Tensions and opportunities at Shanghai's waterfronts

Laboratories for Institutional Strategies toward Sustainable Urban Planning and Delta Design Transitions

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Tensions and opportunities at Shanghai's waterfronts

Laboratories for Institutional Strategies toward Sustainable Urban Planning and Delta Design Transitions

Dissertation

for the purpose of obtaining the degree of doctor
at Delft University of Technology
by the authority of the Rector Magnificus, prof.dr.ir. T.H.J.J. van der Hagen
chair of the Board for Doctorates
to be defended publicly on
Wednesday 20 September 2023 at 12:30 o'clock

by

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This dissertation has been approved by the promotors.

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Prof.dr.ir. V.J. Meyer	Delft University of Technology
Dr. Y. Zhou	University of Hong Kong
Prof.dr.ing. S. Nijhuis	Delft University of Technology, reserve member.

This research received no funding and was conducted in the candidate's own time, in addition to his regular work activities for his research lab Urban Language and works as faculty member at Tongji University in Shanghai.

In the 19th century, Britain and Europe taught the world how to produce.
In the 20th, the US taught us how to consume.
If China is to lead the world in the 21st century,
it must teach us how to sustain.

Watts, 2005

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Summary

How can the Global North oriented and welfare state rooted Sustainability Transitions theories be enriched with the Chinese and communist state rooted Ecological Civilization thinking that has been included in the Chinese constitution since 2007, to make it able to evaluate the making of the direct-controlled municipality Shanghai into an institutional frontrunner of sustainable transitions in urban planning and design with its prime waterfront as exemplary 'urban lab'? Around this central question, this dissertation examines how Shanghai's coastal and waterfront developments have changed over the past two decades under the influence of shifts in Chinese state capitalism towards what is called an Ecological Civilization. Both lines of thinking – Sustainability Transitions theories and Ecological Civilization thinking – are based on a strive for sustainability. The question is whether this can be done more efficiently and convincingly in a centrally controlled society than in a non-autocratic (liberal) society. Does the Chinese approach in Shanghai offer lessons for elsewhere, and how can different approaches and practices reinforce each other in the field of spatial planning and strategies for a sustainable transition?

Ecological Civilization strives for "a dynamic equilibrium in which people and nature interact with each other and function harmoniously as a whole" (Frazier et al., 2019). It is a relatively new development model, a socio-technological approach in which sustainability is paramount. In addition to the well-known people (the social), planet (the ecological), profit (the economic) trio, cultural and political aspects have also been integrated. This new course, promoted in China as 'people-oriented', is rooted in Eastern philosophy and is seen by Chinese Policymakers as a Marxist alternative to consumption-driven capitalism. In theory this means a radical paradigm shift, but the practice along waterfronts in Shanghai shows just the opposite: real estate positions are decisive in policy choices, and short-term thinking dominates. Despite tentative experiments with participation, citizens are still on the sidelines, there is no 'civil society'. Moreover, there is a sharply increasing shortage of affordable housing and living space, while new real estate is vacant en masse, which does not benefit the quality of life.

To test both lines of thinking two cases have been examined along the waterfronts of Shanghai. The first case on former docklands. Later than other world ports, Shanghai started to move its ports out of the city at the beginning of this century.

This created opportunities for urban renewal on previously inaccessible and polluted riverbanks. Centrally located along the Huangpu River, the Expo 2010 World Expo was a catalyst in redefining the relationship between city and river in Shanghai, with the motto “Better City, Better Life”. Since then, real estate clusters and recreational and ecological zones have been realized on a very large scale along both riverbanks in a short time, intended as “National Demonstration Zone for the Development Capacity of the Global City of Shanghai”. A large number of industrial artifacts have been reused and integrated into the new waterfronts, and dozens of top cultural institutions have been attracted to open their branches along the waterfront, such as the Center Pompidou. Yet there is a lot of vacant office space. Another problem is that new (affordable) housing is almost absent along or near the waterfront. Analogous to the 1930s, when the classic Shanghai Bund with its line-up of international banks and capital formed the link between Shanghai and the world, the current waterfront revitalization is primarily a showcase for financial institutions and world power.

As a second case, the peripheral island of Chongming is analyzed, located in the estuary of the Yangtze River. Chongming was designated as an eco-island and “National Ecological Demonstration Zone” two decades ago. Policy differences between the elaboration of the two example projects and other findings are explained in the two final chapters.

The first introductory chapter outlines a broader background, describes the research method, and sets the theoretical framework within which two cases are studied. This is followed by five substantive chapters, consisting of previously published peer-reviewed articles – the first as a book chapter and the other four in academic journals – that examine cases from different angles.

Chapter 2 (Den Hartog, 2023A) evaluates the sustainability promises as integrated into spatial practices in Shanghai. With the relocation of industries, the creation of recreational areas along the water and even the reduction of urban population and urban growth, the implementations seem to be meeting socio-economic demands rather than ecological and hydrological challenges. Chapter 3 (Den Hartog, 2019) zooms in further and introduces the two cases, namely the exemplary transformation of the Huangpu River with real estate and public outdoor spaces, and the unplanned real estate developments on Long Island a part of Chongming Island. The reality of both projects raises the question of whether this is more persuasive or efficient than practices in the Global North. The two cases are further elucidated in the following two chapters. The ambitious iconic projects presented in Chapter 4 (Den Hartog, 2021A) again show that the pilot projects along the Huangpu River are more developmental than ecological oriented. Chapter 5 (Den Hartog, 2017B)

zooms in on Chongming Eco-Island in which confrontations between central-local interests become clear. Finally, in chapter 6 (Den Hartog, 2021B) the conflicts in both cases are further discussed. It becomes clear that a sustainable transition must be accompanied by thorough (market) research into needs, and above all in consultation with all stakeholders, including residents and other users, and nature interests.

It is clear from previous chapters that the speculative 'new bunds' in Shanghai were partly created by international influences and capital flows as the ultimate expression of 'neoliberalism with Chinese characteristics' (Harvey, 2005) and thus run counter to the expectations of Ecological Civilization thinking (and also conflict with theories about Sustainability Transitions). Chapter 7 discusses how the Global North-oriented and welfare state-based theories of Sustainability Transitions and Ecological Civilization thinking can enrich each other, which is further answered in final chapter 8 with policy recommendations.

This dissertation emphasizes that ecological civilization thinking can offer hopeful starting points for sustainable transitions but can only work well if 'checks and balances' are included. The suggestions in Chapter 8 are intended to contribute productively to improve the accessibility, inclusivity, and vibrancy of Shanghai's waterfronts, and mitigate ecological degradation in the context of an urban delta.

Samenvatting

Hoe kunnen de op het Globale Noorden georiënteerde en in de welvaartsstaat gewortelde theorieën over duurzaamheidstransities worden verrijkt met het sinds 2007 in de Chinese grondwet opgenomen 'ecologisch beschavingsdenken' de stadsprovincie Shanghai tot een institutionele koploper van duurzame stedenbouwkundige transities te maken, met haar waterkanten als voorbeeldig 'urban lab'? Rond deze centrale vraagstelling wordt in dit proefschrift onderzocht hoe de kust- en waterfrontontwikkelingen van Shanghai tijdens de afgelopen twee decennia zijn veranderd onder invloed van verschuivingen binnen het Chinese staatskapitalisme naar wat men aldaar een ecologisch beschaving noemt. Beide lijnen van denken zijn gebaseerd op een streven naar duurzaamheid, waarbij het de vraag is of dit in een centraal aangestuurde samenleving efficiënter en overtuigender kan als in een niet-autocratische (liberale) samenleving. Biedt de Chinese aanpak in Shanghai lessen voor elders, en hoe kunnen verschillende benaderingen en praktijken elkaar versterken op het gebied van ruimtelijke ordening en strategieën voor een duurzame transitie?

Ecologisch beschaving streeft naar "een dynamisch evenwicht waarin mensen en natuur met elkaar interacteren en als geheel harmonisch functioneren" (Frazier et al., 2019). Het is een relatief nieuw ontwikkelingsmodel, een sociaal-technologische benadering waarin duurzaamheid voorop staat. Hierbij zijn boven op het bekende people (het sociale), planet (het ecologische), profit (het economische) trio ook culturele en politieke aspecten geïntegreerd. Deze in China als 'people oriented' gepromote nieuwe koers heeft wortels in Oosterse filosofie en wordt door Chinese beleidsmakers gezien als Marxistisch alternatief voor consumptie gedreven kapitalisme. In theorie betekent dit een radicale paradigmawisseling, maar de praktijk langs waterkanten in Shanghai laten juist het tegenovergestelde zien: vastgoedposities zijn doorslaggevend in beleidskeuzes, en korte termijn denken domineert. Ondanks voorzichtige experimenten met inspraak staan burgers nog altijd op de zijlijn, een 'civil society' ontbreekt. Bovendien is er een sterk toenemend tekort aan betaalbare woon- en leefruimte terwijl nieuw vastgoed massaal leegstaat, wat de leefbaarheid niet ten goede komt.

Om beide denkrichtingen te testen zijn langs de waterkant van Shanghai twee casussen onderzocht. De eerste case op voormalig havengebied. Later dan andere wereldhavens is Shanghai begin deze eeuw begonnen haar havens de stad uit te

plaatsen. Dit creëerde kansen voor stadsvernieuwing aan voorheen ontoegankelijke en vervuilde rivieroevers. De wereldtentoonstelling Expo 2010, centraal gelegen langs de Huangpu Rivier, vormde een katalysator bij het herdefiniëren van de relatie tussen stad en rivier in Shanghai, met als motto “Better City, Better Life”. Sindsdien zijn langs beide rivieroevers zijn in korte tijd op zeer grote schaal vastgoedclusters en recreatieve en ecologisch zones gerealiseerd, bedoeld als “Nationale Demonstratiezone voor het ontwikkelingsvermogen van de wereldstad Shanghai”. Een groot aantal industriële artefacten is hergebruikt en geïntegreerd in de nieuwe waterkanten, en tientallen culturele topinstituten zijn aangetrokken om hun filialen langs de waterkant te openen, zoals het Centre Pompidou. Toch is er veel leegstand van kantoren. Een ander probleem is dat erlangs of nabij de waterkant grotendeels nieuwe woningen ontbreken. Analoog aan de jaren dertig, toen de klassieke Shanghai Bund met zijn line-up van internationale banken en kapitaal de verbinding vormde tussen Shanghai en de wereld, is de huidige revitalisering aan het water vooral een uitstalraam voor financiële instellingen en wereldmacht.

Als tweede case wordt het perifeer gelegen eiland Chongming geanalyseerd, gelegen in het estuarium van de Yangtze Rivier. Chongming is twee decennia geleden aangewezen als eco-eiland en “National Ecological Demonstration Zone”. Beleidsmatige verschillen tussen de uitwerking van beide voorbeeldprojecten en andere bevindingen worden geduid in de twee slothoofdstukken.

Het eerste inleidende hoofdstuk schetst een bredere achtergrond, het beschrijft de onderzoeksmethode en stelt theoretische kaders waarbinnen twee casussen bestudeerd worden. Hierna volgen vijf inhoudelijke hoofdstukken, bestaande uit eerder gepubliceerd peer-reviewed artikelen – de eerste als boekhoofdstuk en de andere vier in academische tijdschriften – die casussen vanuit verschillende invalshoeken doorlichten.

Hoofdstuk 2 (Den Hartog, 2023A) evalueert de duurzame beloftes zoals geïntegreerd in ruimtelijke praktijken te Shanghai. Met de verplaatsing van industrieën, het creëren van recreatiegebieden langs het water en zelfs de beperking van de stedelijke bevolking en stedelijke groei, lijken de implementaties vooralsnog eerder tegemoet te komen aan sociaaleconomische eisen dan aan ecologische en hydrologische uitdagingen. Hoofdstuk 3 (Den Hartog, 2019) zoomt verder in en introduceert de twee cases namelijk de als voorbeeld stellend bedoelde transformatie van de Huangpu Rivier met vastgoed en publieke buitenruimtes, en de ongeplande vastgoedontwikkelingen Long Island als onderdeel van Chongming Island. De realiteit van beide projecten roept de vraag op of dit overtuigender of efficiënter is dan praktijken in het Globale Noorden. De twee cases worden verder belicht in de hiernavolgende twee hoofdstukken. De ambitieuze iconische projecten die

in hoofdstuk 4 (Den Hartog, 2021A) worden gepresenteerd, laten opnieuw zien dat de proefprojecten langs de Huangpu Rivier meer ontwikkelingsgericht dan ecologisch zijn. Hoofdstuk 5 (Den Hartog, 2017B) zoomt in op het Chongming Eco-eiland waarbij confrontaties tussen centraal-lokale belangen duidelijk worden. In hoofdstuk 6 (Den Hartog, 2021B) tenslotte worden de conflicten in beide onderzochte cases verder belicht, het wordt duidelijk dat een duurzame transitie gepaard dient te gaan met grondig (markt)onderzoek naar behoeftes, en bovenal in samenspraak met alle belanghebbende inclusief bewoners en andere gebruikers, en natuurbelangen.

Uit voorgaande hoofdstukken wordt duidelijk dat de speculatieve 'nieuwe bunds' te Shanghai mede gecreëerd zijn door internationale invloeden en kapitaalstromen als ultieme uitdrukking van 'neoliberalisme met Chinese kenmerken' (Harvey, 2005) en daarmee indruisen tegen de verwachtingen van het ecologisch beschavingsdenken (en eveneens confligeren met theorieën over duurzaamheidstransities). In hoofdstuk 7 wordt bediscussieerd hoe de op het Globale Noorden georiënteerde en in de welvaartsstaat gewortelde theorieën over duurzaamheidstransities en de ecologisch beschavingsdenken elkaar kunnen verrijken, wat verder beantwoord wordt in slothoofdstuk 8 met beleidsmatige aanbevelingen.

Dit proefschrift benadrukt dat het ecologisch beschavingsdenken hoopvolle uitgangspunten kan bieden voor duurzame transities, maar alleen goed kan werken als er 'checks and balances' in worden opgenomen. De suggesties in hoofdstuk 8 zijn bedoeld om op productieve wijze bij te dragen aan het verbeteren van de toegankelijkheid, inclusiviteit en levendigheid van de waterfronten van Shanghai, en het tegengaan van ecologische achteruitgang in de context van een stedelijke delta.

1 Introduction

In the context of climate challenges, a looming energy crisis, and a pandemic – which is still impacting daily life in China at the moment of writing, Spring 2023 – this research examines Shanghai's (China's) drive to redefine perspectives on growth, development, and urbanity in a radical way aimed at realizing a new way of sustainable development.

Worldwide policy makers and planners are struggling to combine economic growth (see Figure 1.1) with sustainable development (Club of Rome, 1972; United Nations, 2015A; IPCC, 2022; IPCC, 2023). Asia plays a central role in the ongoing urbanization wave, in which China increasingly acts as agent of transformations, something that increasingly challenges western perspectives. China's socio-economic policies and extreme fast and massive urbanization (Hsing, 2010; Gu et al., 2012; Jun, 2010; Wu, 2015) contributed to lifting more than 800 million people out of poverty (World Bank and DRC, 2022). China's unprecedented urbanization has led to improvements in housing and working conditions. However, it also brought a sequence of serious social, environmental (Brown, 1995; Balica et al., 2012; Hanson et al., 2011; Jourdan, 2013; Ke, 2014; Quan, 2014; Wang, 2012; Li et al., 2020; Tian et al., 2022), and economical (Demarais, 2019; Kandhari, 2023; Stevenson & Li, 2021) tensions, which makes China the chosen one (Watts, 2005; Pan, 2006; Gare, 2021) to experiment with new forms of spatial planning and design, that contribute to lead the world into a sustainable transition. These challenges culminate in China's economic powerhouse and world port Shanghai[1].

Ecological Civilization (Henderson and Joffe, 2016; Pan, 2016; Hansen, M.H. et al. 2018; Frazier et al., 2019) is China's official policy frame since it was integrated in the Party Constitution in 2007 (Hansen, M.H. et al., 2018). According to some scholars it is a response to (Western) capitalism (Gare, 2020), which can be seen as a model that exploits the planet and its inhabitants (Urry, 2010). Ecological Civilization claims to offer an alternative sustainable development model (Pan, 2016;

1 Shanghai is in administrative status a 'direct-controlled municipality' thus in political power equal to a Chinese province. The city with its port is economically comparable to the Netherlands (Desjardins, 2017). In 2021 Shanghai was the world's most expensive city (Williams, 2021), but at the same time, parts of the city have third world conditions – e.g., there are several million households with limited or no access to basic services, without hukou (Den Hartog, 2015), the so-called' floating population.

Gare, 2020). As a country China used to have all needed resources to sustain independently (Jun, 2010), but these times are over, and China plays a central role in an interconnected globalized world. Rice and other essential products are increasingly imported from other countries, and The Belt and Road Initiative – "an open arrangement in which all countries are welcome to participate" (Ruta, 2018) – makes clear that China proactively reopens and reclaims a dominant role on the world stage. As an international port city Shanghai plays a key role in this. Shanghai is full of extremes and antonyms: old vs. new, urban vs. rural, poor vs. rich, local vs. global, chic vs. shabby, loaner bike vs. Ferrari, etcetera, which gives this metropolis it's unique identity, and therefore also offers opportunities to investigate and resolve tensions by combining the best of both worlds.

In line with these challenging contradictions and search for (re)connections, this research draws on academic and philosophical insights from "both worlds" and attempts to combine them: (international) Sustainability Transitions theories (Evans et al., 2016; Grin et al., 2010; Hölscher et al., 2018; Kivimaa et al., 2017; Loorbach, 2007; Sengers et al., 2016; Weiland et al., 2017; Ehnert, 2022)[2] – a discourse which is mainly practiced in the context of the Global North, especially (former) North- and Western European welfare states – supplemented by insights from (local) Ecological Civilization thinking. This new theoretic and practical lens will be constructed, tested, and adjusted for the case of Shanghai. The expectation is that confronting global (Sustainability Transitions theories), and local (Ecological Civilization thinking) ways of thinking, and related policies and applied practices will lead to new insights, both theoretically and practically. By combining, adjusting, and enriching ideas from both lines of thinking this dissertation aims to contribute to filling practical and theoretical lacunes and to offer encouraging new perspectives – in the context of increasing political and social-cultural tensions (Demarais, 2019; Stevenson & Li, 2021; Kandhari, 2023). By using insights from both Sustainability Transition thinking as well as Ecological Civilization thinking this research aims to create a tailormade and more effective approach that can enhance mutual understanding, with a special focus on the urgency to find common grounds in supporting a process of social learning through participation with all thinkable stakeholders.

Ecological Civilization thinking and policies show that China is gradually detaching from the extreme technocratic "Man must conquer nature" approach (Shapiro, 2001) that started during Mao's era (1949-1976). China's economic catch-up is currently in a phase beyond poverty alleviation (Liu et al., 2021A). Simultaneously urban planning

2 Practical examples can be found online at: https://transitionsnetwork.org

and design solutions start to shift quickly toward a qualitative more sophisticated approach. Major leaps forward have been made in the past decade in China in the field of more sustainable infrastructure (high-speed train network, shared bicycles, electric vehicles, etc.), clean energy (wind turbines, solar panels, etc.), and the construction of large-scale green structures. Also in Shanghai great strides in tackling environmental pollution and energy problems have been made, such as the relocation of polluting industry – although in many cases it still pollutes elsewhere, which is a form of environmental injustice and contradicts the principles of Ecological Civilization (Pan and Zhou, 2006) – the mass introduction of electric vehicles and low-carbon buildings, and large-scale green structures in and around urban areas, especially related to waterfront locations (as explained in following chapters). As a result, the air quality in Shanghai improved noticeably, and even many birds appeared (personal observation). Yet, although there have been major improvements in air quality in recent years and air quality is accepted by many as "environmental problem as a trade-off for economic development" (Winter et al., 2021) it is still a serious problem with an estimated 9100 deaths annually (Iqair, 2023).

The Chinese-led approach to an envisioned Ecological Civilization as new paradigm, in which 'spatial planning and development' are prioritized (UN Environment Programme, 2016)[3], is crystalized in massive transformations at Shanghai's waterfronts, along the Huangpu River and also peri-urban on Chongming Island. China is moving from a production to a consumer society, which in Shanghai is strongly reflected in the transformation of the port area into a consumer landscape, with dozens of kilometres of recreational walking and cycling paths and greenery as a backdrop for gleaming office towers and hotels, high-end museums, and luxury shopping malls. Simultaneously recreative landscapes emerge at Shanghai's fringes, as along the watersides of the agricultural valuable end ecological vulnerable Chongming Island. Guided by Ecological Civilization policies as paradigm, on all governance levels, Shanghai's waterfront transformations became eye catching showpieces and an expression of national pilot programs that experiment and showcase how a sustainable future is envisioned. In the context of increasing scarcity of land and resources, world's highest real estate prices, climate change challenges, and socio-economic challenges the metropolis Shanghai is using urban planning and design to combat these urgent challenges, and even aims to set a new standard for others to follow (Shanghai Municipal People's Government, 2016).

3 Eight priorities can be distinguished for the Implementation of an Ecological Civilization (UN Environment Programme, 2016): (1) spatial planning and development, (2) Technological innovation and structural adjustment, (3) Land, water, and other natural resource sustainable uses, (4) ecological and environmental protection, (5) regulatory systems for Ecological Civilization, (6) monitoring and supervision, (7) public participation, and (8) organization and implementation.

However, the implementation of this policy causes (unintended) new tensions, especially environmental conflicts, and social inequalities (Piketty, 2013; Piketty, 2022), such as an increasing shortage of affordable housing and selective accessibility of facilities at the new watersides. In terms of carbon emissions China is a relatively distant second, with 11% of all historical emissions, after the US which is responsible for about 20% of all historical emissions. However, when looking at the per-capita emissions China is not even in the top 20 of cumulative emissions 1850-2021 (Evans, 2021). A question is whether all the drastic measures that China is taking are sufficient to achieve the ambitious objectives of the fourteenth Five-Year Plan (2021-2025) and the 2035 long-term goal outline (Xinhua News Agency, 2021), as further explained in chapter 2. The ambitious challenge is how to steer the city's development in a way that economic growth can continue, and simultaneously contribute to a decreasing ecological footprint, reduction of carbon emissions, preservation of biodiversity, and safe energy and resources, in an inclusive way in line with the 'Urban SDG 11' (United Nations, 2015B; UN Environment Programme, 2015)[4].

FIG. 1.1 "(The) architecture industry is a pillar industry of (the) national economy", logan of China's former Ministry of Construction in 2003 (Photo by author in an architecture bookstore in Shanghai, 2009)

4 All 17 Sustainable Development Goals (SDGs) are co-signed by China UN Environment Programme, 2015). Goal 11 is the so-called "Urban SDG" and focusses on cities. It can be summarized as: "Make cities and human settlements inclusive, safe, resilient and sustainable" (United Nations, 2015B).

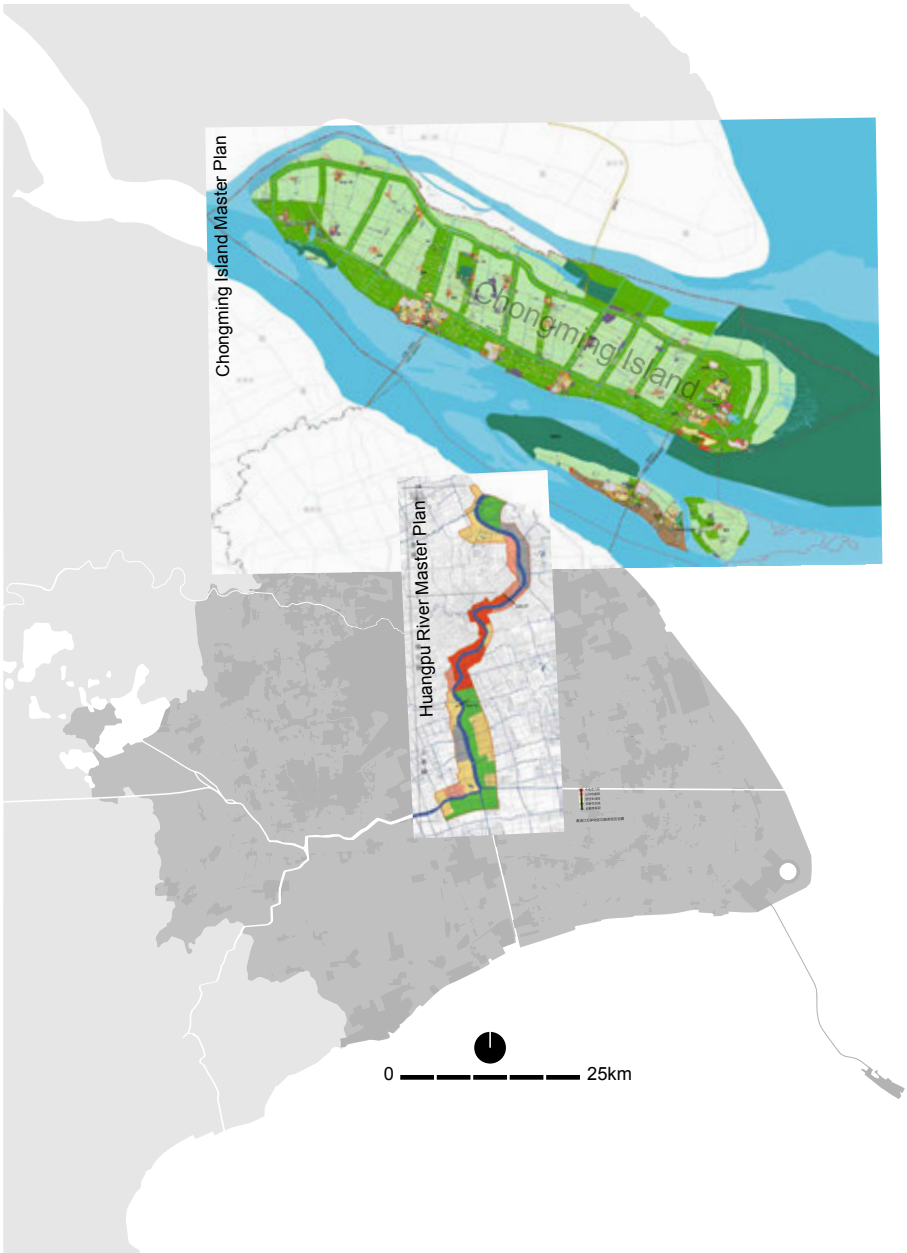

FIG. 1.2 Location current master plans of the two main cases, both are National Demonstration Zones for introducing sustainable (urban) planning and design practices: one central urban case along the Huangpu River and one peri-urban (actually rural) case Chongming Eco-Island central in the Yangtze Estuary (source: Shanghai Municipality; background map and adjustments by author).

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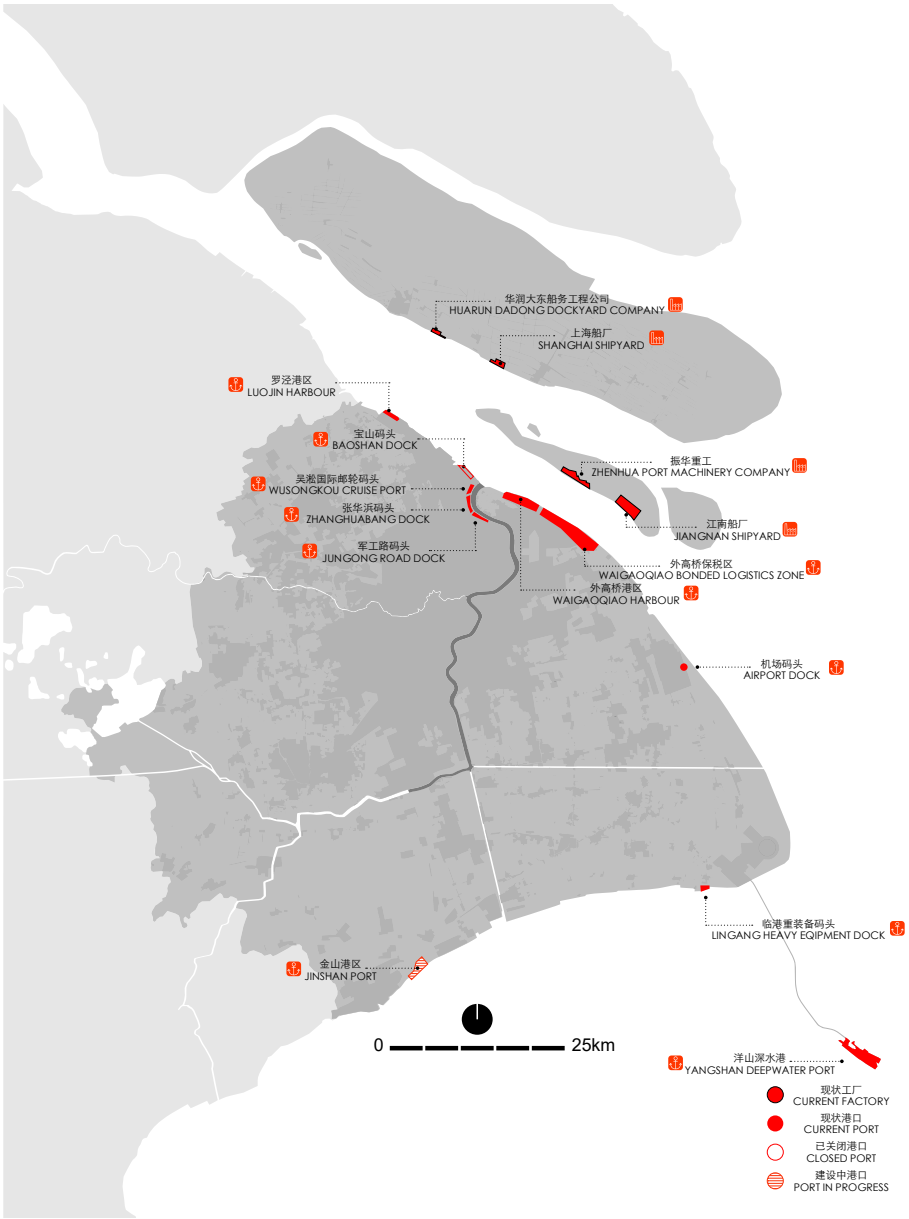

FIG. 1.3 Since early this century most ports and related facilities have been relocated from the Central City of Shanghai along the Huangpu River to decentral locations along the coast of Pudong District and to Chongming District (map by author and Jiawei Hu).

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1.1 Shanghai's Strategic Position in the Yangtze River Delta: An Accumulation of Tensions and Opportunities

River delta worldwide offer ideal conditions for agriculture and also urbanization (King, 1911). Here we can find the world's largest concentrations of spatial and economic development, fueled by world ports as a 'window to the world', where not only goods are traded but also cross-pollination takes place in the field of knowledge and culture. Also, Shanghai's owes its prosperity to its strategic location in the delta of the Yangtze River, China's main river and economic artery. Waterfronts, the original lifeblood of settlements in this area, became increasingly unattractive due to industrialization in the late nineteenth and early twentieth century due to pollution and impoverishment. Today, port relocations and deindustrialization have just rediscovered waterfronts and the domain of speculative real estate projects, culminating in so-called urban megaprojects (Christiaanse et al., 2019; Del Cerro Santamaría, 2013; Hanakata & Gasco, 2018). These have a major economic impact, but also direct consequences for the living environment. It is here where urbanization culminates and this metropolis manifests itself especially along the Huangpu River in all its appeal with the classic bank buildings on the Bund and the modern skyline in Lujiazui, and recently a series of new urban megaprojects – or new Bunds – with buildings designed by international star architects and an accumulation of local and foreign investment: the waterfront is the new trademark of Shanghai. Not long-ago China was still a developing country, and today it is a modern dynamic society, with a fast growing thriving socio-economic middle class. China has developed in a short time from 'factory of the world' to almost the largest economy in the world. Only two decades ago, much of Shanghai's waterfronts were delta marsh lands with a coal dumps, shipyards, and polluting factories (personal observation). Today it is the scene of shiny bank buildings, hotels, and museums designed by star-architects Ando, Chipperfield, Foster, Heatherwick, Koolhaas, Kuma, and others, supposed to contribute to further open up Shanghai (China) and building a world-class waterfront with global influence (Shanghai Municipal People's Government, 2016).

However, as mentioned before, Shanghai's Frontier-Role also creates vulnerabilities and tensions, ranging from serious air pollution to water pollution, agricultural dramas such as the "Huangpu River dead pigs incident" (Jourdan, 2013) and floodings due to subsidence (Tan et al., 2012; China Daily, 2003). Sustainable (urban and economic) growth is strongly interlinked with changes in (urban) production and consumption, changes in (urban) land use and energy use, and changes in

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lifestyle. The simultaneous transition of agriculture land and industrial production areas to a land use that fits the consumption and service society is crystallizing in Shanghai's new waterfronts. Shanghai is facing a range of tensions as a result of unlimited urbanization during recent decades. Natural capital and rural values, around Shanghai, have long time been neglected in favor of rapid urbanization and economic growth. Planning practices in the Yangtze River Delta are mainly based on a tabula rasa approach, and steered by money-driven ambitions, hence resulting in serious disturbances of the delta as a coherent system, where ecological values and local communities are increasingly under pressure. Less than a ten years ago ships rolled off the ramp and heavy industries plagued the air, water, and soil qualities. Today, about half of the planned 120 kilometers of regenerated waterfronts with lush greenery and trails form the impressive backdrop for massive real estate projects, skyscrapers, and malls, that are in aesthetic quality and appeal surpassing many other metropolises. At the same time along Chongming Eco-Islands fringes speculative properties emerge, investments by urban residents of central Shanghai, on places that conflict sharply with intended eco-promises (Den Hartog, 2017B).

The performances of the new usages of Shanghai's main waterfronts are a unique object of study, especially how their regeneration – since port functions moved to elsewhere – can contribute to create inclusive, safe, resilient sustainable (urban) transitions. Since all the land in the central city is state-owned[5] the Huangpu River waterfront as case is unique because this enables proactive support[6] by China's central-controlled urban planning and design policies and practices, aimed to make the case of Shanghai an institutional frontrunner, and by aiming to make Shanghai a model and guide for other cities in China and even abroad, as stated in Shanghai's latest master plan (Shanghai Municipal People's Government, 2016). In this research is examined which impact the implementation of largescale urban (regeneration) projects along the main waterfronts have on their context and to what degree the realities match the ambitions as expressed in this master plan regarding achieving Sustainable Development Goals (SDGs), especially with Urban SDG 11 (United Nations, 2015B)[7].

5 Albeit partly with the central government in Beijing and partly with the local government in Shanghai, and partly by local collectives on Chongming Island.

6 In the Chinese practice local governments are decisive and can push through decisions quickly albeit usually without participation. In short, seemingly ideal starting conditions ideal for developers, planners, and designers who want to realize their own dreams (without consulting citizens). Moreover, financial success seems assured by unprecedentedly high property values, regardless of the architectural quality of the project, as everything will be sold for a sky-high price. This is a condition that some administrators and planners in the Global North (secretly) dream about.

7 Also see Appendix D.

But what does this really mean in daily life practice, for the people who live here? How does this align with Ecological Civilization thinking, and what can we learn from this?

Regeneration processes along the waterfront in Shanghai resemble other world ports. Since the introduction of containers and scaling up of industries many ports have been relocated far outside the city, freeing up old port-related areas for redevelopment and a reconnection between citizens and the riversides. Celebrated examples are Hamburg, Baltimore, and Boston, followed by many others, from Tokyo to New York, from Singapore to London (Meyer, 1999; Brownill, 2013; Hein, 2016). This resulted in a range of literature on various aspects of regenerated waterfronts in port cities, e.g., public space and the essence of good urban design (Meyer, 1999), their role in creating inclusive cities (Costa, 2002), waterfronts as connector and interface (Hein, 2016; Hein, 2021), vitality and number of users (Liu et al., 2022), public participation in the planning process in waterfront redevelopment (Doucet et al., 2011; Li and Zhong, 2021), their function in climate change adaptation (Balica et al., 2012; Hanson et al., 2011; IPCC, 2019; Ke, 2014; Xian et al., 2018; Shanghai Municipal People's Government, 2018; Quan, 2014), and environmental aspects, especially endangered ecosystems (Wang, 2012; Li et al., 2020). Worldwide, urban waterfronts have been used for neoliberal urban policy experiments (Boland et al, 2017; Brenner & Theodore, 2002; Doucet, 2013; Harvey, 1989; Iovino, 2018; Sassen, 2014; Swyngedouw et al., 2002), closely related to the phenomenon of capital and power accumulation (Harvey, 2005; Hsing, 2010; Wu, 2015). The waterfronts of Shanghai are currently a scene of spatial clustering, with a special position for two new urban development models: (1) culture-led waterfront redevelopment and the "bring in creative class" paradigm (Landry & Bianchini, 1995; Florida, 2004; Jacobs, 1984), and (2) innovation-led waterfront redevelopment (Zukin, 2020), especially post 2008, as spinoff of the Expo area redevelopment (see paragraph 4.3.2). These clusters appear along Shanghai's waterfronts as urban megaprojects, somehow like urban megaprojects elsewhere (Christiaanse et al., 2019; Del Cerro Santamaría, 2013; Hanakata & Gasco, 2018) but amplified to an extreme in terms of scale, development speed, and consequences. Moreover, (affordable) housing is absent, and existing housing – regardless socio-economical or cultural values – is massively bulldozered to make place speculative investment objects (Den Hartog & González Martínez, 2022).

China's governance system is currently organized in a strict top-down hierarchy. However, initiatives and decisions on a local level – especially on a neighborhood level – are usually decisive for the final results. These local ambitions – that usually fail to look beyond their local political border – in combination with short-term goals, mainly money-driven ambitions, a tabula rasa approach, and a lack of thorough market research causes many tensions in this delta-region. This also

has consequences for the delta region as a system (Meyer, 2022), and affects its resilience – as personally experienced during the 2022 lockdown in Shanghai when many citizens were absent of food for weeks (Hurst, 2022; Den Hartog, 2023) – although recent planning measures such as red lines, a population cap, and a massive new green ecological framework (see paragraph 6.3.2 and Figure 6.1) – aim to mitigate these tensions.

1.2 Shanghai's Waterfronts as Urban Lab for Experiments in Urban Planning and Design

In 1992 revolutionary and former statesman Deng Xiaoping named Shanghai as "Head of the Dragon" (Foster et al., 1998): China's economic gateway to the world. Nowadays Shanghai is still China's most progressive and innovative city[8]. Within China, world's fastest and largest urbanizing nation, the metropolis Shanghai plays a forefront role since more than two decades when it comes to experimenting with urban planning and design innovations (Den Hartog, 2010, P.63-80; Den Hartog, 2016).

Many innovations in Shanghai are followed or copied whimsically by other Chinese cities. Shanghai's urban planning and design practices are indented as influential models to follow, as declared by the former paramount leader of the People's Republic of China Deng Xiaoping in 1992 (Foster et al., 1998). Shanghai wants to be a model city by taking the lead as "excellent global city"[9], and promises – in its master plan – to show how the city of the future should be shaped (Shanghai Municipal People's Government, 2016). The master plan even states that this

8 Although some might claim Shenzhen took this place, especially since at the moment of writing the long-term effects of the lockdown in Shanghai are unsure.

9 Excellence means here: "Taking development as primary task, ecological protection as the foundation and culture as the soul, and putting people first", as depicted at the entrance of the renewed Shanghai Urban Planning Exhibition Hall (since Autumn 2022). This permanent exhibition is organized in three levels that together represent "Excellence": Humanistic City (Floor 2), Innovation City (Floor 3), and Eco-City (Floor 4).

exemplary function could be extended to large parts of the world, especially the Global South[10] and BRI-countries which is in line with recent national policies.

Shanghai, strategically located at the mouth of the Yangtze River, can be seen as China's pioneer of urban design innovation (den Hartog, 2010) and energy transitions (Shi, 2021). As a world port city with global connections, Shanghai positions itself as China's prime laboratory for experiments in urban planning and design (Den Hartog, 2010)[11]. The rough, unpolished reality of (former) port landscapes is excellent for conducting experiments and innovations, as we can see in many samples worldwide (Meyer, 1999; Hein, 2014; Hein, 2016). Since Shanghai's Expo 2010, an event that worked as accelerator for massive urban regeneration and renewal, this is taking place increasingly along former port-related waterfronts – which always have been a transit zone between local and global, with trading companies, transshipment, and as an address for international banks in the former foreign concessions. Hence, Shanghai's waterfronts, both in central urban as well is in peripheral areas, form an accumulation of conflicting claims for space, living, working, recreation, nature, and water safety. Simultaneously they offer a setting for innovation and experiments, especially with new urban forms and sustainable solutions in urban planning, and design (e.g., high-density efficient land use, low-carbon buildings, pedestrian oriented spaces). The profession of urban planning and design is all about preparing for the future, by making plans or constructing scenarios.

Over the past three decades and ongoing, various transitions are taking place almost simultaneously in Shanghai (China). First of all, a political and economic transition to a post-communist system, which is a transition into a state-controlled global-oriented market economy that started under former Paramount Leader Deng Xiaoping in 1978 with the reform and opening-up, a program of economic reforms officially named Socialism with Chinese characteristics. This transition has been

10 The concept of the Global South is classified by the World Bank as low- and middle-income countries, which surprisingly does include China, since the World Bank classifies this country as an "upper-middle-income country" (World Bank, 2022). The concept Global South is generally also based on a group of countries that share similar economic, social, and political characteristics, including a history of colonization, underdevelopment, and poverty. Although Shanghai belongs to the most expensive cities on earth, and has a GDP comparably to the Netherlands (Desjardins, 2017), the average income in Shanghai, and China is still low. Although it is debatable whether China belongs to the Global South, the country is seen by many as a protagonist for low- and middle-income countries. For this and other reasons in the current academic discourse China is usually still counted as part of the Global South, also in this study.

11 Shanghai's experimental new town policies two decades ago were directly targeting to import foreign knowledge and experience in the field of urban planning and design, unfortunately this was disrupted by local governance practices limited to visual effects to attract homebuyers and investment (Den Hartog, 2010).

closely connected with a transition from an industrial into a post-industrial society with a fast-emerging new socio-economic middle- and upper-class working in the tertiary sector. Moreover, it is accompanied by a neo-liberal inspired transformation in urban governance "from managerialism to entrepreneurialism" (Harvey, 1989; Harvey, 2005). Urbanization plays a crucial role (Jacobs, 1984) in this, especially via capital accumulation (Harvey, 1982; Harvey, 2005). Ongoing urbanization accompanied by a new lifestyle of consumption causes increasing pressure on the environment, especially in megacities as Shanghai (see 2.22.2 and 6.1) adding to the already existing urgency of sustainable transitions – including e.g., an energy transition, low-carbon transition (Den Hartog et al., 2018), and climate change adaptation. In Shanghai all these transitions occur simultaneously in a relative short period of time and amplified in scale and thus also in impact. Moreover, they influence and boost each other and cannot be seen separately.

In all of the transitions and challenges urban planning and design plays a crucial role, which is especially evident along Shanghai's large-scale regenerated waterfronts. Hence the waterfront transformations are a critical object for study, especially on how local practices align with top-down policies, and also with international theory and practices. For this reason, two waterfront related National Demonstration Zones[12], meant to introduce new policies and to set guidelines, are examined in this research (see 1.8). Both are established by the central government as showcase with a main focus on sustainable transitions, especially through urban planning and design. In this research is evaluated how these transitions manifest themselves along the new waterfronts of Shanghai, how urban planning and design responds to this, and how this can contribute to an overall sustainable transition, with a focus on the Urban SDG 11 (see 1.6.1). In line with New York, Rotterdam, and other port cities (Meyer, 1999; Hein, 2014; Hein, 2016), Shanghai has made efforts in the past decade to transform its former port related waterfronts into an attractive urban landscape. Additionally, Shanghai focusses on innovation and the knowledge economy, in line with China's national policy. Analogue to New York and other world ports the regenerated waterfronts along the Huangpu River in Shanghai form the setting of innovation complexes (Zukin, 2020), disguised as urban megaprojects (see chapter 4).

12 National Demonstration Zones are selected by the central government based on a specific geographic area, intended to highlight and promote a specific industry (e.g. biotechnology, AI) or to introduce a new policy goal (e.g. CO2 reduction, new energy). The national government usually offers a range of incentives and policy support (e.g.: substantial tax reduction, free renting, etcetera) to ensure success. One of the main efforts is to stimulate economic growth and development and to attract domestic and foreign investment.

