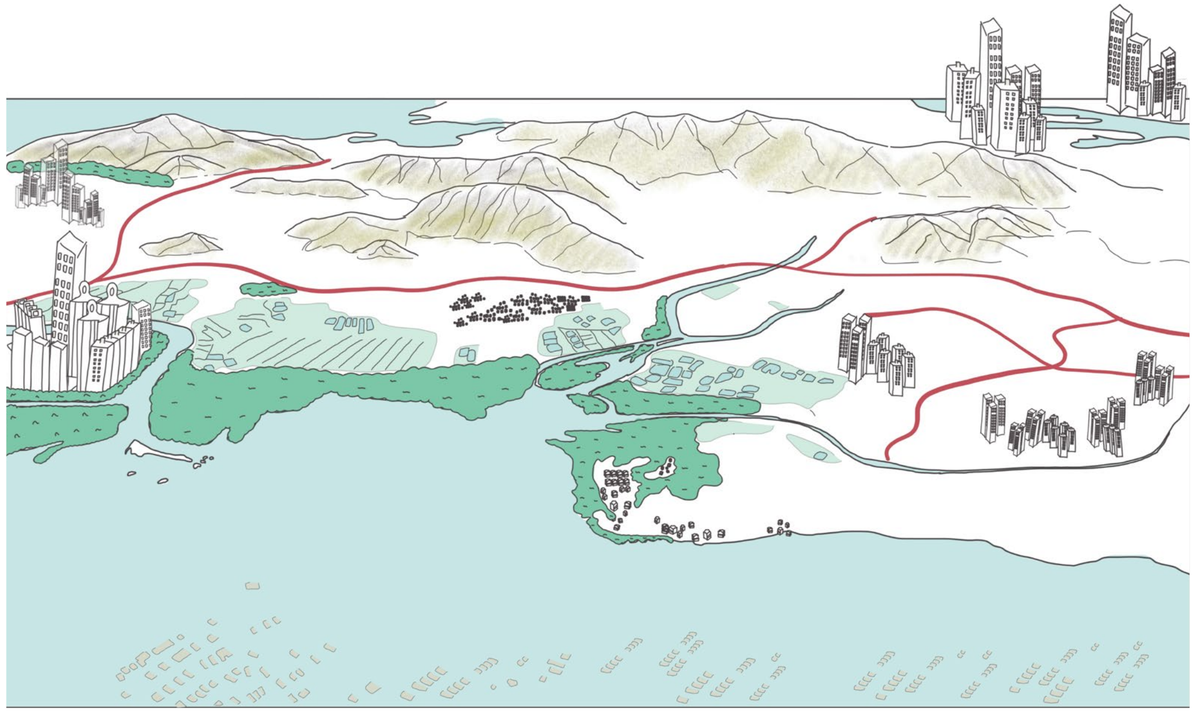


Figure 115. Bird eye sketch illustrating the border area

Figure 116. Hong Kong and Shenzhen border, photo: Martin Chan, South China Morning Post

Shenzhen – New Territories: One country, symbiotic system

Development trends

In the current vision for Hong Kong (Conceptual Spatial Framework, 2021) the selected strategic location is envisioned to be part of the knowledge and technology corridor. The focus is on promoting knowledge and technology, which is important for economic growth and innovation in the area. This focus improves Hong Kong's position as a strategic location in the global knowledge economy and supports the city in attracting innovation and investment. This means that the chosen strategic location in an important link within this envisioned corridor. Therefore, this corridor plays a big role in driving the current and future developments in the area.

Figure 117. Northern territories development plans (Hong Kong SAR Government, 2019)

New territories strategy

The Northern Metropolis is divided into four zones in the development plans for this area (Northern Metropolis, n.d.). From left to right, these zones include: a 'High-end Professional Services and Logistics Hub,' an 'Innovation and Technology Hub,' a 'Boundary Commerce and Industry Zone,' and a 'Blue-Green Recreation, Tourism and Conservation Circle. ' For the further planning and development of our selected strategic location, we focus only on the last three zones because these are the relevant zones within our strategic zoom in.

Innovation and Technology Hub (blue): central to the planning of this zone is the development of the San Tin Technopole on the border with Shenzhen. This technological hub is the hub of future technological and innovative developments in the area.

Boundary Commerce and Industry Zone (purple): this zone supports the Technopole with planned infrastructure projects, such as logistics centres and a new residential city, aimed at employment and housing for Technopole employees.

Blue-Green Recreation, Tourism and Conservation Circle (green): in the east near Mirs bay, the focus is on conservation and eco-tourism. Here, ecological conservation and tourism development are combined to provide sustainable recreational opportunities and enhance biodiversity.

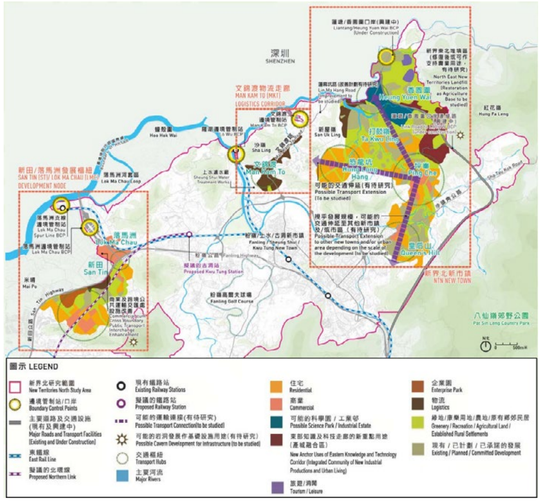


Figure 118. Northern territories strategy (Hong Kong SAR Government, 2019)

New Northern territories development plans

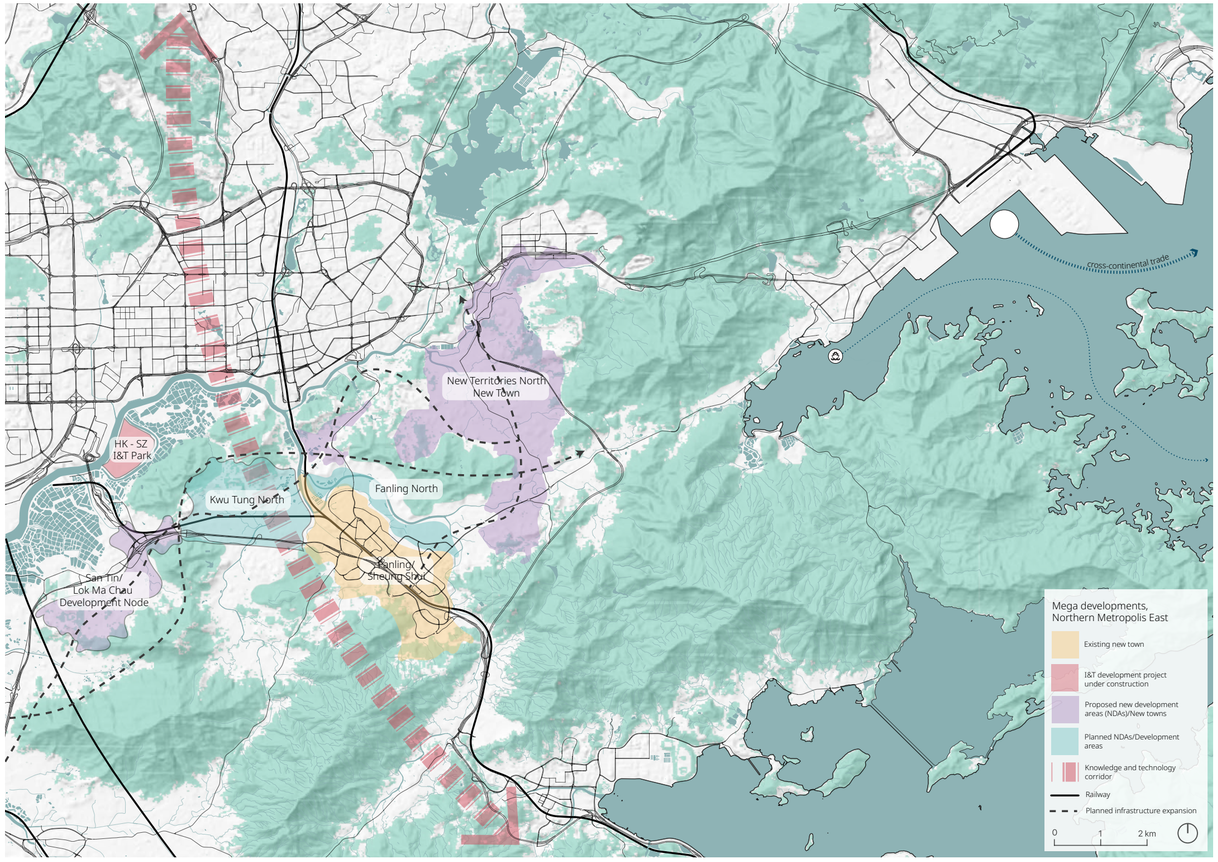


Figure 119. Mega developments in the New Territories, map made by the authors with data from (Hong Kong SAR Government, 2019)

The map provides a detailed overview of the San Tin Technopole and the planned new town that will support this technopole (Hong Kong SAR Government, 2019).The map shows the planned land use of the area, which indicates that the development plans for this area already quite elaborated. The technopole is strategically divided into zones related to their functionality. A new town is also planned, with residential areas, and other facilities designed to support the technopole.

The plans include specific funtional directions related to transportation infrastructure, green spaces, and recreational facilities to promote diverse development. This supports the growth of both the technopole and the residential new town.