On top of all these challenges there is a recent change of course driven by Ecological Civilization policies that in words are somehow contrary to the line of former Paramount Leader Deng Xiaoping. General Secretary Xi's China is moving away from Deng's state-capitalism and state-consumerism mantras (e.g.: "to get rich is glorious" and "make some get rich first") and calls for wealth redistribution and even a restriction on extreme high incomes. However, this line seems diametrical opposite to practices along the main waterfront where speculative real estate clusters emerge in unprecedented speed and scale.

This research aims to contribute to the international and local discourse and practices by identifying and clarifying beforementioned tendencies, to draw mutual lesson, and to offer recommendations by examining and trying to understand local policies and practices, which differ sharply from the Global North.

1.3 Problem Statement

During last three decades the world's economic center of gravity started shifting to the east, a process that is likely to continue despite growing global uncertainties (Asia Development Bank, 2022). Decisions on proactive climate actions are increasingly co-decided by emerging powers, including China, which is meanwhile also a main contributor of greenhouse gasses (Mufson & Dennis, 2021) and environmental stresses (Brown, 1995; Hanson et al., 2011; Jourdan, 2013; Wang, 2012; Li et al., 2020). "China as a relatively poor country has made a conscious choice to shift its focus from the quantity to the quality of growth" and is leading the world in sustainable development, according to Roach (2019). Since 2007 China's guiding Ecological Civilization policy (Henderson and Joffe, 2016; Frazier et al., 2019), which can be seen as an alternative sustainable development paradigm (Pan, 2016) and even an anti-capitalism approach (Gare, 2020; Gare, 2021), showcases that a shift to sustainable development is becoming a new priority (Hansen, M.H. et al., 2018). Cities play a crucial role in this, due to their higher carbon footprints: "cities can be seen as a problem but also as possible solution" (World Economic Forum, 2022). Shanghai, one of the world's prime port cities and China's "Head of the Dragon" (Foster et al., 1998), promises in its latest master plan to become excellent and exemplary – both local and international – in sustainable urban planning and design solutions and to guide urban growth into a sustainable direction (Shanghai Municipal People's Government, 2016).

Based on recent waterfront developments in the rapid urbanizing delta of the Yangtze River this research evaluates how the city leaders in Shanghai are struggling to combine economic growth with making this city "inclusive, safe, resilient, and sustainable"[13]. As China's most international connected city, Shanghai has the perfect conditions for introducing innovations and practical experiments, especially along its waterfronts, where confrontations between human and nature culminate. This makes the transformed waterfronts a perfect theoretical test case to see to what extent Ecological Civilization policies as governance model are effective, and to distillate lessons.

By combining theoretical insights from the field of Sustainability Transitions theories (Evans et al., 2016; Grin et al., 2010; Hölscher et al., 2018; Kivimaa et al., 2017; Loorbach, 2007; Sengers et al., 2016; Weiland et al., 2017; Ehnert, 2022) with Ecological Civilization thinking a new theoretic framework is created (see 1.6.4). With help of two cases – both National Demonstration Zones aiming for a sustainable transition through of urban planning and design (see 1.8) – this combination is tested and evaluated, leading to new insights, and concluding recommendations.

In the international academic discourse and real life practice the term 'urban lab' (Park, 1929) usually refers to countless mostly small-scale initiatives – especially in the Sustainability Transition discourse – which often remain local, are difficult to scale up, or stumble over a lack of political decisiveness and tedious decision-making processes (Steen & Van Bueren, 2017; Scholl & De Kraker, 2021). In China this is quite the opposite: National Demonstration Zones (United Nations, 2018) and pilot projects (Xin et al., 2017) are large-scale experiments, carried out in short though in little transparent processes and rather exclusive (as described in following chapters). These (national) demonstration zones[14] and pilots – pilots are usually smaller in scale and more specific, see paragraph 4.2.1 – are political means in China's Ecological Civilization policy. This research will reflect on mutual lessons to be learned from China's approach – since in North- and Western European welfare states a belief in social engineering ('make-ability') got lost and there are calls for a renewed central decisiveness – and if it is possible to find a balance between central control and decentralized neo-liberal principles.

13 These are the key aims of the Urban SDG 11 (United Nations, 2015B; UN Environment Programme, 2015).

14 Another sample is the 'One City, Nine Towns' development strategy (2001–2007), in which each suburban district of Shanghai had to build a 'new town demonstration area'. This was a spatial-economic development plan aimed to accommodate new citizens (migrants from other provinces) and relocated citizens from overcrowded neighborhoods in the central city (and to make place for new urban projects downtown) after demolition, and to prevent urban sprawl around Shanghai (Den Hartog, 2010).

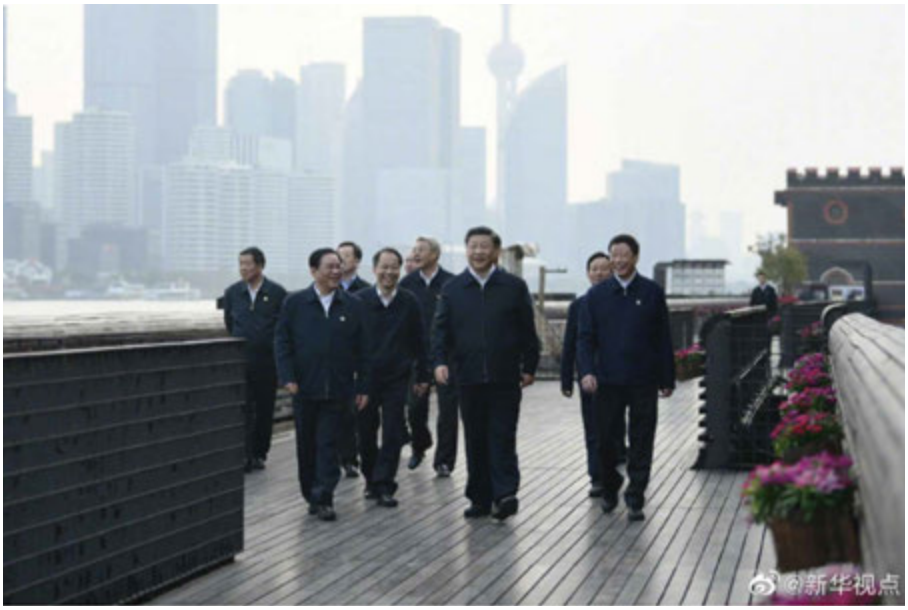

FIG. 1.4 The waterfront inspection in Yangpu District by General Secretary Xi in November 2019 (Photo by Xinhua News Agency, 2019) underlines the political importance of the waterfront transformations. During this visit he put forward the concept "the city is built by the people and for the people". This phrase is immortalized in a monument on the spot (also visible on Figure 6.5) as mission for Shanghai.

Shanghai showcases multiple successful efforts[15] and opportunities of transitions toward sustainable urban planning and design practices. But there are also tensions in the context of extreme high population and building densities, land scarcity, world's highest real estate prices, climate change challenges, an energy transition, socio-economic challenges, and new unforeseen challenges – e.g., a trade war, a tech war, the aftermath of the Covid-19 pandemic and brutal lockdown, and geopolitics (Demarais, 2019; Kandhari, 2023). After decades of being neglected as unattractive and dirty, waterfronts became a gold mine for investors and speculators with large-scale real estate projects, besides being an attractive public space with ecologically values. Massive speculative building complexes are emerging along the watersides – with corporate urban megaprojects (Christiaanse et al., 2019; Del Cerro Santamaría, 2013; Hanakata & Gasco, 2018) along the Huangpu River,

15 Shanghai uses scarce land very efficiently, has high-quality public transport, and is at the forefront of electric means of transport, thereby significantly reducing CO2 emissions. As described in chapters 2-6, from a purely spatial perspective, the new waterfront transformations are very high quality (but functionally lacking).

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and large-scale housing estates at the peri-urban waterfronts (Figure 1.2) – which are causing spatial improvements, but also serious tensions with the local social-cultural and ecological environment. Moreover, this is in sharp contrast with the promised Ecological Civilization targets as set in the Shanghai Master Plan 2017-2035 (Shanghai Municipal People's Government, 2016) and also with targets of the Urban SDG 11 (United Nations, 2015B; UN Environment Programme, 2015)[16]. Still, there are steady improvements to be discovered and opportunities to become exemplary, but as will be argued, this is more likely in more transparent processes and through co-creation and co-learning with input from a civil society.

1.4 Research Gaps and Relevance

China's rapid urban transition has global impact, in terms of production and consumption, and especially also in terms of increasing ecological footprint. Hence it is urgent to study recent efforts in sustainable transitions through Chinese urban planning and design, from a combined international and Chinese perspective.
The global discourse on Sustainability Transitions is limiting itself to the Global North, especially North- and Western European countries with strong welfare state traditions[17]. This discourse does not yet have many practical applications in low- and middle-income countries (Loorbach et al., 2017; Oates, 2021), though the vast majority of urbanization takes place there. This can result in theoretical biases (Feola, 2020), as becomes clear in the still limited Sustainability Transitions studies in the Global South (Hansen, U.E. et al., 2018; Wieczorek, 2018). Moreover, the discourse on Sustainability Transitions is limiting itself to small scale practices. Consequently, the research framework of Sustainability Transitions needs adjustments to be applicable in the Global South especially in the field of the key analytical concepts of niches (Oates, 2021) and urban labs (see paragraph 4.2.1).

16 This so-called "Urban SDG" focusses on cities and can be summarized as: "Make cities and human settlements inclusive, safe, resilient and sustainable" (United Nations, 2015B; UN Environment Programme, 2015). All SDGs are co-signed by China.

17 The same can be said about the Layers-Approach – which has been used in chapter 5 as a handy tool to explain the situation.

Until recently little research has been done on the local practical implications of Ecological Civilization policies in China (Chen & Zhao; 2021), in particular, empirical evidence on practical application in urban planning and design is still lacking (De Jong, 2019), with a few exceptions (Chen, 2017). This is actually the case in the whole Global South (Nilsson, 2016; Ramos-Mejía, 2018; Feola, 2020). According to Li et al (2015) “only a few researchers have attempted to understand the Western conceptualization of sustainability in the context of Chinese culture”. According to Feola (2020) “Sustainability Transition research has failed to engage in any significant analyses or critiques of capitalism”, and “energy transitions in the Global South risk the reproduction of Western ideals of progress and modernity, which might be perceived as a new form of colonization” (Nilsson, 2016; Feola, 2020).

Extending the discourse of Sustainability Transitions with Ecological Civilization thinking insights in the complex political landscape in China, and even the wider Orient, is highly relevant, not only since the economic and geopolitical center of gravity is shifting to this part of the world but also because multiple international actors – e.g., investors, designers, engineers, entrepreneurs, and also artists and academics, often originating from the Global North – are deeply involved in the projects discussed in this research. This underlines that combing insights from both the Sustainability Transitions theories and Ecological Civilization thinking is highly relevant to the international discourse, not only in theoretical but also in a practical sense.

While China is in the daily spotlight of the media, outside of China there is generally a knowledge gap – and bias – about what is actually going on, because information provision is not very transparent, exacerbated by the limited physical access to the country until recently during the Covid-19 crisis. Additionally, there are difficulties with access to (reliable) sources. Although still with many limitations (see 1.9 this research aims to contribute to a better mutual understanding both within the academic discourse as well as in practice, both inside and outside China. This research is considered to be relevant in giving insight to both local and international city leader, planners, designers, thinkers, developers, citizens, and others. A continuation of knowledge exchange and practical exchanges between China and the world, and between the Global North and the Global South is needed more than ever, in which Shanghai as protagonist and global-oriented port city plays a key role.

1.5 Aim, Conceptual Frame, and Research Questions

The academic aim of this research is to extend (urban) Sustainability Transitions theories – which is until today mainly practiced in the context of European welfare states and not yet in the Global South – and to test its usability in China with its specific local socio-cultural and physical context, by integrating insights from Ecological Civilization thinking. The research objective of this research is to redefine 'urban lab' as a concept and steering tool in its specific local Chinese context, and to find a way to improve the effects of the adjusted urban lab concept as guiding and gentrifying element in a more sustainable way.

For sustainable transitions in the practice of urban planning and design solutions, not only local but also international mutual understanding and cooperation is essential. Hence the objective is to make a substantive contribution to the discourse on transitions to sustainable urban planning and design solutions. In line with this, a broader definition of the concept of sustainability has been sought in paragraphs 1.6.4 and 7.2, in line with the Urban SDG 11 (United Nations, 2015B). Another objective is to explain the role of international actors, since Shanghai is a global and interconnected city, and also in the discussed cases international stakeholders play a crucial role. This research not only aims to add new insights to existing academic literature but also contribute to providing insight into practical solutions for planners, designers, city leaders, and developers in a process of knowledge exchange, both inside as well as outside China.

This leads to the central research question: **How can the Global North oriented and welfare state rooted Sustainability Transitions theories be enriched with the Chinese and communist state rooted Ecological Civilization thinking to make it able to evaluate the making of the direct-controlled municipality Shanghai into an institutional frontrunner of sustainable transitions in urban planning and design with its prime waterfront as exemplary 'urban lab'?**

To answer this central research-question the following empirical and theoretical sub questions will be answered first:

Sub question 1: **How can an 'urban lab' as promoted in Sustainability Transitions theories be identified in the context of Shanghai and how can these experimental and pioneering projects contribute to a sustainable transition effort?**

Sub question 2: **How can Sustainability Transitions theories be applied in a useful way in the context of Shanghai, with additional insights from Ecological Civilization thinking?**

Sub question 3: **What can we learn from differences in governance approach when comparing waterfront transformation processes in Shanghai's central city and peri-urban fringes?**

Sub question 4: **How can Shanghai manage to implement large-scale waterfront transformations while integrating significant ecological improvements and place-making and the preservation of industrial heritage and flood defense in relation to Sustainable Development Goal 11 – also known as "the Urban SDG 11" in which inclusive, safe, resilient, and sustainable development is emphasized?**

Sub question 5: **How can the urban planning and design approaches of the direct-controlled municipality Shanghai be understood as proactive through the lens of the combined concepts of Sustainability Transitions theories and Ecological Civilization?**

Following Figure 1.5 explains graphically how the research is framed:

FIG. 1.5 Research framework (by author)

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1.6 Supporting Theories: Sustainability Transitions and Ecological Civilization

The theoretical problem to be tackled in this research project is how to extend Sustainability Transitions theories – which is mainly practiced in the context of the Global North, especially North- and Western European welfare states, and not yet in the Global South – with Ecological Civilization thinking, by testing its usability in an Asian / Chinese context in a way that is more inclusive, at the waterfronts of the direct-controlled municipality Shanghai.

In paragraphs 1.6.2 and 1.6.3 the main ingredients that are applied of both lines of thinking – which are similar in intention – will be distilled and combined in a framework, which will be tested – based on findings in subsequent chapters 2-6 – in the closing chapters 7 and 8.

The theoretical framework (Figure 1.6) is built with theoretical support from the discourse of Sustainability Transitions theories and additional support of Ecological Civilization thinking. The initial research steps were structured according to the Layers-Approach (see 5.2), which did not cover the aspect of transition since it is a more static analysis, a snapshot, which can only partially understand the rapidly changing complex political and economic Chinese reality. This has been overcome by extending it – replacing it – with an approach through the lens of Sustainability Transitions theories (see 3.2 and 4.2). Similar to the Layers-Approach also the frameworks used in Sustainability Transitions theory originate from the Global North, especially North- and Western European countries with strong welfare state traditions, thus they cannot always be literally reused for all geographical different locations. Hence a tailor-made approach is necessary. Because these Sustainability Transitions theories are still insufficiently focused on Chinese reality, the idea of Ecological Civilization thinking has been added as an extra tailor-made lens. Therefore, there is sometimes an overlap in the theoretical parts of the individual chapters, which is expanded and further refined during the research process and is perfected in more recent papers (e.g., chapter 6). The discussing chapter 7 and concluding chapter 8 of this research examine the links between Sustainability Transitions theories and Ecologic Civilization thinking in more detail.

1.6.1 Defining Sustainability and Sustainable (Urban) Development

To answer the research question, it is essential to first unravel the concept of sustainability. In the Sustainable Development Goals[18] (SDGs), which are co-signed by China (United Nations, 2015A) – the concepts of sustainability and sustainable development follow the definition of *The Brundtland Report*, which states: "Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). This common definition is usually followed in Sustainability Transitions theories. China, as a prominent member of the United Nations, has endorsed these definitions too, but has adapted it locally on some aspects – this could also be the case in some other countries, at least locally –, as shown in the following chapters. The definition of sustainability is more all-embracing according to Ecological Civilization thinking, which has been the guiding policy since 2007 (Hansen, M.H. et al., 2018) in China.

The research focus is on urban planning and design; hence the use of SDGs will be limited to the Urban SDG 11, which is the 'Urban Sustainable Development Goal' and "plays a central role in creating carry capacity and awareness for global sustainability" (United Nations, 2015B; UN Environment Programme, 2015). Only 3 per cent of the Earth's land surface is urban used, but cities worldwide use 60-80 per cent of all energy consumption and contribute about 75 per cent of all carbon emissions (United Nations, 2015). Cities are believed to provide "interlinks and integrated approaches across sectors and goals, given that a city represents a microcosm of all the other SDGs" (ICLEI, 2015). SDG 11 represents "a pivotal first step towards the integration of sustainable urban development into the global framework for action" (ICLEI, 2015). This means that local effects could be scaled-up and push other cities or regions and in the end nations to achieve all SDGs. For this reason, and as this research is about Shanghai the focus will be on SDG 11, which is also named the "Urban SDG" (United Nations, 2015B; UN Environment Programme, 2015). Urban SDG 11 can be split up in ten key targets (see appendices C and D) that can be summarized as to "make cities and human settlements inclusive, safe, resilient and sustainable" (United Nations, 2015B).

18 In 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development and set 17 SDGs that aim to be a "blueprint to achieve a better and more sustainable future for all" (United Nations, 2015A). These SDGs were agreed by 193 national governments and must be implemented by local actors.

To better understand this way of thinking so that it can be combined with insights from Sustainability Transitions theories, both ways of thinking are explained in the next two paragraphs 1.6.2 and 1.6.3. After that, a new theoretical lens will be constructed in paragraph 1.6.4. This is tested for both cases – as introduced in paragraph 1.8 – in Chinese practice in the paper-based chapters 2 – 6. Based on this new theory is extracted in the discussing and concluding chapters 7 and 8, with important additional insights.

1.6.2 Insights from Sustainability Transitions theories

The theoretical problem to be tackled in this research project is how to extend (urban) Sustainability Transitions theories with Ecological Civilization thinking. This paragraph introduces basic principles from the discourse of Sustainability Transitions theories which are applied in chapters 3, 4, and 6 and in the concluding chapters. The discourse of sustainability transition theories (Markard et al., 2012; Evans et al., 2016; Grin et al., 2010; Kivimaa et al., 2017; Köhler et al. 2019; Loorbach, 2007; Loorbach et al. 2017; Sengers et al., 2016; Weiland et al., 2017; Ehnert, 2022) does research on socio-technical transformations toward a more sustainable future, and the route toward realizing this future. In this debate Sustainability Transitions are defined as "a radical transformation towards a sustainable society, as a response to a number of persistent problems confronting contemporary modern societies" (Grin et al 2010) and "a fundamental transformation towards more sustainable modes of consumption and production" (Markard et al., 2012). This transformation process can be accelerated through a participatory process of visioning, experimenting, and learning (Evans et al., 2016; Loorbach et al. 2017; Rotmans et al 2001). Especially learning plays a key role in Sustainability Transitions research, especially learning-by-doing (Van Poeck et al., 2020).

During the last two decades the field of Sustainability Transitions research expanded fast and became heterogeneous focusing on a variety of aspects, e.g., electricity, food, transport[19], waste management, water, all especially related to urbanization (Loorbach et al., 2017; Köhler, 2019). Transitions are long-term process of radical and structural change at the level of societal systems (Grin et al., 2010) and transition research is considered as a helpful tool to understand the complex nature of these challenges and to show how societal transitions can be steered into a more sustainable direction.

19 China impresss with sustainable collective infrastructure. Over the past decade, the country has rolled out an unparalleled highly advanced network of high-speed trains, plus many metro lines, electric vehicles, shared bicycles, etcetera.

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Although the discourse of Sustainability Transitions is geographically still focusing on cases in the Global North, it has already developed widely in conceptual and technical language (Kivimaa et al., 2017; Sengers et al., 2016; Weiland et al., 2017). Within Sustainability Transitions theories there are harmonies in generic concepts such as path dependencies, niches and experiments, governance, regimes, multi-actor process, long-term process, open-endedness, and uncertainty (Loorbach et al., 2017; Köhler, 2019). Due to faster global developments in all areas, from global warming to economic or political upheavals, transitions are nowadays "problem driven" instead of "opportunity driven", due to a lack of time (Geels 2011).

The core idea in transitions research is to approach a transition as a process of disruptive (Loorbach et al., 2017) system or regime change. The central concept of a socio-technical regime (Rip, 1995) refers to a stable and dominant order in a societal (sub)system (Geels, 2002). The political reality in China is characterized by dominant central control, which can be considered stable, but is constantly changing under the influence of internal and external factors.

Various theoretical frameworks – e.g., neo-institutional theory, evolutionary economics and science and technology studies – are in use within the Sustainability Transitions discourse to explain socio-technical transitions, in the context of global (and local) challenges as climate change, social inequalities, and energy transitions.

Three key concepts from Sustainability Transitions are relevant for this research: (1) expectations (or visions), (2) socio-technical experimentation, and (3) sustainable innovation journey. With the help of these three concepts the cases are analyzed – in chapter 4, 5, and 7 – on sustainable transition aspects, based on which lessons are taken and recommendations are given to guide these projects towards more sustainable pathways.

1 **Expectations:** The concept of 'expectations' can be explained as "statements about the future that circulate" (Van Lente, 2012), which are used to explore how actors use appealing visions of a sustainable future in urban projects. Since 2007 Ecological Civilization is presented and promoted as "a vision for our global future, a new social imaginary" in China (Hansen, M.H. et al., 2018).

2 **Socio-technical experimentation:** To translate these expectations into realities on the ground, actors need to participate in a process of 'socio-technical experimentation' (Evans et al., 2016), where expected creative and innovative solutions are tested and developed in real-life settings or urban labs. Innovation and experimentation are seen as concepts to start and stimulate a transition, which take place during a sustainable innovation journey.

3 **Sustainable innovation journey:** Socio-technical experimentation is supposed to occur with involvement of a variety of societal stakeholders in an open-ended unfolding (Van de Ven et al., 1999) 'sustainable innovation journey' (Geels et al., 2008), full of uncertainty (Garud et al., 2014).

Recurring terms in Sustainability Transitions theories are urban labs and niches, which are incubators and accelerators for transformation. As explained in chapter 4 the phenomena of urban labs and niches have a very different nature in China compared to the Global North (where Sustainability Transitions theories are rooted). Socio-technical changes in relatively stable developed countries differ from the social and economic dynamics in fast developing countries, especially also because of historical and institutional differences, which are visible in the nature, scope, and quality of these changes that varies strongly (Sharp & Raven, 2021). This research focusses on the analyses if and how the context of (China's) central controlled state capitalism can guide this process in a more convincing and efficient way, with possibly better results than in capitalist countries (Urry, 2010; Feola, 2020).

1.6.3 Insights from Ecological Civilization Thinking

In order to disentangle the theoretical problem in this research project this paragraph introduces basic principles of Ecological Civilization, which are applied in chapters 2 and 6 and in the concluding chapters as possible extension to Sustainability Transitions theories. Ecological Civilization is a way of thinking or philosophy and can be traced back to the ancient Chinese philosophy of "nature and Man as one" (Pan, 2016). Since 2007 the central government in China aims to realize an Ecological Civilization, and the expectation is that this will be a basic reality by 2035, and fully developed by 2050 (Hansen, M.H. et al., 2018; Gare, 2021). In this research is explored what this expected paradigm shift means in theory and practice, how this corresponds to the internationally accepted SDGs – which are also signed by China –, and especially how it interacts or can enrich the Sustainability Transitions discourse.

Almost all policies and practices regarding China's spatial and environmental development mention the term Ecological Civilization, usually in mottos and slogans as guidelines, but usually without any detailed explanation, which results in local discrepancies. Ecological Civilization is a social-technological development model in which sustainability and environmental management are paramount and in which, in addition to the economic, also social, and ecological aspects are leading. According to Frazier et al. (2019) the concept Ecological Civilization can be defined as "a dynamic equilibrium state where humans and nature interact and function harmoniously".

According to Pan (2016) Ecological Civilization aims "to combat social inequality and environmental unsustainability associated with industrial civilization" and the recent Chinese experiences "demonstrate that this new development paradigm has the potential to lead us to global sustainability". Ecological Civilization thinking has roots in Marxism and is meant as the next step after industrial civilization (Gare, 2020). It claims to offer the potential to challenge or even replace global capitalism, analogous to how the USA displaced Britain after the Industrial Revolution as the dominant hegemonic power in a new era (Gare, 2021), with London and New York as economic centers respectively. It goes without saying that the economic powerhouse and world port Shanghai plays a key role in this new era, although its gleaming glittering skyline along the Huangpu River is initially reminiscent of an enlarged capitalism, and continuation in the old way (Den Hartog, 2021A).

After decades of rapid growth, the concept Ecological Civilization represents a radical paradigm shift in Chinese cities and rural areas, accompanied by major social and economic reforms. The fact that China, and Shanghai, are capable of implementing radical shifts is not only apparent from its history of drastic socio-technical experiments and reforms (Bray, 2005; Den Hartog, 2016; Shapiro, 2001; Sze, 2015) but also from recent interventions such as the lockdown of the metropolis of Shanghai in the spring of 2022 (James, 2022; Hurst, 2022). Recurring conceptual terms are 'beautiful' and 'harmonious development', which in local practice often means literally sweeping streets and squares clean, whereby e.g., informal markets and other elements that according to the city leaders don't refer to prosperity, must disappear. In contrast to global neoliberalism, the state has a very strong grip on all areas of social development, as well as spatial planning, where, for example, the city of Shanghai (and also Beijing) has been restrained by its latest master plan within red contours which means that both physical urban expansion and population expansion are limited (Shanghai Municipal People's Government, 2016)[20].

20 This master plan is imbued with political slogans like "to serve the people" (为人民服务) and "people oriented" (以人为本), but also concrete promises about the waterfront redevelopment, based on Ecological Civilization thinking, in particular: "returning the river to the people" and "building a 'world- class waterfront space". These promises are further explained with terms as "ecologic restoration" (to add green) and "low carbon" (to get rid of pollutants) promises, and "the waterfront (of the Huangpu River) will become a continuous public space" to strengthen Shanghai's global and local identity, with historic and socio-cultural continuities (Shanghai Municipal People's Government, 2016). In terms of Ecological Civilization, the Shanghai 2035 master plan aims to further optimize land use (ecological, agricultural, and urban space), especially by expanding "the ecological space" and implement a red line of ecological protection (Figure 55). A key element in this is the creation of an ecological network (see 6.3.2), as protective buffer around main infrastructures and further enhancement of the value of ecological services. The intention of the plan is also "to construct a continuous ecological coastline" which even stretches beyond the municipal borders. The master plan further emphasizes: "The world is embracing an era of innovation-driven knowledge economy. With this new development context, the world has stepped into an era of Ecological Civilization that puts environmental friendliness and a humanistic approach first" (Shanghai Municipal People's Government, 2016).

There certainly is no such thing as a free market in China, it is more like ‘neoliberalism with Chinese characteristics’ (Harvey, 2005). The approach to the pandemic (see the prologue) also shows the strong state interference and, besides, that economic growth in China is no longer sacred.

This core ideas of Ecological Civilization have deep roots in Chinese traditional philosophies, especially the three principal philosophical systems of Confucianism, Taoism, and Buddhism, but also in Legalism, and Yin–Yang (Li et al, 2015). It turns in essence away from the Western idea of industrialization (Linster and Yang, 2018) and attempts to reverse ecological deterioration and enhance environmental regulatory institutions (Henderson and Joffe, 2016) as a new paradigm of civilization (also see paragraph 5.3.2). To prioritize nature is a fundamental shift in the policy of the Peoples Republic China, especially after more than three decades of GDP prioritization. The phrase “humans are not the master of nature and cannot attempt to transform and conquer nature” (Pan, 2016) is diametrically opposite to Mao’s “Man must conquer nature” during the transition from an agricultural to an industrial civilization (Shapiro, 2001), that is a crucial change in the fundamental attitude of government policy, which is essential to bring about a sustainable transition.

The term Ecological Civilization consists of two components: “ecological” and “civilization”. Literally the Chinese term **生态文明** (Shēngtài Wénmíng) translates as “Ecological Civilization”. The word for “civilization” is “**文明**” in Chinese. The translation of “ecological” is **生态**. According to Pan (2016) within Ecological Civilization thinking the term ecology refers to interrelations and co-existence of all individual life forms or “natural phenomenon”, and the term civilization to any creation by human society. The English word civilization originates the Latin word civil, meaning “citizens”, and civitas are cities, a place where people gather and needs a certain behavior to co-exist, a need for civilization. In Chinese language the original word **文明** (Wénmíng) emphasizes “a person’s internal cultivation and capability improvement” (Pan, 2016) which is somehow different from the (external) inter-person relations, or social groups in the English translation of civilization. It implies good values, capacities, and practices in political, cultural, and economic life (Gare, 2021). The complete translation of **生态文明** can also be explained as “ecological progress” or “ecological conservation” in a freer translation. However, “conservation” and “progress” themselves don’t mean “**文明**” in Chinese. Some samples of recurring used political slogans to promote the concept are: “Build a beautiful China and strive to enter a new era of Ecological Civilization” (**建设美丽中国，努力走向生态文明新时代**), “Cherish innovation-driven growth, optimize industrial structure and accelerate an Ecological Civilization building” (**在发展中珍惜资源，注重生态文明建设**), and “developing a robust domestic framework for biodiversity conservation that supports eco-civilization in China and globally”

(制定有力的国内生物多样性保护框架，为中国和全球生态文明提供支持；以及);
all can be found in official policy documents and official state media (Xinhua News Agency, 2017). Central returning keywords in the discourse on Ecological Civilization are 'high quality of life' and 'people oriented'.

Since the inclusion of Ecological Civilization in the constitution in 2007 there have been significant investments e.g., in transportation, water, energy, mining, industry, public health, tourism, and greening. Translated to urban planning and design practices this includes amongst others the integral construction of low-carbon projects and the integration of nature and city by adding large amounts of green (see 6.3.2, and Figure 6.1B). September 2017, the CCP Central Committee integrated "Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era" (习近平新时代中国特色社会主义思想) in the Party Constitution (Liu and Chen, 2017) and Ecological Civilization started to play a key-role in order to implement Xi Jinping's perspectives or "thought" (Xi, 2014; Xi, 2017; Xi, 2020), which is expected to be the new national ideology of socialist development (Xi, 2017).

The impact of Ecological Civilization thinking is stretching to far beyond China's borders, since it is increasingly exported (Faure, 2020) and promoted to other countries that make part of the Belt and Road Initiative (Ruta, 2018), This underlines the need to share knowledge about this philosophy and to explore new combinations.

1.6.4 Combining Insights from Sustainability Transitions Theories and Ecological Civilization Thinking into a Framework

Sustainability Transitions and Ecological Civilization thinking share fundamental ideas about sustainability, as also expressed in the SDGs. As explained in paragraph 1.6.1 the concept of sustainability in the SDGs is primarily based on The Brundtland Report (United Nations, 1987), but strongly influenced by the idea of a Triple Bottom Line (Elkington, 1997)[21]. This Triple Bottom Line – which is meant to emphasize "the social and economic dimensions" of The Brundtland Report, according to Elkington (1997) – is based on the so-called Three Main Pillars:

21 The Triple Bottom Line formed the basis of Shell's first sustainability report in 1997, with as result that this frame become very influential in the Dutch and the Anglo-Saxon context (Shell, 1997; Shell, 2022).

(1) the social equity bottom line (or 'people', in which 'people' refers to all possible stakeholders); (2) the environmental bottom line (or 'planet', which refers to natural capital), and (3) the economic bottom line (or 'profit', which since 2002 is usually replaced by 'prosperity'[22]), commonly known as the trio 'People, Planet, Profit'[23]. The Triple Bottom Line is interlinked to the 'seven revolutions'[24], which will lead us to 'sustainable capitalism', according to Elkington (1997), following market mechanisms with competing (corporate) entities.

The perspective of Ecological Civilization thinking starts with the same trio: (1) social (people-oriented civilization), (2) environmental (ecological), and (3) prosperity. However, according to the PRC's State Council guidance, Ecological Civilization thinking identifies two extra pillars: (4) culture and (5) policy (governance), on both of which a lot of emphasis is put (Pan, 2016; Hanson, 2019). Based on this, the conceptual framework in this research has been expanded with these dimensions, in addition to what is common in international sustainable development discourse. When extending the Triple Bottom Line framework this results in five pillars – (1) People, (2) Planet, (3) Prosperity, (4) Culture, and (5) Policy to examine[25] the urban planning and design efforts along the waterfronts of the in chapter 1 introduced National Demonstration Zones in Shanghai. In the search for a transition to a more sustainable way of life, urban planning and design play a crucial role, not only economically (Figure 1.1) but also in terms of the other four pillars. The theoretical framework for this research will be structured accordingly (see Figure 1.6).

22 On the occasion of the World Summit on Sustainable Development in Johannesburg in 2002, the word profit was replaced by prosperity, in order to include social profit in addition to economic profit.

23 The SDGs are supposed to be an integrated and indivisible balance of "the three dimensions of sustainable development: the economic, social, and environmental" (United Nations, 2017), in other words: economic growth, social inclusion and environmental protection.

24 According to Elkington (1997) there are "seven sustainability revolutions" that will lead to a "sustainable capitalism transition", in which "business, much more than governments or non-governmental organizations (NGOs), will be in the driving seat": (1) from 'compliance' to 'competition (in markets); (2) from 'hard values' to 'soft values'; (3) from 'closed' to 'open' (transparency); (4) from 'product' to function' (life-cycle technology); (5) from 'subversion' to 'symbiosis' (in partnerships); (6) from 'wider time' to 'longer time'; and (7) from 'exclusive' to inclusive' (in corporate governance).

25 Thee five pillars are explicitly used in chapters 7 and 8 that are based on findings of chapters 2-6.

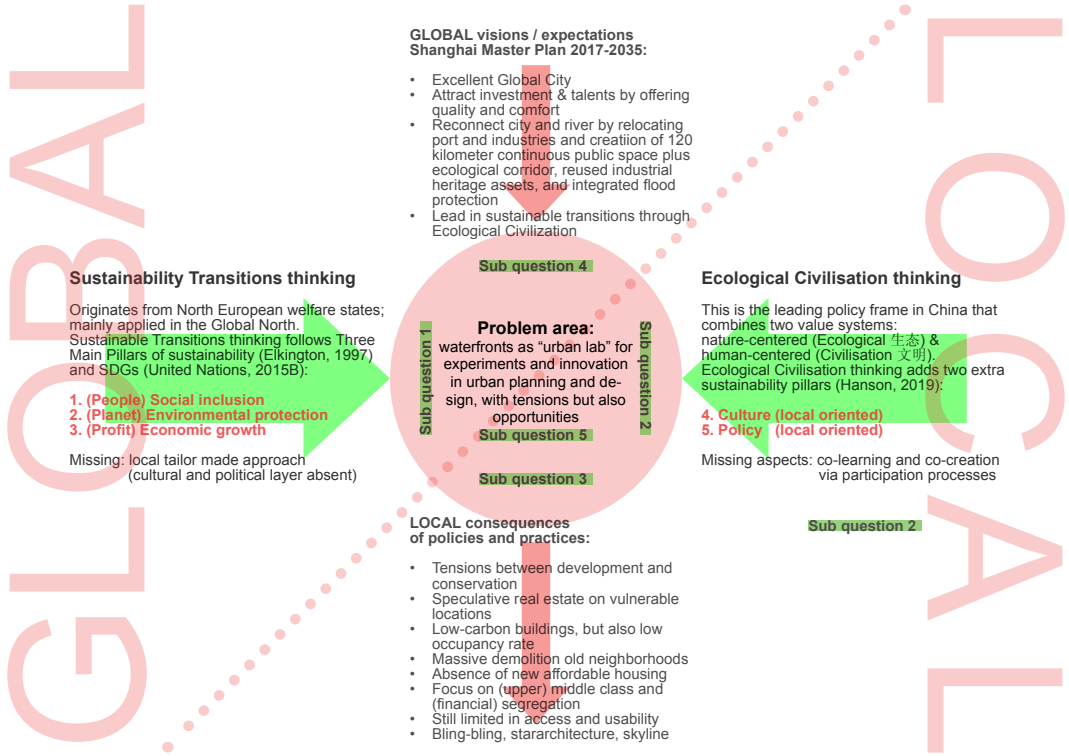

FIG. 1.6 Theoretical framework (by author)

1.7 Methodology for Data Analysis

Because access to reliable data in China is difficult, and because real effects in urban planning and design are more measurable through on-site observation and interviews with users and stakeholders, an empirical research method was chosen. Empirical evidence for this research is collected via on site observations, interviews, and multiple workshops with students and professionals, initiated by the author. A lot of data was also obtained through an efficient combination of research with my own practical work, because I did the research in my spare time, without funds, and also had to continue my regular work obligations. For example, an important foundation for data collection was laid via seminars and design workshops with international and local architecture and urban planning students at Tongji University's College of Architecture and Urban Planning, between 2017 and 2022, and during fieldwork with

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students at the Shanghai University of Finance and Economics as part of the authors' course 'city and environment', between 2015 and 2019. During site visits there were conversations with local people, varying from construction workers and farmers to real estate specialists, and more in-depth conversations with key-stakeholders, including local officials, entrepreneurs, nature conservation specialists, and urban planners. Desktop research was carried out to review Sustainability Transitions and Ecological Civilization literature, and relevant planning documents at the municipal and national level (when needed with translation and interpretation). The author co-organized and participated in multiple knowledge exchange projects in cooperation with various universities in Shanghai and abroad.

The research method for this research is based on a qualitative approach, with literature study, site observations, interviews with main stakeholders (including local authorities, design institutes, designers, engineers, real estate specialists, artists, researchers, farmers, office workers, visitors, and residents). The research is implemented based on two main case studies – further explained in the next paragraph 1.8 – as often practiced in social sciences for complex matters (Yin, 2003; Flyvbjerg, 2006). The large amount of collected data offers a starting point for additional research after completion of this research. Besides research questions also a set of original propositions have been put forward (see separate attachment). The findings are unique for these cases thus can't function as blueprint for other cases elsewhere, but offer handles and global insights to be adapted elsewhere, and to be further developed as a tailor-made local solution with relevant elements of both theories combined, as further explained in paragraph 1.6.4.

FIG. 1.7 One of multiple site visits at the Huangpu River waterfront (Photo by my students, 2021).

1.8 Two National Demonstration Zones as Research Case: the Huangpu River Waterfront Transformation, and Chongming Eco-Island

National Demonstration Zones in China usually serve as a model for economic development. By demonstrating best practices – pilot projects (see 4.2.1) – and providing a platform for experimentation and innovation, they serve to introduce new policies and set guidelines as exemplary for the whole nation. By studying two National Demonstration Zones– which are both established with as main aim to show how sustainable development can be achieved – in Shanghai, we can learn here how the ambitions and promises imposed from above, by the national government in Beijing, are translated into daily life reality on the ground. With the help of these empirical findings the theoretical framework will be tested.

Both the Huangpu River waterfront transformation and the Chongming Eco-Island project are as National Demonstration Zones meant to show not only locally, but especially also to the world, how sustainable (urban) development can be achieved. Both are inherently related with waterfront transformations and play a central role in the (urban) delta system of the metropolis Shanghai. The two are selected as a complementary couple, one in central urban area along the Huangpu River, and one at the peri-urban fringes of Shanghai in the estuary of the Yangtze River. The two are considered of crucial importance in Shanghai, as stated in the latest master plan for the city, with a sample function for China and even beyond the national borders (Shanghai Municipal People's Government, 2016), especially in terms of sustainable urban planning and design, low-carbon transitions, and a harmonious integration of nature and culture in line with the principles of Ecological Civilization thinking. Hence, they serve as an ideal test case in answering the central question in this research.

Both socio-technical experiments are in ambition comparable with the concept of 'urban lab' (see paragraph 4.2.1) as used in Sustainability Transitions theories – although there is a difference in scale, impact, and stakeholder selection.

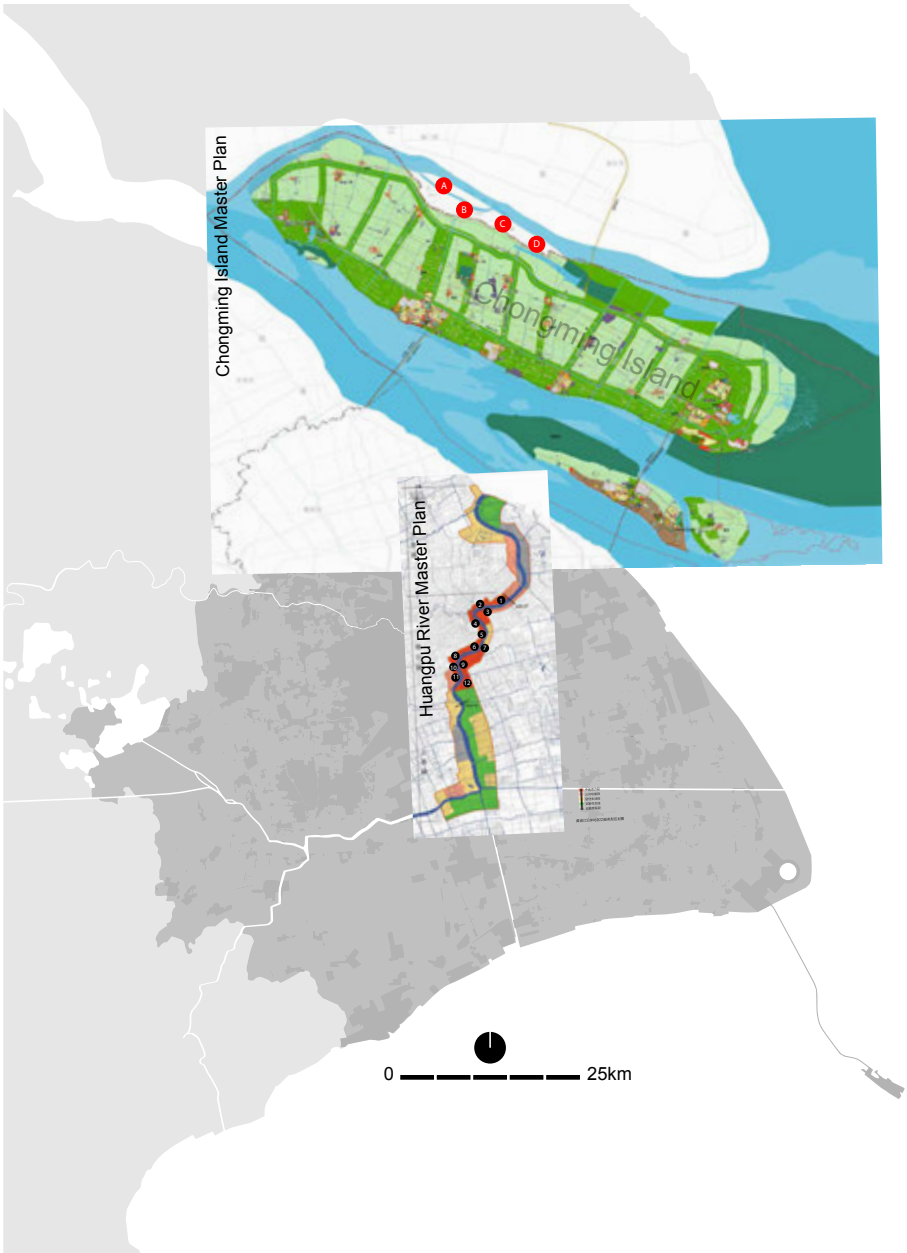

FIG. 1.8 Master plans of the two National Demonstration Zones inserted on the municipal map. The locations of urban megaprojects along the Huangpu River are depicted as black dot, and the peri-urban housing projects as red dot (source: Shanghai Municipal People's Government; background map and adjustments by author).