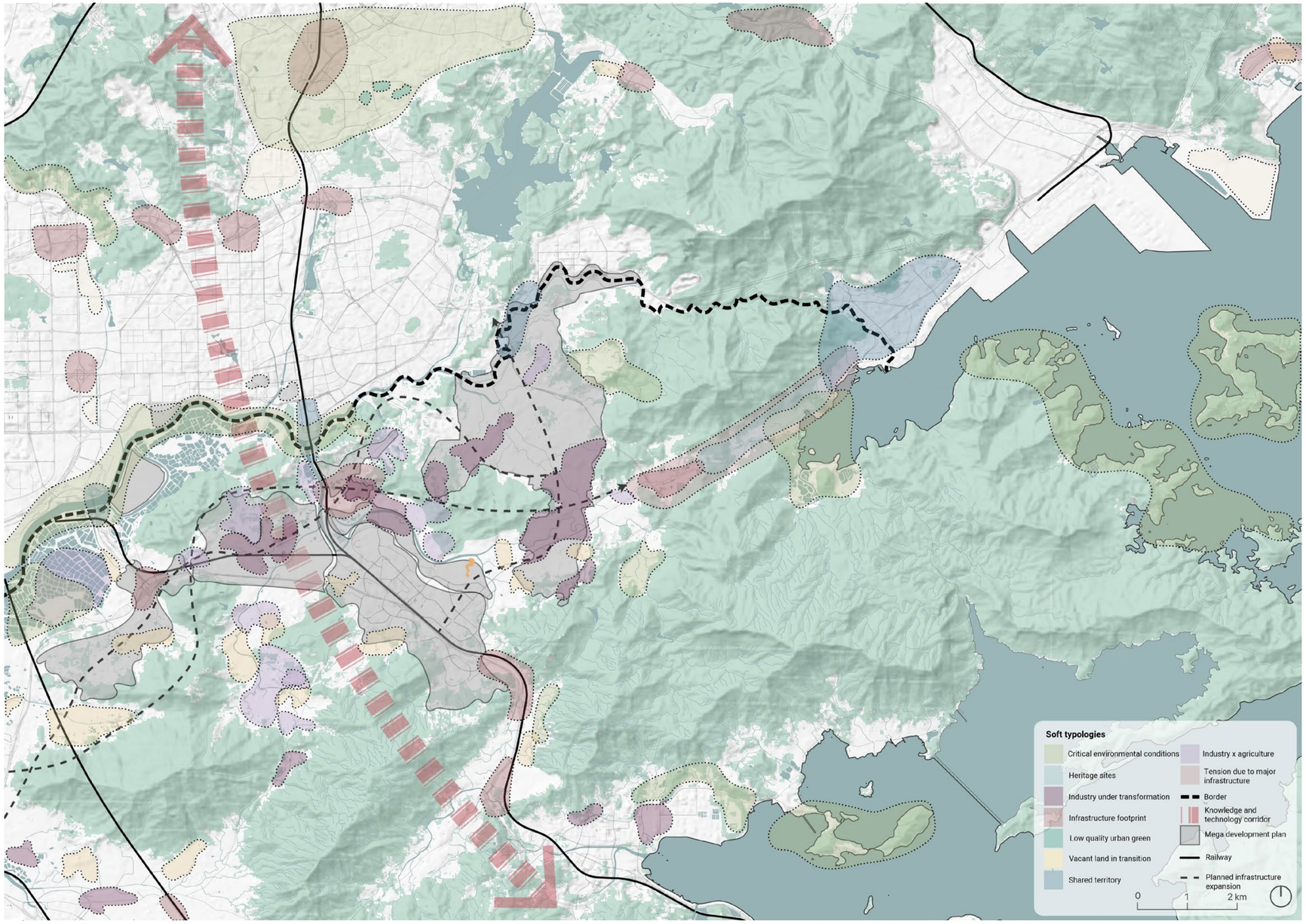


Figure 120. Identified soft typologies in Shenzhen – New Territories

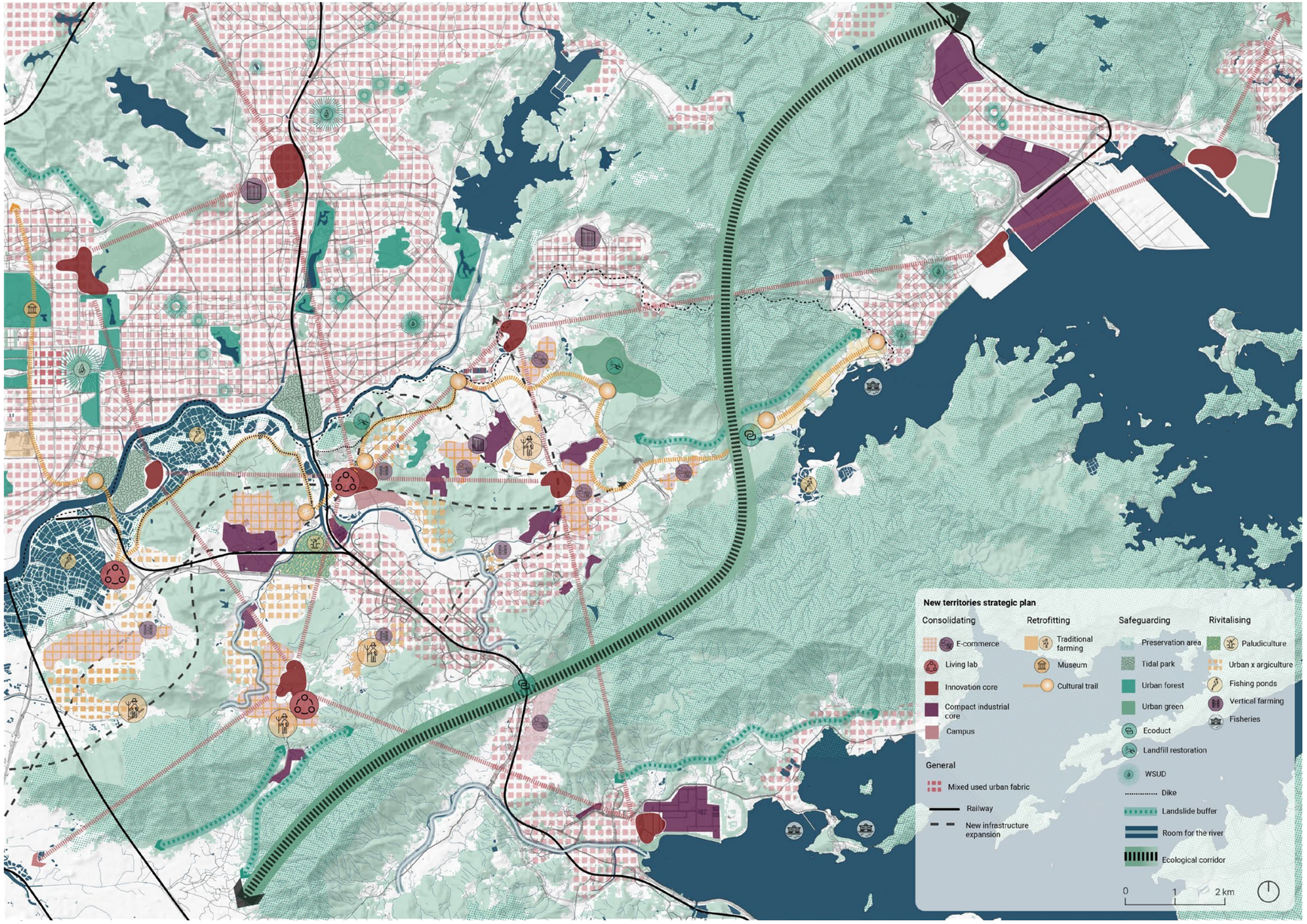
Shenzhen – New Territories: One country, symbiotic system

Soft mapping meso

This strategic location is situated between several major urban areas: the densely populated centre of Shenzhen, Mirs Bay Port, a key economic hub for the region, and the emerging San Tin Technopole along with the planned new towns in Hong Kong which are complementary for the San Tin Technopole. Following the same methodology to identify the soft locations in the area, all typologies were identifies, along with a new location-specific typology important for this strategic area: shared territory soft locations. This typology receives great tension because of the “one country, two systems” , and will continue to do so as the border dissolves gradually. The two different systems of these cities will merge into one, creating new dynamics and opportunities (Bond, 2022), leading to the emergence of new soft locations in the area.

Due to the anticipated removal of the border, this region is already experiencing and planning for many mega development projects. The planned San Tin Technopole is to be located at the Shenzhen border, and new towns together with significant new infrastructure are being planned to complement the technopole. These current and future developments create a mix of various soft locations in the area, especially on the Hong Kong side of this strategic location.

Due to the scale difference, three more typologies are being identified. Areas of low quality urban green are discovered and their upgrade can play a crucial role to the amplification of crucial environmental conditions such as urban heat island effect and flooding risk. Additionally, vacant land in transition and phased-out mining areas are being identified, creating opportunities for new developments.



The proposed strategy for this strategic location focuses on the four key characters: Consolidating, Retrofitting, Safeguarding, and Revitalizing. Each character plays a role in the future of this location, promoting sustainable development as well as taking into account the local socio-environmental conditions. Consolidating: Instead of a one large San Tin Technopole at the edge of Shenzhen , this strategic plan proposes to spread multiple smaller innovation cores across the area. These cores are place-bound and factor in the local socio-environmental conditions. A network of knowledge sharing among these cores is created and they are integrated into the larger system. These new cores create an environment where compact industry exists alongside innovation and education. This decentralized approach does not only improve the overall economic landscape but it also benefits the areas surrounding these cores economically. In addition, living labs are introduced to engage diverse stakeholders. The introduction of e-commerce aims to support the area around the cores even more and reconnect remote/ disconnected areas into the system. Retrofitting focuses on preserving and enhancing cultural heritage. A heritage trail which goes through the area connects many cultural landmarks, from traditional villages to museums, ensures they are appreciated while integrating them into the broader cultural network. Traditional farming practices are also reintroduced in some areas to improve sustainability and promote local knowledge and cultural values. Safeguarding mainly focuses on environmental aspects. In this strategy the major ecological corridor, which connects the different green areas in the whole Greater Bay Area, is improved to enhance the preservation of nature. A green blue water system is administered where water from the entire area is redirected towards the sea and rivers are given more room. The implementation of water-sensitive urban design (WSUD) aims to improve water management ever further. Smaller scale interventions like eco-ducts, urban green enhancements, and landfill restorations contribute to overall sustainable development and ecological balance. And for revitalizing, this strategy aims on the integration of urban and productive landscapes with each other. This includes creating combined urban-agricultural landscapes and introducing innovative productivity methods in the area like paludiculture and vertical farming. By mixing urban environments with productive uses, the strategy promotes sustainability and resilience while improving the economic and environmental aspects.