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Relations between urban and rural are reciprocal (Cronon, 1991), as argued in the following chapters. For this reason, two seemingly contradictory cases are chosen, within the jurisdiction of the Direct-controlled Municipality of Shanghai, which are both official National Demonstration Zones: the urban Huangpu Riverfront (case 1), and the rural Chongming Eco-Island (case 2). Since mid-19th century Shanghai is the global financial center of China and a mix of extremes: High-Tec and low-tec, informal wet markets and luxurious malls, rich and poor, rural, and urban, high-density, and low-density, traditionalism and avant-garde, strict state-control, and an emerging voice of a civil society. The two cases are somehow contradictory extremes too, with still mainly a traditional lifestyle, sometimes even disconnected from the sewer, on Chongming Island (trough limited accessibility before opening of the bridge-tunnel combination in 2009) while along the Huangpu River we find an accumulation of wealth, luxury, and comfort, with expensive cars and words highest real-estate values (Williams, 2021). Yet, the two cases do have important cultural-historical[26] and economic[27] links.

Thanks to fertile farmland in the Yangtze River Delta Shanghai emerged as a prosperous metropolis (King, 1911). Chongming Island not only provides food supplies but also labor force (e.g., a major share of Shanghai's cabdrivers originates from Chongming). Nowadays developments in the urban core have a direct relation with the fringes, in term of real estate values, speculation, migration, and recreation. In Shanghai's rural fringes, especially also on the still idyllic natural edges of Chongming, there is an increasing exurban development that express a new urban-oriented lifestyle of prosperity, with luxurious real estate, golf courses and marinas. Project like Long Island[28], as described in chapter 5 are like 'pockets of wealth', in fact they are for locals hardly accessible enclaves and mainly owned by investors from central Shanghai.

26 Such as the merchant guild at the South Bund that served Chongming Island (Den Hartog & González Martínez, 2022).

27 Such as land use compensation strategies to allow the city of Shanghai to expand the urban areas agricultural land needs to be compensated to guarantee food security.

28 Many designers from the Global North have contributed to various parts of the debatable plan, including renowned agencies such as the Boston-based firm Sasaki. On their website they acknowledge that "the mouth of the Yangtze River is one of the most fragile and threatened ecosystems in the world", and mention that the previously approved master plan […] established a legal framework" but "disregarded key site features and overlooked multiple opportunities that could result in a more sustainable development approach" and "restricted the potential for hydrological connections and wildlife movement". Nevertheless, the ongoing real estate tension the office designed a new plan that "prioritizes the landscape, promotes social engagement, and offers a diverse park system that connects the community to the region's landscape heritage" (https://www.sasaki.com/projects/chongming-island-xincunsha-master-plan).

Both demonstration zones are large-scale socio-technical experiments, and received unlimited input, and support from a wide range of international stakeholders – investors, designers and engineers participating in multiple design competitions, academics invited to dozens of seminars and workshops, and even politicians e.g., the Dutch royal family, and (former) presidents of the UK and France.

Both projects are expected to lead to world-class standards (Shanghai Municipal People's Government, 2016). For this reason, multiple international stakeholders have been involved for international knowledge exchange during expert meetings and design competitions. Both projects aspire to connect with a new desired (international oriented) lifestyle – although this breaks with local communities – rural residents and farmers, respectively (port-related) working class neighborhood residents – and offer event spaces for the happy few, opportunities for tourism and leisure, and position themselves as vehicle for city branding (Chongming: Floriade; Huangpu: Expo, SUSAS, etc.), aimed to attract a selective innovation oriented or creative oriented group of talents, and investors.

This research evaluates how the ambitions and promises of urban planning and design are translated into realities on the ground for both cases. Analyses and evaluation of recent efforts of these two demonstration zones is expected to lead to new theoretical and practical insights about the guiding role of urban planning and design, through a combined lens of Sustainability Transitions theories and Ecological Civilization thinking. The cases are used to test how insights from Sustainability Transitions can be extended and adjusted wit insights from Ecological Civilization thinking, in chapters 7 and 8. The next two paragraphs provide basic background about the two cases, which is elaborated further in chapters 2-6.

1.8.1 Huangpu River Waterfront: National Demonstration Zone for the (Sustainable) Development Capability of Shanghai as Global City

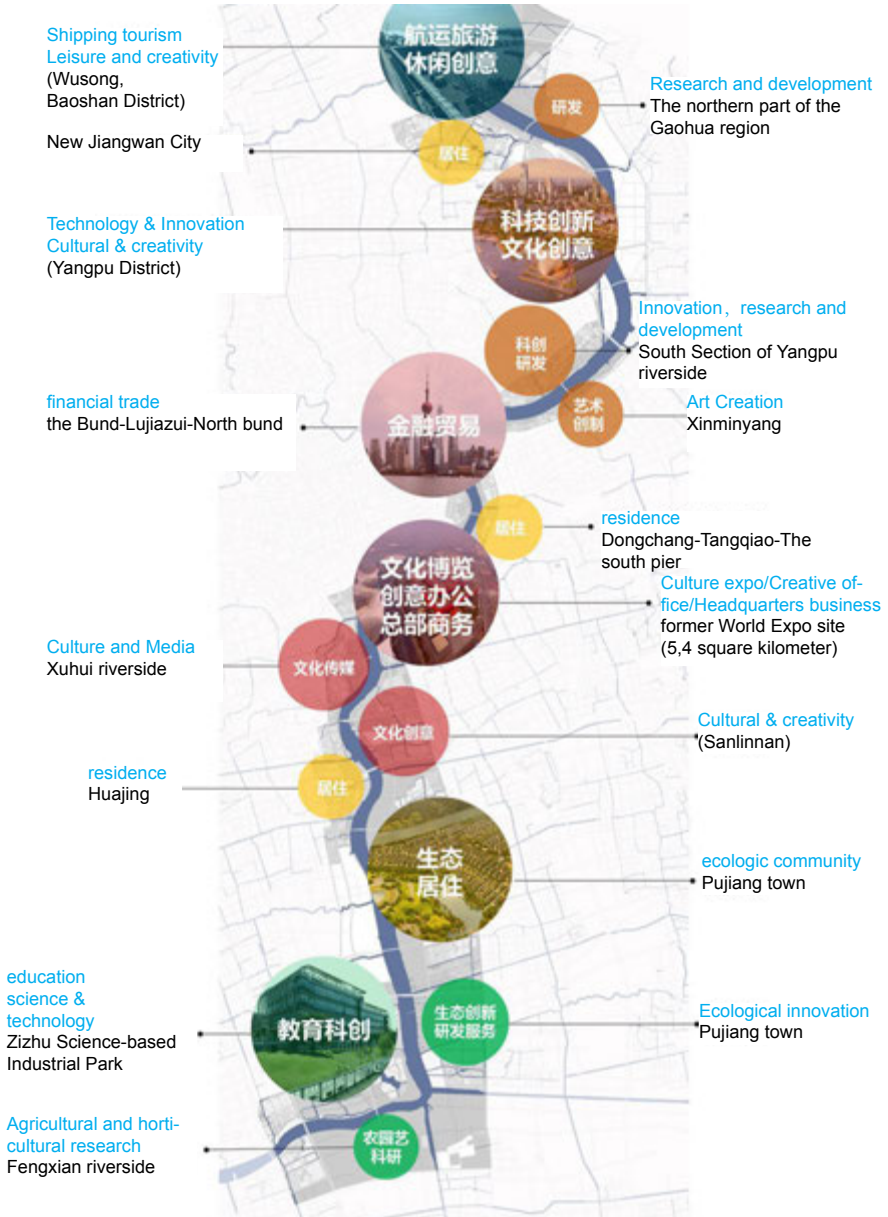

FIG. 1.9 Huangpu River waterfront as National Demonstration Zone with mulitple pilot projects (source: Shanghai Municipal People's Government, adjusted by author)

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In 2016, the Huangpu waterfront became a “National Demonstration Zone for the development capability of the global city of Shanghai” [29], meant to show to the world how sustainable development can be achieved (Shanghai Municipal People’s Government, 2016). Like other world ports, prosperity and international trade in Shanghai started at the Waterfront, located along the largely manually excavated Huangpu River strategically close to the mouth of the Yangtze River and the estuary, with connections both inland and worldwide. Since the beginning of this century, the port functions are increasingly relocated to the city edges and beyond, with the Yangshan Deepsea Terminal as icon. As a result, the old port areas are freed up for urban development, analogous to other world ports (Meyer, 1999; Brownill, 2013; Hein, 2016).

Shanghai’s latest master plan states that by implement the national strategy of this demonstration zone it is playing “a pioneering role in the reform and opening-up in the new era and set up the pace for innovation and development”. As direct result of the World Expo 2010 the Huangpu River is positioned as “functional development axis” and “cradle of China’s modern finance, trade and industry” with “Ecology as the foundation, and Culture as the soul” (Shanghai Municipal People’s Government, 2018).

The iconic image of Shanghai’s classic Bund with colonial bank buildings facing the contemporary skyline of Lujiazui Financial District is symbolic of China’s reopening and connection to the world. World Expo 2010 in Shanghai, with as motto ‘Better City, Better Life’ played a key role in the redevelopment of the waterfronts along the Huangpu River, as socio-technical experiment, and accelerator of urban regeneration. This expo emphasized the renewed international position of Shanghai, emphasized by it central urban location on either side of the Huangpu River on former docklands, connecting both sides of the city symbolically and physically – with new tunnels and a bridge – and with the Chinese hinterland and the world

29 The Huangpu River and Suzhou Creek are together “the representative space and iconic carrier in the efforts to build Shanghai into an international metropolis” (as depicted in the Shanghai Urban Planning Exhibition Hall at People’s Square since 2022). The Huangpu River is “a centralized display of development capabilities in an international metropolis”, while the Suzhou Creek is “a typical demonstration zone of livability in an international metropolis”. Both together are expected to give Shanghai “a world-class waterfront with global influence” (quotes from the permanent display in Shanghai Urban Planning Exhibition Hall, 2022).

(see 3.4 and 4.3.2). As physical legacy[30] the expo was a leverage for the ongoing large-scale waterfront redevelopment.

Nowadays Shanghai's classic Bund has multiplied itself into a dozen new Bunds (see Figure 1.10, Figure 1.11, Figure 1.12, and Figure 4.1) which are corporate real estate clusters or so-called urban megaprojects (see chapter 4). As physical connectors between the local and the world economy, the regenerated waterfronts of many world ports today form the scene of prosperity and an expression of power (Zukin, 2006). The former industrial waterfronts play a key role in Shanghai's new positioning, not only as new continuous public space and "urban living room" (Shanghai Municipal People's Government, 2016), but also in terms of new ecological connection, and flood protection[31]. The urban regeneration offered an opportunity to remove polluting industries and to bring more green and public space into the city (Shanghai Municipal People's Government, 2016). The waterfront renewal means a further spatial densification, opposed to sprawling urban extension on (agricultural) land at the urban fringes. The projects excel in the use of low-carbon buildings in pedestrian-friendly ensembles (Den Hartog, 2019). Though also with strong gentrification effects on adjacent neighbourhoods, which are recklessly demolished after outplacement of residents.

30 Another legacy of this World Expo 2010 is the yearly recurring World Cities Day on 31 October, designated by the United Nations firstly in 2010 during the closing ceremony of the expo, while releasing the Shanghai Manual for Better Cities – alternatively also named The Shanghai Declaration (United Nations Department of Economic and Social Affairs, 2011). In the run-up to the Rio+20 conference this document (United Nations Conference on Sustainable Development, 2022) set op some guideline for realizing "urban sustainability" and "sustainable, livable and harmonious cities" (United Nations Department of Economic and Social Affairs, 2018). Urban governance was seen as the key. Many of the themes of this declaration preluded the current pathway of the Shanghai Master Plan 2017 - 2035 (Shanghai Municipal People's Government, 2016), especially the commitment to promote the use of renewable energy sources and aim for a strong reduction of carbon emissions.

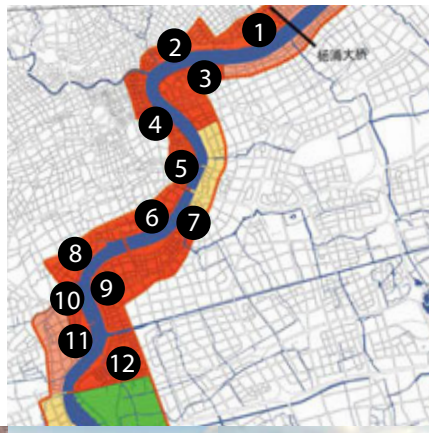
31 Since 2019 the waterfront design guidelines changed from "hydraulic engineering design" to "overall space design" (Shanghai Urban Planning and Natural Resources Bureau et al., 2019).

Urban megaprojects along the Huangpu River in the Central City since 2012

1: Yangpu Waterfront
700,000 m² R&D and culture (in progress)
2: North Bund CBD
2,350,000 m² grade-A offices, hotels, retail (built)
+8,4 million m² extra as announced in 2022 (planning)
3: Harbour Financial City
1,360,000 m² grade-A offices & retail (built)
4: Bund Financial Center
426,000 m² grade-A offices, culture & retail (built)

Vacancy rates 20% and higher

Photos by author 2018-23;
Maps by Shanghai Municipal People's Government, adjusted by author



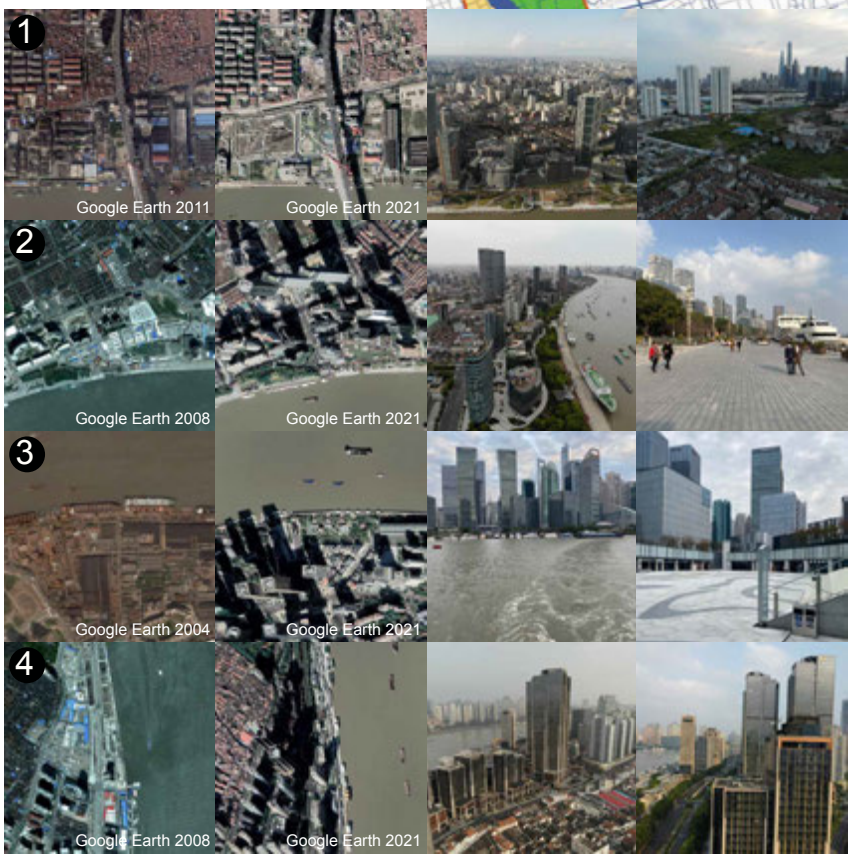


FIG. 1.10 Former port-related waterfronts as scene for massive real estate speculation: urban megaprojects along the Huangpu River since 2012 in (mapping and photos by author).

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Urban megaprojects along the Huangpu River in the Central City since 2012

5: Greenland Bund Finance City
1,200,000 m² grade-A offices & retail (built)
6: Urban Best Practice Area
120,000 m² art & culture pilot (built)
7: Expo Park
2,000,000 m² grade-A offices, retail & culture (built)
8: West Bund Financial City (art and culture pilot)
1,800,000 m² offices (in progress)

Vacancy rates 20% and higher

Photos by author 2018-23;
Maps by Shanghai Municipal People's Government, adjusted by author

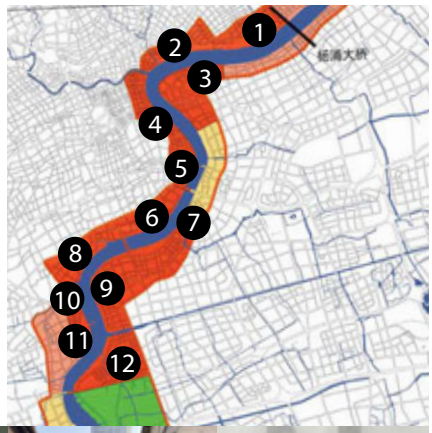

FIG. 1.11 Former port-related waterfronts as scene for massive real estate speculation: urban megaprojects along the Huangpu River since 2012 in (mapping and photos by author).

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FIG. 1.12 Former port-related waterfronts as scene for massive real estate speculation: urban megaprojects along the Huangpu River since 2012 in (mapping and photos by author).

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1.8.2 Chongming Eco-Island: National Ecological Demonstration Zone

FIG. 1.13 Chongming Island Master Plan (Source: Chongming District authorities)

Chongming Island has been established as “National Ecological Demonstration Zone” in the 9th Five-Year Plan (2016-20) in 1996 (Sze, 2015; Ma et al., 2017), and was to serve as a pilot project for sustainable urban planning (Xin et al., 2017). Its status was updated into a “World-Class Eco-Island” since 2016 (13th Five-Year Plan, 2016-20) – although the latter term mainly targets for investments (The Agricultural and Rural Committee of Chongming District, 2019).

National demonstration zones usually already have a track record and strong potential (for successful results) in their specific field, as we can also see in the two zones in this study. However, the case of Chongming Eco-Island is partly an exception: the original plan included the construction of half a dozen eco-cities based on high-tech industries, but these have been canceled after a political disruption (Den Hartog, 2017B). Yet today, this case still targets agricultural innovation industries and low-impact industries.

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The still agricultural dominated Chongming Island is increasingly becoming a recreational outlet for the city. Moreover, it's fringes also became an investment opportunity for real estate since the opening of the tunnel-bridge in 2009. As a case it shares many similarities with the new Huangpu riverbanks – regarding recreational urban use and speculation, under a banner of environmental improvement – and also is related to it as an urban 'granary' that supplies the city via ships that are unloaded at urban quays, and with a merchant guild at Dongjiadu (Den Hartog & González Martínez, 2022). Not unimportant is the fact that China's largest shipyard and related industry, formerly on the Huangpu River, has been relocated to the Chongming District. Since early this century most ports and related facilities and industries have been relocated from the Central City of Shanghai along the Huangpu River to decentral locations along the coast of Pudong District and to Chongming District (Figure 1.13) with more space for large-scale new port developments and better accessibility for larger ships, and less polluting pressure on urban areas. These new port locations are accompanied by new towns and new cities, to house port related workers such as in Lingang New City (Den Hartog, 2010). Additionally, the new towns and other real estate projects here are mainly targeting to inhabitants of Shanghai that fancy investment opportunities, on reclaimed land (Den Hartog, 2019).

Both the Huangpu River and Chongming Eco-Island play a crucial connecting and accelerating role in a newly constructed ecological network (see appendix G and H), which is supposed to interconnect the high dense urban area and urban fringes in an urban-rural harmonious balance. Within the municipal territory the "key ecological region" is formed by "Chongming world-class ecological island" and "the coastal wetlands in the Yangtze Estuary, with Jiuduansha Wetland and Chongming Dongtan as important wetland space to protect international bird migration routes – two RAMSAR zones are included (see 5.3 and 6.3.5), and in July 2022 it has been nominated for Unesco World Heritage (Yi, 2022).

“Ten Mile Bund” on Chongming Island (the part that belongs to Jiangsu Province)

A: Greenland Long Island
70,000 apartments (after limitation)
Sunac Sea Paradise
1,500 apartments (after limitation)
Guru yingtai
3,000 apartments (after limitation)

B: Da’ai City
11,500 apartments (after limitation)

C: Country Garden
3,500 apartments (after limitation)

Vacancy rate 97% and higher

Photos by author 2018-23;
Maps by Shanghai Municipal People’s Government, adjusted by author

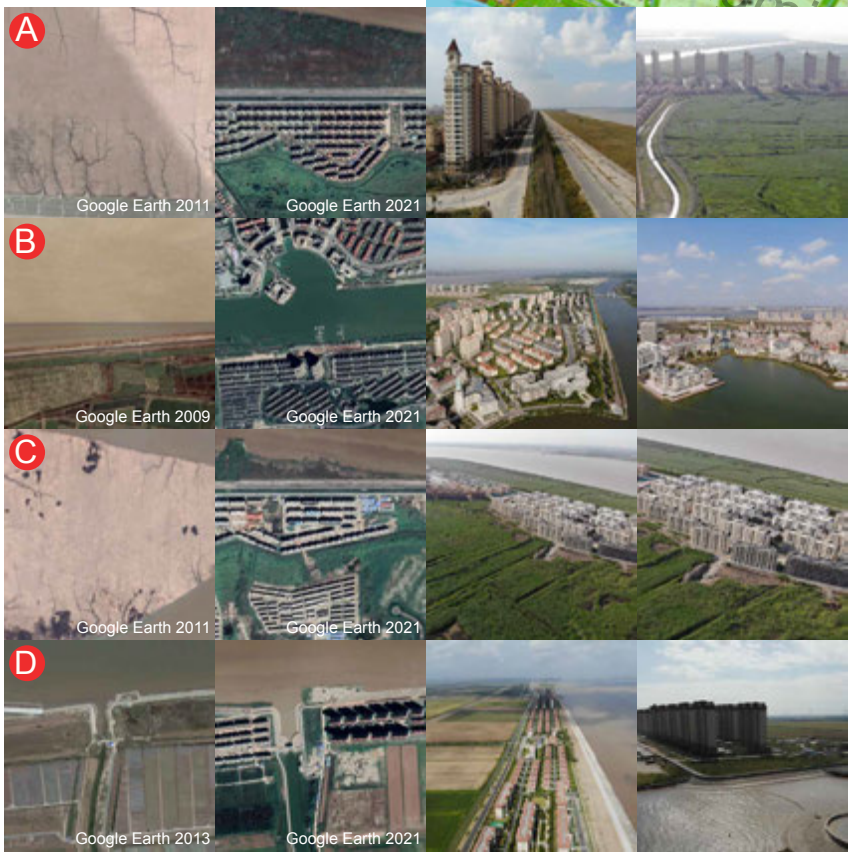

FIG. 1.14 Peri-urban waterfronts as scene for massive real estate speculation: luxurious housing estates on Chongming Eco-island on reclaimed wetlands since 2014 (mapping and photos by author)

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1.9 Limitations

The study has some limitations because potential sensitivities – the discussed projects are of high political importance, especially since General Secretary Xi's waterfront inspection in November 2019, and additionally the navy is a main stakeholder along the waterfronts. Also, though translation was continuously available, the interpretation may be viewed differently. Moreover, in the Chinese context, access to reliable numerical data can be complicated, although as a faculty member at Tongji University I could relatively easy find sources. Hence a qualitative research approach has been used in this study. Multiple consults with various stakeholders, thorough peer reviews of the paper-based chapters, and proof readings of the whole research ensure that possible biases or misinterpretations are removed.

1.10 Structure of the Research

This research is structured around five previously published peer-reviewed articles. The main body – chapter 2-6 – is offered by one peer-reviewed book chapter and four original peer-reviewed articles in academic journals. The structuring of these five chapters can be approached as an anthology, with each chapter approaching the ongoing transitions from a slightly different perspective. During the research period also, other related publications have been produced – see bibliography author – which where useful to gain new insights. Where needed a reference is made to them.

Chapter 1 of this research introduces the problem, research question and research design.

Chapter 2 answers the question how Shanghai can manage to implement large-scale ecological improvements – in the context of high building density, land scarcity, and booming real estate prices – (for its waterfronts) and how can Shanghai integrate ecological values with its other aims, such as flood defense, place-making, and the preservation of industrial heritage. This chapter is originally a peer-reviewed book chapter *Shanghai's Strive to Excel in Climate Change Adaptation and Low-Carbon Promises: A Model to Follow?* published in 2023 by NYU Press, and functions as an introduction to the wider context of the research and explains the status

quo of sustainable urban planning and design in Shanghai. This chapter also elaborates on promises and effectiveness of Ecological Civilization policies and the Shanghai 2035 master plan.

Chapter 3 answers the question how urban regeneration processes along Shanghai's waterfronts can be steered into more sustainable paths, while keeping historical continuity and ecological values, and creating attractive well-functioning new environments, and which lessons be taken from Sustainability Transitions theories. This chapter is originally a peer-reviewed journal paper with as title *Re-defining the appreciation and usability of urban watersides in the urban center and peri-urban fringes of Shanghai,* published in 2019. In this chapter the appreciation and role of living and working along waterfronts in the context of China's extremely rapid and large-scale urbanization is assessed. The paper further explains how, in the context of extreme urban pressure in Shanghai, the well-manicured new urban watersides are visually attractive and promising, but functionally not optimal due to various reasons. In this chapter the two main cases, which are both National Demonstration Zones, are introduced: the Huangpu River waterfront transformation, and Chongming Eco-Island. Both are meant to show how sustainable development can be achieved.

Chapter 4 answers the question how an 'urban lab' as in Sustainability Transitions theories can be identified in the context of Shanghai and how these pioneering projects can contribute to a sustainable transition effort. In this chapter – which is identical to the paper *Shanghai's Regenerated Industrial Waterfronts: Urban Lab for Sustainability Transitions? Urban Planning* published in 2021 – the role of pilot projects, in the guise of urban megaprojects, along the Huangpu River are identified and assessed. It examines how these innovation-oriented projects contribute to Shanghai's effort to take the lead in developing sustainable transitions in urban planning and design. This chapter also explains how these so-called urban megaprojects contribute to an overcapacity and monofunctional supply in real estate along the waterfronts – exclusively cultural or commercial spaces, still largely unoccupied (at least 25-50%), and lacking housing – and disrupts the good intentions.

Chapter 5 answers the question on which factors can explain the process of seemingly unbridled urbanization at Shanghai's fringes and the roles do planning processes play in this development? It also clarifies which changes in spatial planning and design approaches are needed to mitigate the negative impacts of massive unplanned real estate developments along Shanghai's rural (peri-urban) waterfronts. This chapter is originally a peer-reviewed journal paper with as title *Rural to urban transitions at Shanghai's fringes: Explaining spatial transformation in the backyard of a Chinese mega-city with the help of the Layers-Approach* published

in 2017 and explores the (spatial) consequences of extreme urban pressure on Shanghai's vulnerable peri-urban and rural fringes. It explains how the top-down policy to transform Chongming Island into an Eco-Island contains discrepancies with promises of local policies, practices, and daily life realities. This chapter clarifies how – to a certain extend analogue to the real estate projects along the Huangpu – real estate speculation is disrupting the promises, and conflicts sharply with local cultural and natural values at Shanghai's peri-urban fringes on Chongming Island. Here high-end housing complexes, almost completely (97%) unoccupied, appear along the waterfronts on vulnerable locations. This chapter explains how a lack of relationship toward natural, cultural, or societal contexts in urban planning and design practices easily results in serious disturbances and derailments if expectations, definitions, priorities and aims, on national, provincial, and local level are not shared by all actors. It emphasizes the need to match with daily life realities to enable a sustainable transition.

Chapter 6 answers the question how city builders and planners in Shanghai seek to improve the balance between wetland protection, urban development, and climate change adaptation, in the context of an extremely high population concentration, world's highest real estate values, and continuous urban development pressure. This chapter is originally a peer-reviewed journal paper with as title *Engineering an Ecological Civilization along Shanghai's main waterfront and coastline: Evaluating ongoing efforts to construct an urban eco-network* published in 2021. This chapter shows how experimental, sustainable-branded, projects along Shanghai's main urban and peri-urban waterfronts and coastline could derail – in the context of an extremely high population concentration, world's highest real estate values, and continuous urban development pressure –, despite decisive ambitious government action, if definitions are not shared and expectations for the future are not co-created.

Chapter 7 discusses the findings of previous chapters and elaborates on how urban planning and design approaches of the direct-controlled municipality Shanghai can be understood as proactive in relation to Sustainable Development Goal 11 through the lens of the combined concepts of Sustainability Transitions theories and Ecological Civilization.

Chapter 8 answers the overall research questions – as introduced in paragraph 1.5 – on how insights from Sustainability Transitions theories and Ecological Civilization thinking can enrich each other and can be applied in a useful way in the context of Shanghai. This chapter concludes with practical and policy recommendations.

TABLE 1.1 Position of chapters (papers) linked with the main cases, and their role within this research (by author).

Chpt	Title	Position of chapter	Main question (per paper = chapter)	Main findings
1	Introduction (problem statement; research questions; conceptual framework; methodology)			
2	Shanghai's strive to excel in climate change adaptation and low-carbon promises. (Den Hartog, 2022)	This chapter introduces and assesses the official ambitions of Shanghai's latest master plan (Shanghai Municipal People's Government, 2016) of sustained economic growth as well as promises of environmentally sustainable futures. Broad introduction Shanghai climate change challenges; focus on rising environmental awareness	How can Shanghai manage to implement large-scale ecological improvements – in the context of high building density, land scarcity, and booming real estate prices – (for its waterfronts) and how can Shanghai integrate ecological values with its other aims, such as flood defense, place-making, and the preservation of industrial heritage?	China is aware of its environmental challenges; and is willing to play a leading role in a green transition; main obstacles: different phase of development with other priorities and expectations, and discrepancies in definition, appreciation, and valuation of ecological assets
3	Re-defining the appreciation and usability of urban watersides in the urban center and peri-urban fringes of Shanghai. (Den Hartog, 2019)	Cases 1 & 2: introduction ambitions, policies and practices; focus on public space, place-making and urban design	How can urban regeneration processes along Shanghai's waterfronts be steered into more sustainable paths, while keeping historical continuity and ecological values, and creating attractive well-functioning new environments, and can lessons be taken from Sustainability Transitions theories?	Political vigor with drastic spatial and economic measures doesn't automatically result into realization of expectations. The general quality of the new waterside projects is very high, but yet fails to fully utilize all potentials. Although there are adjustments and improvements, a more inclusive approach is needed, to benefit from social learning and match the needs for daily life usage.
4	Shanghai's Regenerated Industrial Waterfronts: Urban Lab for Sustainability Transitions? (Den Hartog, 2021B)	Case 1: waterfront redevelopement in central city; conflicts with real estate speculation; focus on socio-economic aspects	How can an "urban lab" as in Sustainability Transitions theories be identified in the context of Shanghai and how do these pioneering projects contribute to a sustainable transition effort?	If an Ecological Civilization approach expects to bring harmony by balancing environmental, economic, and social dimensions, then the real estate projects along the waterfronts are not a convincing demonstration of this potential. They aim exclusively on high end income groups, which doesn't add to urban vibrancy. This crucial to attract foreign companies and investment.

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TABLE 1.1 Position of chapters (papers) linked with the main cases, and their role within this research (by author).

Chpt	Title	Position of chapter	Main question (per paper = chapter)	Main findings
5	Rural to urban transitions at Shanghai's fringes: Explaining spatial transformation in the backyard of a Chinese mega-city with the help of the Layers-Approach. (Den Hartog, 2017)	Case 2: waterfront redevelopement at peri-urban fringes; conflicts with real estate speculation; focus on correction mechanisms and improvisation	How are city builders and planners in Shanghai seeking to improve the balance between wetland protection, urban development, and climate change adaptation, in the context of an extremely high population concentration, world's highest real estate values, and continuous urban development pressure?	A lack of relationship toward natural, cultural or societal contexts in urban planning and design practices result in disturbances. Expectations, definitions, priorities and aims – on national, provincial, and local level – need to be shared and match with daily life realities to realise a sustainable transition.
6	Engineering an ecological civilization along Shanghai's main waterfront and coastline: Evaluating ongoing efforts to construct an urban eco-network. (Den Hartog, 2021A)	Cases 1 & 2 (extended to main urban waterfronts and coastline, and green buffers): reflection on Ecological Civilisation thinking; focus on ecological aspects	How can Sustainability Transitions thinking be applied in a useful way in the context of Shanghai, with additional insights from Ecological Civilization thinking?	China, with Shanghai as a frontrunner, is willing to play a leading role in enabling a sustainable transition, but there are hurdles. This chapter gives practical recommendations aimed to reduce discrepancies between expectations and daily life practice: (1) use clear definitions; (2) co-create a shared vision; (3) stop building on vulnerable locations; (4) create conditions of social learning; (5) supervision needs to go beyond planning boundaries; (6) step beyond an anthropocentric approach; and (7) foster a more experimental approach.
7	synthesis & discussion			
8	conclusions & recommendations			

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2 Shanghai's Strive to Excel in Climate Change Adaptation and Low-Carbon Promises

Den Hartog, Harry (2023). Shanghai's Strive to Excel in Climate Change Adaptation and Low-Carbon Promises: A Model to Follow? In: (ed.) Danielle Spiegel-Feld, Katrina Wyman, John Coughlin. *Global Sustainable Cities - City Governments and Our Environmental Future*. NYU Press.

This chapter is a slightly adjusted version of above-mentioned peer-reviewed book chapter – only the numbering of paragraphs and the citation style has been adjusted, and an explanation of the position of this chapter in this research and a list of main findings have been added on this introducing page.

Position of chapter within this research: This chapter introduces and assesses the official ambitions of Shanghai's latest master plan (Shanghai Municipal People's Government, 2016) of sustained economic growth as well as promises of environmentally sustainable futures and how this can be combined and translated into realities on the ground. It also explains the main environmental challenges and actions Shanghai is taking to adapt to climate change.

Research question: How can Shanghai manage to implement large-scale ecological improvements – in the context of high building density, land scarcity, and booming real estate prices – and how can Shanghai integrate ecological values with its other aims, such as flood defense, place-making, and the preservation of industrial heritage?

Main findings

- There is a rising societal and political environmental awareness, in some respects perhaps more progressive than in most other countries. China is aware of its environmental challenges and responsibilities and is willing to play a leading role in a green transition.
- The main obstacles are that China is in a unique position, a different stage of development – compared to both countries in the Global North as well as in the Global South – with other priorities and expectations, and discrepancies in definition, appreciation, and valuation of ecological resources.

2.1 Green Promises of Shanghai's Latest Master Plan

The subtitle of Shanghai's latest master plan (2017–2035) is "Striving for an Excellent Global City." According to this plan, Shanghai wants to compete with, and possibly surpass, other global cities such as New York, London, Paris, Singapore, and Tokyo with regard to economy, image, and quality of life. The plan's authors state that "the world has stepped into an era of Ecological Civilization that puts environmental friendliness and humanistic approach first." Shanghai aims "to play the pioneering role in the reform and opening up into this new era and set the pace for innovation and development" (Shanghai Municipal People's Government, 2016).

To achieve these aims, the master plan includes ecological ambitions and promises, such as a 5 percent reduction of total carbon emissions, a halving of particulate matter emissions, a ban on raw-waste landfills, and the development of more than three hundred square kilometers of new green structures, all to be realized before 2035. The plan also puts a cap on Shanghai's total population to a maximum of twenty-four million registered residents and adds red lines around the city to limit its footprint and protect agricultural lands against urban sprawl. Furthermore, the plan commits Shanghai to becoming "a more adaptable and resilient eco-city as well as a benchmark for international megacities in terms of green, low-carbon, and sustainable development by developing pilot spaces and infrastructures" (Shanghai Municipal People's Government, 2016). The message is clear: Shanghai wants not only to set a national example for other Chinese cities but also to cross borders to inspire others to become more adaptable and resilient.

How can Shanghai manage to implement large-scale ecological improvements—in the context of high building density, land scarcity, and booming real estate prices—when it took other metropolises, such as New York, Tokyo, and Singapore, many years to realize much less ambitious aims? And how will Shanghai integrate ecological values with its other aims, such as flood defense, place-making, and the preservation of industrial heritage? This chapter considers these questions, highlighting the tension between China's push toward growth and urbanization and the need to safeguard its cities from environmental threats. As is described, this tension has played out in stark terms in Shanghai, where leaders are grappling with how to advance their development objectives, which have historically relied on reclaiming wetlands, while adapting to rising seas and strengthening storms.

2.2 Ecological Vulnerability in Urbanizing Deltas

During the past three decades, urbanization across the globe has accelerated dramatically, especially in the world's emerging economies. China is without doubt a frontrunner in this trend. Most of the urbanization in China has occurred in a one-hundred-kilometer zone along its coastline and has been highly concentrated in three main deltaic areas: the Pearl River Delta, the Bohai Rim, and the Yangtze River Delta. These deltas are also where many fertile agricultural lands are situated (King, 1911) and where most of China's ecologically important wetlands exist (Paulson Institute, 2016).

Approximately 41 percent of the world's population lives in river deltas (Edmonds et al., 2000). Cities like Shanghai, Rotterdam, Amsterdam, London, Venice, New York, New Orleans, St. Petersburg, Russia, and many others were all at least partially built on wetlands and swamps. Due to their strategic location, deltas are the scene of complex land-use conflicts: urban development, infrastructure, ports, wetlands, and fertile agricultural land all fight for positions on the same land. And due to rapid large-scale urbanization and the prioritization of these other land uses, wetlands are increasingly under threat.

Wetlands are crucial eco-systems. They provide habitat and breeding grounds for almost 40 percent of all plant and animal species, as well as, either directly or indirectly, almost all of the supply of freshwater that is consumed around the

world (UN Climate Change News, 2018). Wetlands also provide a range of eco-system services, such as rainwater storage or sponge capacities, water purification, carbon sequestration, biodiversity conservation (Sutton-Grier and Howard, 2018), and is also critically important for storm surge protection (Möller et al., 2014). Wetlands can also provide limited options for urban recreation (limited to protect the wetland), which can be very valuable in cities with scarce open space. Despite all these benefits, nearly 35 percent of the world's wetlands were lost between 1970 and 2015, and this loss has been accelerating since 2000 (Ramsar Convention, 2018). Moreover, decision-makers often undervalue the importance of wetlands; urban wetland management and policy guidance is lacking around the world, and tensions usually exist between conservation and development (Ramsar Convention, 2018).

Since the 1950s, more than half of China's coastal wetlands have disappeared; 53 percent of temperate coastal eco-systems, 73 percent of mangroves, and 80 percent of near-shore coral reefs have vanished (Paulson Institute, 2016). This loss has occurred mainly because "huge economic returns from land reclamation have prompted local governments to 'bypass' regulations issued by the central government" (Larson, 2015). Reclaiming land from the sea is a relatively quick and cheap way to get more land and profits—although land needs four years to firm up and solidify in the Netherlands, for example, construction in China can often start within one or two years. Yet, while development on wetlands may appear economically attractive, it poses serious consequences in light of the rising threats of climate change: weakening the shoreline, increasing the vulnerability to threats of sea-level rise and flooding, and making adaptation more challenging.

2.3 Shanghai, China's Economic 'Head of the Dragon' in a Vulnerable Yangtze River Delta

Over many centuries, an efficient network of waterways steered the spatial and economic development of the Yangtze Delta in a relatively sustainable manner (Ball, 2017; King, 1911). This started to change in the middle of the twentieth century, when Chairman Mao ruled the country. Under Mao's leadership, there was a shift toward extreme technocratic engineering: "Man must conquer nature," Mao insisted (Shapiro, 2001). Natural capital and landscape values were neglected, and

planning practices were accordingly based on a tabula rasa approach. Many natural waterways in the region were transformed into canals, while others were dammed or cleared. More recently, during the past three decades, GDP-oriented motives also started to dominate waterfront planning, with additional collateral damage for eco-systems and livability, fed by extreme urbanization pressure, mass migration to the city from rural areas, and a change of lifestyle in the new urban areas. The combined effects of Maoist disregard for nature and capitalist tendencies to exploit it have wreaked significant damage on Shanghai's coasts and riparian lands.

The origins of Shanghai are inseparable from its location beside the water; the city's name even literally translates as "upon the sea." Along the coastline, there has always been a strip of natural wetlands that grew via sedimentation from the Yangtze River's estuary. This eastward shifting of the coastline largely created the territory of Shanghai. But since the 1950s, this natural process has been greatly accelerated by breakwaters and land reclamations. Approximately 40 percent of the tidal flats around Shanghai have disappeared since 1980, mainly due to land reclamations in the Yangtze estuary zone, Chongming Island, and along the coastline of Pudong. In total, these land reclamations have created about 816.6 square kilometers of new land between 1974 and 2018 (Xing et al., 2020; Tian et al., 2015). Shanghai currently still counts approximately 464,600 hectares of wetlands, mainly spread over Chongming, Pudong, and Qingpu districts (National Bureau of Statistics of China, 2020).

There is a constant clash between urbanization desires and ecological protection, and new lands are increasingly used for agriculture and urban expansion, including housing, airports, infrastructure, and recreational landscapes. One example of this clash is the Nanhui Coastal Wetland Reserve at the southeast edge of Shanghai's Pudong district, just south of Pudong International Airport, which saw a situation reminiscent of what occurred in Jamaica Bay in New York as that city made way for JFK Airport. In 2002, the huge wetlands reserve, measuring 122.5 square kilometer in area, was a tidal flat; it was reclaimed from the sea one year later. Officials planned to build Lingang New Harbor City there, with an expected eight hundred thousand inhabitants by 2020 (Den Hartog, 2010). This planned city was supposed to accompany the Yangshan Deep-Water Port complex, constructed in 2010—currently the largest container terminal in the world—and adjacent heavy-industry complexes. However, due to the remote and unattractive location, as well as a temporary collapse of world trade and container transport, the growth of the new city stopped. About three-quarters of the planned city has not yet been built and lies fallow.

In the original plan, the city would have been surrounded by lush nature and wetlands. Instead, a large part of the lands reserved for nature development is currently in use for aqua farming and plantations. From an agricultural point of view,

wetlands are often seen as wastelands, and thus farming, including aqua farming, is prioritized above nature conservation, especially in times when agricultural grounds are becoming increasingly scarce in the fertile region around Shanghai (Li, 2019; Li, 2020). However, there has also been pushback against the agricultural use of this land, in favor of conservation. A group of environmentalists, scientists, and nature lovers launched a protest, addressed to Tesla's new Gigafactory that started construction nearby, to raise awareness and counter the threat against the wetlands (Brelsford, 2019).

The so-called Long Island project at the northwestern edge of Shanghai's Chongming Eco-Island provides a more scandalous example of the tensions between conservation and urbanization. Chongming Island was appointed as a National Ecological Demonstration Zone in 1996 and was to serve as a pilot project for sustainable urban planning (Xin et al., 2017). But there was a loophole in the policy covering the northwest corner of the island, which developers and profit-seeking local governments exploited to their advantage. In short, under the guise of protecting land through conservation, natural wetlands have been reclaimed for the sake of massive speculative real estate (Den Hartog, 2017B). This loophole has since been adjusted by the central government – unfortunately, after the damage was already done (Den Hartog, 2019).

Besides threats of land reclamation, the wetlands also face threats from sea-level rise and changes in sedimentation due to a decrease in discharge after construction of the Three Gorges Dam in 2003 (Yang et al., 2005).

Despite each of these threats and challenges, it is encouraging that China, with Shanghai as a forerunner, is attempting to restore the damage that has been done to the environment during the past few decades of extreme massive urbanization. In 2018, the State Council launched a new regulation on land reclamation to protect coastal wetlands (State Council, 2018). And to compensate for the collateral damage of rapid urbanization, Shanghai is searching for ways to protect the remaining wetlands and stimulate the establishment of new ones.

2.4 China's Shift to an Ecological Civilization

China's extreme and hasty shift toward urbanization, accompanied by industrialization and intensified agricultural production, has resulted in prosperity and high living standards for many people. But it has also brought serious environmental pollution, a shortage of resources, social-economic imbalance, and increasing vulnerability to flooding and sea-level rise.

Since the beginning of this century, Chinese national policy has been increasingly searching for a new "green economy," which essentially turns away from the Western idea of industrialization (Linster and Yang, 2018). In this regard, President Hu Jintao was greatly influenced by the philosophy of the American architect William McDonough and chemist Michael Braungart, particularly their idea of cradle-to-cradle design and a circular economy (McDonough, and Braungart, 2002). In fact, since the People's Republic of China's eleventh Five-Year Plan (2006–2010), it has committed itself to achieving a green economy and has specifically pledged to increase the use of renewable energy sources, to reduce carbon emissions drastically, and to increase forest coverage of lands. In the twelfth Five-Year Plan (2011–2015), additional targets were added, including reversing ecological deterioration, and enhancing environmental regulatory institutions (Henderson and Joffe, 2016). In 2012, former president Hu called to "actively respond to global climate change" (Eighteenth National Congress of the Communist Party of China, 2012). China declared a "war on pollution" and started to introduce multiple green policies. It also started to decouple environmental pressure from economic growth (Linster and Yang, 2018) and promised that the year 2030 will be a turning point, not only because China promises to react effectively on the Sustainable Development Goals set by the United Nations (United Nations, 2015A; UN Environment Programme, 2019) but also because China is aiming to realize an Ecological Civilization by that time (Henderson and Joffe, 2016; Hansen, M.H. et al. 2018).