Figure 121. Strategy map in Shenzhen – New Territories

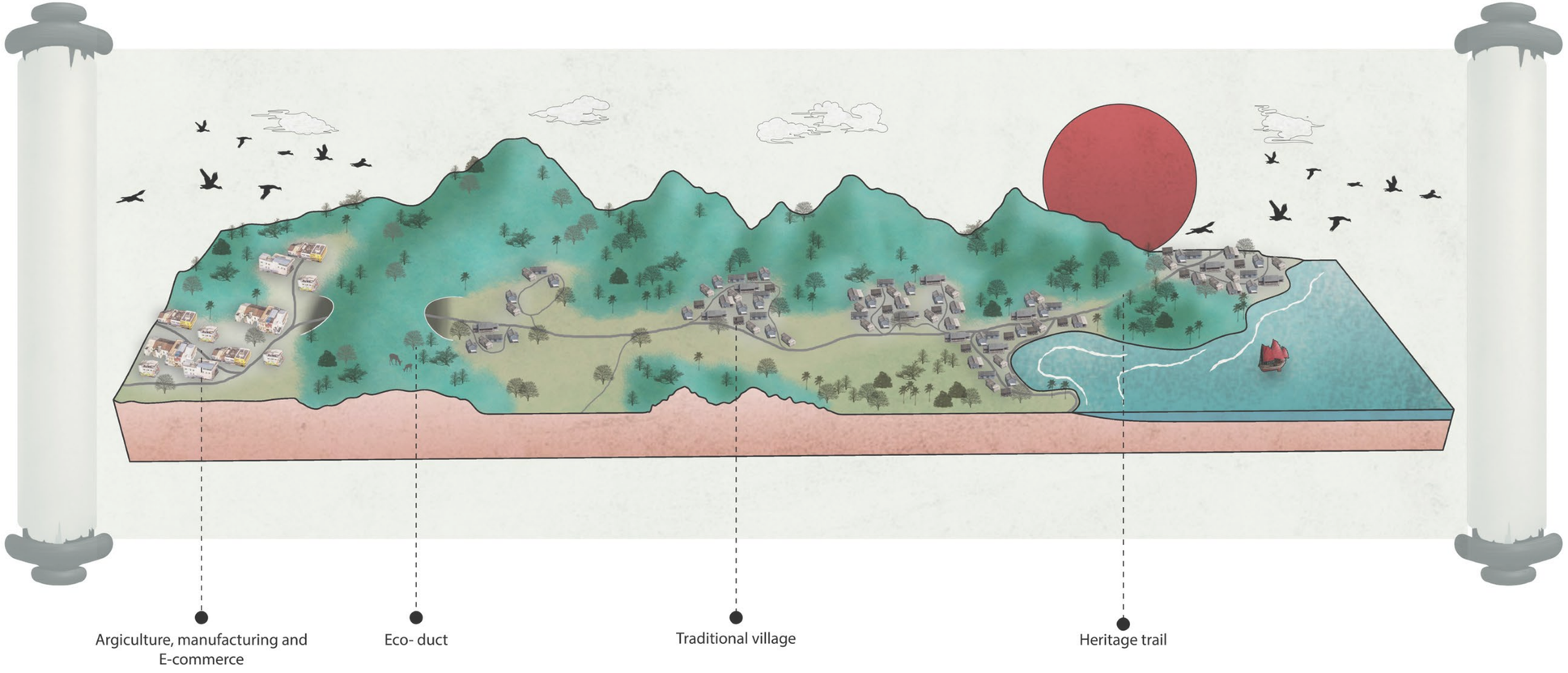
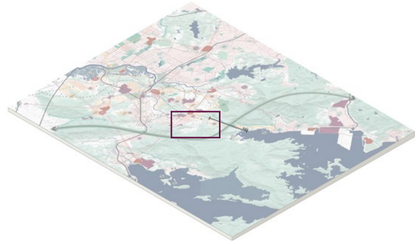


Figure 122. Perspective section aa': heritage and ecology

Shenzhen – New Territories: One country, symbiotic system

Perspective section aa'

The section is located in a valley near the border with Shenzhen. This area has been strategically chosen because of its location between important ecological and economic areas. On the east side it borders Mirs Bay, and on the west side is a cluster of new e-commerce companies. The valley is surrounded by protected nature reserves in the north and south. These areas are connected by an eco-bridge that crosses the valley, which promotes the natural integration of the ecology in both areas. Within the valley are several traditional villages, connected by the Heritage Trail. This heritage route makes it possible to experience the cultural value of the villages and connects them to a larger cultural network. This also contributes to tourism in the area. To the left of the eco-bridge are the newly introduced e-commerce companies, which provide a modern economic boost to the region. The section therefore combines nature, culture and modern trade, and therefore plays an important role in the regional strategy.