On March 11, 2021, the National People's Congress of China voted to pass the resolution on the fourteenth Five-Year Plan and the 2035 long-term goal outline (Xinhua News Agency, 2021). This plan sets out goals for an 18 percent CO_2 emissions reduction and a 13.5 percent energy-intensity reduction for the coming five years. This goal is significantly higher than what was set in Shanghai's master plan, and in the coming months, it will become clearer what this will mean for local policies. The previous Five-Year Plans showed a trend of overachieving the previously set goals, and according to some researchers, this will happen again in this new period (Liu et al., 2021B).

The concept behind “Ecological Civilization” has been gradually integrated into the policies of the ruling Communist Party since the seventeenth National Congress in November 2007 (Marinelli, 2018). The integration of measures to counterbalance the negative effects of environmental changes became a national strategy under General Secretary Hu Jintao in 2007: “We will adopt fiscal and taxation systems conducive to scientific development and set up sound compensation systems for use of resources and for damage to the ecological environment” (Hu, 2016).

Ecological Civilization can be defined as “a dynamic equilibrium state where humans and nature interact and function harmoniously” (Frazier et al., 2019). To realize an Ecological Civilization means a drastic societal reform with serious consequences for economy, society, and daily life. The concept of Ecological Civilization has received a lot of skeptical reactions from several international observers (Hansen & Liu, 2017; Wang et al., 2014; Wang-Kaeding, 2018). Although some scholars claim that Ecological Civilization originates from the Western discourses on ecological modernization (Zhang, 2007), it also has deep roots in Marxism and has the potential to challenge or even replace global capitalism (Gare, 2020). A remarkable aspect of the concept is the call for a new balance between top-down and bottom-up governance approaches and for exploring public-private partnerships and new forms of participation—ideas that are also mentioned in the final chapter of Shanghai’s latest master plan (Shanghai Municipal People’s Government, 2016). This is still in an elementary phase, and time will tell us how this will work out in practice over the next few years. However, outwardly, at least, General Secretary Xi has strongly endorsed the Ecological Civilization discourse and called for a more balanced model of economic growth. With his statement that “clear waters and green mountains are as valuable as mountains of gold and silver,” he stresses the economic importance of strong environmental action (Rudd, 2020).

In recent years, the concept of an Ecological Civilization has permeated Chinese urban planning and architecture. For example, in 2009, the National Development and Reform Commission established the “Low-Carbon City Initiative” – a discussion on “Low-Carbon City Initiative” projects in Shanghai can be found in Den Hartog et al. (2018) –, and in 2015, it launched the “Sponge City” initiative – A discussion about the “Sponge City” project in Nanhui (Lingang) can be found in Roxburgh (2017) –, which aims to create water storage buffers in so-called sponge districts to capture storm water. As part of these initiatives, several experimental pilot projects have also been implemented in Shanghai, with varying results.

2.5 Shanghai's steps toward Ecological Civilization

According to Shanghai's master plan, "citizen happiness" is fundamental to Shanghai's development and a key motivator of officials' efforts to build a prosperous and innovative city. To achieve citizen happiness, officials believe they must engineer "a desirable ecological city," which is formulated as "a beautiful space that meets the demands of the increasing number of citizens, where the water is more blue – when I interviewed representatives of the local urban planning office they literally told me they are searching for technologies to make the water more blue and transparent (personal conversation) –, and the land is more green, living in harmony with nature to satisfy the citizens yearning for a better life (Shanghai Municipal People's Government, 2016)."

A crucial step toward the implementation of Shanghai's Ecological Civilization and combat against climate change is the promise to create a "green and open eco-network," with at least 60 percent of the municipal land area used for ecological land (Shanghai Municipal People's Government, 2016). According to the master plan, this is an increase of about 10 percent of green lands compared with today—a massive amount, given the high building density and scarcity of land in Shanghai. In dense downtown areas, this green ambition will be realized in part through green roofs and other forms of vertical green infrastructure. To connect the downtown with the surrounding open landscape, a series of green corridors that are more than one thousand meters wide are planned, as well as large new wetlands along the coastline. Several huge new city parks, hundreds of small pocket parks, and small-scale green features on a neighborhood level are planned as well. A showcase of this ambition for ecological restoration is the massive transformation of former industrial waterfronts, explained in more detail in the following sections. Many of these green projects have already been implemented over the past few years or are under construction; in some cases, construction plans have been accelerated and prioritized due to the COVID-19 crisis.

Similar to the Green Belt around London and other green buffers, such as the Green Heart of the Randstad metropolis in the Netherlands, a main function of Shanghai's green and open eco-network is to accommodate the leisure needs of the emerging new middle class. The eco-network is intended to bring citizens closer to nature and to reconnect the city with the countryside—literally "introducing the forest to the city." Moreover, this green framework is considered to be a new backbone for urban development (an alternative to a water- or road-based one).

In 2015, the local authorities started constructing the "Overall Plan for Ecological Civilization System Reform," which is an integrated component of the Shanghai Master Plan (2017–2035). In this plan, the term "ecological space" refers to "land that is used to provide eco-system services in the city, including green land, forest land, garden land, cultivated land, tidal flat reed land, pond aquaculture water surface, unused lands, etcetera" (Shanghai Municipal People's Government, 2016). This broad definition seems to encompass all the land that is not an urban built-up area and not paved. However, the ecological values of these spaces vary greatly. In fact, some built-up spaces can have ecological values—for example, Shanghai has a fast-increasing number of roof gardens—while some unbuilt and unpaved lands have almost zero ecological value. Additionally, a large share of the green or ecologically earmarked spaces are clearly meant for recreational or decorative purposes, to serve human beings; usage by other species to stimulate biodiversity is often a secondary consideration or is entirely absent. It seems that in land-use planning, quantity still prevails over quality in Shanghai.

2.6 The Huangpu River Waterfront as a Stage for Innovation and Ecological Civilization

A key project to realize the promise for Shanghai to become an "Excellent Global City" and to fulfill the goals of ecological restoration and Ecological Civilization is Shanghai's ambitious transformation of the former industrial-dominated waterfront of the Huangpu River and Suzhou Creek. In 2018, the Huangpu waterfront became a "National Demonstration Zone for the development capability of the global city of Shanghai" (Shanghai Municipal People's Government, 2016). Besides strengthening the embankments to reduce flood risk, the purposes of the new waterfront were (1) to create a continuous open public space as an "urban living room" and central park to counterbalance the densely populated metropolis, (2) to preserve industrial heritage and emphasize Shanghai's identity as a port city, (3) to create new cultural centers (mainly in vacant industrial heritage buildings) to facilitate the expected needs of a new international-oriented middle class, and (4) to strengthen ecological connections. Combining this effort with urban regeneration or renewal in former industrial waterfronts and adjacent densely built urban areas is a vast challenge, especially in urban economic centers that face land scarcity and additional problems, such as needing flood defense systems. Yet, impressively, more than half of this project has already been completed (Shanghai Municipal People's Government, 2018).

In Shanghai's current master plan, the Huangpu River is regarded as an important ecological corridor and a national "green and low-carbon demonstration zone" (Shanghai Municipal People's Government, 2018). The Huangpu River and Suzhou Creek waterfront transformations are engines to speed up the ecological restoration of former industrial areas. The master plan promises to improve the diversity of green spaces, to benefit from existing eco-system services, and to create a blue and green interconnected ecological network to replace former polluting industries. Attractive greening projects and walking trails have been created along both riversides of the Huangpu River and also along the Suzhou Creek, accompanied by massive real estate projects, thematic office parks aimed at the finance sector, international trade centers, centers for high-tech and artificial intelligence, five-star hotels, and many cultural facilities. However, much-needed housing is lacking at the new waterfronts, especially affordable housing (Den Hartog, 2019).

Due to the large scale of the project (120 kilometers of waterfront will be transformed by its end), different sections of the Huangpu River's waterfront are in different stages of development and usage; they also belong to different municipal districts and differ in their implementation and maintenance. Today, more than twenty-five kilometers of river length, which means fifty kilometers of waterfront in total, has already been transformed, after many polluting industries were removed. In less than five years' time, an almost continuous and attractive public waterfront with greenery, renovated industrial heritage buildings, cultural facilities, and biking and walking trails emerged here with abundant public recreational space, offices, shopping, and hotels, offering a welcome and pleasant relief from the urban congestion for many people. Plans are under way to relocate the last remaining industries, including Baosteel, the second-largest steel producer in the world. These measures surely benefit the quality of air and water and also add needed green spaces for recreation.

Massive new real estate clusters also emerged along the riverbanks during the past five years. All of the newly built buildings received green labels to match the National Green Building Standard, especially regarding low-carbon emissions, although the application of these standards in practice is questionable (Den Hartog et al., 2018). Unfortunately, field surveys and multiple talks with real estate developers and other specialists indicate that a large share of the new buildings are used for speculation purposes and remain mainly empty, even several years after completion. Other office locations, such as those around the Hongqiao Hub, are preferred to the waterfront locations due to lower pricing and better connectivity to elsewhere, according to interviewed leading specialists from the real estate sector.

The extremely dense concentration of buildings on both riverbanks of the Huangpu River, in combination with the almost continuous industrial sites, makes it nearly impossible to create an ecological corridor here that would match the scale of the master plan's ambition. Yet officials have successfully relocated a large share of the polluting industries to outside the edge of the city, even to other provinces – to reduce carbon emissions in the city and to improve the general image and quality of life – and made a place for a scenic landscape crossed by recreational walking and cycling trails, in a period of about five years. Thus, the city has made meaningful, if imperfect, progress towards eco-restoration.

2.7 Can Shanghai become an Excellent Example for Climate Change Adaptation?

The policies and projects that have been launched in Shanghai over the past few years are impressive with regard to scale and speed. Many city leaders and experts from all over China see Shanghai as a model and gateway to the international world, and many trends that have started in Shanghai have since been transplanted all over China. Shanghai's master plan connects convincingly with the discourse and practice of the international community in its language and promises, trying to absorb the ethos of sustainability into its planning approach. Indeed, the plan has the ambition to exceed international best practices with regard to speed, scale, and quality. Moreover, many of the promising words in Shanghai's master plan have already been translated into specific plans, and a large part have already been implemented, thanks to the decisive centrally managed government, in possession of money flows and land positions. There have been some impressive accomplishments as well: the new Huangpu waterfronts are breathtaking, and it is mind-boggling that they were realized in such a short time span. The amount of greening integrated in a new eco-network, partly already under construction, is also unprecedented.

Yet these facts, supplemented with impressive numbers of square kilometers, distract us from some substantial deficiencies. In many cases, such as with the new waterfronts in downtown Shanghai, the aim still seems to be to improve the public image and status of the city, attracting foreign investment, or to create a comfortable living environment for a selective upper middle class (Den Hartog, 2019; Li & Zhong, 2021). And the plan to cap Shanghai's total population at a maximum

of twenty-four million registered residents, meant to limit the urban pressure, is also causing social-economic tensions. Real estate values are booming, and Shanghai is increasingly becoming the domain for the happy few; the affordable-housing crunch is especially acute in the new waterfronts, where low-income housing neighborhoods have quite literally been erased. Moreover, the municipality of Shanghai is already home to several million more inhabitants than the desired cap of twenty-four million, if unregistered residents are included in the calculation (World Population Review, 2020). What will happen with these unregistered migrant workers? Will they return to their rural villages? And what about informal street markets? Systematically, they are disappearing. The disappearance of the street markets has taken place at an accelerated pace following the COVID-19 crisis, as the government has demolished a number of such markets and traditional low-rise, working-class neighborhoods. Relatedly, unemployment will increase, and the gap between rich and poor will widen further.

Although public awareness is increasing, many voices are not being considered during implementation of the master plan. In recent government policy documents and communications, the focus on unbridled GDP growth seems to have decreased and been replaced by terms like “eco-system services”, “Ecological Civilization”, “ecological restoration”, “Green GDP”, “harmony with nature”, and so on. Yet, as we have seen, even when governments have very good environmental intentions, projects or policies can easily fail when public participation is lacking. And although Shanghai has made some efforts to include the public in the development and implementation of the master plan—the fact that the master plan is largely available online in several languages is unprecedented and a step toward real openness—there is still further to go.

Surprisingly, China’s constitution has recognized the importance of public participation and consultation since the time of Mao, but the government has generally neglected the public’s role in the years since. Several scholars have called for the government to reprioritize the public’s role in China’s environmental policy making (Li and Shapiro, 2020). The realization of a true Ecological Civilization is necessarily a process of gradual adjustment and understanding, which cannot be implemented from the top down at once; rather, it needs more involvement, consultation, and incentives (Xie et al., 2020). If this participatory approach can be incorporated into the Chinese pilot or demonstration projects, it might lead to more effective and sustainable outcomes.

2.8 Conclusions

Although China is aware of its environmental challenges, including the need to adapt to climate change, and is willing to play a leading role in a green transition, it must surmount several obstacles before it can realize its ecological objectives. There are discrepancies in the definition, appreciation, and valuation of ecological assets such as wetlands. Greening is frequently used as a means of beautifying real estate projects. Terms like “Ecological Civilization” and “green eco-network” sound promising and create high expectations but seem primarily aimed at creating benefits for people, such as making cities more desirable places for people to live. There also seems to be a tendency to undervalue eco-system services and the use and protection of wetlands. Going forward, Shanghai and other Chinese cities would do well to create clearer definitions for assets like wetlands and terms like “ecological restoration” or “eco-system services” and to communicate these definitions with all stakeholders.

China, with Shanghai leading the way, is shifting from a production economy toward a consumption society. In a process of trial and error, there is a search for a new balance. Although the newly implemented public spaces along the Huangpu River are visually attractive, there are still shortcomings in their daily-life functionality, as well as in their functionality as an ecological corridor (Den Hartog, 2019; Den Hartog, 2021B). Eco-civilizations need to serve people, of course, but also other species, if they are to effectively combat climate change and restore eco-systems.

China is in a different phase of development than many established countries in the Global North and must therefore deal with a different audience of stakeholders and end users, usually with different educational backgrounds, experiences, and lifestyles. Environmental pressure rose quickly during recent decades due to extreme urbanization, and consequently, there are other priorities and expectations that must be considered in urban planning and societal transformation.

Despite all these challenges, Shanghai has commenced a journey toward an Ecological Civilization that will make big a impact on the daily life of its inhabitants. Hopefully, more thoughtful experiments will follow in Shanghai to establish this metropolis further as a world-leading lab for sustainable transition and urban innovation. Shanghai, and China as a whole, can play a leading role in sustainable transitions and be a role model for other cities and countries, such as in developing countries in the Global South but perhaps also in developed countries in the Global North.

3 Re-Defining the Appreciation and Usability of Urban Watersides in the Urban Center and Peri-Urban Fringes of Shanghai

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This chapter is a slightly adjusted version of above-mentioned peer-reviewed journal article – only the numbering of paragraphs and figures and the citation style has been adjusted, and an explanation of the position of this chapter in this research and a list of main findings have been added on this introducing page.

Position of chapter within this research: This chapter assesses how and why the appreciation and role of living and working along waterfronts in the context of China's extremely rapid and large-scale urbanization is changing and explains how, in the context of extreme urban pressure, well-manicured new urban watersides are often visually attractive but functionally inadequate. This chapter concludes with suggestions and recommendations on how urbanization processes along the waterfront can be directed in a more sustainable way, while preserving or enhancing local socio-economic, historical, and ecological values.

Research question: How can urban regeneration processes along Shanghai's waterfronts be steered into more sustainable paths, while keeping historical continuity and ecological values, and creating attractive well-functioning new environments, and can lessons be taken from Sustainability Transitions theories?

Main findings

- Political vigor with drastic spatial and economic measures doesn't automatically result into realization of expectations.
- The general quality of the new waterside projects is very high, but yet fails to fully utilize all potentials.
- Although there are adjustments and improvements, a more inclusive approach is needed, to benefit from social learning and match the needs for daily life usage.

3.1 Introduction

This chapter describes and analyses the changing appreciation and role of living and working along waterfronts in the context of China's extremely rapid and large-scale urbanization, occurring since the end of last century (Hsing, 2010). The chapter focuses on the Direct Controlled Municipality (equal to a province) of Shanghai and its surrounding region, with its many canal towns and rich water history. Historical continuities and recent discontinuities will be explained and assessed regarding the appreciation and usability of urbanized watersides, with one case in Shanghai's Central City and two cases in its rural fringes, all under high urban development pressure.

Resorting to Sustainability Transitions theories, overarching patterns are identified and translated into broad lessons on how urbanization processes can be steered into more sustainable paths, keeping historical continuity and attractive well-functioning new environments. In the next paragraph, three key concepts are introduced (expectations, socio-technical experimentation, and innovation journeys) as useful tools to help assess the promises and realities of waterside transitions. The paragraph 3.3 elaborates on the methodological approach and the selection of the cases. Paragraph 3.4 describes the dynamics for the three cases. Paragraph 3.5 combines the findings, and the final paragraph 3.6 concludes with some recommendations.

3.2 Theory: Expectations, Experiments, and Journeys

This chapter describes and analyses tendencies in recent urbanization projects and their relationships with the water in Shanghai, China, especially regarding the functionality of new public spaces, but also regarding ecological, socio-economical, and sociocultural values, and flood risk measures. Illustrated with three cases, these changing relationships are conceptualized by resorting to insights from the field of Sustainability Transitions. In this field, scholars investigate major shifts toward sustainable socio-technical systems of production and consumption. The study of socio-technical transitions to sustainable urban development draws on a wide range of theories and lines of thought (such as neo-institutional theory, evolutionary economics and science and technology studies) and a variety of frameworks and approaches (such as the multi-level perspective, strategic niche management and transition management) to express how promising visions of a sustainable future and attractive urban realities – for example living along the waterside – can be translated into experimental development projects and how these can be empowered in order to transform the unsustainable current order (Grin et al., 2010; Markard et al., 2012). To investigate the promises and realities of urban waterfront projects, three core concepts from the Sustainability Transitions field will serve as 'sensitizing concepts' for the empirical analysis and structuration of the argumentation (Blumer, 1954). These concepts are: (1) expectations, (2) socio-technical experimentation and (3) innovation journeys, which I proceed to explain below.

To investigate how actors use appealing visions of the future in their urban development projects, scholars from the field of Sustainability Transitions often use expectations as a concept. Expectations can be defined as "statements about the future – uttered or inscribed in texts or materials – that circulate" (Van Lente, 2012). The idea that they circulate is important because they are not merely descriptive statements, but they are especially 'performative', which means that they help to create a new reality by providing heuristic guidance (Rip and Kemp, 2006), by coordinating roles and activities amongst actors (Konrad, 2006) and by legitimizing certain investments (Borup et al., 2006). Expectation is one of the key processes in facilitating sustainable innovation journeys, and to do this successfully, expectations should be robust (shared by multiple actors), specific (if expectations are too general, they do not give guidance), and of high-quality (Schot & Geels, 2008).

To turn visions into reality, actors engage in a process of socio-technical experimentation. Ideas that look appealing on paper and sound good in words are applied in real-life settings to be tested and developed further. In this context, experiments can be seen as seeds of change that may eventually lead to a shift in urban planning approaches (Sengers, 2016). Opposed to the experimentation in the natural sciences that usually take place under strictly controlled conditions to find hard objective truths, the experimentation in the field of Sustainability Transitions take place in a real-world environment with a wide variety of societal actors and other influences. To deal with this, it is more accurate to talk about a 'socio-technical experiment', which can be defined as: "an inclusive, practice-based and challenge-led initiative, which is designed to promote system innovation through social learning under conditions of uncertainty and ambiguity" (Sengers, 2016).

Experimentation in the urban environment is an unfolding innovation journey (Van de Ven et al., 1999) and in particular a 'sustainable innovation journey' (Geels et al., 2008). A journey also implies open-endedness and uncertainty (Garud et al., 2014).

3.3 Case Study Selection and Methodological Approach

This chapter describes and analyses two different situations of a changing relationship between city and waterside: one urban case along the Huangpu River in downtown Shanghai with a transition of industrial waterfronts into recreational waterfronts, and two rural (now peri-urban) cases with 'Long Island' on Chongming Island and 'New Venice' in neighboring Nantong (Figure 3.1). In the latter two cases, agricultural functions and wetlands have been transformed into speculative residential and recreational property. By conducting this comparative case study research (Yin, 2003) also qualitative methodological approaches for geographers (Limb and Dwyer, 2001) are used.

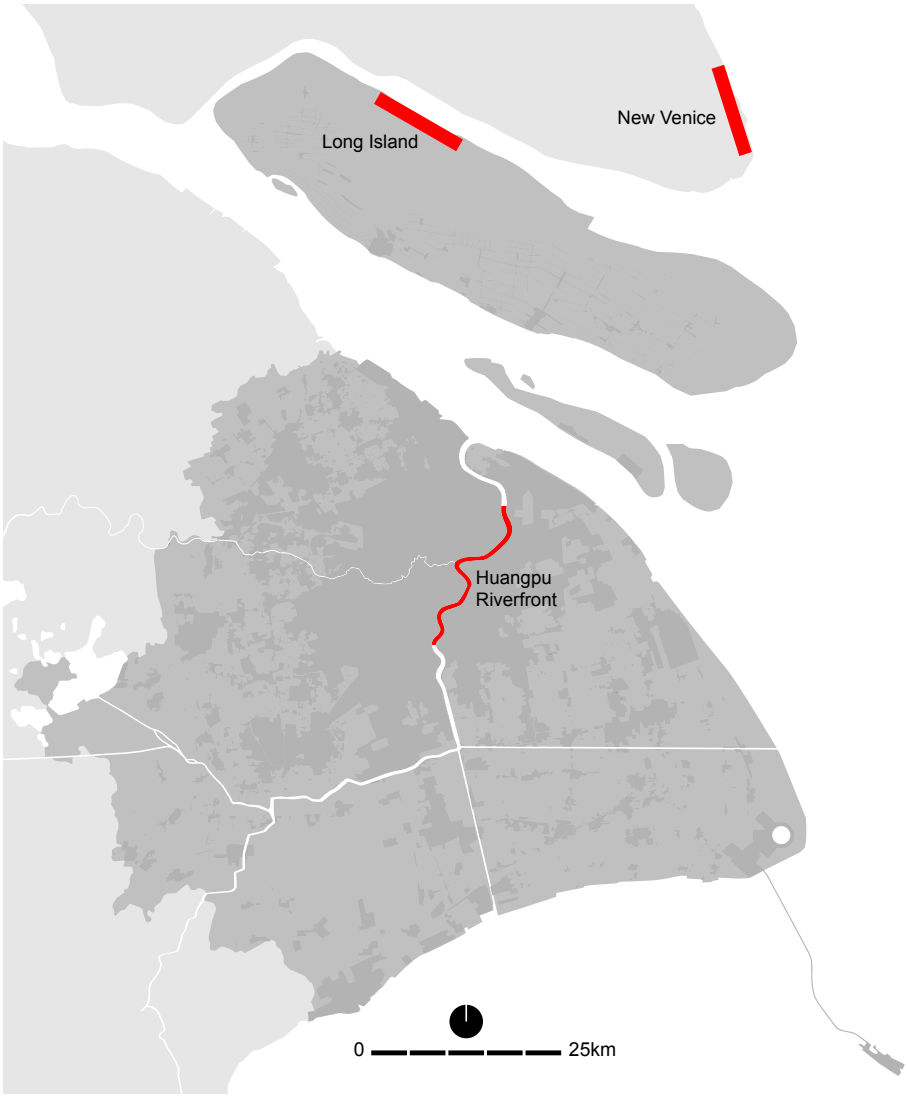

FIG. 3.1 Huangpu River with more than 45 kilometers of new waterfront in the Central City of Shanghai's Direct Controlled Municipality. The cases Long Island and New Venice at Shanghai's rural fringes are under the administration of Nantong, in Jiangsu Province (map by author, 2019).

Both the Huangpu Waterfront case and Chongming Island (exclusive Long Island and New Venice) were during their initial planning process appointed as National Demonstration Zones. The urban and peri-urban cases are chosen because they are complementary to each other (urban vs. rural, high-density vs. low-density, etc.), because they are related to each other (same target group: the new middleclass),

and because they are representative for many waterfront developments in the wider context of the Yangtze Delta (and to some extent even for China as a whole).

The Direct Controlled Municipality of Shanghai and surrounding Yangtze River Delta Region are China's economic engine and 'Head of the Dragon' for centuries, thanks to a strategic location for trade, efficient waterways, and fertile soil. Many experiments and projects in Shanghai function as model for projects elsewhere in China (Den Hartog, 2010). Shanghai's new urban waterfronts form one of the main planning strategies in this city's attempt to become an 'Excellent Global City' according to the Shanghai Master Plan 2017 – 2035 (Shanghai Municipal People's Government, 2016). Since 2018 the Huangpu Waterfront is earmarked as a "demonstration zone for the development capability of the global city of Shanghai" (Shanghai Municipal People's Government, 2016) to determine the image and brand of Shanghai and to improve the quality of life in megacities. Chongming Island was appointed as National Ecological Demonstration Zone in 1996 (Sze, 2015). Both demonstration zones function as sample for similar situations elsewhere in China, according to the Shanghai Master Plan 2017 – 2035.

Within the context of Chongming Island the case of Long Island is described in this chapter because it illustrates the loopholes of the National Ecological Demonstration Zone. Chongming is an experiment to realize a more sustainable and balanced (but still urban-centered) society. The real estate development of Long Island illustrates what would probably happen on Chongming as a whole when the Eco Island policy is absent. Inherently related to this the case of New Venice shows the extreme consequences of what will go wrong if the waterfront landscape is approached as a mere investment object.

Scientific research that focuses on recent developments at the waterfronts in Shanghai and the Yangtze River Delta region is still limited. The Huangpu Waterfront redevelopment and the ambitions for Chongming Island are both to a high degree experimental within the Chinese context. The degree of experimentalism is illustrated by the fact that dozens of international design competitions have been launched during the past two decades for the Huangpu Waterfronts and Chongming Island as a whole and also for subareas, e.g., Chongming Island Master Plan in 2004, Dongtan Eco-City (on Chongming) in 2005, North Bund in 2010, Suzhou Creek redevelopment plan in 2016, the 22-kilometer-long Huangpu River East Bank in 2016, and many others. This has generated an enormous number of plans and ideas. Subsequently, new plans were compiled by picking and reassembling the – in the eyes of decision makers – most attractive elements in a very opportunistic way. This method is very common in China's spatial planning and design but very unusual in Western countries in terms of copyright and prestige. This 'shopping'

among design competition entries and 'use' (or misuse) of international input is rejected with great suspicion and distrust in the international discourse of architects and urban developers in the West (Den Hartog, 2010). Nevertheless, this is still daily practice in China, sometimes resulting in success, sometimes in failure, like in an experiment.

Although the cases have many similarities, there are also significant differences, in scale, in economic-geographic position, in policies, and in functioning. However, they clearly illustrate the recent dramatic shift in the relationship between the urban environment and the water, focused on the role and appreciation of urban watersides. The main goal is to give recommendations and suggestions to overcome future mistakes in planning and practices and to mitigate their effects. The findings in this chapter are based on a series of site visits, observations, and interviews (Table 3.1). The author is very familiar with all cases and has done related research and design projects in this region during the last ten years.

TABLE 3.1 Figures on data collection

	Interviews	Grey literature	Site visits
New urban waterfronts Central City of Shanghai	Residents (50+) Urban planners and architects (10) Local government officials (5) Developers (3) Real estate agents (5) Knowledge institutes (1)	Official policy docs (3) Governmental website (1) Expert meetings (3) Knowledge institute reports (1) Workshops (3)	Hongkou Creek (25+) Suzhou Creek (25+) North Bund (25+) East Bund (15+) South Bund (15+) West Bund (15+)
New peri-urban waterfronts (Chongming and Nantong)	Homeowners and residents (25+) National government officials (1) Master plan expert committee (3) Shanghai government officials (2) Local government officials (3) Urban planners and architects (8) Developers (2) Real estate agents (3) Knowledge institutes (6)	Official policy docs (3) Governmental website (3) Expert meetings (4) Knowledge institute reports (5) Workshops (3)	Chongming Island (35+) Nantong (7)

3.4 New Urban Waterfronts in The Central City and Peripheries of Shanghai

3.4.1 Shanghai's Rich Historical Relationship to the Water During the Years

Shanghai, and its wider urban region with neighboring cities and towns, used to be crisscrossed by waterways (Figure 3.2). The city's name literally translates as "upon the sea," since the coastline has been shifting eastwards due to sedimentation processes of the Yangtze River and tributaries. Water is not only a means of transportation and trade but also a source for stories, local myths, and cultural practices. The classic Chinese painting Qingming Shanghetu, from the early 12th century, is the perfect illustration of the importance of water in Chinese urbanization (Figure 3.3; see full version in appendix M). The Qingming Shanghetu depicts the rich mix of economic activities on the urban waterside and embankments, symbolic for the vitality of a relative compact city clearly defined within its city walls.

Until the middle of the twentieth century, the spatial and economic development of the Yangtze Delta was propelled by an efficient network of waterways and canal towns (King, 1911; Ball, 2017). In "Farmers of Forty Centuries" F.H. King describes how more than 3,000 kilometers of waterways provided an ingenious transport system that simultaneously supported soil fertility and irrigation. To improve the fertility of the land, a great deal of mud was dredged from the canals and creeks and spread across the fields. At the same time, night soil from the cities was transported to the fields by boat to be used as natural fertilizer, even until the late 1990ies (author's own observation). To a large extent, these techniques contributed to the self-sufficiency and economic growth of China.

Later, under Mao's leadership, the Chinese government adopted policies that imposed a technocratic engineering on the surrounding landscape: 'Man must conquer nature' (Shapiro, 2001). Natural capital and rural values around Shanghai (and elsewhere in China) have been largely neglected since then. Current planning practices are consequently based on a tabula rasa approach and steered by GDP-oriented motives, with a lot of collateral damage for eco-systems and livability. During the last few decades many natural waterways in this region were transformed into canals, while others were dammed or filled in completely.

FIG. 3.2 There used to be a more a direct interaction between urban life and water, also for washing laundry and cleaning food (photo by author, 2013).

FIG. 3.3 Fragment of the classic painting Qingming Shang He Tu – original painting by Zhang Zeduan. Twelfth century, Handscroll, 24.8 x 528.7 cm (Source: Beijing, Palace Museum).

The eastward shift in the world's economic center of gravity at the end of last century has made highways, railroads, and airports the new flywheel of Shanghai's development — a process accelerated by mass migration to the city from rural areas. The few remaining canal towns are revalued now and more and more exploited as tourist attractions and investment opportunity, hence still losing their original population and character due to gentrification processes. Simultaneously, many remaining waterways around Shanghai are currently transformed into scenic

landscapes due to experimental landscape 'beautification' policies, which resulted in the planting of many flowers along roadsides and canals. The long and fruitful relationship between the urban landscape and its water systems is changing drastically. The water system seems to be degraded from a transportation and urbanization backbone into a decorative element to brand real estate projects, without much sense of its historical importance and former usages. Countless street names still pay homage to the former canals and creeks that disappeared. Today, the reality is completely the opposite to the former water-rich landscape, with multiple new towns, high-tech industrial parks and other new phenomena sprawling at the fringes of Shanghai and other megacities connected by asphalt and rails (Den Hartog, 2010). Since late last century Shanghai is transforming itself from an industrial and agricultural – large parts of the Direct Controlled Municipality are still mainly agricultural – dominated city into a service-oriented metropolis. New real estate projects aim for a rising upper middle class, and in the rural fringes especially also on the wealthier elderly who are in search for leisure and luxury. Shanghai is "Striving to become an Excellent Global City" according to the credo on the first page of the Shanghai Master Plan 2017 – 2035. To facilitate this in the Central City, a large number of waterfronts has been transformed from a mainly industrial usage into a recreational and commercial use with abundant public recreational space, offices, shopping, and hotels, offering a welcome and pleasant relief of the urban congestion for many.

Simultaneously – but not directly as a result of policies but more as a result of greedy developers that know how to exploit loopholes in regulations –more and more recreational and luxurious settlements are popping-up in the rural fringes. The latter ones are located on often-questionable locations – e.g., in conflict with existing natural and social-cultural values, vulnerable (Balica et al., 2012) to flooding, inaccessible to common people – as observed during fieldtrips and also learned from interviews with multiple stakeholders.

FIG. 3.4 Most creeks disappeared and the few remaining ones, such as Hongkou Creek, are often disconnected from urban life by floodwalls (drone photo by author, 2018).

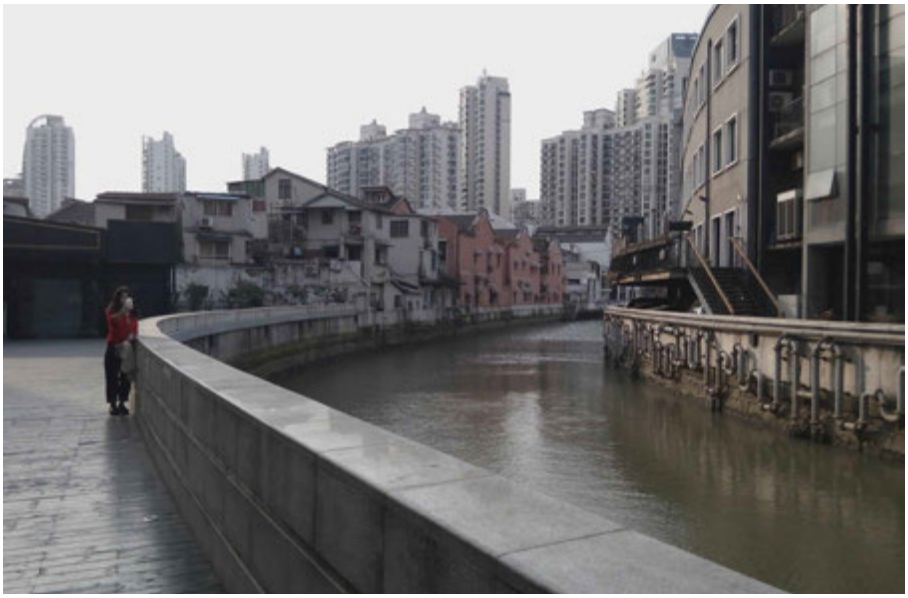

FIG. 3.5 Most creeks disappeared and the few remaining ones, such as Hongkou Creek, are often disconnected from urban life by floodwalls (photo by author, 2018).

FIG. 3.6 The Cool Docks as depicted was shortly after its redevelopment in 2010 disconnected from the city by new floodwalls and parking, resulting in the closure of many restaurants in the old warehouses. Since 2018 this area is under redevelopment again (photo by author, 2018).

Because of ongoing transformation, the role and experience of water have changed, especially in daily life usage (Figure 3.4, Figure 3.5, and Figure 3.6). In the past, living by the waterside in Chinese cities was rarely an attractive option. Industrial developments, especially since the 19th century, made many of them very dirty and smelly, while others became repositories of household waste. However, since about a decade ago, real estate developers and policymakers are increasingly rediscovering watersides as an added value. For example, along the new highway that connects Chongming Island and Nantong to Shanghai, huge real estate sales advertisements promise living close to nature and along watersides. Also, in many shopping malls and metro stations in downtown Shanghai, real estate companies are adverting investment in real estate in the rural periphery around Shanghai aggressively, using flyers, model houses and virtual reality presentations. These locations are advertised as relatively cheap, not too far if you own a car, and away from urban congestion.

3.4.2 Regeneration of Urban Waterfronts in the Central City of Shanghai

Following the development plan "Striving for a world-class waterfront area" (Shanghai Municipal People's Government, 2018) the Huangpu River and Suzhou Creek will have 120 kilometer of continuous accessible riverside zones in 2020. The expectation is to bring a large-scale continuous greenery and public space in the city (a "people-centered focus on creating a shared space"), to preserve some historical (industrial) buildings, and "to extend the spirit of the Expo by building a global city of excellence to be able to compete with waterfronts such as in New York and Paris" (Shanghai Municipal People's Government, 2016). Since end of last year more than 45-kilometer of renewed riverfronts are now open for pedestrians and cyclists, with a very positive impact on the quality of life for the city as a whole.

During the last decade the local authorities have made a very serious effort to clean up the riverbanks to improve Shanghai's image as a city along the river. It started with the 2010 World Expo, which played a key role in redefining Shanghai's relationship with its waterfronts. The promise (expectation) was to reconnect the city with the water starting with the Expo. Wharfs and accompanying industries have been relocated, to decrease pollution in downtown areas and to create space for industrial growth elsewhere. The planning authorities located Expo 2010 in a relatively central place, deliberately aiming to further densify the city instead of contributing to the suburban sprawl. However, today, more than eight years after the event, the more than 5 square-kilometer large Expo site is yet to realize its oft-quoted slogan: "Better City, Better Life." Only a small part has been redeveloped. The central park on the river's south bank especially built for the Expo is now partly walled off and poorly maintained, attracting only a handful of daily visitors. Some exceptions are buildings owned by the Propaganda Bureau (Chen et al., 2014) such as the Power Station of Art, a former power plant that became home to one of China's most avant-garde galleries. Also, the China Art Museum and the Mercedes Benz Arena still play host to popular events. Nevertheless, most other buildings have been demolished, and on the south bank of the river, a few dozen office towers have been constructed since 2016, but these developments remain devoid of any sign of urban street life until today.

For municipal officials, mega events are a great excuse for revitalizing and rebranding cities (Van Vrijaldenhoven, 2007). But too often, the vitality of the host city is undermined by a lack of long-term strategy. The ambitious promise to give the Expo site back to the city seems to have failed for the time being, with only a few dozen sparsely used new office towers and one huge shopping mall on the site, instead of the urgently needed (affordable) housing. Meanwhile, on the fertile agricultural lands outside Shanghai, huge residential and commercial areas are sprawling.

FIG. 3.7 One of the regular positioned marinas with decorative new yachts for rent along the new waterfronts of the Huangpu River. The yachts are rarely used (photo by author, 2019).

FIG. 3.8 Today there is more than 45 kilometers of combined cycling and pedestrian routes along the Huangpu's new waterfront (photo by author, 2019).

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FIG. 3.9 Multiple new cultural institutions opened their doors in reused industrial relics. Here Tank Space, a center for contemporary art installations and performances (photo by author, 2019).

However, with a series of design competitions between 2013 and 2018 more than 45-kilometer stretch of new waterfront along the Huangpu River has been redeveloped now as recreational and commercial spaces: South Bund, West Bund, North Bund, and East Bund (Figure 3.7, Figure 3.8, and Figure 3.9). All of them refer with their name to the international image and ambition of the classic Bund. According to the before mentioned development plan "Striving for a world-class waterfront area" the Huangpu River must become "the public living room in the city" to create continuous open urban space in the dense urban fabric.

Shanghai rediscovered itself as a city 'above' or along the water. This creates big spinoffs for the local economy. For example, the Yangpu District used to be a rundown part of town with many industries and working-class inhabitants but promotes its waterfront now on their website as a "World Class Waterfront Development Belt" aimed to attract foreign investors (including Fortune 500 companies) and the creation of 50,000 new jobs before 2020 (2019). The square meter prices for real estate along the Yangpu Districts waterfront today are on some locations already up to more than $12,000 (Lv & Wang, 2019). The project is nicknamed by McKinsey "from rustbelt to brainbelt". Also, the redevelopment of Suzhou Creek, a branch of the Huangpu and until recently one of China's most polluted waters is an indicator of change in appreciation

of watersides amongst developers and policymakers. Extremely luxurious new housing complexes (up to $16,000 per square meter, 2019 – visited by author) have sprung up along the banks of Suzhou Creek, overlooking the newly odor-free river.

To make the Huangpu waterfronts attractive, a multitude of cultural facilities have been implemented such as reused industrial buildings mainly aiming for creative industries, museums, and exhibits (Figure 3.9). Multiple playgrounds for children, including skating parks and climbing walls, have been built along the riverbanks. To create a lively attractive 'image', even a dozen marinas have been constructed on eye-catching locations. They are filled with luxurious yachts to suggest vibrant water tourism. However, the yachts are seldom used and most of them are not privately owned –it is very hard to get a permission to use a yacht on the busy Huangpu River since there is a lot of freight transport – but are available for rental by a development company to be used for special occasions like weddings or company activities. Another still-unaddressed issue is the fact that most of the above-mentioned waterfront projects have so far taken the form of offices, hotels, and high-end apartment buildings, and most of them remain empty since they are used as investment objects only. Most of the ground floors – which are usually used for public services, shops, and restaurants – are still empty. According to some respondents, the Feng Shui – a traditional Chinese philosophy that was been illegal during the heydays of communism but is in a process of revival nowadays. Feng Shui aims to bring harmony between people and their surroundings – is not good here, especially along the North Bund.

Except for the West Bund part most of the new constructed boardwalks and cycling routes are not used intensively yet. Although they are visually very attractive large parts are often relatively inaccessible for daily life use, according to field observations and a number of interviews with residents, being far away from residential areas and difficult to reach by public transport. It's often hard to find a place to sit and enjoy the view on the water (except for the West Bund and East Bund). Dozens of cameras and security guards stop people from taking spontaneous actions, so as to prevent the local authorities from being held liable if someone falls into the water. While the dangers of swimming are clear, even fishing is prohibited in most places – but some people neglect this limitation and still go fishing. Additionally, the construction of multiple barriers against a rising water level means that in many places the water is not visible. The Cool Docks for example, a promising redeveloped area along the South Bund that opened in 2010 is one example of an area where glitzy restaurants, hotels, and penthouses remain relatively empty and unfilled by virtue of their remoteness for pedestrians (Figure 3.6). Currently this Cool Docks area is already undergoing an intensive redevelopment, less than ten years after its completion.

FIG. 3.10 The new waterfronts have still many limitations in access and usability, e.g., partly privatized parts used for docking luxurious yachts for rent, but seldom used (photo by author, 2019).

FIG. 3.11 The new waterfronts have still many limitations in access and usability, e.g., partly privatized parts used for docking luxurious yachts for rent, but seldom used (photo by author, 2019).

FIG. 3.12 The new waterfronts have still many limitations in access and usability. This photo shows a sign with the text "If you love me, don't touch me!" to prevent people sitting on the grass lawns (photo by author, 2019).

The expectation for the Huangpu Waterfront was that it would become an international first-class public "sitting room as well as an "ecological corridor" according to the master plan. These very ambitious promises have already been partly achieved today. More than 45 kilometers of waterfront is realized almost continuously, for pedestrians and cyclist (less than 3 years ago most of these areas were inaccessible). Especially large tracks of the newly constructed West Bund became a very dynamic and attractive public space and also some parts of the North Bund and East Bund, although most of the waterfront still lacks users. The promised cultural facilities and historical linkages with the industrial past are established in multiple museums and galleries in reused and renovated warehouses, and the integration in the new landscape of cranes, rail tracks, anchor piles, and other artifacts. The low carbon promises are achieved through the replacement of industries and abundant green space for recreation, although the ecological connection is not optimal since there is no continuity for animals and plants in their natural settings. The new green spaces are mainly decorative grasslands and trees. Although parts of the embankments have a green character the waterfronts are still dominated by long stretches of concrete former industrial embankments and this

seems unlikely to change soon. The promise to attract investment is also lacking, most new real estate projects (mainly offices and commercial spaces) are missing tenants. Tourism is limited to the Old Bund area and the new creative centers at the West Bund, which is less than 5% of the total new waterfront space.

The short time span and high-quality outcomes can be seen as a successful result of socio-technical experimentation, although according to many interviewees the usability is not optimal yet. However, more and more places show spontaneous adjustments and creative use of the waterfront spaces such as picnicking and various sport activities on places that were not meant for this. Meanwhile there also is an improvement visible when we compare the first implemented parts and the later implemented parts, especially also the redevelopment of the Cool Docks area, which proves to a certain extend a sustainable innovation journey. Coming years more improvements are expected, especially when more and more people will start using the spaces.

The current transition of China's society and economy is perhaps reflected in the controlled transition of public spaces and urban settings along the watersides. All is aimed on economic prosperity and improving the public image and status. But the real potential of urban watersides seems unnoticed, and space for spontaneous usage (fishing, kiting, playing) is strictly limited. Many buildings along the waterside are still not turning their front to the water; they are oriented with their entrance and main façade towards the roadside. Shanghai's new relationship with the water seems slightly platonic here.

3.4.3 New Role and Usage of Watersides in the Peri-Urban Periphery of the Direct Controlled Municipality of Shanghai

The rural parts of the direct controlled municipality Shanghai (equal to a province) transformed drastically in last two decades. For this chapter, two segments of the waterfront in the Yangtze estuary are examined, both bordering to Shanghai but administratively belonging to Nantong (Jiangsu Province). The first case is on Chongming Island; the second one is just north of it at the other side of the Yangtze River. In 1996 Chongming Island has been appointed as China's National 'Green Eco-Island', a pilot project for sustainable development (Den Hartog, 2017B), in the latest master plan this status been upgraded to a National Ecological Demonstration Zone, it is expected to be an experiment to realize a more sustainable and balanced (but still urban-centered) society. Chongming and also large parts of Nantong are still rural in appearance and land use, although this is changing due to new infrastructures. Shanghai's Chongming Island is located in the middle of the Yangtze

River Estuary and is still far behind on the general development of Shanghai, due to its isolation. At the same time, it has high ecological values, especially for migratory birds (at the east end of the island there are even two zones that are according to Unesco's Ramsar Convention on Wetlands of international importance). It also has rich agricultural resources since this alluvial land is extremely fertile.

However, the urban development pressure is alarming, especially since the completion of a new tunnel-bridge in 2009. This resulted in rapid increasing real estate values and ambitious plans aiming to attract Shanghai's new middle class (Den Hartog, 2017B). A range of new real estate projects and infrastructures doesn't appear to be eco-friendly at all. Chongming's new infrastructure and urban development brings new opportunities and prosperity for the local population, but simultaneously it also forms a threat for traditional lifestyles, existing spatial qualities, the water system, and ecological system. Also, in terms of governance there are conflicting interests. Although the national government desires the island to become a national sample for sustainable development, the local government seems especially keen on stimulation of new real estate developments, such as high-end housing and business parks, as an opportunity to gain more income and to catch up economically. The current ambition is to connect the island with Shanghai's metro system before 2020, although this seems not feasible. Simultaneously the Shanghai Direct Controlled Municipality considers the island as a backdrop for day-tourism as a release for the urban congestion. Recently a series of senior housing complexes are under construction, aiming for wealthy elderly. However, they don't come, and the apartments remain empty and are used for investment only (Den Hartog, 2017B).

A clear illustration of what could go wrong if there is no strict supervision is the township of Qidong, at the northern tip of the island. As a result of the natural sedimentation process over the years, this township belongs to the Jiangsu province and drops outside the National 'Green Eco-Island' policy. This part is under the jurisdiction of the City of Nantong, north of the river, who saw this as an opportunity to develop a new town for 100,000 inhabitants, named 'Long Island' (Figure 3.13, Figure 3.14, and Figure 3.15). This water sport and leisure-oriented project is under construction on top of reclaimed wetlands and tidal flatlands since 2013. Most of the already erected 40-floor-skyscrapers and villas are acquired by individual buyers from Shanghai, who use this location as an investment opportunity, and certainly not for living, resulting in a dramatic situation of empty real estate on top of former wetlands (Den Hartog, 2017B). This is socio-economically, culturally, and especially ecologically a grand failure. Last year national officials were revising this case and ordered a temporary 'halt' on construction. After considering the possible demolition of the high-rises the decision was made to still continue constriction but limit the building height to 6 floors.

FIG. 3.13 Fragment of the Long Island development project (image from www.fang.com).

FIG. 3.14 Empty real estate for investment on Long Island. According to real estate agents and spoken residents almost 100% of the units are owned by Shanghainese (photo by author, 2019).

FIG. 3.15 According to real estate agents and spoken residents almost 100% of the units are owned by Shanghainese (photo by author, 2019).

Another, even more extreme situation can be found at the Nantong side of the estuary, just north of Chongming (Figure 3.16, Figure 3.17, and Figure 3.18) way Bridge in 2011, the travel time from Qidong to Shanghai dropped from 4 to 1 hour. This fact, in combination with the strategic location at the northern side of the mouth of the Yangtze River, led the Nantong authorities to prepare this location for investment, with the hope this could give a positive spin-off to the economically rather poor surrounding areas.

FIG. 3.16 Scale model of New Venice in Nantong (photos by author, 2018).

FIG. 3.17 Billboard of New Venice in Nantong (photos by author, 2018).

FIG. 3.18 Privatized new beach in New Venice, Nantong (drone photo by author, 2018).

The local economy used to be mainly based on agriculture (aquaculture) and a few outdated shipyards with related industries. To diversify the economy and attract higher income groups, the decision was made to focus on water related tourism and housing. To brand this new town and attract investors the name "New Venice" was chosen. A water-rich plan was made for the first phase of the development, with a five-star hotel, conference venue, commerce, and housing for 100,000 new citizens on top of reclaimed land, formerly tidal flats, and wetlands. A dam was made in 2011 to improve the water quality, especially its color, near the coastline: the sediments in the water will sink to the bottom and increase the transparency of the water a bit. In 2012 the first apartments completed and quickly sold to mostly Shanghainese individual investors, according to interviewed real estate agents. Hence this site became an investment vehicle. Today this project remains still empty, five years after its completion, similar to many so-called Chinese ghost towns (Shepard, 2015). The beach – one of the only two beaches in a 60-kilometer radius from the center of Shanghai – is walled of and only accessible after payment of sixty Chinese Yen, which is more than a day salary for local people in neighboring villages. Due to the wall also the visual relation towards the water is absent. Only hotel guests on higher floors can see the water. Public transport is missing and the available shops and even the hotel and conference venue are sparsely used. Though the local

authorities and developers made a lot of money by this development also this case can obviously be named a mismatch in socio-economic terms: (1) almost no new jobs are created for locals; (2) the project is a waste of space and resources; and (3) it is an ecological tragedy since former wetlands are gone. This project showcases another clash between promises and reality, and moreover a mismatch with what is really needed.

3.5 Discussion

Periods of rapid economic growth and urbanization frequently go hand in hand with innovation. Contemporary Chinese cities fulfill all the conditions for experimenting with architectural typologies, building technologies, and planning concepts: economic prosperity, a vast and relatively cheap labor force, a growing educated middle class, and a financially strong government that legally owns all the land. Experimenting means to try something new, evaluating the results, and repeating the experiment if necessary. While outcomes may vary, the spirit of experimentation is something to be celebrated. China is home to its fair share of failed architectural experiments, but it has also seen many promising results, especially regarding new urban transportation systems.

Although the process of collecting inspiration and innovative ideas through 'shopping' under international design competition entrees (Den Hartog, 2010) appears to be highly experimental, it remains sometimes unclear if the decision makers learn during their "innovation journey". Nevertheless, multiple adjustments during the process of design and implementation suggest that there is at least an intention to learn and discuss. The Cool Docks area for example has been used for tests with various typologies of integrating a flood barrier into the public space, and also there was a pilot to activate this remote area by implementing an artificial beach (between 2010 and 2017). Currently a new boardwalk is under construction to improve visibility of the water. In the case of Chongming we see that new versions of the general master plan include updates and improvements to steer the eco-island development into a more desirable direction (Ma et al., 2017). Especially also the building halt of the Long Island development indicates willingness for adjustments and radical changes (even complete deconstruction of the high-rises was for a moment a serious option).

Testing out different ways of making better cities are supposed to be a key to this strategy of improving the quality of live and stimulating the economy. The scale and speed of China's transformation in the last two decades could not have happened without embracing innovation and the energy for change. Unlike relatively small-scale urban labs (Evans et al., 2016) in the Western context, the Chinese approach has been much more pronounced, albeit with often-severe collateral damage to the environment. An increasing uncertainty in terms of climate change and also the national economy calls for a paradigm shift in architecture and urban planning. Policymakers, developers, architects, and urban designers across the country should articulate a more coherent vision for the readjustments that will have to be made to our living environments sooner or later. Hopefully more thoughtful experiments will follow and result in trendsetting inspiring samples that transform China into a world-leading urban lab for sustainable building and urban innovation.

Though lot has been changed in a positive way the new relation between city and water is still a platonic one. That is really a pity. Many samples worldwide – Barcelona, London, New York, and Rotterdam, etc. (Meyer, 1999) – prove that a wider range of design solutions is possible to bring people closer to the water safely. However, with kilometers of waterfronts still waiting to be (re-)developed in the area of Shanghai, there will be new opportunities for real 'place making'.

3.6 Conclusions

This chapter uses basic insights from the academic field of Sustainability Transitions, especially about expectations, socio-technical experimentation, and sustainable innovation journeys. The sections Theory: Expectations, Experiments, and Journeys and Case Study Selection and Methodological Approach describe how drastic spatial and economic measures don't automatically result into realization of expectations. Although the general quality and appearance of the implemented projects is very high, these attributes are not accompanied by the expected improvement of the quality of daily life. The cases promise to go beyond conventional projects and have to a certain extent an experimental character, but in the end after implementation they are not that much different and the promises are mainly used for branding (De Jong et al., 2018) and investment (Den Hartog, 2017B). The new watersides have a high decorative character yet fail to fully utilize all the potentials offered by their prime locations along the water. It seems that 'numbers', 'size' and especially

'image' matters for local developers and authorities. However, the adjustments in the described cases also prove that lessons are learned, though usually after damage is done. China is rapidly shifting from a production economy towards a consumption society. Its unique situation of large-scale and extremely rapid transformation is unavoidably accompanied by trial and error.

Based on the findings of this chapter some recommendations can be made, aimed to make the discrepancies between expectations and needs for daily life reality smaller. Although the quantity and quality of the implemented new public spaces are highly attractive visually, there is a discrepancy between form and needed functions: accessibility, space for spontaneity (Figure 3.19, Figure 3.20, and Figure 3.21), proximity of (affordable) housing, and more places to rest (especially in the North Bund area). By involving more stakeholders and end-users in the planning and design process, and by implementing 'needs assessment' in advance, more usable, attractive, and vibrant spaces can be realized (recommendation 1).

In the first part of this chapter, an experiment is defined as an "inclusive, practice-based and challenge-led initiative, which is designed to promote system innovation through social learning under conditions of uncertainty and ambiguity" (Sengers, 2016). The cases that are analyzed in this chapter teach us that China's extreme development speed in combination with the present political vigor (financially strong, quick changes and decisions are possible, all landownership belongs to the government) also requires social learning and connection with all stakeholders and their needs to be able to realize a more sustainable innovation journey. The three cases described show mismatches and partial failures in their promises (expectations) and what they delivered in terms of socially, economically, and environmentally sustainable development. Another recommendation to planners and policymakers is to foster a more 'experimental mindset' without fixed end goals, and to look beyond their own projects and seeking to learn from other practices. Moreover, it is essential to be aware of societal and environmental challenges and uncertainties (recommendation 2).

Even more needed is a transition in worldviews: the earth is not an empty sheet, a tabula rasa, but a palimpsest of multiple layers in which multiple factors come together. By searching a better connection with the existing landscape, ecological and sociocultural values a stronger identity and sense of place could be realized (recommendation 3). This third recommendation is practiced in the case of the Huangpu Waterfronts but is absent in both rural cases. The supervision in the central city is obviously stronger than on Chongming.

FIG. 3.19 Spontaneous use of watersides in new towns near Shanghai (photo by author, 2010 - 2019).

The relation of urban settlements with the water used to be very direct in this region. This shifted during the period of industrialization since late 19th century. Nowadays there is a new shift taking place, geared toward service industries, recreation, and tourism. To be able to facilitate this shift and steer it in the right direction, more awareness of the place-making possibilities of watersides is needed, in line with already existing local values (historical, ecological, and socio-economical). This will certainly result in a less platonic relation: a more dynamic, functional, and pleasant urban life, as a reinterpretation of the classic Chinese painting Qingming Shanghetu.

FIG. 3.20 Spontaneous use of watersides in new towns near Shanghai (photo by author, 2010 - 2019).

FIG. 3.21 Spontaneous use of watersides in new towns near Shanghai (photo by author, 2010 - 2019).

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4 Shanghai's Regenerated Industrial Waterfronts

Urban Lab for Sustainability Transitions?

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This chapter is a slightly adjusted version of above-mentioned peer-reviewed journal article – only the numbering of paragraphs and figures and the citation style has been adjusted, and an explanation of the position of this chapter in this research and a list of main findings have been added on this introducing page.

Position of chapter within this research: This chapter identifies and evaluates the role of pilot projects and demonstration zones along the Huangpu River and examines how these pioneering and experimental 'urban megaprojects' contribute to Shanghai's effort to take the lead in developing sustainable urban transitions. Further the chapter explains the motivation, role, and the spatial and socio-economic effects of these innovate and creative dubbed real estate clusters along Shanghai's regenerated industrial waterfronts on their context.

Research question: How can an 'urban lab' as in Sustainability Transitions theories be identified in the context of Shanghai and how do these pioneering projects contribute to a sustainable transition effort?

Main finding

— If an Ecological Civilization approach expects to bring harmony by balancing environmental, economic, and social dimensions, then the real estate projects along the waterfronts are not a convincing demonstration of this potential, because these projects aim exclusively on high end income groups, which doesn't add to urban vibrancy. This urban vibrancy is crucial to attract foreign companies and investment.

4.1 Introduction

This chapter examines recent waterfront regeneration projects in Shanghai that are expected to play an experimental and exemplary role.

These projects have a strong spatial and socio-economic impact. By reconnecting the city with the Huangpu River, the waterfronts, after losing their former port role, have once again become the main driver for urban development. Approaching this phenomenon through the lens of Sustainability Transitions theories has not been done before in the Chinese context and fills gaps in the still limited research on recent waterfront transformations in Shanghai (den Hartog, 2019, 2020; Li & Li, 2016; Li & Zhong, 2020; Yang et al., 2020).

Shanghai's urban development has shifted from an urban expansion model with new towns (den Hartog, 2010) to a model of urban densification and regeneration within red lines that prevent the city from sprawling outward (Shanghai Municipal People's Government, 2016). Simultaneously the city is implementing ambitious projects and policies to facilitate an urgently needed shift from quantitative planning toward qualitative planning. The subtitle of Shanghai's latest Master Plan (2017–2035) is: Striving for an Excellent Global City (迈向卓越的全球城市; Shanghai Municipal People's Government, 2016). According to this plan (abbreviated as Shanghai 2035), the city wants to compete, and possibly surpass, global cities such as New York, London, Singapore, and Tokyo in terms of economy, image, and quality of life. Shanghai 2035 promises to realize "a city of innovation, a cultural city, an ecological city, and a modern socialist metropolis with world influence" by 2035 (Shanghai Municipal People's Government, 2016). The urban regeneration of the Huangpu riverfronts plays a key role with no less than 120 kilometers of waterfront transformation intended to eliminate polluting industries, create a continuous open public space (den Hartog, 2019), to make new ecological

connections (den Hartog, 2021B), to reuse industrial heritage (den Hartog, 2020), and to add new landmarks. More than 50 kilometers new waterfronts have been already implemented. This work, accompanied by large real estate clusters, dwarfs other waterfront transformations worldwide.

The research objective is to understand the underlying motivation and effects of emerging pilots and demonstration zones (see Paragraph 2.1) in Shanghai, which are supposed to function as urban labs. The academic objective is to use Sustainability Transitions theories (Paragraph 2.1) in an adjusted way, to analyze and evaluate these urban labs on sustainability aspects, with additional insights from Ecological Civilization philosophy (see paragraph 2.2). The main research questions are: How can an urban lab be identified in the context of Shanghai? How do these pioneering projects contribute to a sustainable transition effort? The following criteria will be examined: adjustability, inclusiveness, functionality, low-carbon impact, and urban vibrancy (see table 4.1). Based on this assessment, recommendations for improvement will be made in Paragraph 5.

Empirical evidence comes from multiple daily-life field observations between 2008 and 2021. Between 2012 and 2021 multiple sections of the waterfronts were analyzed intensively in the context of research and design studios with students from Tongji University (7 semesters North Bund, 2 semesters South Bund, 1 semester Yangpu waterfront and Fuxing Island). In 2019 and 2020 more than 300 questionnaires were completed, with student assistance, amongst visitors (tourists, office workers, etc.) on multiple locations along the river. The questions were concerning usability and appreciation of the new public space and buildings. Semi-structured interviews were conducted with two leading real estate analysts, three developers, more than 20 designers and planners involved in relevant projects, three local officials, and more than 10 scholars. Relevant planning documents, media reports and publications were studied, with translation and interpretation assistance available when needed. Preliminary research results have been presented and discussed during workshops and seminars in Shanghai and elsewhere.

4.2 Sustainability Transitions Theories, Experiments, and Ecological Civilization

4.2.1 Urban Labs and Experiments

In this article concepts of the sustainability transition discourse frame the empirical analysis and argumentation. These concepts help explain how promising visions of a sustainable future and attractive urban realities are translated on the ground, and how these projects can help shift the urban reality into a more sustainable order.

A century ago, scholars from the Chicago School of Sociology approached the city as an urban lab and used the concept of social experimentation (Park, 1929). In contemporary mainly European-centered discourse on sustainable urban transitions, the term urban (living) lab is used for socio-technical experiments with a participatory nature (Steen & Van Bueren, 2017), usually on a neighborhood-scale. Urban labs are not necessarily physical, but "represent sites" and "allow stakeholders to design, test and learn from socio-technical innovations in real time" (Wirth et al., 2018, p. 230). Urban labs are tools to find new forms of urban governance to address complex problems; they function as an inspiring sample. They have tended to focus on public spaces such as infrastructures (e.g., NACTO) or greening projects (e.g., Naturvation Atlas).

In the field of Sustainability Transitions scholars investigate radical shifts toward sustainable socio-technical systems of production and consumption (Evans et al., 2016; Grin et al., 2010; Kivimaa et al., 2017; Sengers et al., 2016; Weiland et al., 2017). Urban labs are usually community-based and follow processes with many steps and turns and not always satisfying results (Karvonen, 2016). Yet, there are successes among these so-called urban transition arenas (Wittmayer et al., 2014).

Three key concepts in this discourse are 'expectations,' 'socio-technical experimentations,' and 'unfolding innovation journeys.' 'Expectations' addresses how stakeholders use tempting visions of a better future in their urban development projects. These visions or "statements about the future" circulate (Van Lente, 2012) and are 'performative,' helping to create a new future reality by coordinating roles and activities amongst actors (Konrad, 2006), and by legitimizing certain investments (Borup et al., 2006). To be effective, these expectations or visions need

to be shared by multiple actors (Schot & Geels, 2008). To translate expectations of creative, innovative, and sustainable urban solutions into realities they are tested and developed in experimental real-life settings: urban labs. Experiments can be seen as key to change. A process of 'socio-technical experimentation' by a wide variety of societal stakeholders can transform expectations or visions into reality. Socio-technical experimentation is an open-ended 'unfolding innovation journey' (Van de Ven et al., 1999) or, more specifically, a 'sustainable innovation journey' (Geels et al., 2008), full of uncertainty (Garud et al., 2014). In contrast to experimentation in the natural sciences—which usually takes place under strictly controlled conditions and is aimed at finding objective certainties—there are multiple external influences possible in an urban lab. Therefore, scholars in the field of sustainability transition studies describe them as 'socio-technical experiments,' which can be defined as: "An inclusive, practice-based and challenge-led initiative, which are designed to promote system innovation through social learning under conditions of uncertainty and ambiguity" (Sengers et al., 2016, p. 162).

How can we identify and evaluate urban labs in Shanghai? In Chinese urban planning and design there are basically three different levels of experimental projects:

First, pilot projects are experiments located in one or several places to be further adjusted and expanded nationwide. They are expected to aid in reformulating relevant policies (e.g., a 'low-carbon pilot'; den Hartog et al., 2018). Second, demonstration projects (or zones) are considered successful experiments that can be replicated and can function as a national or international sample (e.g., Chongming Island as National Ecological Demonstration Zone; den Hartog et al., 2018). Finally, model (**文明**) projects have been deemed 'excellent' (**卓越**) social management models that support political principles, e.g., Ecological Civilization (see Paragraph 2.2).

These different labels for projects are linked with different financial and governance constructions and can overlap. In Shanghai 2035 the Huangpu River's waterfront as a whole is labelled a "demonstration zone for the development capability of the global city of Shanghai" (Shanghai Municipal People's Government, 2018). This is a socio-technical experiment on a municipal level. The waterfront redevelopment is designed and implemented at the district level; each district has founded its own government-owned development company (e.g., West Bund, see Paragraph 3.3). Within these administrative bodies, there are smaller pilot projects for testing specific aspects, such as 'AI Town pilot' and 'art zone pilot' at West Bund (see Paragraph 3.3). All these demonstration zones and pilots have pioneering and guiding roles. They most probably will be awarded with the honourable title 'model project' afterwards. While urban labs, especially in the European context, are usually

limited in impact (Scholl & De Kraker, 2021), the demonstration zones and pilots described in this article have a considerable impact that redefines almost everything, by creating a 'new world.'

4.2.2 Ecological Civilization as National Socio-Technical Experiment

Ecological Civilization (Sheng Tai Wen Ming, 生态文明) is a socio-technical experiment that can be defined as a "dynamic equilibrium state where humans and nature interact and function harmoniously" (Frazier et al., 2019, p. 1). According to some scholars, it originated in the discourse on ecological modernization (Zhang et al., 2007). However, it has strong roots in Marxism and some scholars claim that it has the potential to challenge or even replace global capitalism (Gare, 2020). Nevertheless, the concept of Ecological Civilization has received many sceptical reactions (Hansen & Liu, 2017; Wang et al., 2014; Wang-Kaeding, 2018). Realizing an Ecological Civilization means a paradigm shift and drastic societal reform of all aspects of life, including the economic system. Recurring terms in the discourse of urban planning and design in China are 'beautification' and 'harmonization.' Both terms originate from the Ecological Civilization campaigns and have been promoted by the national government since 2007 (Hansen, M.H. et al., 2018). Beautification refers to improving the overall urban image, and harmonization means to improve the quality of life and fortune of the society. In Shanghai's urban regeneration efforts beautification and harmonization are apt to mean polishing street life by eliminating whatever does not align with prosperity and modern urban living in the view of local leaders. Informal street markets and old working-class housing are examples of targets for removal. Beautification and harmonization are principles to provide social guidance and reflect strong state control over urban planning and design practices. This State control is also reflected in the new waterfronts of the Huangpu River (den Hartog, 2019). This transition from an industrial civilization to an Ecological Civilization contains three dimensions that need to be brought into harmony, according to the Communist Party's constitution: the environmental, the economic, and the social. General Secretary Xi continually emphasizes Ecological Civilization as a more balanced model of economic growth.

4.3 Socio-Technical Experimentation: The Huangpu River Waterfront as Stage for Innovation and Ecological Civilization in Shanghai

4.3.1 Shanghai's Frontier-Role

Shanghai is China's gateway to the world and economic Head of the Dragon, as announced by revolutionary and former statesman Deng Xiaoping in 1992 (Foster et al., 1998). Hence this world port city positions itself as urban laboratory (den Hartog, 2010, 2016). With this 'frontier' role, Shanghai is the stage for many experiments. The former port-related industrial waterfronts have a crucial position in this; they have become a porous interface for new urban development and a way to reconnect city and river. City leaders nationwide see Shanghai as an inspiring model with access to new ideas. Many initiatives and trends that started in Shanghai are transplanted elsewhere in China, such as the concept of Xintiandi (den Hartog, 2017A).

The origins of Shanghai are inseparable from its location beside the water (Ball, 2017; King, 1911). The strategic deltaic location made Shanghai into an international hub for exchanging goods, finance, and knowledge. The former foreign concessions were zones of exemptions with exclusive rights for a select group—somehow the precursors of current demonstration zones—that accelerated international trade and global connections. It made Shanghai the third-largest banking and finance centre in the world during the 1930s, with the classic Bund as icon. The city's location in the Yangtze River Delta is also a vulnerable one, with flood risk and conflicts between urban, industrial, ecological, and agricultural land use. This location makes Shanghai an excellent place to experiment with new urban planning and design approaches that aim to make the city more sustainable and resilient. The Master Plan Shanghai 2035 promises this metropolis will play a pioneering role and lead the reform into the era of Ecological Civilization. The expectation is to become an "environment-friendly, economically-developed, culturally-diversified and safe liveable city" (Shanghai Municipal People's Government, 2016, p. 17). In Shanghai's more detailed master plan for the Huangpu River, the expectation is to build a "world-class waterfront development zone"

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(世界级滨江发展带). This plan distinguishes three key functions for the river: (1) the river as spatial and functional carrier; (2) the river as the city's public living room with rich human connotation (referring to heritage and identity); and (3) the river as an ecological corridor for a harmonious coexistence between humans and nature, in terms of 'Ecological Civilization.'

A main 'expectation' as stated in Shanghai 2035 is to become "a more adaptable, resilient eco-city and benchmark for international megacities in terms of green, low-carbon and sustainable development" (Shanghai Municipal People's Government, 2016, p. 25). This ambition will be showcased in demonstration zones. According to Shanghai 2035, Ecological Civilization requires a new balance between top-down and bottom-up governance approaches and an exploration of public–private partnerships and new forms of participation. Citizen participation is mentioned frequently in the final chapter (Shanghai Municipal People's Government, 2016). Ecological Civilization means a shift to a new planning approach: a process of exploration and new balances between rigid control and flexible adaptation (Chen & Du, 2018; Xu et al., 2017).

Within the wider context of waterfront regeneration, the various municipal districts of Shanghai developed a dozen large thematic real estate clusters, each of them comparable in size to Canary Wharf in London or Hudson Yards in New York (Figure 4.1). These clusters contain attractive new functional programs, usually related to arts and creativity, but their main share consists of offices, five-star hotels, and exclusive retail. Less than 5% is (upscale) housing. In paragraph 3.2–3.4, three prominent zones that contain several of these clusters are described in more detail, chronologically. They have been selected because the municipality has deemed their transformations exemplary and trendsetting.

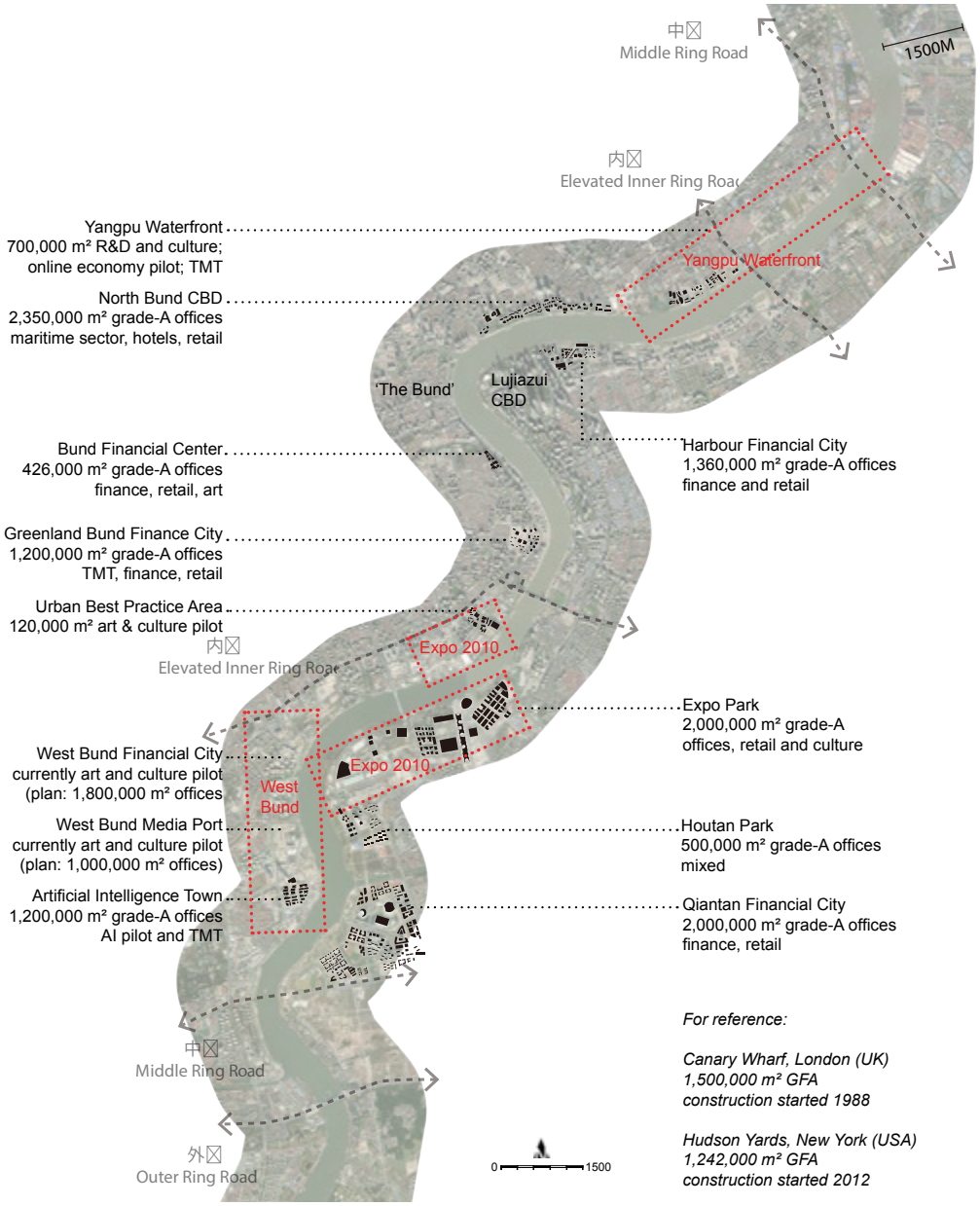

FIG. 4.1 Map with urban megaprojects since 2012 along the central section of the Huangpu River. Source: Image by Harry den Hartog and Jiawei Hu; Satellite photo as underlay by Shanghai-Tianditu (2021).

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4.3.2 Former Expo 2010

FIG. 4.2 Two pictures of the former expo area filled with grade-A offices around remaining expo-pavilions. Source: Author (Summer 2020).Two pictures of the former expo area filled with grade-A offices around remaining expo-pavilions. (Photos by author, Summer 2020).

The expectation that development projects should reconnect the city with the river began in 2002 with the Regional Comprehensive Development Plan for the Huangpu River and preparations for Expo 2010, themed "Better City, Better Life," located on former docklands on both sides of the river (Pudong District and Huangpu District). For this event navy-owned shipyards and about 27,000 housing units were removed. The event accelerated multiple urban projects (Wong, 2010) and made Shanghai "China's pioneer for urban regeneration" (Li & Li, 2016, p. 342). Across the city it resulted in refurbished facades, green decorations, and the accelerated removal or hiding of everything, especially informal street life and low-income neighborhoods, that did not fit the desired international image. Expo 2010 was primarily a socio-technical experiment to encourage people to become 'model' citizens (Chen, 2018; Wong, 2010) as part of an early phase of Ecological Civilization implementation. For example, there were educational campaigns on how to behave in public spaces, for example the tradition of wearing pajamas outdoors was (temporary) discouraged. Besides being an international business event, Expo 2010 was a moment to experiment with new forms of public–private partnership, loans, and bonds (Chen, 2020). After the event, the innovation journey was interrupted (den Hartog, 2012): post-event reuse of the area was delayed for 5 years, because suburban development was still more profitable. The well-visited iconic Power Station of Art, China Pavilion, and Mercedes Benz Arena have been exceptions. The Urban Best Practices Area was a showcase with pioneering samples of low-carbon and passive buildings during the expo. The Urban Best Practices Area was meant to become a cultural cluster after the expo (Li & Li, 2016), but this was postponed until 2019 because West Bund took over the role, thanks to more successful experimental collaborative governance (see Paragraph 3.3). Currently

the Urban Best Practices Area is in the process of revival. Since 2015 the Pudong side of the expo has been filling up with office clusters and malls (Figure 4.2), instead of needed (affordable) housing.

4.3.3 West Bund

FIG. 4.3 On the left, the AI Town under construction. Between the towers, several art institutes are still visible. On the right, the TANK Shanghai, a pioneering and multifunctional art centre in former oil storage. (Photos by author, September 2020).

After Expo 2010 the West Bund area started to be redeveloped by a state-owned enterprise with the same name, in Xuhui District. Since the mid-19th century, cement and coal deposits, wharfs, and a military airport have dominated the area. This was a pioneering zone during China's industrial development, with new industries and technologies. The 'expectations' were to make the riverside a scenic space for citizens and to establish a pilot International Art Industry Cluster (den Hartog, 2020; Hastings, 2019; Zhou, 2017). The West Bund is also a Cultural and Financial Cooperation Pilot Zone that experimented with new forms of "government-led regeneration with market-oriented management and collaborative governance" (Qiu, 2019). Its innovation journey started with the experimental West Bund biennial in 2013 in a former airplane factory. Since 2015 this biennial is renamed in Shanghai Urban Space Art Season, co-organized by West Bund and the municipal Urban Planning Bureau. With a range of onsite events and installations along the waterfront, the aim has been to attract people and (international) investors. West Bund has become a brand. In line with Museum Mile in New York and South Bank in London, a range of museums, galleries, and art events were invited to West Bund. In 2019 even Centre Pompidou opened a branch in the presence of Emmanuel Macron, president of the French Republic. The planning is said to be in accord with Ecological Civilization by

using “culture-oriented, eco-based and technological-innovation-driven” development principles (Shanghai Municipal People’s Government, 2016). West Bund is (after the classic Bund) the most intensively used of the new waterfronts in Shanghai. It enjoys experimental exceptions in its freedom of use: Unlike in most other sections visitors are allowed to bring pets and play with kites. Picnic blankets and tents can be spotted on the lawns. There is a large area for electronic dance music events and a skate park. This all has put West Bund on the mental map of a culture-oriented, educated, young, and middle-class section of the population and of international expatriates. In terms of square meters, West Bund is one of the largest art districts in Asia. Its success can be attributed to the proximity of high-end neighborhoods, tax incentives, and rent-free leases for cultural institutes (Zhou, 2017). In 2013 several buildings were offered for short-term lease to local architecture offices for their emerging practices, and to add a sense of creative entrepreneurial flavor. As soon as the pilot AI Town is completed (Figure 4.3), these studios could be dismantled. After an innovative journey of branding by creating a scenic landscape and attracting cultural institutes, the area is gaining a more formal corporate image, aimed at competing for investment on the global stage under the catchy slogan “Art & AI as engine.”

4.3.4 Yangpu Waterfront

FIG. 4.4 Behind the scenic Yangpu waterfront, which is a “demonstration zone for the construction of a people-oriented city”, while adjacent working-class neighborhoods are being demolished. Source: Author (May 2021).

Decades before West Bund, Yangpu District’s waterfront was a pioneering area for modern Chinese industry, with textiles, shipbuilding, pharmaceuticals, soap making, tobacco, machine manufacturing, public utilities, and more. Together with North Bund (Hongkou District) this waterfront is in the former American Concession, one

of the foreign enclaves founded after the Treaty of Nanjing (1842) as a basis for international trade. Late in the last century, the area was run-down, with polluting industries and dilapidated working-class neighborhoods. Urban regeneration started in 2012 when a textile factory was transformed into the Shanghai Fashion Centre, an outlet mall. Also, at the Yangpu waterfront a Shanghai Urban Space Art Season biennial was organized in 2019 (after the first two editions at West Bund in 2013 and 2015, in 2017 a third edition took place at the East Bund). Today Yangpu promotes its waterfront as a 'World Class Waterfront Development Belt' in an attempt to attract foreign investors. The project is nicknamed "from rustbelt to brainbelt" (Lv & Wang, 2017). The square meter prices for residential real estate are already up to €13,000 per square meter (2021). In November 2019, General Secretary Xi visited Shanghai. During his visit he only visited the Yangpu waterfront (a "demonstration zone for the construction of a people-oriented city"), which underlines its strategic importance and demonstration role. In the fall of 2021, a key meeting will be held in Shanghai with General Secretary Xi attending, and a large conference venue is under construction at the North Bund waterfront in Hongkou district, not far from the place he visited previously, in a highly visible spot. The original ambitious plans were to make the Yangpu waterfront into an innovation belt with jobs for more than 170,000 people (Lv & Wang, 2017), but over the past year economic and political realities have changed the innovation journey. Responding to the Covid-19 pandemic the adjusted expectation is to transform the area into a large Online Economy Park (Yang, 2021) based on 5G technologies and the fast-emerging technology, media, and telecommunication sector, which by 2020 already occupied more than 15% of Shanghai's total office stock. This innovation journey is expected to continue with lower density and much more green space. Today the adjacent plots are still derelict, with several remaining working-class neighborhoods ready for demolition. The migrant workers who live here seldom use the waterfront spaces, because they have almost no free time. The lack of connectivity between the river and run-down neighborhoods and the negative connotation in the collective memory (pollution, poverty) of this part of the city make this waterfront still less intensively used than other waterfronts in the city (Figure 4.4). This trend is expected to be completely reversed over the next five years.

TABLE 4.1 The three cases compared on several aspects.

	Expo 2010	West Bund	Yangpu Waterfront
Governing body	Pudong District and Huangpu District	Xuhui District	Yangpu District
Operated by	Bureau of Shanghai World Expo Coordination	Shanghai West Bund Development Group (West Bund)	Shanghai Yangpu Binjiang Investment and Development Co., Ltd

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TABLE 4.1 The three cases compared on several aspects.

	Expo 2010	West Bund	Yangpu Waterfront
Size of zone	5.28 square kilometer	9,4 square kilometer	12 square kilometer
Main expectation	Better City, Better Life / reconnect city and river	Art & AI as engine / reconnect city and river	demonstration zone for the construction of a people-oriented city'
Main experiments	Urban regeneration experiment;	Pilot International Art Industry;	Pilot Online Economy Park
	Urban Best Practice Area being reused aspilot for International Art Industry	Cultural and Financial Cooperation Pilot Zone (government-led regeneration with market-oriented management and collaborative governance);	
		Pilot Artificial Intelligence Town	
Timeline / journey	2006-2010 urban regeneration to prepare Expo;	start waterfront regeneration 2010;	start waterfront regeneration 2010;
	Expo2010 (world exposition) = event-led urban regeneration;	West Bund 2013 / SUSAS 2015 (urban planning and design biennials) = event-led urban regeneration;	SUSAS 2017 (urban planning and design biennial) = event-led urban regeneration;
	2010-2015 partly demolition / remains mainly vacant;	2019 Centre Pompidou opened a branch;	
	since 2015 redevelopment with office clusters;	since2018/2019 start construction AIT own and West Bund Media Port;	
	since 2018 UBPA redevelopment	preparations for West Bund Financial City	
Inclusiveness	removal large amounts of working-class neighborhoods / no new housing on site	mainly high-end housing; public space is very well- used by all kinds of people	removal large amounts of working-class neighborhoods / partly replaced by high-end housing complex
Functionality	mostly desolate, except UBPA and River Mall	well-functioning	still rather desolate
Low-carbon impact	removal of industries	removal of industries/ all new buildings with low-carbon labels	removal of industries/ all new buildings with low-carbon labels
Urban vibrancy	Many visitors during Expo in 2010, but almost no visitors afterwards. Gradual revival since 2018, but half the lands are still bare. Preparations to construct a large urban park for greening. Half of the lands being used for offices and retail, but largely vacant (except three main venues:China Pavilion, Mercedes- Benz Arena,and PowerStationofArt).	Relatively successful, well-visited, with many art related events and exhibitions; experimental 'free zone' with many tolerance for all kind of spontaneous activities.	Temporary many visitors during SUSAS 2019, but much less afterwards; reuse "under consideration".

4.4 Discussion

In the international discourse urban labs are supposed to supplement or even replace traditional urban planning approaches, especially following the global economic crash of 2008. Local authorities frequently use urban labs to mask a lack of funding, or to suggest public–private partnerships (Karvonen, 2016). The Covid-19 pandemic accelerated the use of urban labs (Honey-Rosés, 2021; Rowe, 2021). In contrast to the grassroots elements in urban labs, the demonstration zones and pilot projects along the Huangpu River are initiated in a top-down manner and are controlled by the local government, usually with substantial international help: investors, engineers, designers, and other professionals. Some of these projects do experiment with public participation (Chen, 2018; Shanghai Municipal People's Government, 2016), but mainly through incentives (Zhou, 2017).

In fact, these projects are urban megaprojects (Christiaanse et al., 2019; Del Cerro Santamaría, 2013; Hanakata & Gasco, 2018). Megaprojects can be characterized as "comprehensively planned mixed-use complexes, operated under a single authority and governed by exceptional regulations," usually in public–private partnership (Christiaanse et al., 2019, p. 15). They are intended to function as an accelerating tool in urban regeneration processes aimed to revalorize urban centers. Urban megaprojects—such as Canary Wharf in London or Hudson Yards in New York—are expected to be 'agents of change' (Surico, 2020). Like urban labs, they are powerful drivers of 'urban innovation,' but in the case of Shanghai, the processes are accelerated and amplified. Urban megaprojects have their roots in post-war American urban planning (Altshuler & Luberoff, 2003), and have been used as a tool by local governments to quickly generate money. With their large-scale and often monumental architecture they "express strong political will, under different political regimes," often supported by neo-liberal motives (Christiaanse et al., 2019, p. 20). Urban megaprojects are the arena where global ambitions meet local values, with socio-economic gentrifying effects on surrounding neighborhoods (He, 2007). In Shanghai, they have led to the displacement of large groups of residents and the demolition of characteristic and traditional, but dilapidated, neighborhoods. In esthetic terms they are "carefully laid-out urban developments" (Christiaanse et al., 2019, p. 15) with a public purpose, used for place-making and identity creation.

Worldwide, urban waterfronts have been used as neoliberal urban policy experiments (Brenner & Theodore, 2002; Iovino, 2018; Sassen, 2014; Zukin, 2020). In Shanghai since the late 1990s, urban planning practice has been increasingly combined with market-driven developments. This trend in some ways represents a departure from

the socialism-with-Chinese-characteristics approach that emphasized adapting Marxism-Leninism to local Chinese conditions and aimed to improve the quality of life of millions by stimulating the national economy. The emergence of speculative urban megaprojects (Figure 4.5 along the Huangpu River is characteristic of what Harvey identifies as 'neoliberalism with Chinese characteristics' (Harvey, 2005).

FIG. 4.5 Emerging urban megaprojects AI Town (left picture) and Houtan (right picture), with super-tall landmarks. Source: Author (March 2021).

So, what is innovative in these thematic GDP-driven megaprojects along the Huangpu River? At first glance they appear to follow a real estate formula analogous to, for example, Hudson Yards in New York—the largest private real estate development in the US (Sorvino, 2016) that received fierce criticism (Kimmelman, 2019; Wainwright, 2019). The urban megaprojects along the Huangpu River are a mixture of private and state capital, and the spatial and socio-economic shockwaves they have made in the city and wider region needs research that goes beyond the scope of this article. Nevertheless, compared to the usual urban planning practice in contemporary China, the demonstration zones and pilot projects along the Huangpu indeed introduce new elements, such as walkable and car-free environments, functional mixing, and the inventive use of underground spaces. Innovative in the context of Shanghai and China is also the large amount of green and public space aimed at recreational use. Less than a decade ago there were hardly any walking or cycling paths, and the concept of a leisure society is still unknown. Moreover, pilot projects with high-end art, AI industries, and an online economy are unique in China and far beyond. These urban megaprojects can compete in appeal with those in other world cities and are perhaps even better designed. Most of the buildings and public spaces are actually designed with the help of leading international architects, including David Chipperfield Architects, Foster + Partners, Heatherwick Studio, Kengo Kuma, KPF, OMA, Sanaa, Sou Fujimoto, and also many emerging local talents such as Atelier Deshaus and OPEN Architecture.

With the exception of the International Art Industry pilot at West Bund, as described in Paragraph 3, other megaprojects along the Huangpu experience difficulties attracting office tenants, as well as users of the eye-pleasing public spaces. From field surveys with students a range of shortcomings came to light. Most of the new waterfront spaces lack facilities and have functional limitations (Figure 4.6; den Hartog, 2019). Local government-related institutions and companies have been relocated here, while (international) art institutes have been attracted by incentives (Zhou, 2017). Although most museums are intensively used, most office areas are still under-occupied. From field surveys and conversations with real estate specialists, it became clear that most of the offices are merely used for speculative investment, with a third of the offices taken up by foreign investors. According to leading experts from Cushman & Wakefield, the average vacancy rate in Shanghai is about 20%, though in some waterfront projects it is much higher; other office locations such as Hongqiao Hub are preferred due to lower pricing and better connectivity (personal communication, 29 October 2020; see also Hatton, 2020). From personal conversations with multiple users of the buildings, it became evident that the actual vacancy rate is far higher than this average. More than a few buildings are completely empty several years after completion and were empty even before the start of the Covid-19 pandemic and the US–China trade dispute (Hammond, 2019). There is uncertainty about the actual need for these office spaces. Exemplary is the well-known Shanghai Tower, the world's third tallest and presented as sustainable (it has a LEED Platinum label[32]), but more than a third of its floors have been empty since 2016 (personal communication with users, September 2021)! Such projects provide scenic backgrounds for taking photos, analogous with the crowded classic Bund, where swarms of tourists take selfies with the skyline as background (preferably without freight ships). The new waterfronts mainly facilitate a new white-collar (upper) middle class and tourists. Interviews by students with users on site during the autumn of 2020 revealed that most users are occasional visitors living at least half an hour away by car or public transport. The new waterfronts are still relatively unknown to local citizens, even though local authorities launched multiple publicity campaigns and events along the water, such as marathons and music events. Words such as art, creativity, and innovation are happily used for branding with specific target groups. 'Culture' has become a market currency (Zhou, 2017). While the future of West Bund is not yet sure, the main venue of Shanghai Urban Space Art Season 2017 at East Bund will be reused as a museum for the Chinese Communist Party. Former venues of the Shanghai Urban Space Art Season in 2019 are still empty, with "reuse under consideration" (Personal communication with key stakeholder, 22 May 2021).