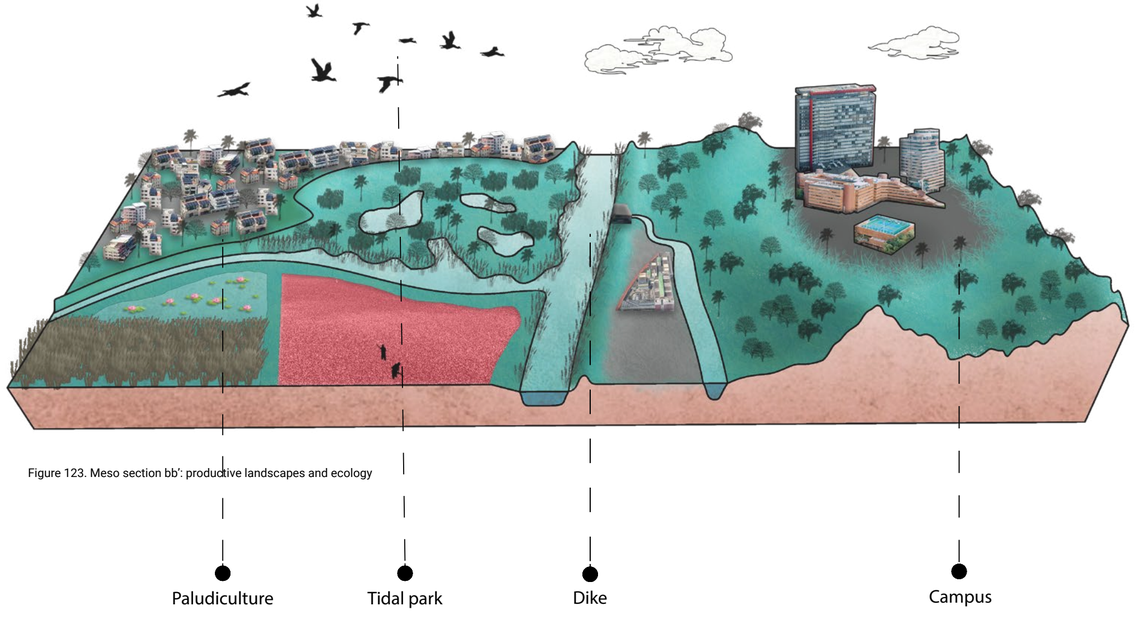


Figure 123. Meso section bb': productive landscapes and ecology

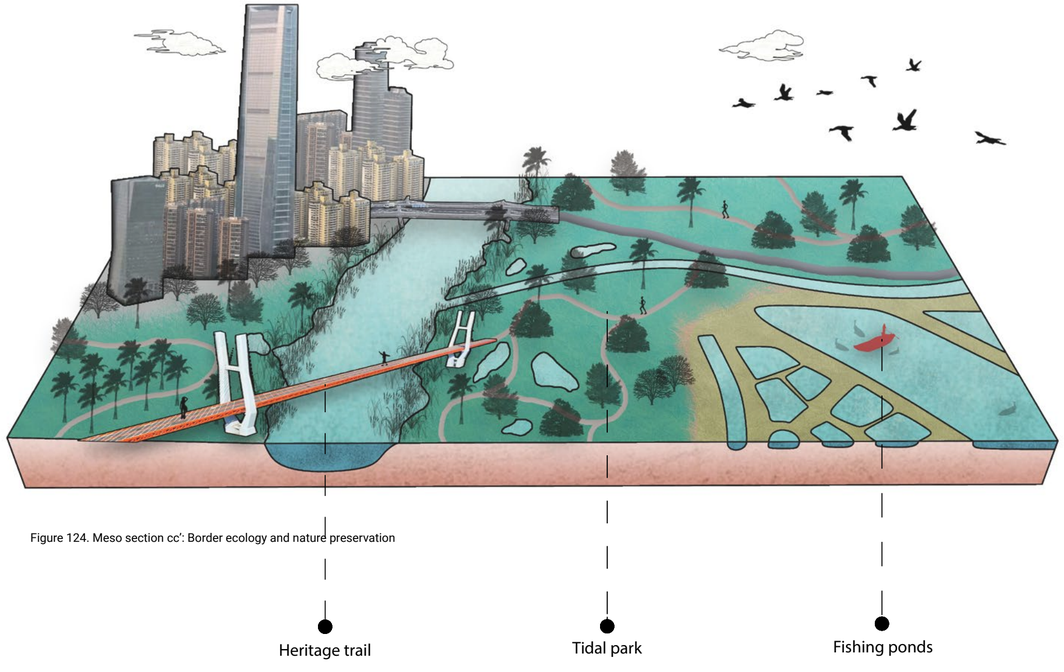


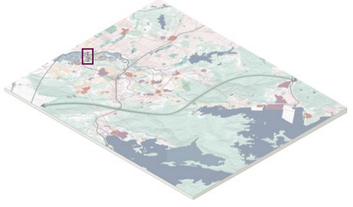
Figure 124. Meso section cc': Border ecology and nature preservation

Section bb': Productive landschapes and water management

This section, which is located at a more central location within the area, brings together multiple aspects of the strategy. On this section we see a integration of productive landscapes into the urban environment and the introduction of an innovative way of productivity introduced within the urban environment: paludiculture. This promotes both sustainable production and enhances the ecological value of the area. Another important element in this section is the construction of a new dike to protect the area from flooding. This measure is an important part within the water management strategy and ensures the area's security. A wetland has also been created to enhance the biodiversity in the area and improve water management on a natural way, contributing to a more resilient and ecologically healthy environment.
This section also acts as a hub for education and innovation, thanks to the creation of a new campus. This campus promotes knowledge sharing and technological advancement, strengthening the area's role as a centre for learning and development.

Section cc': Border ecology and nature preservation

This is a section at the border with the highly dense center of Shenzhen and the new territories that shows the new border ecology between Hong Kong and Shenzhen. This focus is now strongly on ecological conservation and water management around the river. A soft green edge has been created on the Hong Kong side of the river, which not only enhances the biodiversity in the area but it also used for recreational space. On the right side of this section are traditional fishponds, which play an important role in sustainable production methods and contribute to enhancing the cultural values and managing water. These ponds also function as a buffer zone for the river floodings.
The Heritage Trail also crosses this area and accommodates the appreciation of the cultural sites and connects them together, contributing to their conservation and appreciation. This combination of ecological preservation, sustainable production practices and cultural heritage strengthens the border zone between Hong Kong and Shenzhen, making it important location for both nature conservation and cultural heritage preservation.