32 LEED stands for 'Leadership in Energy and Environmental Design' and it is one of the most popular green building certification programs used worldwide.

FIG. 4.6 Multiple vacant offices, here at North Bund, and limitations in the use of public space, here on former Expo 2010 site. Source: Author (Autumn 2019).

In short, the urban megaprojects along the Huangpu River appear to be primarily oriented to support the desired image of a global city, and to stimulate the economy with investment and tourism. They provide an excellent illustration of 'neoliberalism with Chinese characteristics' (Harvey, 2005). Usability for citizens in daily life seems secondary (den Hartog, 2019; Li & Zhong, 2020; den Hartog, 2021B). The question is whether the inspection of the Yangpu waterfront last year by the General Secretary might change this unsustainable tendency, since he emphasized serving the people (为人民服务) and taking a people-oriented (以人为本) approach, two recurring terms associated with Ecological Civilization.

Urban planning and design in China are characterized by impressively large investments in advance for public infrastructures (including public space and cultural facilities). This helps to create an attractive environment for investors and citizens, which are expected to come eventually, even after years of vacancy (Shepard, 2015). In the People's Republic, all urban land is owned by the state. Selling land-use rights is a main source of income for local authorities. Shanghai's regenerated waterfronts are thus an investment vehicle for the city. Simultaneously, the new skyline and green décor adds to the desired 'excellent global' image and attracts tourists. This speculative approach has strong analogies with the functioning and image of the classic Bund with its line-up of bank buildings, the starting point for international trade and foundation of the former concessions (Figure 4.7). These 'new bunds' are like enclaves with different regimes, aimed at trade and investment. Though their boundaries are physically porous, they create new socio-economic limitations and have strong gentrifying effects on the surrounding city. After decades of socio-economic decline, China is using its current period of prosperity not only to catch up, but also to invest in its future by creating overcapacity in square meters of office space, museum space, and so forth. As long as the percentage of

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workers in the service economy in Shanghai is significantly lower than in competing global cities such as London and New York, there will be interest in building more offices, even when there is little demand for them yet. From this point of view, the creation of oversupply during economic prosperity can be explained as sustainable development. Still, this causes friction with the before-mentioned common definition of sustainability (United Nations, 1987), especially since unquestionably it is not inclusive to replace affordable working-class neighborhoods with exclusive (and mainly empty) real estate.

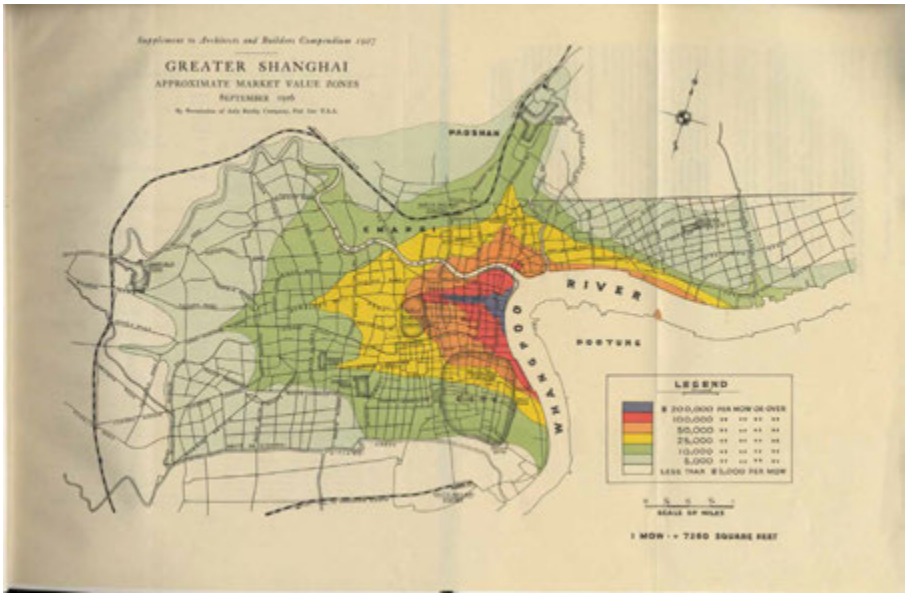

FIG. 4.7 During the period of foreign concessions, Shanghai's Nanjing Road area and Bund (both in purple) became the new heart of the city, and housed multiple headquarters, foreign banks, and shipping companies. The former foreign concessions used to be closed to local Chinese citizens. Source: Brooke and Davis (1927).

What makes these projects sustainable? Besides the removal of polluting industries and building low-carbon buildings in return, the projects are pedestrian-oriented. However, only half of the real estate clusters are within walking distance of a metro station. All buildings meet the National Green Building standard; in many cases even international labels such as LEED are obtained, although the labels are questionable here (den Hartog et al., 2018). Yet, as described in paragraph 3.4 the motivation behind the projects is primarily economically based but goes along with an intention to improve the image and quality of life. Environmental concerns are taken into consideration but are not yet prioritized (chapter 6). The urban megaprojects

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focused on finance and innovation, or tourism and creative industries are expected to make Shanghai into an excellent global city. According to Sassen (1991) a global city is a 'post-industrial production site' characterized by strategic transnational networks that support significant specialized financial and producer services that keep the globalized economy running (Sassen, 1991). Shanghai certainly excels in terms of city branding through architecture and new public waterfronts of high quality. In contrast to small-scale urban (living) labs, the large-scale pilot and demonstration projects along the Huangpu River do have an impact: They finance the city, enable the relocation of polluting industries, upgrade the overall city image, and add desirable qualities through place-making and greenery.

Should these urban megaprojects be considered urban labs as discussed in Sustainability Transitions theories? The quantity and quality of their public space and real estate along the waterfront is impressive. Their 'statements about the future' are robust and shared by multiple actors (Schot & Geels, 2008; Van Lente, 2012), although citizens are excluded (den Hartog, 2019; Li & Zhong, 2020). The projects are also practice-based and challenge-led (Sengers et al., 2016) in their approach. Governance processes in Shanghai involve a complex interplay of multiple groups or departments (Miao & Lang, 2014; Zhou, 2017), and interplay between top-down authority and bottom-up agency (Li & Zhong, 2020), but they operate as one entity that can overrule all non-governmental stakeholders. The local government has absolute ownership and mandate over all urban lands. This makes it necessary to redefine the urban lab as concept in the Chinese context. The term 'lab' suggests that failure is possible, while the terms 'demonstration zone' and 'pilot project' point to an excellent 'expectation' that excludes failure. Thus, the described projects are not as intended to be open-ended (Van de Ven et al., 1999) as urban labs are in the international (mainly European-centered) discourse. System innovation is a controlled process in Shanghai. This means that social learning factors including feedback from end-users have generally been excluded, although some initial steps have been taken to consider that feedback (Li & Zhong, 2020; Shanghai Municipal People's Government, 2016). Urban labs are tools to find new forms of urban governance. Experimentation has helped China introduce innovative policies, and local officials are encouraged to experiment to find innovative solutions and to give feedback to help adjust national policy formulations (Miao & Lang, 2014). This has even created opportunities to experiment with 'exemptions' allowing marketization in a planned economy (Zhou, 2017). The government especially encourages innovation clusters as incubators for new industries and as a source of change. Yet, due to the urge to catch-up socio-economic experimentation in China often resembles making something quickly, followed by adjustments during implementation – i.e., improvising. Urban planning and design are usually an innovation journey based on collecting best practices for inspiration and improving or adjusting them as

needed (den Hartog, 2010). This offers unlimited flexibility, especially since labor costs in Shanghai are still relatively low. Compared to urban labs, the described projects in Shanghai are characterized by large-scale functional programming without direct relationship to their context. They are built in a short time, without a clear time horizon or plans for (re)use. As enclaves of 'neoliberalism with Chinese characteristics' (Harvey, 2005) the projects are indeed "niches where disruptive innovation takes place" (Loorbach, 2014).

4.5 Conclusion and Recommendations

In summary, approaching the demonstration zones and pilots through the lens of urban transition theories is helpful to identify bottlenecks, but the terms 'demonstration zone' and 'pilot' are indeed more suitable than 'urban lab' based on their emphasis on image-building and steering roles. Differences in governance structure, socio-economic context, scale, stakeholders, and impact, make it necessary to explain the described cases through the lens of Ecological Civilization philosophy. Adjustment of perspective is needed to be helpful in developing recommendations for improvements in governance and possible new directions. If Ecological Civilization claims to be an alternative to global capitalism (Gare, 2020) and expects to bring harmony by balancing environmental, economic, and social dimensions, then the urban megaprojects along the waterfronts are for the moment not a convincing demonstration of this potential. How can we find a way to adjust or improve the effects of the demonstration zones and pilot projects along the Huangpu? Based on the discussion above, some recommendations can be made.

A first recommendation is to add sufficient (affordable) housing, including new housing typologies aimed at more diversity of households, including young talents. The locations discussed offer sufficient space for a great deal of housing. A returning keyword in the discourse on Ecological Civilization is 'high quality of life.' Shanghai wants to excel as a global city, attract foreign investment, and offer a comfortable living environment. But in practice, this comfortable living environment is only accessible for a selective upper (middle) class (Chen & Sun, 2007). Such exclusiveness does not add to urban vibrancy. According to interviewed real estate analysts, inclusiveness and diversity in population and housing will result in more attractive urban street life, which is crucial to attract foreign companies and investment (personal communication, 29 October 2020).

A second recommendation is to fill vacant floors (temporarily) with SOHO units (small-office-home-office) and start-up companies. This will add 24-hour urban vibrancy and diversity. This is especially recommended for the former Expo 2010 site. The scale of the current oversupply dwarfs the market failure of Canary Wharf in London in the 1990s (when 60% of the offices were vacant, followed by a revival a decade later). The new mode of working due to the pandemic makes vacant offices even less likely to be used soon, as confirmed by multiple real estate experts worldwide. Yangpu waterfront is already anticipating this.

This leads to a third recommendation that a user-oriented approach is needed in advance, along with a more flexible and open setup able to absorb unexpected shocks (e.g., trade disputes and pandemics); in other words, what is needed is resilience. The creation of a buffer is only sustainable if oversupply can be changed into other usages easily, instead of being redundant. This fits with the mentioned principles of Ecological Civilization and also with before mentioned concept of sustainability (United Nations, 1987).

The formerly inaccessible waterfronts have been made more porous and accessible to the public, but still there are limitations in accessibility. Meanwhile, the thematic corporate and cultural clusters form socio-economic enclaves, due to their exclusive character and the mode of targeting specific users. A fourth recommendation is improving connectivity with surrounding neighborhoods by increasing porosity in all cases described (people-oriented for all people). Additionally, lessons should be learned from experiences in other world-port cities, especially New York, where large-scale urban development has been counterbalanced by opportunities for small-scale and grassroots developments resulting in urban vibrancy (Jacobs, 1961).

A fifth recommendation is to nurture the promise of Ecological Civilization regarding the reintroduction and stimulation of grassroots elements in governance (Li & Zhong, 2020; Miao & Lang, 2014). This is also explicitly included in Shanghai 2035 (Shanghai Municipal People's Government, 2016). More creative, inclusive, and participatory forms of experimentation are needed. For this purpose, studying lessons from urban (living) labs in other countries with consideration of potential scalability is recommended. Vice versa other cities could study cases in Shanghai, since there are promising outcomes in terms of quality, scale, and effectiveness. Nevertheless, tailor-made approaches and adjustments are needed in other contexts because of differences in preferences, appreciation, and governance. Shanghai is in a different phase of socio-economic development than established global cities and needs to deal with a different audience, with other priorities and expectations.

China's unique socio-economic journey toward an Ecological Civilization and sustainability transition will certainly make an impact in Shanghai, elsewhere in China, and even far beyond, such as in the Global South. Ideally, more inclusive experiments will follow and transform Shanghai into a world-leading lab for sustainable transition and innovation.

This study has limitations. Not all stakeholders were able to meet or speak with the author. There might be differences in definition or interpretation, although translation was continually available. The complexity, scale, and impact of the subject offer options for further research on multiple aspects. The timeframe of the current master plan of Shanghai spans until 2035. Many unforeseen changes could happen in that time. This journey, filled with uncertainty, will continue.

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5 Rural to Urban Transitions on Chongming Eco-Island

Den Hartog, Harry (2017B). *Rural to urban transitions at Shanghai's fringes: Explaining spatial transformation in the backyard of a Chinese mega-city with the help of the Layers-Approach.* International Review for Spatial Planning and Sustainable Development, 5 (4), 54-72.DOI: 10.14246/irspsd.5.4_54 https://www.jstage.jst.go.jp/article/irspsd/5/4/5_54/_article

This chapter is a slightly adjusted version of above-mentioned peer-reviewed journal article – only the numbering of paragraphs and figures and the citation style has been adjusted, and an explanation of the position of this chapter in this research and a list of main findings have been added on this introducing page.

Position of chapter within this research: This chapter explores the spatial consequences of extreme urban pressure on Shanghai's vulnerable rural (meanwhile peri-urban) fringes. The top-down policy to transform Chongming into an Eco-Island contains discrepancies with promises of local policies, practices, and daily life realities. The layers approach has been used here as tool for detecting the problems. This chapter also clarifies which changes in spatial planning and design approaches are needed to mitigate the negative impacts of massive unplanned real estate developments along Shanghai's rural (peri-urban) waterfronts.

Research question: Which factors can explain the process of seemingly unbridled urbanization at Shanghai's fringes and which roles do planning processes play in this development?

Main findings

- A lack of relationship toward natural, cultural, or societal contexts in urban planning and design practices result in disturbances
- Expectations, definitions, priorities and aims – on national, provincial, and local level – need to be shared and match with daily life realities to realize a sustainable transition

5.1 Introduction

5.1.1 Extreme Urbanization in the Context of a Vulnerable Delta

While in most parts of the world the majority of the population lives in urban areas, most of the people in Asia and Africa still live in rural conditions (United Nations, 2014), but this is changing rapidly. Unprecedented numbers of housing and urban infrastructures are appearing on former rural lands. A big share of this urban expansion occurs in river deltas, which have always been strategic locations for trade and fertile grounds for food supply. However, deltas are also extremely vulnerable due to loss of fertile agricultural land, the loss of natural diversity, and flood risk, being key concerns that threaten life in urban deltas (Campanella, 2014).

Without doubt the most extreme and unprecedented examples (in terms of rapid and large-scale urbanization) can be found in China, with millions of people on the move, currently cumulating in the formation of urban mega-regions (Friedmann, 2005; United Nations, 2014) and ruralopolises (Qadeer, 2000). These new mega-regions are mainly economically defined without much consideration for underlying natural and historical landscapes.

Within China the Yangtze River Delta Region is currently the largest urban mega-region (World Bank and the DRC, 2014) and nicknamed ‘Head of the Dragon’: opening its mouth to the world, with the Yangtze River as its body and tail. This accumulation of economic power and concentration of people in the Yangtze River Delta has deep historical roots (King, 1911); it is here where tensions between economic, spatial, and ecological interests are currently in an almost apocalyptic state.

During the last two decades, cities in the Yangtze River Delta have been expanding explosively with many hundreds of square kilometers of new urban areas built yearly, usually right on top of fertile agricultural and natural grounds of the delta. In terms of physical scale and economic impact Shanghai is the key player, centrally positioned in the Yangtze Estuary: economically strategic, but also extremely vulnerable when it comes to ecology, fertile agricultural lands, and flood risk (Balica, Wright, & van der Meulen, 2012; Brown, 1995; Den Hartog, H., 2013; Ke, 2014; Wang, 2012). An urgent concern is land scarcity, and this is worsened by a seemingly uncontrolled urban expansion and spatial fragmentation, causing inefficiency and even more loss of fertile land. A series of on-going land reclamations released the pressure temporarily; though they bring collateral damage to existing eco-structures and wetlands and increase the flood risk.

The confrontations are the most extreme and pressing in the urban fringes, due to the temporary transition zone between rigid urban expansion and still existing natural capital and rural values. For this chapter Chongming Island in Shanghai is chosen as an illustrative case for the enormous urban pressure (Figure 5.1). First of all, Chongming Island is a very pure, almost virgin case with high natural and agricultural values since it has been isolated as an island until recently. Since 2009 it has been connected by a bridge-tunnel combination – before that it used to be hardly accessible. This has resulted in rapid changes in landscape, infrastructure, land use and lifestyle. Secondly Chongming Island has been appointed by the Central Government in Beijing as an Eco-Island since 2001: a national showcase and pilot to show the world how sustainability can be achieved. Thirdly, Chongming Island was the last rural county within Shanghai's direct-controlled municipality (equal to a province) and has received urban status since January 2017 (also see appendix G). The status quo of the island's rural to urban transition is rather unique and can clearly illustrate the current tensions in different spatial claims and ambitions regarding rural to urban transitions.

The island has a long history of urban influences and large-scale spatial interventions (e.g., large scale land reclamations and state farms in the 1960s, large scale relocation projects late last century and more recently the planning of a series of new towns). The island plays a main role in regional and even international eco-systems, especially as a resting place for migratory birds (the eastern tip of the island contains two Ramsar zones, which were appointed in 2002 by the Convention on Wetlands of International Importance, on behalf of several UN agencies and international non-governmental organizations). In short, the conflicts in land use and occupation are extremely felt here.

FIG. 5.1 Urban growth of Shanghai's direct-controlled municipality (source maps: Den Hartog, 2010).

5.1.2 Sectorial and Mechanical Approach

Large-scale urban expansion requires good planning and good governance. Worldwide urban development processes have been dominated by modernism. Especially during the post-war part of last century, the common idea was that blueprint planning could control social and physical processes. Currently the discourse is changing due to a series of dramatic natural and social clashes (e.g., Hurricane Katrina in New Orleans, 2005, Hurricane Sandy in New York, 2012) showing that a more flexible and resilient approach is urgently needed in spatial planning and design worldwide. This aims to bring the different spatial claims and interests (agriculture, economy, ecology, housing, water safety, et cetera) into a more sustainable and resilient balance (Scheffer, 2009).

Spatial planning and design in China face two main problems. First of all, there is a lack of transparency in spatial planning processes, and inherently a lack of insight into how different factors relate to each other (Ho, P., 2001; Ho, S. P. & Lin, 2004). Secondly the governance system seems to consequently not be steering towards resilient solutions in this complex context. Usually GDP-oriented motives are dominant in the decision-making (He, Huang, & Wang, 2012). Chinese spatial

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planning and design practices are usually extremely rigid in their implementation, and at the same time seemingly random, often with a lot of collateral damage for the environment and quality of life. To be able to mitigate the impact on the natural and man-made environment an extreme transition in spatial planning and design approaches is urgently needed. The question is how to achieve this and how to improve resilience, for example in the complex case of Chongming Island and in the wider context of the Yangtze Delta.

Thus, the aim of this chapter is to develop a proper understanding and theorization of the phenomenon of a seemingly uncontrolled spatial development, and to be able to propose recommendations toward a more resilient metropolitan development that is able to mitigate the negative impacts on the natural and man-made environment. To reach a proper understanding and theorization, the Layers-Approach is applied. It supports an integrated approach by describing and analyzing various spatial claims and interests, aimed to clarify what should be the priorities in decision-making.

5.1.3 Structure of this Chapter

This chapter will analyze and interpret the spatial impact of the seemingly uncontrolled urbanization in the rural fringes of Shanghai during the last decade, focusing on the case of Chongming Island in the context of the Yangtze River Delta's estuary. This island has a clearly defined border; thus, the impact of the urbanization can also be clearly defined. The 'isolation' of the island ended by the building of a 25.5 kilometers long bridge-tunnel combination in 2009 and additionally since January 2017 the State Council transformed the administrative status of the island from (rural) county to (urban) district. Both changes resulted in clearly identifiable urban impacts. Although, already since the end of the millennium there are increasing classifiable urban influences, Chongming Island has been the focus of various policies and studies on national, regional, and local levels since the beginning of this century, in the context of being one of the world's fastest growing and largest metropolitan regions.

In the urban transitions discourse, there are research gaps on the consequences of unbridled urbanization in the Chinese context, especially regarding the interrelations between eco-system functioning, socio-economic systems, and spatial qualities (Bucx et al., 2010). There is also a gap in integral approaches to linking developments in the different layers, e.g., urban-economic, and natural development (Bucx et al., 2014).

To collect the needed information, more than thirty in depth interviews have been recorded with local stakeholders, public and private: one official on Shanghai's direct-controlled municipality level, one official on a local district level, two officials at township level, two developers, several architects and urban planners involved in various planning and design projects on the island, local entrepreneurs, inhabitants and other stakeholders. Additional relevant literature studies and policy reviews have been done, and more than a dozen field visits, including three workshops with students and local stakeholders have been undertaken during the last ten years by the author of this chapter.

5.2 Analytical Framework and Research Method

5.2.1 Theoretical Framework

The main question is which factors can explain the process of seemingly unbridled urbanization at Shanghai's fringes and which roles do planning processes play in this development? This is tackled by analyzing the process, appearance, and impact of a seemingly unbridled urbanization in Shanghai's rural backyard: the case of Chongming Island.

5.2.2 Using the Layers-Approach in Urban Planning

To reach a proper understanding and theorization it is essential to analyze and evaluate the spatial transformations in the past, present, and expected future of spatial configurations and responsible governance systems. To achieve understanding and theorization, the Layers-Approach (Dammers et al., 2014; Bucx et al., 2010; Bucx et al., 2014; De Hoog, Sijmons, & Verschuuren, 1998; McHarg, 1969; Sijmons, D. F., 1991; Sijmons, D. & Feddes, 2002) is used as a theoretical framework.

The Layers-Approach has been very influential in planning practices worldwide, especially in the European context where it has been further developed since the 1970s (Kerkstra & Vrijlandt, 1990; De Hoog, Sijmons, & Verschuuren, 1998; Meyer et al., 2012; Sijmons, D. F., 1991), with several successful practical samples such as 'Room for the River' in the Netherlands. This was a pilot application to develop a more resilient and adaptive spatial planning approach with the help of a spatial framework that works with nature instead of competing or ignoring it. However, the approach also received a lot of criticism in the discourse (van Schaick & Klaasen, 2011). Testing its principles in a different context, which is far more extreme and complex, is adding to the criticism and contributes to the validation and critical assimilation of scientific knowledge. Hence this approach could frame this critique and needs to be developed further into a tailor-made approach for the Chinese context.

The Layers-Approach has been developed as a critique on mechanical top-down approaches of planners and engineers worldwide, who have tried to control nature, and have therefore often led to vulnerable situations (Campanella, 2014). In the Chinese context, the old-school mechanical and top-down approach is ubiquitous and even more extreme, especially since Mao's 'Man must conquer nature' doctrine (Shapiro, 2001). Natural capital and rural values around Shanghai, have been neglected for a long time in favor of rapid urbanization. Current planning practices in the Yangtze River Delta are based on a tabula rasa approach, and are usually steered by GDP-oriented motives, hence resulting in serious disturbances of the delta as a coherent system and a loss of resilience. However, recently rising problems such as subsidence and flooding, and increasing risks for natural hazards, and additional environmental pollution issues, have created more awareness in the discourse, both nationally and locally.

The Layers-Approach has its roots in the ideas of Ian McHarg, who wrote the ground-breaking book Design with Nature (McHarg, 1969) in which he explained that man should conform to nature and ecology and work with it instead of competing with it. McHarg developed a mapping method that distinguished multiple aspects of a plot of land into multiple stacked layers, the so-called 'layer-cake'. The approach has been developed further by (amongst others) De Hoog, Sijmons, and Verschuuren (1998).

According to Sijmons, D. and Feddes (2002), the Layers-Approach is meant as a "quick witted policy instrument" that is strategic in organizing priorities in spatial planning and in analyzing the positions, responsibilities, and interrelations of the various actors. As a strategic instrument the approach is used to explain and organize relations between three layers and to distinguish the responsibilities and actions to be taken by the various levels of governance that are connected to these layers.

On the other side, the approach is used as a tool for spatial analysis to clarify how the three layers have influenced each other through the ages, with lessons for the future according to Sijmons, D. and Feddes (2002). By approaching an urban region as a complex, layered, and dynamic system it will be possible to indicate the interrelations of various spatial processes. Within this complex layered system there are interactions among its three layers: the geo-morphological base (substratum), infrastructural systems in the middle, and finally land-use patterns (occupation). These layers or subsystems have different dynamics and development speeds but influence each other (Table 5.1). Mapping provides information about the 'behavior' of a complex system – e.g., a delta region – focused on the way the three layers have influenced each other during the years. Based on this analysis, urgent key-issues can be identified regarding tensions between urban-economic and natural developments, aimed to discover the behavior and path dependency of the system as a whole.

TABLE 5.1 Layers-Approach, according to De Hoog, Sijmons, and Verschuuren (1998).

		Design and planning tasks	Approaches
Layer 1	Substratum	– Dealing with the physical efffects of climate changes – Modernising the ater management system	– Nature engineering – Civil engineering
Layer 2	Networks	– Strengthening the position of the Netherlands in international networks – Control and steer the growth of mobility	– Complexes approach (developing nodes ffor exchange od information and knowledge) – Corridor approach (developing mainports and hinterland connections)
Layer 3	Occupation	– Accommodating spatial claims and shrinkage in relation to values and attractivity	– 'Ecology' approach (an ecology defined as a locally characteristic 'lifestyle-environment') – Mold-Contramold approach (city vs. landscape)
	Coherence	– Creating synergy between interventions	– Conditioning spatial planning – Facilitating spacial planning

According to the Layers-Approach there are private domains (mainly occupation), public domains (networks), and the natural system (substratum). The public domain should mainly set priorities – in the western discourse – according to the dynamics of the different layers and interact with the natural system the most. However, this clear order is subjected to a political shift from a centralized government to a market-based structure (a more or less similar process of decentralization is gradually happening in China) that allows for new forms of bottom-up governance styles. This shift has consequences for the order of the Layers-Approach because this means that the occupation layer gains more structural importance in an urban development while before this was designated to the

network layer. The question is how the relationship between the occupation layer and the network layer can be the most effective and steered towards a more resilient way in future developments, especially also in relation to the substratum.

Two processes are especially hard to control in urban deltas in general: physical-territorial processes under influence of climate change, and societal processes. Currently in the European context there is a shift towards 'building with nature' to create more space for 'bottom-up processes' in the natural system (which is the bottom layer). It is important to create conditions for those systems or layer with the slowest dynamics (i.e., the substratum), to prevent hazards such as flooding, and at the same time indicate how and where conditions for urban and economic development can be created. These dynamics are extremely important in policymaking and defining responsibilities. Since the Chinese practice is still lacking transparency (although this is improving gradually), a better understanding of these responsibilities will be extremely useful for understanding the status quo, possible risks, and actions to be taken.

The European planning context of top-down steering is gradually disappearing. Initiatives and steering come more and more from local governments. Meanwhile the bottom layer (substratum) is also in a phase of transition in terms of governance, where the focus on water safety and water quality by strong government bodies has gradually expanded with the involvement of nature and environmental organizations in projects. Thus, both in the bottom layer as well as in the top layer, there are currently transitions in the European context where the traditional technocratic approach is gradually making place for a new, more organic approach.

In the Chinese context, there still is a very dominant steering from above, although the implementation by local governments usually is decisive, without much hindering by the central government, through lacking supervision and differing aims and ambitions. Therefore, the Layers-Approach needs some adjustments to be a handy tool in the Chinese context, to clarify and categorize the various levels of governance and the responsibilities and actions to be taken.

The Layers-Approach will be used for the case of Chongming, firstly by identifying the various factors that impact its spatial development. An overview will be given of the most significant space-altering initiatives that have been deployed on Chongming Island that influenced the rural-urban transition, especially since the year 2000 when the urbanization pressure accelerated (Den Hartog, Harry, 2010). The Layers-Approach will be followed to develop basic knowledge on the conflicts on every layer and the interrelations and interdependencies between the three distinguished layers. Bottlenecks in the usability of the Layers-Approach in the Chinese context will be identified and fixed where necessary.

Secondly, an overview will be given of the conflicting ambitions of the different policy levels: the national, the regional (Shanghai's direct-controlled municipality in the context of the wider Yangtze Delta) and the local level.

Finally, these initiatives and changes are categorized, with help of the Layers-Approach, to create a general overview of the direction the island is going. Based on this, some recommendations will be made to improve the spatial planning practice.

5.3 Case Chongming Eco-Island

Chongming Island, strategically located in the midst of the Yangtze River's estuary just north of Shanghai, is China's national appointed Eco-Island, a wished-for model for sustainable development. One of its main features is Dongtan Wetland Park; an international, strictly protected Ramsar Zone for migratory birds.

However, Chongming Island's contemporary dynamics are extremely high. The household registration system on this island was changed into 'urban' in January 2017. This means that all the registered residents on the island will receive an urban hukou household registration, and thus direct access to urban facilities (Den Hartog, 2015). Simultaneously the local government and developers have got more opportunities for urban development, although still with restrictions under the eco-island policy. This will add to the already existing urbanization pressure on the island that started to accelerate in 2009 with a new bridge-tunnel combination that connects the island to the rest of Shanghai. Additionally, a rail-connection is currently in preparation.

Chongming is the world's largest alluvial island, although a large part was reclaimed with polders during the 1960s. Since the eighth century, it has gradually formed from several smaller islands and sandbanks in the estuary of the Yangtze River. The northern and north-western edges are reclaimed from the river with dikes. During the Cultural Revolution, the tranquil island was an exile for thousands of intellectuals who had to work on state farms. Since 1958 it has become part of the direct-controlled municipality of Shanghai, before it was made part of the Jiangsu province. Chongming District also contains two smaller islands.

Chongming District counts approximately 660,000 officially registered inhabitants living mainly a rural traditional lifestyle, in sharp contrast to the Central City of Shanghai. This number may differ from the actual number of people since many

are registered here but living elsewhere, in particular, the younger generation is increasingly leaving the island behind to find opportunities in Shanghai or other cities. Meanwhile there are also unregistered migrant workers doing agricultural jobs or work on shipyards and related industries. The main island contains several shipyards and spread-out industrial developments, as remains from the policies of the 1960s. There are four small towns with some industries for electrical equipment, pharmaceuticals, metallurgy alloys, card stock and steel, as well as weaving, and spinning cotton. The land is mainly used for agriculture (large state farms and smaller family farms), fishing farms (eel and Chinese mitten crab), cattle breeding, and since recently, extensive recreation. Nowadays most inhabitants work in the fields for low wages, and while younger generations move to Shanghai for career opportunities, their parents build oversized country houses filled with furniture waiting for them to return. Due to its remote location, backward image, and strict limitations on urban and industrial development caused by the Eco-Island policy (Chongming Island has been appointed by the Central Government in Beijing as an Eco-Island since 2001), the opportunities for economic development and employment are marginal. Currently the rate of population aging on Chongming is the highest in all of Shanghai (29.7% in 2013, according to Shanghai's Statistical Yearbook).

5.3.1 Transitions Following the Layers-Approach

This paragraph explains how a variety of human and natural interventions have changed the spatial structure of the island. This is explained further in this paragraph following the classification of the Layers-Approach.

5.3.1.1 Transitions and Challenges on the Substratum or Bottom Layer

The coastline of the Yangtze River Delta has shifted eastwards over the ages. Recent land reclamations are in line with this and aim to keep balance with the expected future urbanization and agricultural needs. Besides the large-scale state farms on reclaimed land along the island's coastline (there are seven of them on Chongming Island built in the 1950s during the period of the 'Great Leap Forward' policy) several recent land-reclamations have been used as 'land use compensation strategies' to allow the city of Shanghai to build urban areas elsewhere while guaranteeing food security. However, land reclamations make the delta as a system also more vulnerable to flooding and affect the ecological system negatively by losing wetlands (Ke, 2014; Wang, 2012).

5.3.1.2 Transitions and Challenges on the Network Layer

On 31 October 2009, the first phase of the Shanghai-Chongming-Jiangsu Tunnel-Bridge project (six lanes and two rail lines) was opened, reducing a 45-minute ferry trip to a 20-minute car drive, and making the island a target development site, as announced officially on the opening day. Shanghai is now within commuting distance. The intention to include one or more eco-cities into the initial eco-island plans was to ensure enough jobs in the long run and to prevent people from commuting, which is essential from a low-carbon point of view. Besides being a connection to the outside world, the bridge-tunnel combination is making property values rise quickly, causing high development pressure, although there are restrictions on building new housing and industries. Directly adjacent to the bridge the price per square meter of new real estate projects are at least four times higher compared to previous newly built projects elsewhere on the island. Simultaneously, almost all newly built residences are bought by the upper middle class living in the central city of Shanghai (the central city is defined as inside the outer ring road) as second houses or speculative objects and remain uninhabited (according to three local officials and five local real estate sellers that were interviewed by the author).

5.3.1.3 Transitions and Challenges on the Occupation Layer

Due to the improved infrastructure, a huge number of people visit the island for daytrips and weekend tourism, especially the wetlands, thus putting pressure on the ecological values there. Additionally, real estate values are booming. In mainly four locations, relatively large recreational real estate developments are taking place aimed at Shanghai's new upper-middle class who can afford a second home on the island for leisure and speculative investment. Chongming Island provides an attractive escape from the pollution and congestion of Shanghai, thus urban influence is likely to increase here.

To realize the ambition of making Chongming into a 'National Green Eco-Island' several economic compensation strategies have been put forward and rural tourism has become a new source of income. The number of visitors is still relatively low, because of the 'uncomfortable' lifestyle that contrasts a lot with the lifestyle of the new middle class in Shanghai and other neighboring cities. According to the previous master plan for Chongming (Figure 5.2) one of the ideas to attract people to the island was to get Shanghai Disney there. Some entrepreneurs even launched the absurd idea to build a copy of Michael Jackson's Neverland Ranch and a zone for gambling. Although the Shanghai municipality fortunately has halted these

initiatives, two golf courses and a resort with large expensive villas have been constructed, adjacent to the location of the planned eco-city. Another golf course is in preparation and there are also plans for horse racing tracks (for gambling) in consideration now.

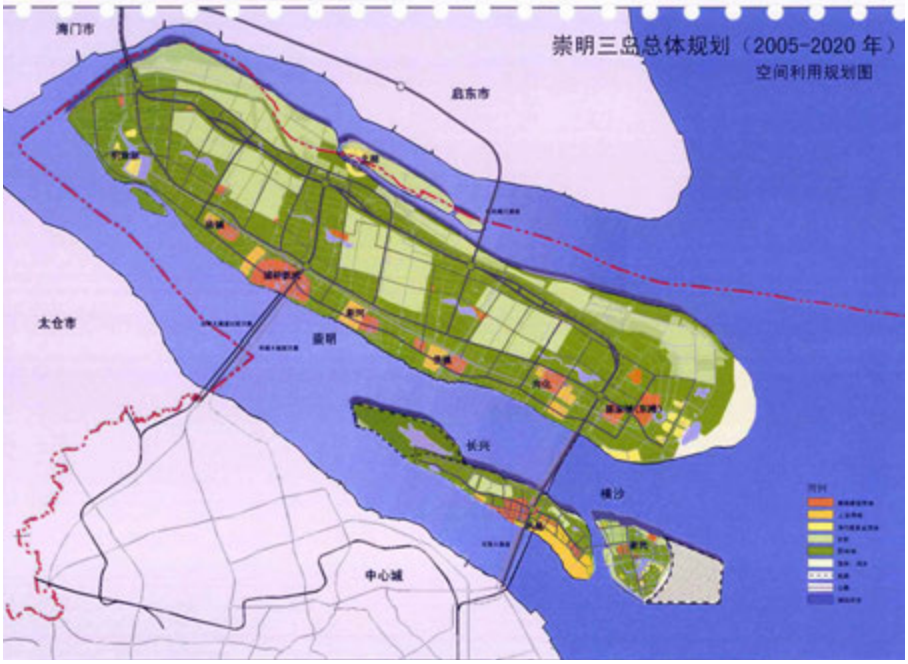

FIG. 5.2 Chongming Master Plan 2005-2020

Recently more than 360 hectares of the former Dongping woodland has been transformed into Dongping National Forest Park for tourism. Simultaneously a part of the Dongtan wetlands (bordering the Ramsar zone with bird reserve) became an important tourist attraction, and on the former site of the Dongtan Eco-City, luxurious senior housing complexes are under development. These are without noticeable eco-features that differ from conventional housing, adding additional pressure on the local ecological and landscape values, especially since this car-based and quasi-Mediterranean architectural style development is decorated with exotic flora – thus ignoring the local resources and eco-systems.

5.3.2 Conflicting Policy Ambitions

In China there are three de jure administrative levels, although de facto, the system is more complicated. Simplified the main three levels are: provincial level (Shanghai's Direct-controlled municipality is equal to a province), county and district level (Chongming used to be a county and became a district in 2017), and township level (Chongming island comprises of 19 towns and townships, of which two are situated in the Jiangsu Province). The difference between county and district is that a county has mainly a rural status and a district an urban status, with inherently different restrictions and regulations, such as the hukou household registration system that regulates access to services (Den Hartog, 2015).

China's governance system is currently organized in a strict top-down hierarchy. However, initiatives and decisions on a local level – especially by local governments, but also by the countless small and medium enterprises – are usually more decisive for achieving final results with far reaching consequences. Furthermore, there are huge discrepancies between top-down planning ambitions and daily life practices. Additionally, the economic and cultural gaps between urban and rural residents as a result of the hukou household registration system (Den Hartog, 2015) hinders the adaptation of local planning practices in rural areas such as on Chongming Island.

As opposed to most other countries, in China it is not possible to own land. China's land use system has mainly two types of ownership: state-owned urban land, and farmer collective-owned rural land. Although there are restrictions, rural land can be developed (Huang et al., 2017). Changing the formal land use from agricultural production to urban and industrial development is a critical process, especially in developing economies (Yuan, 2004). Developers can buy land-use rights, usually for 70 years in the case of residential land use and for 50 years in the case of industrial or commercial land use. Land use is strictly regulated and controlled, especially regarding agricultural use. However, as a result of economic reforms private investors can obtain land use rights from the government and even retransfer these rights to a third party. Consequently, land use leasing creates incentives for local governments to sell land use rights to generate income that can be used to finance urban, industrial, and infrastructural projects (He, Huang, & Wang, 2012).

Since China was economically underdeveloped in comparison with western countries until late last century, currently the Chinese planning policies in general are in essence based on GDP-oriented motivations, aimed to catch-up economically. As a result, care for the environment and quality of life often is of secondary importance. China's latest Five-Year Plan, however, indicates a demand for "People-oriented urbanization", for which new planning approaches are needed. On a local level this

meets many conflicts with local ambitions and practices, usually not looking beyond the political border, in combination with short-term goals, GDP-oriented motivations, a tabula rasa approach, and a lack of thorough market research combined with the urge to catch-up economically. This will be evident for the case of Chongming Island in the following paragraph.

In 2001 Chongming Island was appointed as China's National 'Green Eco-Island' and pilot for sustainable development. However, so far this has resulted in several conflicts and misinterpretations (Li, 2012).

5.3.2.1 National Policy Ambitions

In 2001 Chongming Island was earmarked as China's national model for sustainability, energy efficiency and environmental awareness, and it became a national experimental zone for Ecological Civilization. During the years more than 40 local and international firms and organizations have been invited to participate in various studies and design competitions for the whole island as well as for special cases such as Dongtan Eco-City and other proposed new towns on the island. In 2004 the American firm Skidmore, Owings & Merrill's winning urban and agricultural master plan for the whole island presented a combination of advanced agriculture as the island's major economic engine plus several compact transit-rich cities for a total of almost one million people along the southern shoreline. From the results a general structure plan emerged, made by SIIC (Shanghai Industrial Investment Holdings CO., Ltd.), a government-funded real estate developer, in close cooperation with the Shanghai Municipal City Planning Administration.

In 2003 McKinsey & Company and Arup from the UK were invited to produce a development strategy for the case Dongtan Eco-City, a zero-carbon development for 500,000 people, which would become a pilot project within the context of the wider master plan for the whole island. On 9 November 2005 Hu Jintao and the former Prime Minister of the United Kingdom Tony Blair signed an agreement on trade, science, technology, and education. This included the implementation of the plans for Dongtan Eco-City as a joint project between SIIC and Arup. The intentions of this international cooperation were to make the 86 km^2 (including wetlands, buffer, and recreation) Dongtan Eco-City the first self-sustaining city environment on earth by minimizing CO2 emissions and maintaining social and economic sustainability, according to the previous master plan (2004). Arup was asked to design a dynamic post-industrial model city with respect for its natural surroundings and a minimum of economic constraints. The project should make it clear that China is willing and

able to achieve sustainable solutions in the context of rapid urbanization. After the much-debated Kyoto agreement, the first substantial sustainable city would not be achieved by a Western developed country but by China, following these ambitions.

However, due to a political problem with (amongst others) Shanghai's responsible Communist Party Secretary in 2006 and additionally exploitation problems, the Dongtan Eco-City project came to a dramatic halt. Since recently the construction activities on the site started again, but without the original eco-ambitions though. And with strictly limited numbers of square meters yearly to be developed, due to restrictive policies for this sensitive location near the Dongtang wetlands. The new main target group for the current residential developments is wealthy aging people, all from Shanghai, according to SIIC. Two golf courses have been developed previously, near the former eco-city site, and on the site itself luxurious villas and apartments are under construction, also without any additional eco-features, surrounded by green decoration, mainly imported exotic plants that cannot grow in a natural way without intensive care by gardeners. The term 'eco-island' has been abused for 'green washing' here.

5.3.2.2 Regional Policy Ambitions

Chongming is the last remaining mainly rural and open part within Shanghai's direct-controlled municipality. Regionally the island can be seen as a green lung in the context of the densely populated Yangtze River Delta Region.

However, Shanghai's government has been looking at overall priorities in terms of development options around Shanghai since late last century. The island used to be one of the main rice bowls of the region, but this function seems to have become less important now. Chongming Island as a whole present clearly a major opportunity for development. In the late 1990s, before the development of Lujiazui, there were already serious ideas to make 'a second Hong Kong' on the south-eastern tip of the island, a Special Economic Zone according to professors who have been involved as advisors for the eco-island concept development. Mainly due to the remote location and the still missing bridge, finally it became favorable to choose Lujiazhui as a CBD and other parts of Pudong as Special Economic Zones, but not Chongming. This was in the late 1990s just before the Eco-Island policy was introduced.

This Eco-Island policy aims to safeguard the island from massive urban development to preserve especially the natural, but also agricultural qualities of the island. However, the recent conversion of the island into an urban district (since January 2017), and the earlier construction of the bridge-tunnel combination and the scheduled rail connection, make it very clear that regional ambitions still go further than keeping the island rural and green.

5.3.2.3 Local Policy Ambitions

Since the population is aging rapidly, due to lack of attraction and employment opportunities for younger generations, the local ambition is to generate income with real estate development projects and some additional (eco) tourism, aimed at the new middle class of the central city in Shanghai.

In the Master Plan for Chongming Island (2001) a series of new towns and (light) industrial zones have been scheduled along the south coast to support the local economy by creating jobs and facilities for the island's inhabitants. Since the start of the eco-island policy these new urban cores, which are mainly extensions of already existing settlements, have developed gradually, according to plan. Meanwhile however, on a smaller scale many sprawling developments have taken place in the rural areas where farmers have built countless new houses for themselves and for their offspring – similar to elsewhere around Shanghai and in the wider Yangtze River Delta Region. It seems that the restrictions on land use and construction activities have only partly been efficient so far, although since recently there is more strict supervision on limiting the building of new rural housing.

The township Qidong, which is located at the northern tip of the island and belongs to the Jiangsu province, is illustrative of what can go wrong if there is no supervision. As a result of the natural sedimentation process over the years, the old natural border, on which the municipal border is based, has shifted to the north. As a result, almost 50 square kilometers of the 1,271 square kilometer large Chongming Island belongs to the Jiangsu Province, which is not covered by the National 'Green Eco-Island' policy. This part belongs to the township of Qidong, which is under the jurisdiction of the City of Nantong on the other side of the river, who have greedily used this opportunity to develop a new town here for 100,000 inhabitants, named 'Long Island'. The development started with reclaiming land on top of former wetlands and tidal flats in 2013, which is relatively easier than converting agricultural land use into urban land use. In 2015 housing construction had already started, mainly villas and 40-floor-skyscrapers, which are technically full of risks

such as subsidence and flooding. The worst problem is perhaps the ecological damage. More than five square kilometers of former wetlands have been erased here in favor of profitable real estate. More than 95% of the buyers of this real estate are families from Shanghai, who use these houses purely as speculative investment opportunities and possible weekend retreats, thus are not for their main living.

This so-called 'Long Island' project was initiated by the municipality of Nantong and Greenland, a large real estate developer from Shanghai. Warned by news coverage on CCTV late last year the central government in Beijing brought a halt to this project. Currently, a core team of specialists from Jiangsu province and Shanghai's Direct-controlled Municipality are trying to reach a consensus on how to proceed with this project. The first idea is to massively reintroduce greening here by planting trees. Some of the already built skyscrapers might also be destroyed as a symbolic act.

There obviously is no strict supervision on the implementation of the master plan and Eco-Island policy regarding land use limitations, at least not in the part that belongs to Nantong. Furthermore, the local government, both on the district level and township level, seem to have slightly different interpretations about the translation of the eco-island ambitions into practice. A big share of the implemented greenery along main infrastructure routes, e.g., in Dongtan and Qidong, is imported exotic and decorative greenery, and without much ecological value.

FIG. 5.3 Sales center for real estate on former wetlands (Photo by author, 2017)

FIG. 5.4 Remnants of wetlands, waiting for urban development. On the horizon high-rises in the Qidong township in Jiangsu Province, constructed since 2014 on former wetland and tidal flats. (Photo by author, 2017)

FIG. 5.5 Wetlands north of Qidong township in 2004 (Source: Google Earth, 11 February 2017)

FIG. 5.6 Same location as Figure 5.5 but in 2016, Qidong township with land reclamation and real estate development (Source: Google Earth, 11 February 2017)

FIG. 5.7 Dongtan in 2005 with fish farms and rice paddies (Source: Google Earth, 11 February 2017)

FIG. 5.8 Same location as Figure 5.7, Dongtan in 2016 with golf courses and villas (Source: Google Earth, 11 February 2017)

5.4 Discussion and Conclusions

China's rapid changing economy and society are not reflected in a change in spatial planning: the city is still regarded as 'a machine for living' without a direct relationship toward its natural, historical culture nor societal context.

Planning practices in China are mainly based on a tabula rasa approach, resulting in serious disturbances and conflicts between the different layers following the Layers-Approach. The bottom layer, the substratum, is often ignored.

In the Western discourse, however, the Layers-Approach promotes the bottom layer, the substratum, as the leading one in setting governance priorities. The middle layer, the infrastructural or network layer, functions as steering, to serve the occupation layer, although this is changing. In the case of China, the Layers-Approach can be seen as a guidance tool to set priorities again for the substratum as foundation, to respect ecological values and to learn how to build with nature. However, the practice in China, as illustrated for the case of Chongming, is very different from this theory. The urge to catch-up economically gives the occupation layer absolute top-priority. Meanwhile the network layer is still serving, though usually totally ignoring the substratum.

Planners and policymakers in China have neglected the rural areas around Shanghai during the last two decades, while all attention went to urbanization, and followed the ambition to change Shanghai's Central City into a service-oriented prosperous international metropolis. One of the side effects of this is a serious polluted rural water system and the disappearance of many traditional water-based rural communities.

The international expectations about the definition and implementation of an eco-island also do not match in the case of Chongming, since there are different priorities and aims, especially on a local level. The development of China's rural areas, in this case the rural fringes of Shanghai, are obviously in a different development phase with very different social and economic priorities. There is a pressing urge to catch up economically. Furthermore, there seems to be a discrepancy between top-down planning ambitions, local practices, and daily life.

Moreover, the eco-island policy on Chongming is not strictly controlled and implemented all over the island. The eco-label locally has been explained as 'green decoration' to market real estate and improve a feeling of comfort for the new

middle class. Chongming Island is in a phase of beginning gentrification where the new (upper-) middle class is taking over while ignoring the local socio-cultural and spatial qualities. The trend is that main parts of the island become a backdrop for the city, which can be beneficial for the island economically, but conflicts strongly with the eco-island promises.

The main challenge is to find a balance between economic growth and protection of the environment and spatial qualities. Currently the increasing focus on eco-tourism and elderly communities (some consist of more than a thousand units, even with high-rises) forms a threat for local spatial qualities and, in some cases, also for ecological qualities.

A new spatial planning approach requires a search for a new balance between, on one side, the physical-spatial system of the urban delta and the needed interventions, and on the other side an adjusted practical governance system, in which the challenge is to find the best way of matching bottom-up and top-down processes. In the Chinese context, the top-down approach is still omnipresent, but in reality, initiatives, and decisions on a local level, by local governments and developers, sometimes even by (influential) local residents, are far more critical factors.

Since recently China's spatial planning and design climate has been in transition, gradually opening up, and shifting toward more small scale and locally oriented developments. Another glimpse of hope is that on a small scale there are more and more promising local initiatives, often with the help of citizens from elsewhere who are willing to 'adopt' rural lands – for example eco-farmers, who also play a role in disseminating knowledge on things such as organic farming to local farmers, community-supported agriculture or even facilities for eco-tourism.

To steer the spatial development into a more resilient direction, an integral approach is essential. This needs to go beyond the Layers-Approach and should also include socio-economic and social-cultural factors.

Residents and other stakeholders on Chongming Island, and also in many other rural cases, are facing different priorities and needs. Daily realities also need to be considered in the spatial planning and other development policies, otherwise it will be hard to steer spatial development in a sustainable way. The increasing economic and cultural gap between local residents and newcomers on the island leads to fundamental conflicts, with dramatic spatial, ecological, and socio-economic consequences. Knowledge dissemination and capacity building under local stakeholders is crucial. Simultaneously, better guidance and supervision are

essential, preferably by a team of independent experts. The Layers-Approach can become a handy tool in this to distinguish priorities and responsibilities by policy choices. Consequently, the relationship between the occupation layer and the network layer can become more effective and be steered towards a more resilient approach in future developments, especially also in relation to the substratum. Re-appreciating and working with existing natural values, landscape, and water systems, could become a new pathway, consequently mitigating the vulnerable balance between nature and society, and making the delta as a system more resilient.

6 Engineering an Ecological Civilization along Shanghai's Main Waterfront and Coastline

Den Hartog, Harry. (2021B). *Engineering an Ecological Civilization along Shanghai's main waterfront and coastline: Evaluating ongoing efforts to construct an urban eco-network.* Frontiers in Environmental Science. DOI: 10.3389/fenvs.2021.639739 https://www.frontiersin.org/articles/10.3389/fenvs.2021.639739/full

This chapter is a slightly adjusted version of above-mentioned peer-reviewed journal article – only the numbering of paragraphs and figures and the citation style has been adjusted, and an explanation of the position of this chapter in this research and a list of main findings have been added on this introducing page.

Position of chapter within this research: This chapter shows how experimental and as ecological and sustainable branded projects along Shanghai's main urban and peri-urban waterfronts and coastline can easily derail – especially in the context of an extremely high population concentration, world's highest real estate values, and continuous urban development pressure –, despite decisive ambitious government action, if definitions are not shared and expectations for the future are not co-created. This chapter further explains how Sustainability Transitions "thinking" can be applied in a useful way in the context of Shanghai, with additional insights from Ecological Civilization "thinking".

Research question: How are city builders and planners in Shanghai seeking to improve the balance between wetland protection, urban development, and climate change adaptation, in the context of an extremely high population concentration, world's highest real estate values, and continuous urban development pressure?

Main findings

- China, with Shanghai as a frontrunner, is willing to play a leading role in enabling a sustainable transition, but there are hurdles.
- This chapter concludes with seven practical recommendations aimed to reduce discrepancies between expectations and their implementation in practice: (1) use clear definitions; (2) co-create a shared vision for the future; (3) stop building on vulnerable locations; (4) create conditions of social learning; (5) supervision needs to go beyond planning boundaries; (6) step beyond an anthropocentric approach; and (7) foster a more experimental approach.

6.1 Introduction

6.1.1 China's shift to a Green Economy and the "War on Pollution"

This chapter explains and examines the ongoing transformation of Shanghai's main waterfronts in the context of a new eco-network, informed by Sustainability Transitions scholarship (Markard et al. 2012) and additional insights from Ecological Civilization philosophies (Hansen, M.H. et al., 2018). The chapter focuses on the Direct Controlled Municipality[33] of Shanghai because this region has an exemplary role within China in terms of testing and implementing new policies. Many city leaders see Shanghai as inspiring model, and gateway to the world with access to new ideas.

33 A provincial level municipality under the direct administration of the central government.

China's extremely rapid shift to urbanization this century (Hsing, 2010) resulted in prosperity and high living standards for many, but also brought collateral damage, including serious environmental pollution, declining available land and resources, and socio-economic discrepancies (Brown, 1995; Li & Shapiro, 2020; Zhao et al., 2006). Since the beginning of this century, China's policies gradually focused on the new principle of a Green Economy (Linster & Yang, 2018), which essentially turns away from the (western) idea of industrialization. Since it's eleventh Five-Year Plan (2006-2010), the People's Republic of China has committed itself to achieving a Green Economy, aimed at increasing the use of renewable energy sources, drastically reducing carbon emissions, and increasing green coverage of lands. In the twelfth Five-Year Plan (2011-2015) additional targets were added, including reversing ecological deterioration, and enhancing environmental regulatory institutions. In March 2014 China declared a "war on pollution"[34] and started to introduce multiple green policies. China's thirteenth Five-Year Plan (2016-2020) continued the lines of the previous two plans and additionally emphasized ecological restoration and protection (State Council, 2016). This year, on 11 March 2021, China's National People's Congress voted to pass the resolution on the fourteenth Five-Year Plan (2021-2025) and the 2035 long-term goal outline[35]. This plan set 18% reduction of CO2 emissions and 13.5% of energy-intensity reduction as goals for the coming five years. Previous Five-Year Plans showed a trend of largely over-achieving previous set goals, and according to some observers this will likely happen again (Liu et al., 2021B).

6.1.2 Toward an Ecological Civilization

China is demonstrating its intentions to promote Sustainable Development Goals (United Nations, 2015A). A key driver in this aspiration is to strive to realize an Ecological Civilization by 2030 (Hansen, M.H. et al., 2018). Ecological Civilization (生态文明) can be defined as "a dynamic equilibrium state where humans and nature interact and function harmoniously" (Frazier et al., 2019). It is a socio-technical experiment. Although some scholars claim that Ecological Civilization originates from the western discourses on ecological modernization (Zhang et al., 2007), it has deep roots in Marxism and the potential to challenge and even replace global capitalism (Pan and Zhou, 2006; Gare, 2020). It has received skeptical reactions

34 "We will resolutely declare war against pollution as we declared war against poverty", said Premier Li Keqiang at the yearly National People's Congress in March 2014 (Reuters, 2014).

35 Available online (Chinese language): http://www.gov.cn/xinwen/2021-03/11/content_5592248.htm (Accessed July 30, 2021)

from several international observers (Hansen & Liu, 2017; Wang et al., 2014; Wang-Kaeding, 2018). The concept of Ecological Civilization has been gradually integrated in the policies of the Chinese Communist Party since the 17th National Party Congress in October 2007, when it became a national strategy, as declared by General Secretary Hu: "Towards a new era of Ecological Civilization to realize the greatness of the Chinese Nation", and "Ecological Civilization is the key to realize the great renaissance" (Hansen, M.H. et al., 2018). In 2012, Ecological Civilization was included in the Party's constitution. Five years later, during the19th Party Congress, General Secretary Xi Jinping emphasized the need to speed up realizing an Ecological Civilization and a more balanced model of economic growth. This transition from an industrial civilization to an Ecological Civilization contains three dimensions that need to be brought into harmony, according to the Communist Party's constitution: environmental, economic, and social. The elaboration of this vision and policy is a paradigm shift to a new planning approach, a journey of exploration and finding new balances, especially balances between rigid control and flexible adaptation (Chen & Du, 2018; Xu et al., 2017).

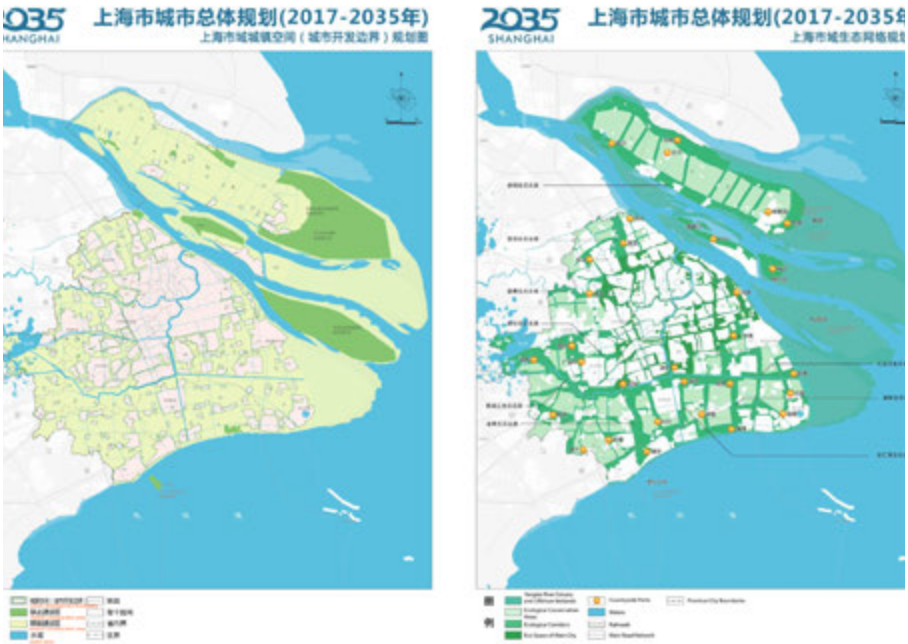

FIG. 6.1 (A) Ecological Protection (Red) Lines with building limitations (Source: Shanghai Municipal People's Government, 2016; adjusted by author). (B) Eco-network plan of Shanghai (Source: Shanghai Municipal People's Government, 2016; adjusted by author).

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Ecological Civilization calls for new balances between top-down and bottom-up governance approaches, by exploring public private partnerships and new forms of participation, as mentioned in the final chapter of Shanghai's Master Plan (2017-2035), in short 'Shanghai 2035' (Shanghai Municipal People's Government, 2016). To supplement this master plan ecological protection (red) lines have been introduced, i.e., zones with building limitations (Figure 6.1A), to guide and control land use planning (Jin, 2020) and ecological protection around existing and planned "ecological land" (Guo, 2018). This is still in an elementary phase and during the current fourteenth Five-Year Plan (2021-2025) period it will become clear how this will work out in practice. Hopefully these promising expectations can be realized, in stark contrast to a previously proposed green belt in the master plan of 1999 that was completely overrun by urban use over a decade ago (Den Hartog, 2010).

6.1.3 Ecological Vulnerability in Urbanizing Deltas

Most wetlands are located along rivers or in river deltas. They provide directly or indirectly almost all of the world's supply of freshwater (UN, 2018). Approximately 40% of the world's population lives in deltas. Metropolitan regions, such as the Yangtze River Delta, the Pearl River Delta, the New York metropolitan area, Greater London, the Randstad Holland, Saigon, St. Petersburg, and many others, were built on wetlands and swamps. Due to their strategic location, deltas are the location of complex land use conflicts: urbanization, infrastructures, ports, wetlands, and fertile agricultural lands compete for dominance. During last three decades the urbanization rate and construction of new urban areas accelerated dramatically, especially in the world's new and rising economies. China is, without doubt, frontrunner in this. As illustrated in paragraph 6.3, in the context of urbanizing deltas, wetlands often loose out. Yet wetlands are crucial eco-systems: about 40% of all plant and animal species live and breed here, and "more than 25% of all wetlands plants and animals are at risk of extinction" (UN, 2018).

Land reclamation, groundwater-level lowering, and other urban influences have diminished wetlands worldwide. The world's wetlands are disappearing three times faster than forests; nearly 35% of all wetlands were lost between 1970 and 2015 (UN, 2018). Since 2000, this process has been accelerating. Worldwide, policy provisions and decision-makers undervalue wetlands according to a report by the global Wetland Convention (UN Water, 2018); and there is a lack of urban wetland management and policy guidance. Usually there are tensions between conservation and development. However, wetlands have a range of important eco-system services (Danley & Wildmark, 2016), such

as rainwater storage or sponge capacities, storm surge protection (Moeller et al., 2014), water purification, carbon sequestration (Sutton-Grier & Howard, 2018), biodiversity conservation, but limited options for urban recreation (limited to protect the wetlands).

Aside from some inland metropolises, such as Chongqing, Chengdu, and Wuhan, most of China's urbanization boomed in a zone of approximately 100 kilometers along its coastline, with extremely high concentrations in the three main delta areas: the Pearl River Delta, the Bohai Rim (Tianjin and Beijing), and the Yangtze River Delta. This rapid growth brought a new urban lifestyle, and improvements in the quality of life for millions. It also brought new problems, such as air pollution, water quality problems, and ecological degradation.

Since the 1950's more than half of China's coastal wetlands disappeared, 53% of temperate coastal eco-systems, 73% of mangroves and 80% of near-shore coral reefs vanished, according to research by China's State Forestry Administration, Chinese Academy of Science's Institute of Geographic Sciences and Natural Resources Research, and the Paulson Institute (Paulson Institute, 2016), mainly because "huge economic returns from land reclamation have prompted local governments to 'bypass' regulations issued by the central government" (Larson, 2015). Sea reclamation is a relatively quick[36] and cheap way to get more land and profits. Another reason is competing policies, e.g., local authorities are required to safeguard food supply by maintaining a minimum amount of arable land[37], consequently allowing wetlands – which are often classified as wasteland (Li, 2019) – to be cultivated for farming.

The concept of protecting nature by law is relatively new in China. China's first nature reserve was established in 1990 in Shanghai; consequently, in this same city public awareness about environmental issues started to increase gradually (Zhao et al., 2006). This pioneering role of Shanghai will be explored further with help of theoretical framing and case studies in the next paragraphs, to examine the achievements and hurdles in Shanghai's ongoing journey towards an Ecological Civilization.

36 In many recent Chinese cases the construction of buildings starts already within a year, for example in the case of the Long Island project on Chongming (Den Hartog, 2017). However, land needs at least four years to get firm and solid, according to Dutch experiences, to prevent damage by subsidence.

37 Since 2004 the Communist Party has set a red line for China's total arable land, which shall be no less than 1.8 billion mu (120 million hectares). See: https://news.cgtn.com/news/3d3d514d316b444f32457a6333566d54/index.html (Accessed July 30, 2021)

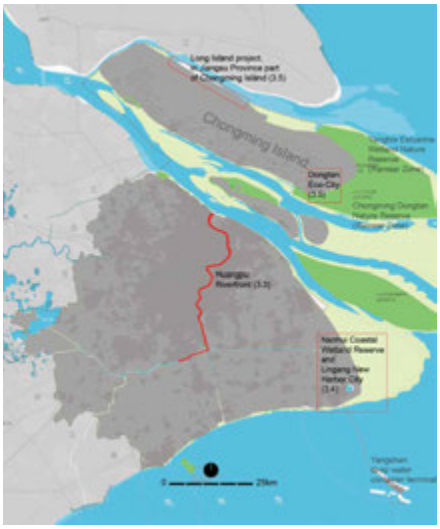

FIG. 6.2 Shanghai Direct Controlled Municipality with the locations mentioned in this chapter (Shanghai Municipal People's Government, 2016; adjusted by author).

6.2 Case Introduction and Theoretical Framing

6.2.1 Aims and Case Selection

This research aims to test how Sustainability Transitions 'thinking' (see 2.2) can be applied in a useful way in the context of Shanghai, with additional insights from Ecological Civilization 'thinking'. This chapter critically assesses how Shanghai seeks to implement large-scale ecological improvements along its interface between land and water, in former port areas and along the continuously shifting coastline, in the context of extreme urbanization pressure. How is Shanghai dealing with the expectation of a sustainable green transition, and what can we learn from this? How is the city seeking to improve the balance between wetland protection, urban development, and climate change adaptation?

The cases (Figure 6.2) are located along Shanghai's main waterfronts and illustrate conflicts between urban development pressure and ecological values. The first case (see paragraph 6.3.3) is the Huangpu River's waterfront transformation in the central city, where former port-related industries make place for a new service-oriented

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economy (Den Hartog, 2021A). The second case (see paragraph 6.3.4) deals with wetland development that conflicts with Lingang New Harbor City and relocated port areas on large-scale land reclamations along Pudong District's coastline. The third case (see paragraph 6.3.5) deals with speculative peri-urban new town developments along the edge of Chongming Eco-Island located in the Yangtze River estuary. All three cases form crucial elements in an engineered new eco-network (Figure 6.1B; see paragraph 6.3.2).

6.2.2 Sustainability Transitions and Experiments

Drawing on insights from scholarship on Sustainability Transitions and additional insight from Ecological Civilization (as a national socio-technical experiment), this chapter examines how planning ambitions are translated into local realities on the ground, during their planning and implementation process, and afterwards. In the field of Sustainability Transitions, scholars investigate major shifts toward sustainable socio-technical systems of production and consumption (Markard et al. 2012). Following the main conceptualization of Sustainability Transitions, which predominantly originate from North- and Western European countries with strong welfare state traditions, some overarching patterns can be identified (Kivimaa et al., 2017; Sengers et al., 2016; Weiland et al., 2017), which are translated into comprehensive lessons on how urbanization processes can be guided towards more sustainable pathways to create attractive and functional new (urban) environments. For this chapter, three core concepts from this body of theory are used to frame the empirical analysis and argumentation: (1) expectations, (2) socio-technical experimentation and (3) sustainable innovation journey.

The concept of 'expectations' is often used in the field of Sustainability Transitions to explore how actors use appealing visions of a sustainable future in their (urban) development projects. These expectations can be defined as "statements about the future that circulate" (Van Lente, 2012). This idea of circulation is important, because expectations are 'performative' by helping to create a new future reality by coordinating roles and activities amongst actors (Konrad, 2006) and by legitimizing certain investments (Borup et al., 2006). Hence expectations should be robust (shared by multiple actors), specific, and of high-quality (Schot & Geels, 2008).

To translate these expectations into realities on the ground, actors need to participate in a process of 'socio-technical experimentation' (Evans et al., 2016). The expected creative and innovative solutions are tested and developed in real-

life settings or urban labs[38]. While testing, a wide variety of societal stakeholders are involved. There are also other external influences that can define the outcome. Unlike experimentation in the natural sciences – that usually takes place under strictly controlled conditions, aimed to find objective certainties – experimentation in the field of Sustainability Transitions is an open-ended process. Consequently, scholars talk about 'socio-technical experiments', which are an: "inclusive, practice-based, and challenge-led initiative, designed to promote system innovation through social learning under conditions of uncertainty and ambiguity" (Sengers, 2016). Experiments are only meaningful if involved actors are willing to engage and foster social learning and are open to system innovation when prioritizing their set sustainability goals (Loorbach, 2007).

Socio-technical experimentation in the urban environment is accompanied by an open-ended unfolding innovation journey (Van de Ven et al., 1999), in particular a 'sustainable innovation journey' (Geels et al., 2008), full of uncertainty (Garud et al., 2014). In paragraph 6.3 a narrative perspective is used to describe these journeys.

In Chinese urban planning and design, we can distinguish three types of experiments:

1 'Pilot-projects' aimed to (re)formulate relevant policies (e.g., a 'low-carbon pilot'; Den Hartog et al., 2018);

2 'Demonstration projects' (or zones) are considered to be successful experiments that can be replicated (e.g., Chongming Island as National Ecological Demonstration Zone; Ma et al., 2017);

3 'Civilized projects' are excellent social management models that support political principles, e.g., Wusong Paotaiwan Wetland Forest Park (CGTN, 2018).

38 For example the "Hunts Point Resiliency" pilot-project in the Bronx, New York City, available online: www.rebuildbydesign.org/our-work/all-proposals/winning-projects/hunts-point-lifelines and https://medium.com/hunts-point-resiliency; or the Living Breakwaters Staten Island, New York City, available online: http://www.rebuildbydesign.org/our-work/all-proposals/winning-projects/ny-living-breakwaters and https://stormrecovery.ny.gov/learn-more-about-living-breakwaters-project; or the multiple samples in Rotterdam, see: https://www.c40.org/case_studies/c40-good-practice-guides-rotterdam-climate-change-adaptation-strategy.

6.2.3 Research Methodology

Empirical evidence for this research is based on site observations, document analyses, and fieldwork by the author. A foundation for data collection was laid during fieldwork with students at the Shanghai University of Finance and Economics as part of the authors' course 'city and environment', between 2015 and 2019. During thirty site visits there were short conversations with local people, including farmers, and more in-depth conversations with key-stakeholders, including local officials, entrepreneurs, nature conservation specialists, and urban planners. During fieldwork, design studios and workshops at Tongji University there were more detailed investigations for all three cases (3.3-3.5). Desktop research was carried out to review Sustainability Transitions and Ecological Civilization literature, and relevant planning documents at the municipal and national level (when needed with translation and interpretation). The author co-organized and participated in knowledge exchange projects in cooperation with various universities in Shanghai and abroad[39].

The study has some limitations. Although translation was continuously available, the interpretation may be viewed differently in some situations. In the Chinese context, access to reliable numerical data can be difficult. Hence a qualitative research approach has been used in this study.

39 The cases in this paper were the subject of previous studies by author: Chongming Island (Den Hartog, 2017; Ma et al., 2017; Den Hartog et al., 2018; Den Hartog, 2019), Nanhui (Den Hartog, 2010), and the Huangpu River's waterfront (Den Hartog, 2019; Den Hartog 2021).

6.3 Shanghai's Waterfronts and Coastline as a Laboratory for Ecological Civilization

6.3.1 Strategic and Exposed Position in the Yangtze River Estuary

The origin of Shanghai is inseparable from its location beside the water[40]. An efficient network of waterways (Ball, 2017; King, 1911) shaped the spatial and economic development of the Yangtze River Delta. Shanghai's waterfronts can be seen as a frontier where conflicts in land use manifest between land reclamation, urban use, industrial use, agricultural use, and natural conservation. Shanghai's location on the estuary brought prosperity, especially as a result of port activity. It also brought exposure and vulnerabilities: scarcity of fertile lands (Brown, 1995), increasing flood-risk (Balica et al., 2012; Hanson et al., 2011; Ke, 2014; Quan, 2014), and endangered wetlands (Wang, 2012; Li et al., 2020).

Along the coastline there has always been a strip of wetlands that grew by a natural process of sedimentation. This process of an eastward shifting coastline largely created the territory of Shanghai. Especially since the 1950s, this process has been accelerated by means of breakwaters and land reclamation. Under Mao's leadership, there was a shift toward technocratic engineering: "Man must conquer nature" (Shapiro, 2001). Natural capital and landscape values were neglected. Moreover, urban planning practices were principally based on a tabula rasa approach, which largely ignores existing natural and cultural-historical values. Many natural waterways in this region were transformed into canals, while others were dammed or filled in completely. Supported by the new principles of the socialist market economy, financial motivations (Harvey, 2005) began to dominate planning and land-use practice, often with additional collateral damage for eco-systems and quality of life for residents (e.g., various forms of pollution, resettlement). Increasing land scarcity forced Shanghai to create new land through land reclamation.

40 The city's name literally translates as "upon the sea".

Besides changes in sedimentation due to a decrease in discharge after construction of the Three Gorges Dam in 2003 (Yang et al., 2005), the wetlands along Shanghai's coastline became increasingly under threat by land reclamation. Approximately 40% of Shanghai's estuarine wetlands have been lost since 1980 due to land reclamation, totaling 816.6 square kilometers between 1974 and 2018 (Li et al., 2020). The main uses of the reclaimed lands have been agriculture and urban expansion – planned new town construction on Chongming Island (see 3.5), and Lingang New Harbor City (see 3.4), Pudong International Airport, tap water storage areas, recreation (golf), and port relocation (from the Huangpu River to along the coastline).

A decade ago scientists warned that Shanghai faced a serious risk for a 'once in a 100 year flood', with serious consequences[41], and possible economic impacts far beyond the city (Balica et al., 2012; Hanson et al., 2011; Ke, 2014; Quan, 2014). Since then, substantial flood protection measures have been implemented along the Huangpu River, in the form of seven-meter-high retaining walls. Also, in the Pudong District, coastal dikes have been reinforced, and make Shanghai – except Chongming Island – better prepared for flood risk compared to some other financial centers (Xian et al., 2018; IPCC, 2019).

These efforts have been convincingly combined with the regeneration of polluted industrial waterfronts and construction of beautiful manicured public spaces (Den Hartog, 2019). However, the 'hard' technocratic solutions with flood prevention infrastructure (Figure 6.3) constitute barriers for ecological development, e.g., concrete embankments do not provide nesting opportunities for fish, birds, and other species and will need to be addressed (Gan et al., 2018).

Along the coastline of Nanhui (see 3.4), many wetlands (including salt marshes, mud flats and portions of the estuary water body) have been diked – constructed at two meters depth below the minimum low-tide level – to speed up siltation reclamation for urban purposes (Tian et al., 2015) instead of benefitting from the storm surge protection capacities of wetlands (Moeller et al., 2014) – and converted into aquaculture farming or agriculture, which adds to flood risk (Cui et al., 2015). To compensate for the collateral damage of extremely rapid urbanization, Shanghai has been searching for ways to protect existing wetlands and stimulate the development of new wetlands, which currently looks like more of an ecological engineering effort than ecological restoration, as will be described in the next paragraphs.

41 Also see this animation by Climate Central's Program on Sea Level Rise, available online: https://choices.climatecentral.org/#11/31.2307/121.4738?compare=temperatures&carbon-end-yr=2100&scenario-a=warming-4&scenario-b=warming-2.

FIG. 6.3 Hard embankments in new ecological park along the Huangpu River (Photo by author, September 2020).

6.3.2 A Green Eco-Network as Socio-Technical Experiment to Support the Transformation of Shanghai into an Ecological Civilization

6.3.2.1 Promising Expectations in "Shanghai 2035"

Following the master plan's promising subtitle "Striving for an Excellent Global City" Shanghai wants to compete with, and possibly surpass, other global cities such as New York, London, Paris, Singapore, and Tokyo in terms of economy, image, and quality of life. Shanghai commits itself to become a benchmark for international megacities in terms of green, low-carbon and sustainability" (Shanghai Municipal People's Government, 2016). Shanghai 2035 further states: "the world has stepped into an era of Ecological Civilization that puts environmental friendliness and a humanistic approach first". By developing multiple pilot-projects Shanghai wants "to play a pioneering role" and "take the lead" by becoming an "environment-friendly,

economically-developed, culturally-diversified, safe and livable city" (Shanghai Municipal People's Government, 2016). In poetic words, the master plan further states that "citizen happiness" is fundamental to development, and because of this, "Shanghai strives to build a prosperous and innovative city". According to its master plan Shanghai also wants to become more adaptable to climate change and resilient. All of this should be realized by engineering "a desirable ecological city", which is explained as "a beautiful space that meets the demands of the increasing number of citizens, where the water is bluer and the land is greener, and one lives in harmony with nature […] to satisfy the citizens yearning for a better life" (Shanghai Municipal People's Government, 2016). The two terms 'beautification' and 'harmonization' have been increasingly used in Ecological Civilization campaigns since 2007 (Hansen, M.H. et al., 2018). The realization of an Ecological Civilization is a nationwide socio-technical experiment, for which Shanghai will play a guiding and pioneering role. In 2015, local authorities started constructing an Overall Plan for Ecological Civilization System Reform, which has been integrated in the Master Plan Shanghai 2035.

6.3.2.2 Socio-Technical Experimentation with Green Infrastructure

A key project in this sustainable innovation journey toward an Ecological Civilization is the construction of a blue and green interconnected eco-network with at least 60% of the municipal territory restored or conserved for ecologic functions (Figure 6.1B), which is an increase of ten percent. Extensive new wetlands and a variety of ecological restoration and engineering projects are planned, ranging from national parks (two on Chongming), city parks, and +1000-meter-wide green corridors to community-based pocket parks and vertical greenery on buildings. Many of these green spaces have already been implemented since 2017, partly accelerated and prioritized due to the Covid-19 crisis. Similar to the Green Belt around London and other green buffers, such as the Green Heart of the Randstad metropolis in the Netherlands, a main function of Shanghai's new eco-network is to "satisfy citizens' diversified leisure demands", but also to enhance ecological diversity (Shanghai Municipal People's Government, 2016). The eco-network aims to get citizens closer to nature and reconnect the city with the countryside, explained as the so-called "introducing the forest to the city"-policy (Shanghai Municipal People's Government, 2016). Moreover, this green infrastructure is mentioned as a new backbone for urban development (instead of rails or asphalt).

6.3.2.3 Sustainable Innovation Journey Toward an Ecological Civilization

In the early phase of implementing this eco-network, many local hurdles became apparent and limited anticipated ecological connectivity (Liu et al., 2019). The experimental projects, as described in the next three paragraphs, are important components in this eco-network. Each started early this century, and important lessons can be distilled from their sustainable innovation journeys. A main problem is a lack of clarity about the definition of "ecological land" (as explained in paragraphs 3.4 and 3.5), resulting in a mismatch between outcomes and expectations. Ecological land is defined in Shanghai 2035 as "land that is used to provide eco-system services in the city, including green land, forest land, garden land, cultivated land, tidal flat reed land, pond aquaculture water surface, unused lands, etcetera" (Shanghai Municipal People's Government, 2016). In fact, this appears to be all the land that is not build upon or paved, and it even includes large water surfaces (compare Figure 6.1A/B with Figure 6.2: grey color on Figure 6.2 is current land surface). Hence, the ecological value of these spaces obviously varies. Shanghai's rapidly increasing number of roof gardens and green facades can have ecological value, and at the same time, there are un-built and unpaved lands that have less ecologic value such as golf courses.

6.3.3 Huangpu River Waterfront as Main Stage for Ecological Civilization

6.3.3.1 Expectations and Socio-Technical Experimentation

Shanghai's most spectacular project is the urban regeneration of the Huangpu River's waterfront that used to be dominated by port-related industries. The river is intended to become a key component of the envisaged eco-network[42], a "green and low-carbon demonstration zone" (Shanghai Municipal People's Government, 2016), and crucial contributor to realize the aspiration of an Ecological Civilization. In the context of extreme urban density, the riverfront is expected to form a continuous open public space as "urban living room", to emphasize Shanghai's identity as a port

42 According to the Shanghai Huangpu River and Suzhou River planning (Shanghai Municipal People's Government, 2018) the ecological space along the Huangpu River will increase with 1,000 hectares "to improve the ecosystem, improve the quality of space, and build an excellent global city".

city, and to create new ecological connections (Figure 6.1B). It is simultaneously the main contributor to becoming an 'Excellent Global City'. In 2018, the Huangpu Waterfront became officially a "demonstration zone for the development capability of the global city of Shanghai" (Shanghai Municipal People's Government, 2016). The importance of this project is underlined by an inspection visit of a section of the waterfront in Yangpu District – within the overall demonstration zone this relative short section is earmarked as demonstration zone for the construction of a people-oriented city (Figure 6.5) – by General Secretary Xi November 2019[43], and a possible revisit during Summer 2021, most likely followed by a visit of Chongming Island.

6.3.3.2 Sustainable Innovation Journey

Combining urban regeneration of former industrial waterfronts with ecological development is an immense challenge, especially due to increasing land scarcity, towering real estate prices, and the necessary integration of a flood defense system. Most polluting industries have already been relocated to beyond the edge of the city (e.g., along the coast of the Pudong district and on Chongming Island) with more space to grow, and even to other provinces. Plans are underway to relocate the last remaining industries, such as the government owned Baosteel, the second largest steel producer in the world. This measure adds to the reduction of carbon emissions within the city limits and improves the general image and quality of life – to make place for a scenic recreational landscape. In less than five years, a very attractive more than 50 kilometers of public waterfront with greenery, and biking and walking trails emerged along the Huangpu, offering a welcome and pleasant relief of the urban congestion.

Yet the new greenery along the Huangpu River is maintained with a people-oriented approach. As observed during field research, pesticides are frequently used to control the manicured newly green landscape. Decorative flowers (good for taking selfies) are preferred instead of the spontaneous growth of species. To accommodate urban use and set priorities for certain areas within the limited available space, zoning has been proposed by experts from Tongji University (Figure 6.4A) with four different categories: (1) "Eco for charming", which means decorative green in a high-density urban context (Figure 6.5); (2) "Eco for sharing", in a context with more space for green that can be used for recreational purposes; (3) "Eco for symbiosis", in a residential context; (4) "Eco for wilderness", which is not accessible to people. In the first three categories,

43 Impressions available online on: http://www.xinhuanet.com/english/2019-11/02/c_138523489_2.htm (Accessed July 30, 2021).

the principle of so-called stepping-stones has been introduced, which means the creation of micro-greens for birds and other species that can hop from one stepping-stone to another one, adding to ecological corridors (Gan et al., 2018). A stepping-stone could be an eco-friendly architectural feature for breeding and shelter (e.g., green walls and roofs), a small (floating) island, or ecological hanging bags along embankments, or ecological slopes. After the urban planning bureau of Shanghai adjusted the proposal (Figure 6.4B), dozens of stepping-stones were introduced (Figure 6.6, and Figure 6.7). "Eco for wilderness" is yet to be found along the Huangpu River, but hopefully this will be realized by 2035, at the end of the journey, as set in Shanghai's master plan. Priority has been given to removing polluting industries and improvement of the area's public image with manicured greenery. A next step in the ongoing sustainable innovation journey is expected to add more ecological values.

The greening projects so far formed the setting for massive real estate projects that were constructed here from 2012 (Den Hartog, 2021A). All these new buildings received green labels to match the National Green Building standard, especially regarding low-carbon emissions. Although in practice the application of these standard is still questionable (Den Hartog et al., 2018), and a very large share of the newly built buildings is used for speculation purposes and remain mainly empty even several years after completion and before the Covid-19 crisis started (Den Hartog, 2021A).

FIG. 6.4 (A) Proposal for ecological zoning along the Huangpu River (Source: Gan et al., 2018). (B) Functional zones along the Huangpu River according to municipal planning bureau (Source: Shanghai Municipal People's Government, 2016).

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FIG. 6.5 People oriented "Eco for charming" along the Huangpu River in Yangpu District (Photo by author, May 2021.

FIG. 6.6 Ecological 'stepping-stone along the Huangpu River at Lujiazui, the city center (Photo by author, March 2020.

FIG. 6.7 Ecological 'stepping-stone along the Huangpu River at the former World Expo 2010 site (Photo by author, March 2020.

6.3.4 Nanhui Coastal Wetland Reserve and Lingang New Harbor City

6.3.4.1 Expectations and Experimentation to Create a "Future Coastal City"

Another locality that embodies the clash between urbanization pressures and ecological protection or restoration is the Nanhui Coastal Wetland Reserve (Figure 6.2, Figure 6.8, and Figure 6.9) at the edge of Shanghai's Pudong District, under the flight path to Pudong International Airport. A significant portion of this 122.5 square kilometers land reclamation project is earmarked for urbanization. In 2002, when the area was a tidal flat, it was expected that the pilot project Lingang New Harbor City would grow here into a city with 800,000 inhabitants by 2020 (Den Hartog, 2010). This new city accompanies the Yangshan Deep-water Port complex, which opened in 2010, today the largest container terminal in the world in terms of capacity. Nearby new (heavy) industry complexes have been erected, partly as a relocation area for the regenerated waterfronts along the Huangpu River downtown. The promising expectation was to create a "future coastal city" with advanced

manufacturing, shipping trade, and marine industry. Lingang New Harbor City was expected to function as “demonstration zone of reform and opening-up, driven by system innovation” and “intellectual and cultural innovation”.

6.3.4.2 Sustainable Innovation Journey and Conflicts with Wetland Restoration Efforts

But, due to the remote location, lack of facilities, and poor building conditions (many buildings suffer serious moisture problems), as well as fluctuations in the expected port development and international container transport, the sustainable innovation journey of this new city stalled. More than half of the realized buildings were still empty in 2021. About three quarters of the planned city actually has yet to be built. Under influence of the nearby Ramsar zones[44] on Chongming Island, the coast of Nanhui became an important transit area for migratory birds, with rich biodiversity. According to the original plan, the new city was to be surrounded by lush nature and wetlands. However, a large part of the lands reserved for nature development currently has other land-uses, such as aqua farming and plantations. From an agricultural point of view, wetlands are often seen as wastelands (Li, 2019) and farming, including aquaculture is prioritized above nature conservation, especially in times of increasingly scarce agricultural resources (Brown, 1995). Wetlands are even defined as unused land in China’s land classification system (Lin, 2009) and consequently are often converted to agriculture[45]. Many stakeholders underestimate the value of eco-system services (Wang et al., 2012). Ecological restoration needs understanding and systematic research since eco-systems are sensitive and complex systems. For example, the soil structure and silt on coastal marshes make it inhospitable for most trees, and especially unsuitable for a cypress plantation, which is the case now (Li, 2019). A group of environmentalists, scientists, and nature enthusiasts launched a protest to raise international awareness to counter this threat, especially since Tesla’s new Gigafactory started construction near here (Brelsford, 2019).

44 Chongming Dongtan Nature Reserve, Shanghai, https://rsis.ramsar.org/ris/1144; Shanghai Yangtze Estuarine Wetland Nature Reserve for Chinese Sturgeon, https://rsis.ramsar.org/ris/1730 (Accessed July 30, 2021).

45 See this article available online at: http://www.ecns.cn/2015/10-30/186433.shtml (Accessed July 30, 2021).

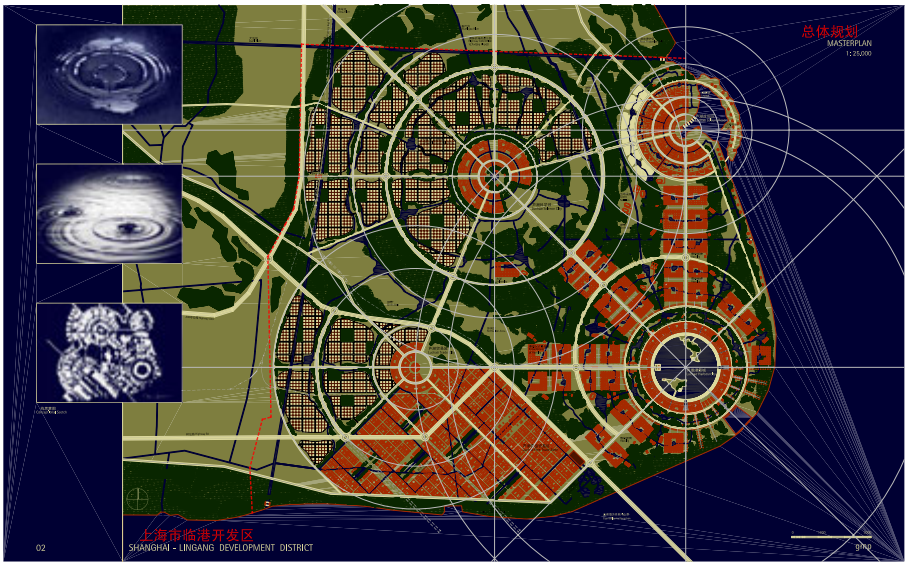

FIG. 6.8 Master plan Lingang New Harbor City with 800,000 inhabitants on top of 122.5 square kilometers reclaimed wetland. Only a quarter of this city and its green buffers has been realized, a large share of the buildings is empty and remaining lands have various usages, mainly farming or recreation (Source: GMP 2001; adjusted by author).

FIG. 6.9 Wetlands partly used for farming at Nanhui in the Pudong District. Lingang New Harbor City was planned here (Photo by author, December 2018).