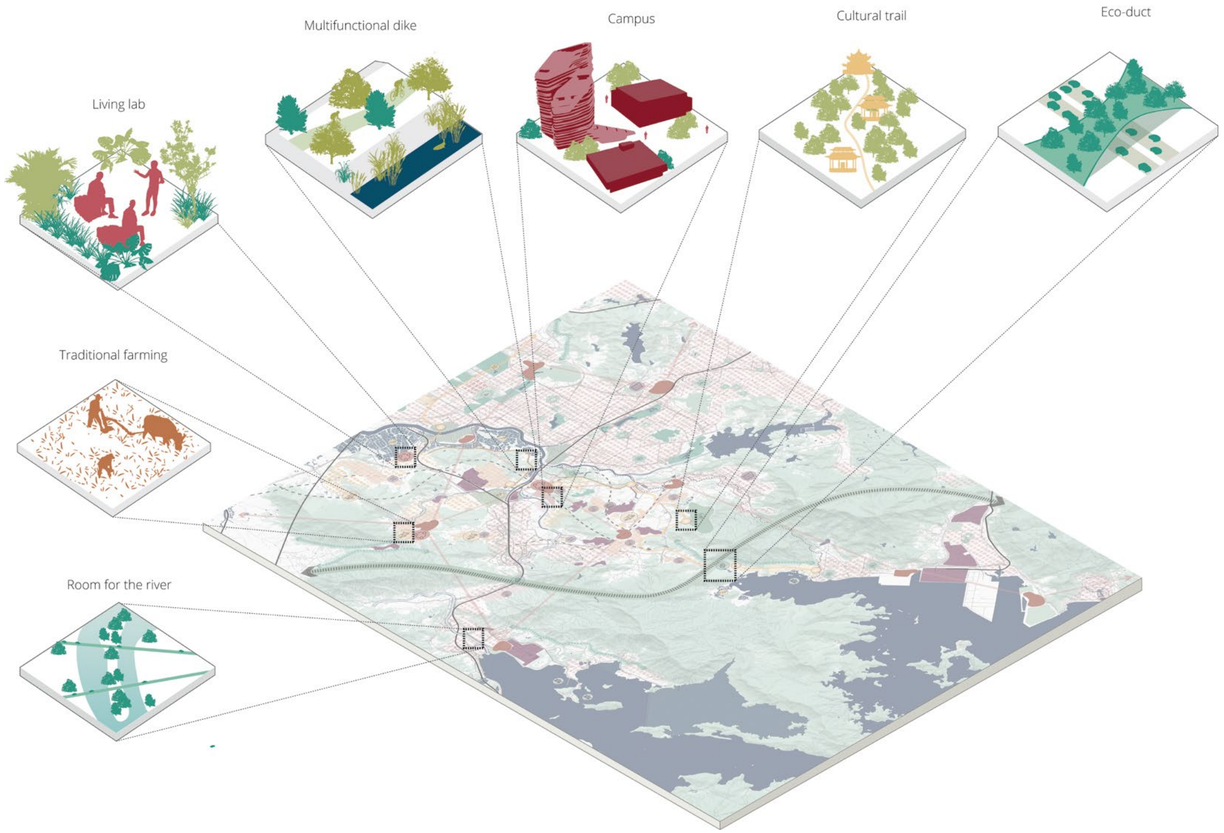


Figure 125. Sample of tools used in the strategy

10

Megascape and mega agglomerations

10.1 Flows on the GBA

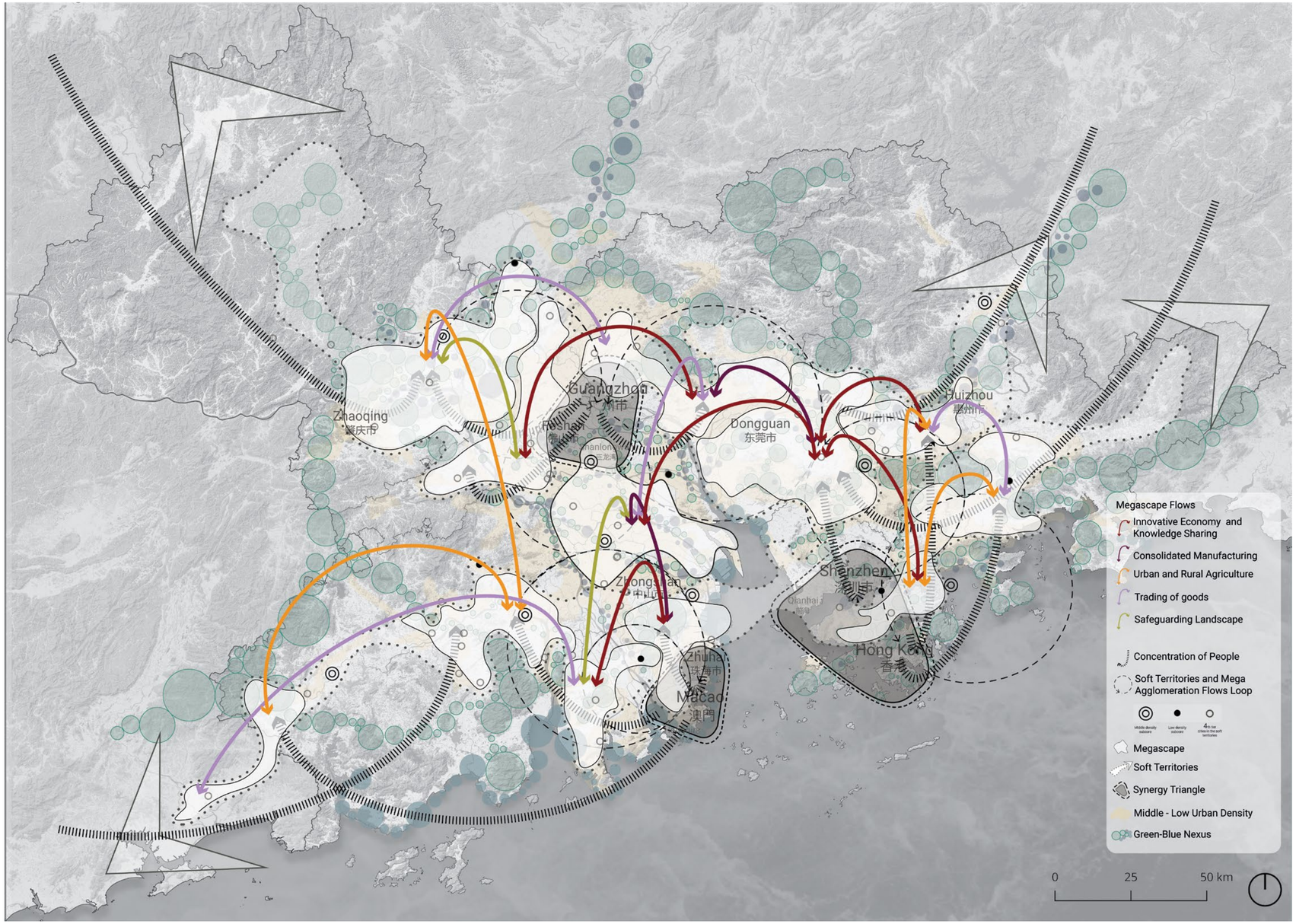


Figure 126. Flows and complementarities in the GBA

This system of megascapes forms a spatial model of concentration in dispersion. The multiplicity of functions that megaprojects have, along with their focus on endogenous transformations, that allows them to operate both separately and in relation to the mega agglomerations of the GBA, attributes to them a self-directed character. This element of megascapes along with the place-bound strategic interventions that take place within them create attractive living conditions. Therefore, population concentrations are likely to form in the peripheries of the GBA, as these areas offer favorable conditions for people relocating from other parts of China to the GBA, as well as for those opting to move away from the densely populated urban cores.

Functional and socio-economic flows are redistributed in the peripheries of the GBA between different megascapes. As the development model focuses on place-bound interventions each megascape adopts a sense of priority based on its local capacities, although the functions emerging within it are multiple. This phenomenon leads to megascapes that have specific directionalities, but still allow interelations with different components of the whole system.

Feedback loops between the regionalization model and the megascapes allows for them to develop complementary. Mega agglomerations provide the necessary services and administration for the peripheries whereas the peripheries support the supply chain for the whole GBA. Individually they form autonomous entities that intercommunicate.

10.2 Limitations and evaluation

Our vision and strategy for the Greater Bay Area beyond 2030 form a system in the peripheries that complements the regionalization model, distributes functions and services fairly, and ensures that areas under tension or in waiting form develop through a process that correlates with their capacities. Additionally, a more balanced distribution of flows is created, generating a more robust system as both mega agglomerations and megascapes are self-sustaining. The place-bound approach we adopt and the green-blue nexus we envision integrate environmental sensitivity with urban development, ensuring that all life in the delta is sustained and enhanced. As we investigate the future of the GBA on smaller scales, we provide the opportunity for flexibility in place-bound development and local initiatives. This is assured as we do not impose masterplans or zoning plans on the strategic sites where our strategy is demonstrated. On the other hand, our limited prior knowledge of the Greater Bay Area, its urbanization processes, planning approach, governance, and biophysical conditions affected our initial understanding of the area's socio-economic, cultural, and environmental dynamics. Similarly, we faced difficulties in understanding the scale at which these factors operate. As a result, our groupwork may have overlooked elements that shape a holistic picture of the area. Desk research and site visits have increased this understanding, albeit on a superficial level; however, further engagement is needed for a proper evaluation of our socio-economic and cultural impact. Additionally, our work faced the limitations of working with unreliable data, either leading to time-consuming processes of correlating different sources that restricted our timeframe or resulting in speculative decision-making. By avoiding the proposition of rigid solutions and instead focusing on generating options within our strategy that correspond to multiple conditions, we aimed to reduce the impact of these limitations.

Figure 127. Collage representing abstractly megascapes interacting and complementing the regionalization model, sources: see sources in Bibliography

11

Reflection

11 Collective reflection

This urban and regional planning project focusing on the development of the Greater Bay Area (GBA) in China has been a multifaceted experience. It has provided numerous insights and learning opportunities, which are critical for both our academic growth and practical understanding of large-scale urban transformations.

One of the primary challenges we faced was transitioning from a highly conceptual and theoretical base to spatial applications. This shift required us to address the complexities of real-world planning, highlighting the intricate ways in which large-scale transformations impact factors at all other scales. Our initial crash course on the GBA introduced a vast amount of novel information, setting the stage for a steep learning curve in the early stages of the project.

The lectures we attended were particularly beneficial, offering a diverse and holistic representation of the challenges facing the GBA. This multidisciplinary approach underscored the importance of integrating different perspectives and expertise, suggesting that future projects could benefit from even more collaboration across various tracks and programs within the university.

A significant difficulty we encountered was understanding and managing the project's scale. The theoretical research conducted during the first two weeks provided a solid foundation, yet translating this knowledge into actionable plans during our site visit proved to be complex. The scale of the project, combined with the need for reliable data and the challenges of adapting to a new context and language limitations, added layers of difficulty to our task.

The collaboration between PolyU and TU Delft introduced us to contrasting methodologies—the morphological game from PolyU and the Delft design method from TU Delft. This combination allowed us to adopt a more holistic approach to the design challenges. The gameboarding method practiced in Hong Kong, which encouraged speculation and experimentation, offered refreshing new insights. Integrating this with the structured Delft design method after our return helped us merge these diverse perspectives into a coherent project.

Working in smaller groups in Hong Kong and then reuniting as one team posed challenges in creating a common narrative. The process involved long discussions and the merging of different theories and concepts, reflecting the diverse voices and backgrounds within our group. Despite these challenges, this approach enriched our project, making it more integrated.

The difficulty of merging individual literature reviews into a single theoretical and conceptual framework was another notable challenge. Each member brought unique insights, which sometimes made it hard to form a cohesive framework. However, this diversity also added depth to our project, resulting in a richer final product.

Interestingly, we found parallels between the deltaic conditions in the GBA and those in the Netherlands. This similarity highlights the potential for knowledge sharing and partnerships, suggesting that insights from Dutch planning could inform future developments in the GBA.

In conclusion, this project was our first exploration of combining and applying different planning methods in an unfamiliar environment. While our understanding may remain superficial at this stage, with further practice, our approach can become more comprehensive. The challenges we faced, from data limitations to group dynamics, ultimately contributed to a more integrated and holistic project. This initial meeting of methods has proven fruitful, laying the groundwork for future expansions and deeper engagement with the complex dynamics of the GBA.

Figure 128. Reflection collage

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