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6.3.5 Chongming Eco-Island

6.3.5.1 Expectations and Socio-technical Experimentation

Chongming Island, located in the estuary of the Yangtze River lies within the municipal border of Shanghai. The 80 square kilometers large Dongtan area is a former state farm, located in Chenjia Town one of the 18 administrative subdivisions of Chongming Island. At Dongtan, on the east end of the island, there are two zones appointed as "wetlands of extreme international importance" by the Ramsar Convention in 1992[46]. Already in 1996, the National Government nominated Chongming as an eco-island, and in 2001 the expectation for this eco-island was "to explore experiences of sustainable development for China's cities and towns and provide excellent model exemplars" (MOST, 2001). It became the site for several experimental projects, including the promising pilot project for Dongtan Eco-city (Den Hartog, 2010). As recently as 2009, the whole island was designated officially as National Experimental Zones for Sustainable Development, and in 2017 this status was upgraded to National Ecological Demonstration Zone (Ma et al., 2017).

6.3.5.2 Sustainable Innovation Journey and Conflicts with Wetland Restoration Efforts

The effectiveness of this eco-island-policy becomes clear when studying the northwestern edge of Chongming, which falls under jurisdiction of Jiangsu Province, and is consequently excluded from the National Ecological Demonstration Zone. Serious conflicts in land use arose there when under the guise of protecting land through conservation development (Milder, 2007), natural wetlands were reclaimed and opened up opportunity for massive speculative real estate. This deviation from the intended sustainable innovation journey toward an ecological demonstration zone on the part of the island that isn't administered by Shanghai occurred due to inadequate supervision, and especially poor communication between various responsible authorities at municipal and provincial levels. A profit-seeking developer (Greenland, which is state-owned, and Shanghai based) and local governments in

46 Chongming Dongtan Nature Reserve, Shanghai, https://rsis.ramsar.org/ris/1144; Shanghai Yangtze Estuarine Wetland Nature Reserve for Chinese Sturgeon, https://rsis.ramsar.org/ris/1730 (Accessed July 30, 2021).

Jiangsu Province started a joint project here named 'Long Island', which envisaged a new town for 100,000 inhabitants, but it was not inhabited because of its remote location, and it has been used for speculative investment (Figure 6.2, Figure 6.10, and Figure 6.11; Den Hartog, 2017B). This has added to the already severely disturbed eco-system along the north-branch of the estuary, subject to ongoing degradation since the 1950's (Guo, 2021), and prone to flood risk (see 3.1). Two similar projects were built there as well. After negative media attention, the central government took over control of the project and started to intervene; halting construction and threatening to demolish all newly constructed high-rise buildings, although the buildings remain (Den Hartog 2019).

This experience illustrates that experimental demonstration zones and pilot-projects need thorough preparation and supervision beyond municipal boundaries, and clear communication with all stakeholders. Another example of problems with implementation of this National Ecological Demonstration Zone occurred near the Ramsar zones at the eastern edge of the island. From the early 1990's Spartina alterniflora, an invasive species used to stabilize shoals to make them ready for reclamation, appeared on Chongming Island. As a consequence of its rapid spreading, wetland biodiversity declined (Zou et al., 2014). In parallel, even with the introduction of the National Ecological Demonstration Zone, land reclamation continued, even within natural reserve areas. This happened under the guise of removing invasive plants (Xie et al., 2020).

One of the first actions to counter these practices was the WWF-China Flyways program, which was financially supported by multiple companies including Coca-Cola, and the Kingdom of the Netherlands[47]. This pilot-project started in 2014 and aimed to reduce and control the Spartina alterniflora. The program involved environmental stewardship on Dongtan wetland by involving local communities and farmers, and by introducing principles and practices of waterbird-friendly aquaculture. As a result, the number of waterfowl species has increased significantly (Shanghai Daily, 2017). The innovation journey of Chongming Eco-Island shows that a sustainability transition can't be a readily achievable instant solution. Even in a central controlled State, it is a long-winded process of adjusting and adapting, especially due to its many dimensions and large scale. It includes both successes (e.g., the before-mentioned WWF-China Flyways program) as well as failures, such as the demise of Dongtan Eco-city located besides the Ramsar zones (Figure 6.2, Figure 6.12), where luxurious apartments have been built along a golf course, mostly empty, that are used for speculative investment instead of the promised ecological dream city (Den Hartog et al., 2018).

47 See also: https://www.eaaflyway.net/signing-of-the-mou-between-the-chinese-state-forestry-administration-and-wwf-china (Accessed July 30, 2021).

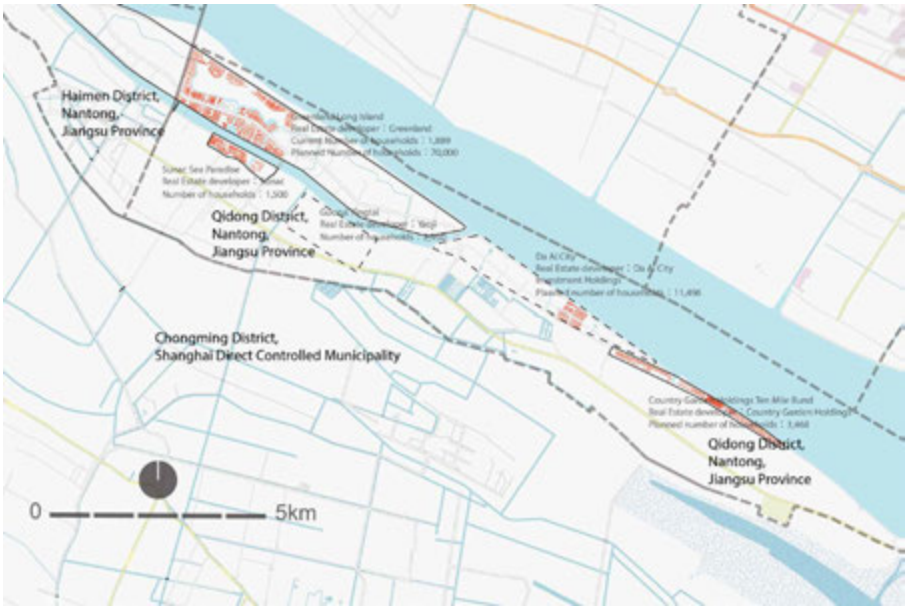

FIG. 6.10 Long Island real estate project and related projects, located in the Jiangsu Province part of Chongming Island, constructed since 2014 on top of more than 12 square kilometers reclaimed wetlands; 97% of the buildings are empty (Map by author and Jiawei Hu).

FIG. 6.11 Fragment of the speculative Long Island real estate project in the Jiangsu Province part of Chongming Island (Photo by author, July 2019).

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FIG. 6.12 Master plan for Dongtan Eco-city, good for 500,000 inhabitants. The plan has never been realized; resorts with in total more than a thousand speculative (seldom used) luxurious villas and a golf course have been built here instead (Source: Arup, 2005).

6.4 Discussion

What can we learn from Shanghai's sustainable innovation journey? How might the city improve the balance between wetland protection, urban development, and climate change adaptation? The above-examined cases show that despite good intentions and central control, expectations can still differ from end results. Apart from advantages in terms of speed, scale, and Chinese decisiveness, we can learn that (severe) collateral damage to the environment can still occur, e.g., because of inconsistent definitions of wetlands (see paragraph 6.3.4), or because of greed and inadequate communication between different authorities (see Long Island in paragraph 6.3.5).

6.4.1 Expectations and Conflicts

The “statements about the future” (Van Lente, 2012) regarding the eco-network in Shanghai’s current master plan are practice-based and challenge-led and steered by Ecological Civilization in an attempt to balance environmental, economic, and social aspects. These statements are certainly robust – because state-led, specific, and of high quality (Schot & Geels, 2008). The promises and content of Shanghai 2035 showcases the absorption of international knowledge and practices, and even has the ambition to surpass other global cities in terms of speed, and scale, and quality. The new Huangpu waterfronts are breathtaking. It is remarkable that they were realized in such a short time span. In addition, the amount of urban greening in the city as a whole, with green buffers and new coastal wetland, all integrated into a new eco-network, largely already under construction, is unprecedented.

This is impressive but distracts from substantive necessary quality and long-term goals. The cases on Chongming (paragraph 3.5), and along the Huangpu River in downtown Shanghai (paragraph 3.3), are primarily aimed at improving the (public) image and status, to attracting (foreign) investment, and to accommodate a selective upper middle class with a comfortable living environment (Den Hartog, 2019). This is also a form of environmental injustice and contradicts the principles of an Ecological Civilization (Pan and Zhou, 2006). For example, relocation of polluting industries might be good for downtown citizens but causes conflicts on the new locations of these still polluting industries.

6.4.2 Socio-technical Experimentation and Learning Factors

In the Global North, the key role in Sustainability Transitions shifts from the national governments toward local governments, especially cities (Sengers et al., 2016). Even in a strongly centrally controlled country as China local governments play a decisive role – in the case of Shanghai even on district level as we found in paragraph 6.3 – and in particular the translation and communication into everyday practice and usages by local people is decisive.

According to Evans et al. (2016) “urban experimentation” could become a new mode of governance that turns cities into laboratories for the future, especially in the context of welfare states that are increasingly under pressure, and “decreasing possibilities of national state actors to shape Sustainability Transitions” (Sengers et al., 2016). In the European centered discourse Karvonen (2016) claims that this

type of experimentation could supplement or even replace traditional urban planning approaches. Karvonen (2016) explains that in the Global North local authorities frequently use it to mask a lack of funding, or to suggest public-private partnerships. In short, it often represents the erosion of the role and responsibilities of the state, by increasingly outsourcing expertise to citizens and non-Government stakeholders.

Yet in the case of Shanghai this is absolutely the opposite due to a very different socio-political setting. In the People's Republic of China, the state uses experimental pilot projects and demonstration zones to set standards and guidelines. The pilot-projects and demonstration zones as described in this chapter are socio-technical experiments, but differ from urban labs and experiments, in scale, timeframe, and because far fewer stakeholders participate directly in these state-led processes. This makes their innovation journeys less inclusive. The terms 'pilot-project' and 'demonstration zone' suggest a certain degree of control of the experiment aimed to prevent failure, opposed to the term 'urban lab'. This makes pilot-projects and demonstration zones different from the definition in paragraph 2.2, because experiments do not guarantee success; they can fail (Garud et al., 2014; Sengers et al., 2016). Failure includes a learning factor.

6.4.3 Sustainable Innovation Journey and Civic Engagement

Limiting participation to a select group of stakeholders also excludes feedback as a possible enabler for learning, e.g., as we saw in paragraph 3.4.3 (Xie et al., 2020). Yet this means that the implementation speed of pilot-projects and demonstration zones can be accelerated, also because of state ownership and mandate over land and resources. Consequently, the state-led approach in Shanghai (China) can be more radical and large-scale. This makes the design and implementation of pilot-projects and demonstration zones less uncertain (Garud et al., 2014) and less open-ended as an unfolding sustainable innovation journey (Van de Ven et al., 1999). Denying learning potential is opposed to an adaptive management approach and a hurdle for system innovation.

In the Sustainability Transitions discourse, experimental approaches and urban labs are expected to lead to innovative, integrated, and inclusive policies and solutions. This can be more easily achieved if sustainability learning is co-created and shared. Coercive environmentalism is certainly no guarantee for successful sustainable solutions (Li & Shapiro, 2020). Actually, public participation and consultation were included in China's constitution during Mao's reign but neglected afterwards. Participation needs to be reprioritized again, including in China's environmental

policymaking, according to Li & Shapiro (2020). As indicated in paragraph 6.1.2, Ecological Civilization calls for new balances between top-down and bottom-up governance approaches and new forms of participation, which is underlined in Shanghai 2035, but is still in an elementary phase in practice. Consultation and transparency are essential to realize a true Ecological Civilization. Feedback from civil society will improve the outcomes from pilot-projects and demonstration projects and will likely make policies more effective and sustainable. Yet, this is less likely under the current prevailing Chinese system of governance, as can be seen in the urban regeneration processes along the Huangpu River that lack an inclusive approach (Den Hartog, 2021A; Li & Zhong, 2020).

This complexity underscores that a true Ecological Civilization involves an innovation journey of gradual adjustment and understanding, which cannot be implemented top-down at once, but needs to be more inclusive with a wide variety of societal stakeholders, e.g., such as happened at the initiative of the WWF on Chongming Eco-Island (see 6.3.5) and the use of incentives to stimulate grassroots experiments with eco-farmers (Den Hartog et al., 2018).

6.5 Conclusion and Recommendations

It is encouraging that China, with Shanghai as a frontrunner, is attempting to restore[48] the damage done by radical urbanization to the natural environment. Based on the findings in paragraph 6.3 and the discussion in paragraph 6.4 some concluding recommendations can be made, aimed to reduce discrepancies between expectations and the reality of daily life. Despite Shanghai's intentions to raise awareness about environmental challenges and its ambition to play a leading role in enabling a green transition, there are still hurdles to be faced.

48 In 2018 China's State Council launched a new regulation on land reclamation to further protect coastal wetlands (State Council, 2018), hopefully more adequate than previous rules (Zhang, 2017).

6.5.1 Expectations need to be Co-created and Shared

To translate expectations into realities on the ground these expectations need shared understanding, including agreed definitions of key concepts, to prevent problems as occurred in Nanhui (6.3.4) and Long Island (6.3.5) where the appreciation and evaluation of ecological assets such as wetlands differed amongst various stakeholders. During fieldwork it became clear that terms like 'green' and 'ecology' are primarily used for making a place visually attractive instead of to increase biodiversity. Policy terms as 'beautification' and 'harmonization' create high expectations but may not be realized in daily life if their intended meaning is not robust (shared by all actors) and not specific (Schot and Geels, 2008). There is a worrying discrepancy in the evaluation of eco-system services and the daily-life use and protection of wetlands. Therefore, a main concern is to acknowledge these eco-system services. To build shared expectation, the first recommendation is to use widely understood definitions, supported by local leaders, and well informed by scientists (e.g., universities and nature conservation organizations) and to communicate this understanding clearly with all stakeholders to guide the innovation journey toward urban sustainability and Ecological Civilization (*recommendation 1*).

A co-created shared vision is essential to realize a sustainable innovation journey (Geels et al., 2008) in the long run. Also, in line with the Ecological Civilization philosophy and participation traditions (Li & Shapiro, 2020), new ways of involving citizens in State-led processes need to be explored, to co-create a shared vision for the future, and by working with communities to better understand their needs and aspirations (*recommendation 2*).

6.5.2 Socio-Technical Experimentation Requires Research about Needs and Consequences

The experimental new cities Lingang (6.3.4) and Dongtan (6.3.5), as well as the commercial development on Long Island (6.3.5), are all constructed on exposed and vulnerable locations, in conflict with existing ecological values (Cui et al., 2015), and subject to flood risk (Wang et al., 2015). Additionally, all three mentioned locations have problems with attracting inhabitants because of their remote locations and disturbing speculative ownership – most building are used as investment objects, especially as second houses by new middle-class families in Shanghai –, resulting

in desolate communities and a waste of resources[49]. This conflicts sharply with the international accepted definition of sustainability (United Nations, 1987) and also with the idea of harmonious interaction with nature as in Ecological Civilization. It is recommended that clear policy guidelines are developed to guide property development to ensure public safety and sustainability including wetland protection (*recommendation 3*).

6.5.3 A Sustainable Innovation Journey Should be a Social Learning Journey, and this can Benefit from Citizen Engagement

A sustainable innovation journey needs to be developed through a joint experimental learning approach – e.g., by approaching wetlands as valuable asset with eco-system services – to be able to effectively protect the remaining wetlands. If an experiment is co-defined as being inclusive and "designed to promote system innovation through social learning" (Sengers et al., 2016) it is essential to involve more actors who are willing to engage and to foster social learning (Loorbach, 2017), including farmers, fishermen, and users in daily life (*recommendation 4*).

In China, local governments generally have a decisive executive role, while the higher levels of government (provincial and national) have more of a policy-prescribing and supervisory role. Due to various reasons (e.g., lack of experience, time pressure, mismanagement) sometimes things go wrong at local executive level. To prevent this supervision is essential during all stages, and beyond (municipal) planning boundaries (*recommendation 5*) – e.g., in the case of Long Island (6.3.5) a supervising team was formed after the damage was done, because the responsible officials could not and did not want to exert influence on the other sides of the municipal and provincial border line.

China, with Shanghai ahead, is shifting from a production economy towards an urban consumption society. During the innovation journey of trial and error, there is a search for a harmonious balance between wetland protection, urban development (including economic aspects, social aspects, etcetera), and climate change adaptation. At the moment it is too early to draw conclusions on the functioning of the new ecological corridors, since only some of them have been implemented so far. Ecological Civilization has an anthropocentric emphasis, which is understandable in

49 Well-known designers and engineers from the Global North designed the master plans for these three new cities.

the context of extreme high population density and the desire for economic catch-up. But to be fully sustainable, eco-friendly, and effective in reducing risks (Greenpeace East Asia, 2021) caused by climate change and to restore eco-systems (UN Environment, 2019), there is an urgent need to step beyond this anthropocentric approach (*recommendation 6*).

Another recommendation is to recognize the reality of uncertainty and ambiguity during the innovation journey of experimentation, to create conditions and opportunities for deliberate social learning and policy adjustments, and correct and steer the project at an earlier stage with creative planning and decision-making processes that are more experimental in nature (*recommendation 7*).

More thoughtful and better-prepared experiments are urgently needed to further establish Shanghai as a world-leading lab for sustainable urban planning and design, and to fulfill the sustainability transition journey toward achieving the Sustainable Development Goals (United Nations, 2015A) and also the goals of an Ecological Civilization. Shanghai's journey differs from established cities in the Global North[50], and needs to deal with a different audience, with a different background, experience, and lifestyle. Consequently, there are other priorities and expectations. The innovation journey towards an Ecological Civilization will have significant impact on daily life in China, and far beyond. The expectations as described in the current master plan span till 2035, thus many unforeseen changes will occur. Hence it remains a journey full of uncertainty.

50 Environmental pressure in China rose quickly last few decades due to extreme urbanization. Additionally, we need to realize that a large share of the polluting industries that contributed to the environmental pressure are relocated (to Shanghai) from countries in the Global North, partly as result of carbon trading policies (Pan and Zhou, 2006). Meanwhile China is currently outsourcing a lot of its environmental degradation to other countries, for example timber trafficking (Colgan, 2018).

TOC

7 Synthesis and Discussion of Main Empirical Findings

Based on the empirical finding from previous chapters the theoretical problem of this research will be discussed in this chapter before it is answered in the concluding chapter 8.

7.1 Shortcomings when Applying Concepts from the International Discourse of Sustainability Transitions in a Chinese Context

This first paragraph gives a synthetically analyses following the three most relevant concepts of Sustainability Transitions theories – see paragraph 1.6.2: (ST1) expectations (or visions), (ST2) socio-technical experimentation, and (ST3) sustainable innovation journey – which have been applied also in chapters 3, 4, and 6 as sensitizers (Blumer, 1954) to structure the empirical analysis and argumentation. As explained in following sections, there are some shortcomings, from which can be learned that a modified lens is needed, as further explained in the next paragraph 7.2 and in the concluding chapter 8.

7.1.1 The Concept of Expectations (ST1)

Through the lens of Sustainability Transitions theories 'expectations' as propagated in master plans and other policy document in the Chinese context are often all-encompassing and highly ambitious. As described in previous chapters, all 'expectations' in the contemporary Chinese context are inextricably linked to the intended realization of an Ecological Civilization, since this concept became an integral part of the policies of the Chinese Communist Party, adopted at the 17th National Party Congress in October 2007, as a national strategy "to realize the greatness of the Chinese Nation", and as "the key to realize the great renaissance" (Hansen, M.H. et al., 2018).

Beyond being an 'expectation' Ecological Civilization is "simultaneously a philosophy, a vision, and compass for a green and prosperous future" (Hanson, 2019) and is seen as a key driver for the country's transition to high quality development in the "New Era" (Pan 2018). As an 'expectation' this is partly in line with Sustainability Transitions theories as being 'performative', by coordinating roles and activities amongst actors (Konrad, 2006) and by legitimizing certain investments (Borup et al., 2006). However, 'expectations' are supposed to be (co)shared by multiple actors, because if they are too general, they can't give guidance (Schot & Geels, 2008). Because the expectations of Ecological Civilization are still multi-interpretable, and mis clear definitions (see chapter 6), the performativity is limited in practical situations, as explained in all previous chapters. This can be improved by enabling a certain form of co-creation and by providing heuristic guidance (Rip and Kemp, 2006).

7.1.2 The Concept of Socio-technical Experimentation (ST2)

In Sustainability Transitions theories urban labs – which are usually so-called community-led Initiatives[51] – form the setting for socio-technical experimentation, in which local residents, shopkeepers and other stakeholders play an initiating and guiding role. These urban labs (or niches) are usually small-scale – but could be on much larger scales– and are seen as a catalyst for large-scale societal changes. In the context of centrally controlled societies such as contemporary China, this works out differently in practice as we learned in previous chapters, not only because of a different scale and speed, but especially because of a limited set of stakeholders

51 Examples of this can be found online at the following websites: http://www.ecolise.eu and https://transitionnetwork.org

and strict top-down control of all processes. China has a strong tradition of socio-technical experimentation[52] (Den Hartog, 2016), also in urban planning and design, with pilots and demonstration projects (see paragraph 4.2.1). Also, the two main cases of this research, both National Demonstration Zones (as introduced in paragraph 1.8) and showcase for sustainable futures, are socio-technical experiments. In these Chinese cases it is precisely the (central) government that initiates and dominates, with the advantage of experimenting on a larger scale and with more decisiveness, finance, and vigor. But with as disadvantage missing valuable insights from end-users, so there's no social learning or consultation (Arnstein, 1969), which too often results in a mismatch.

As explained in the paragraphs 4.2.1 and 6.4.2 the nature of experiments – and associated expectations and objectives – in a contemporary Chinese context are such that success is assured: the terms 'pilot-project' and 'demonstration zone' suggest a certain degree of control, aimed to prevent failure, opposed to the term 'urban lab' as in Sustainability Transitions theories. The process of experimentation is also different in nature since it is not intended to be open-ended – as in Sustainability Transitions theories – but (too) strongly driven by policy expectations.

This study argues that it is precisely the difference in nature and approach that – despite strong central management – can still lead to derailments, as explained in all previous chapters. Yet, corrections are usually swiftly implemented, as we saw in the case of Long Island on Chongming where height restrictions were introduced – instead of initial suggested demolition – for 'illegal' constructed buildings on a vulnerable location (see paragraph 3.4.3). Shanghai's (China's) spatial-economic development, and related urban planning and design practices are a quick process, characterized by a high degree of experimentalism, adjustability, and flexibility. This is admirably and gives hope, beyond collateral damage.

Nevertheless, we must conclude that the definition of the concept urban lab – as in the Sustainability Transitions discourse – is less suitable in a contemporary Chinese context. Experiments are only meaningful if social learning (Loorbach, 2017) will be nurtured, with support of parallel bottom-up developments, to develop the capacity to anticipate on grass-roots developments at an early stage while exploring the possibilities for cross-fertilization and integration of a co-created a shared vision with clear definitions.

52 When communism was introduced as a system it could be seen as socio-technical experiment, same as neoliberal urban policies are experimental (Harvey, 1989; Brenner & Theodore, 2002). In this line even Ecological Civilization thinking can be seen as a socio-technical experiment.

7.1.3 The Concept of a Sustainable Innovation Journey (ST3)

Sustainable innovation journeys require a sequence of experiments and evaluations, as in an (urban) lab, in order to achieve a higher-level social learning. Both cases in the National Demonstration Zones are strongly fueled by international cross-fertilization in their conceptual phase and during implementation, which brought a broad range of innovative ideas that could enrich practice. This is illustrated by dozens of international design contests organized for the whole and for parts, at all scale levels (public space, buildings, neighborhoods, districts). Also, multiple international brainstorming sessions, workshops and exchanges took place together with city officials, accelerated during and after the Expo 2010. Simultaneously there has been an increasing, but still limited and small-scale, bottom-up input by non-state-led initiatives – e.g., the niche movement of eco-farmers on Chongming Island (Den Hartog et al., 2018), and artists' collectives and other creatives in the central city around the West Bund (see chapter 4). Yet, direct involvement of residents has so far been excluded – except the occasional presence of representatives of neighborhood communities (Li & Zhong, 2021), which are selected and usually party member –, which is a missed opportunity, since experimental urban labs – as in Sustainability Transitions theories – are only meaningful through social learning (Loorbach, 2017) by involving a representative range of stakeholders. Even subdistricts also often appear to work independently of each other, without cooperation or learning lessons from practices in neighboring districts (source: various personal conversations). Another core problem related to this is that government agencies fall short in proactively providing relevant information. There's an urgent need for transparency in decision-making, and encouragement "for the public to understand and participate in the environmental issues" (Tu et al., 2019).

Opposed to most practices in the Global North, public participation – which is also seen as a priority for the implementation of an Ecological Civilization (UN Environment Programme, 2016)[53] – is falling short during the 'innovation journey' of the two discussed National Demonstration Zones (Li & Zhong, 2021), which enables speed of execution and radiates decisiveness, but can nevertheless also cause collateral damage or discrepancies, as shown in the previous chapters. China's public participation (Kern & Bolay, 2014) in social governance "is in its embryonic

53 Eight priorities can be distinguished for the Implementation of an Ecological Civilization (UN Environment Programme, 2016): (1) spatial planning and development, (2) Technological innovation and structural adjustment, (3) Land, water, and other natural resource sustainable uses, (4) ecological and environmental protection, (5) regulatory systems for Ecological Civilization, (6) monitoring and supervision, (7) public participation, and (8) organization and implementation.

stage" (Li et al., 2018). Yet, according to some theorists there are positive signs of increasing impact of public opinions (Li, 2022), although this can't be named "participation". In fact, during the lockdown in Shanghai in spring 2022 and the aftermath of Covid-19 restrictions in November 2022, it became dramatically clear that dialogue with people in daily life reality is absent (James, 2022; Hurst, 2022; Den Hartog, 2023B). In China the collective interest overrules the individual interests.

7.1.4 Discrepancies

Summarizing the above discrepancies: due to the ubiquitous hierarchical structure and the lack of a civil society, expectations are exclusively political objectives and slogans, which provide direction with rousing language use, but fall short to define anything precisely, so they remain multi-interpretable. As a result of different definitions, the outcome can still be easily different than the expected sustainable future (see chapter 6), even under strictly guided processes as under the central-controlled regime in China. For research in China these central concepts from Sustainability Transitions theories need to be extended, as explained in the following paragraphs. In paragraph 7.2 is argued how this can be approached with help of the extra lens of Ecological Civilization thinking, on the basis of which mutual suggestions are formulated in the concluding chapter.

Realizing an Ecological Civilization is simultaneously an expectation (ST1), as well as a form of socio-technical experimentation (ST2), and 'the' sustainable innovation journey (ST3). As explained in paragraph 1.6.3 this worldview is strongly political motivated and also grounded on local culture. These latter two aspects (politics and culture) are usually less prominent in the international Sustainability Transitions discourse. In paragraph 7.2 these extra dimensions are added and explained.

7.2 Additional Restructuring with Insights from Ecological Civilization Thinking

This paragraph is dedicated to the synthesis of the main findings of the theoretical and empirical research in previous chapters and discusses and tests these results through a lens that captures core ideas from both Sustainability Transitions theories and Ecological Civilization thinking, to transcend a purely Western approach and to connect this with the Chinese (Shanghainese) context. The theoretical framework as constructed in paragraph 1.6.4 (see Figure 1.6) is used in this paragraph to structure the empirical analysis and argumentation – as an extended version of Triple Bottom Line (Elkington, 1997; United Nations, 2017) with five pillars: (1) People, (2) Planet, (3) Prosperity, (4) Culture, and (5) Policy[54]. By structuring the argumentation in this way creates a more holistic view – as aimed by Ecological Civilization thinking – and also clarifies what the two extra pillars (that are emphasized here) mean in theory and practice, in the search for sustainable transitions in urban planning and design. Based on this in chapter 8 this new theoretical framework will be examined.

7.2.1 People (Civilization)

Ecological Civilization thinking is grounded on a "people-oriented" (Xi, 2017), or "people-centric approach for the public interest" (Pan, 2016). But by researching the demonstration zones along the Huangpu River and on Chongming Island in Shanghai it becomes clear that inclusiveness is limited[55], and that checks and balances by citizens are absent, as clarified in all previous chapters. In theory Ecological Civilization promises a more humane and sustainable alternative to neo-liberalism, and in line with this Shanghai's latest master plan promises an 'Excellent Global City' (Shanghai Municipal People's Government, 2016), but the demonstration zones and pilot projects along the Huangpu River in Shanghai show an excellent example of 'neoliberalism with Chinese characteristics' (Harvey, 2005). In fact, the

54 As explained in paragraph in line with Ecological Civilization thinking in essence two very important extra dimensions have been added to this concept of sustainability, namely: 'culture', and 'politics'.

55 As explained in this research the local reality is much less inclusive than promised, and therefore less sustainable as strived for in the journey toward an ecological civilization, and in the Urban SDG 11 (United Nations, 2015B; UN Environment Programme, 2015).

disputed (Brownill & O'Hara, 2015; Kimmelman, 2019; Wainwright, 2019) neo-liberal concept 'urban megaproject' (Christiaanse et al., 2019; Del Cerro Santamaría, 2013; Hanakata & Gasco, 2018) is multiplied, in a way that is even more exclusive in terms of (un)affordability and (un)accessibility than their counterparts in the Global North. These urban megaprojects are 'concentrations of capital' (Harvey, 2006), with 'exclusionary social relations and rising levels of inequality' (Piketty, 2013).

This is amplified by massive demolition of existing low-income neighborhoods – which according to the UN in some cases could be defined as slum (United Nations, 2015A), but in many cases also offer opportunities for technical upgrading and enhancement of the local identity or historic continuity; in fact, the author of this dissertation lived in such a (slightly) upgraded neighborhood from 2015 till 2020 – to make way for a comfortable and luxurious new corporate world, with 'high quality of life' for a new class, without supply of new affordable housing on site[56]. The offered new housing typologies on site are limited to exclusive serviced apartments (long-stay hotels) thus not aimed at more diversity of households. Yet there are a few promising experiments with talent-housing for young graduates in the Yangpu District, although the new talent policies can cause other frictions (Li & Zhang, 2020).

In other words, the promised "combatting of social inequality" (Shanghai Municipal People's Government, 2016) is absent in all analyzed practices along the waterfronts, since existing affordable housing – as in traditional working-class neighborhoods – is instantly replaced by luxurious service apartments, hotels, and commercial complexes[57]. Local city leaders and developers want Shanghai to excel as a global city and attract foreign investment by offering appealing comfort and urban dynamics focused on high-income groups. As found in chapter 3, 4 and 6 Shanghai's new waterfronts are purely deployed to facilitate and please the new rising (upper) middle class, and to attract investment. For example, most of the new cultural institutions and "world class" museums charge entrée fees that are far above the average budget. The prices are even higher than comparable venues in New York, London, or Paris, as if they want to trump each other in price.

However, Ecological Civilization includes a promise to reintroduce and stimulate grassroots elements in governance (Li & Zhong, 2020; Miao & Lang, 2014). Participation is in practice usually limited to gathering info through smart

56 Relocation venues can be found in remote new towns (Den Hartog, 2010).

57 Based on my own observation and personal communication, this accelerated considerably during the pandemic, when local leaders used the excuse that these (old) neighborhoods increase the risk of spreading the Covid-19 virus (for which there is no evidence).

technologies, e.g., apps on cellphones, and since this technology is controlled (and adjusted?) by the government it is a "non-participatory approach" (Winter et al., 2021). According to Wang et al. (2014) it is possible to realise an Ecological Civilization, but only with the "peoples' full public participation", instead of expecting that a government will solve all problems. Some theorists assume that as a result of Ecological Civilization, market thinking must be subordinated to what people want and empower people at local levels (Pan, 2006; Pan, 2016, Gare, 2021). The previous chapters in this research show that in both cases this is far from reality: financial motivations overrule everything. In short, the pilot projects and demonstration zones along the Huangpu River are less inclusive as Ecological Civilization thinking promises and aim exclusively for a select (upper) middle class that actually has little free time to use these waterfronts for leisure and uses the properties mainly for investment. This conflicts with the promise of inclusivity in the master plan (Shanghai Municipal People's Government, 2016). In short, even in a central controlled context it is essential that all stakeholders participate, with a long-term shared vision, and continuous adjustments and maintenance.

Yet it is promising that, since the latest master plan, initial experiments have been conducted with increasing residents' participation, although limited (Li & Zhong, 2021). After preliminary experiments during the Expo in 2010 (see paragraph 4.3.2) more new forms of participation have been performed as promised (Shanghai Municipal People's Government, 2016), but this voice of a 'civil society' is not loud yet and within limits. Hence a real 'people-oriented' approach as promised in Ecological Civilization policies is still marginal. Exclusion of a civil society conflicts with the primary promises as in Ecological Civilization thinking and even conflicts with the principles of communism (Li & Shapiro, 2020) since it excludes 'the people'. Yet there are gradual changes – which were temporarily brutal interrupted during Shanghai's lockdown and aftermath (James, 2022; Hurst, 2022) – and new opportunities.

7.2.2 Planet (Ecological, Environment)

Ecological Civilization promotes harmony between humanity and nature. It promotes global ecological safety, and aims for a circular economy, with help of ecological services, energy conservation and protection, and low-carbon policies (Pan, 2016). Recent policies and practices – e.g., achievements with public transport systems, clean energy, electric vehicles, and low-carbon buildings – showcases that China is

very aware[58] of its environmental challenges and is willing to play a leading role in a sustainable transition (Liu et al., 2021A). As explained in previous chapters also Shanghai's city leaders and planners are aware of environmental challenges. This direct-controlled municipality (province) is even aiming to play a global leading role in a green transition (Shanghai Municipal People's Government, 2016). The new waterfronts along the Huangpu River in Shanghai show how ecological values can be combined with other aims, such as flood defense, place-making, and the preservation of industrial heritage. This is implemented rapidly on an extremely large-scale and with high quality – which is certainly very impressive – in a context of extremely high building density, land scarcity, and booming real estate prices.

There are obstacles. Carbon emissions are still increasing rapidly. China is nowadays a relatively distant second, with 11% of all historical carbon emissions worldwide, after the US (20%), although per-capita the emissions in China are not even in the top 20 of cumulative emissions 1850-2021 (Evans, 2021). This can be partly explained by China's unique phase of socio-economic development with – in comparison to the Global North – other priorities (poverty alleviation[59]) and expectations, and discrepancies in definition, appreciation, and valuation of ecological assets. China is following a different development pathway – as compared with countries in the Global North – with other priorities and expectations (Mahbubani, 2008; Kissinger, 2011; Wang et al., 2014; Global Times, 2023).

However, there is a discrepancy with the expected "harmony with nature" (Pan, 2016; Xi, 2017) in the practical implementation, as found analyzed in both national demonstration projects. Especially in chapter 6 it becomes clear that discrepancies in definition, appreciation, and valuation of ecological assets can easily happen, and result in serious collateral damage while achieving the aimed starting targets. The discussed National Demonstration Zones on Chongming Eco-Island and along the Huangpu River are supposed to be exemplary in terms of urban planning and design practices with global influences, with a special focus on Ecological Civilization features such as reduction of carbon emissions, ecological restoration, and creating ecological connections. While the Huangpu River waterfronts are more robust in terms of physical appearance, and the watersides on Chongming are more vulnerable with their rural and natural qualities, in both situations we see massive exploitation by real estate investments.

58 There is also a raising public awareness, especially since pollution data of the private sector is published online causing a culture of "name and shame" (Kostka & Nahm, 2017).

59 Although according to Liu et al. (2021A) China's economic catch-up is currently in a phase beyond poverty alleviation.

This stems from the practice that until recently contemporary planning practices in China are mainly based on a tabula rasa, frequently resulting in serious disturbances and conflicts between different layers. When following the Layers-Approach, especially the bottom layer (substratum) is often ignored (see 5.3.1). In chapters 5 and 6 is explained how different priorities by stakeholders on a local level resulted in serious disturbances, and profit-driven motives win from eco-ambitions. In China there is no landownership, and the state has full mandate on the use of lands. The revenue of selling land use rights is a primary source of income for the local government. Shanghai's recent limitation on urban expansion at the fringes and shift to further urban densification made the waterfront into the ideal setting for redevelopment and densification. To steer the spatial development into a more resilient direction, an integral approach is essential, with respect for existing ecological, landscape, and cultural values. This needs to go beyond the Layers-Approach and should also include socio-economic, social-cultural, and political factors, as explained in the following three paragraphs.

7.2.3 Prosperity (Economy, Well-being)

World port Shanghai owes its existence and prosperity to the water. The strategic location in the Yangtze River Delta with fertile lands (King, 1911) and conditions for shipping routes (Den Hartog, 2023C) determined economic and urban growth. Analogous to the 1930s, when the classic Bund with its collection of international banks and capital provided an important link between Shanghai (China) and the world, today the Huangpu Riverfront once again expresses a powerful identity for the city and the country. After serving as a port area with related industries, it became a landscape of attractive recreational spaces and a range of (international) cultural institutions. The lush greenery serves as the foreground backdrop for a revamped skyline – the city's calling card – a series of clusters of financial institutions, corporate office towers and hotels, filled with luxury as 'pockets of wealth'.

As explained in chapter 4 these clusters – filled with high-end offices, luxury malls, absence of housing (except for a few exclusive serviced apartment towers) and even massive demolition of existing low-income neighborhoods, and a lack of sufficient public transportation – are somehow similar to urban megaprojects (Christiaanse et al., 2019; Del Cerro Santamaría, 2013; Hanakata & Gasco, 2018), but amplified. Similar criticized projects as Hudson Yards (Kimmelman, 2019; Wainwright, 2019) and the Docklands (Brownill & O'Hara, 2015) are portrayed as symbols of decadent neoliberal policies and lack of planning. So are the described urban megaprojects

along the Huangpu River in Shanghai, behind their appealing facades, which is from the perspective of Sustainability Transitions not sustainable and certainly not inclusive as meant in the Urban SDG 11 (see appendix C).

In scale, appeal, and in socio-economical contrast with its context this is an amplification of the 'prosperity and an expression of power' (Zukin, 2006) at waterfronts in New York and other world ports, obviously designed to impress, to outshine, and to compete. Again, the waterfront became an iconic décor, apparently not only primarily for the people. The main function of this massive real estate is being investment vehicles[60] and to push economic growth.

The economy appears to be leading in decision-making. As mentionned before this is diametral opposite to the promises of Ecological Civilization thinking. China has a semi-free market, in fact state capitalism (Wu, 2021), mainly controlled via public ownership and state-owned enterprises, inherently interlinked with central-guided governance. During the first two decades of this century housing construction in new towns (Den Hartog, 2010) was the main form of capital accumulation (Harvey, 1982; Harvey, 2005). Since the World Expo 2010 Shanghai's waterfronts became increasingly a backdrop for massive real estate investments, as solidified money. This is being reinforced in a process of urban regeneration and densification, since red lines have been drawn around the city in the current master plan (Shanghai Municipal People's Government, 2016), mainly to protect agricultural land and ecological lands (see chapter 6). This adds new pressure on historic low-rise areas in the existing city which are increasingly decontextualized and, after outplacement of residents, finally demolished (Den Hartog & González Martínez, 2022).

Similar to the urban enclaves along the Huangpu River, on Chongming Island, the other end of the spectrum is visible. Exclusive housing estates emerged (unplanned), largely unoccupied and used for investment-objects as well, without any facilities or interaction with the existing local socio-cultural and landscape qualities. Also these rural waterfront projects with vacant residential real estate embedded in greenery are settings for capital accumulation (Harvey, 1982; Harvey, 2005). These 'pockets of wealth' on the rural edge of the city have a strong impact on the immediate environment in terms of damage to landscape and ecological values, and do not contribute anything to existing surrounding communities (with the exception of limited new employment in green maintenance, security services and other services).

60 The glimmering real estate projects are often foreign investments. According to interviewees, even a company owned by the previous president of the United States invested in at least one project here.

In both cases – central city and peri-urban – these projects are enclaves, 'pockets of wealth' for the happy few. Former industrial (and rural) production landscapes became services-oriented consumption landscapes. In terms of public access everyone can visit it, but in terms of functionality it is not inclusive and aimed for a selective new (upper) middle class that fits in the desired new image that Shanghai wants to express as 'excellent global city' (Shanghai Municipal People's Government, 2016). The waterfronts became a showcase of new wealth and power.

According to Ecological Civilization principles "China's market will be restructured to a socialist economy with Chinese characteristics" (Xi, 2017), but the discussed real estate clusters along the Huangpu River are more similar to "how capitalism reinvent itself" with innovation complexes in New York (Zukin, 2020; Zukin, 2022), but with Chinese characteristics due to strong state interference (Harvey, 2006).

7.2.4 Culture

The importance of culture in a transition to a more sustainable society is strongly emphasized in Ecological Civilization thinking. Not only as a link with ancient philosophies and experiences, but also a link with "justice, social efficiency, harmony, and cultural development" is made, based on communist principles (Pan, 2016), aimed to construct a "Beautiful China" (Xi, 2017; Xinhua News Agency, 2017).

As a relatively young city Shanghai's culture is inextricably linked with water and the delta (Den Hartog, 2023C). As described in chapter 3 the relation between urban settlements and the water used to be very direct. It dominated daily life and commercial activities in this region. Yet, Shanghai's new relation toward the water is primary a platonic relation, mainly aimed on generating scenic qualities for selfies and city branding to attract (foreign) investors. The urban waterfronts along the Huangpu River are a showcase of integrated design solutions with reused (industrial) heritage, new world-class museums, a skyline with offices, luxurious hotels and malls filled with expressions of prosperity and wealth, and exclusive brands aiming for a high-end lifestyle, bound together in a landscape of beautified green lush recreation zones. This all is mostly designed by international architects from the Global North, which contributes to the new global image that Shanghai wants to express. Re-contextualized heritage assets as enclaves are aesthetically not unattractive, with scenic qualities

to satisfy the tourist gaze. But functionally and spatially there is no connection with their original context, due to all-encompassing spatial and social change (Den Hartog & González Martínez, 2022). This strongly differs from possible alternatives that acknowledge the different layers of history in heritage interventions, where at least parts of the previous built and social context could have been conserved.

Shanghai's urbanization still follows the water. The new waterfronts and skyline are the logo of Shanghai as extension of the classic Bund. Beautification strategies contribute to the desired image of Shanghai as a global city, which fits to the official discourse on economic progress, social harmony, and political stability. This desired image is leading in decision making for urban planning and design solutions (Den Hartog & González Martínez, 2022). However, as explained in chapter 3 the new regenerated waterfronts have primarily a decorative character and currently fail to fully utilize all the potentials offered by their prime locations along the water. This is partly the result of 'beautification' policies. Moreover, the use of decorative facades is very common in urban planning and design (Den Hartog, 2010) and contributes to local and national pride and a (shared) feeling of belonging (Den Hartog, 2019). The essence of the problem is not if urban planning and design can improve waterfront vitality (Liu et al., 2022), because the implemented projects do have high quality and appeal. What matters is the daily management of the space, how people are enabled to use it, accessibility and above all the functionality. If what is offered better meets demand, accessibility improves, and more diverse facilities and residential functions are added, then it can lead to vibrant life along the riverside as a contemporary *Qingming Shang He Tu* (Figure 8.1; see full version in appendix M).

7.2.4.1 Global Versus Local: Replacement of Existing Values by a New Regime

The brand-new office complexes described in chapter 4, together with the green decorations, form a new infrastructure to make Shanghai an "Excellent Global City" (Shanghai Municipal People's Government, 2016), in which the waterfront location plays a key role. A consequence of this massive waterfront regeneration is the disappearance of small-scale, low-income housing and informality in former port-related neighborhoods to make place for profitable real estate. Along the waterfronts in Shanghai's Central City countless – at least e few hundred thousand –

existing houses[61] have been demolished during last two decades. The few remaining traditional low-rise neighborhoods near the waterfronts are increasingly under pressure – regardless their potential heritage status. Another accelerating effect comes from the post-pandemic approach in which old neighborhoods are identified as culprits by several stakeholders, especially wet markets, as announced in local news on social media – this source has been taken offline – during the lockdown in Spring 2022, without any scientific evidence. Most residents have been outplaced and demolition is speeding up rapidly as a result of the pandemic[62]. New real estate complexes with mainly malls and office towers are in preparation, instead of the needed housing.

Seen from the perspective of urban experiences in the Global North, the informal intricate urban fabric of traditional neighborhoods could provide conditions for the emergence of new small-scale, economic, and cultural initiatives. Half a century ago Jane Jacobs (1961) pointed out the importance of fine-grained urban fabrics as a condition for urbanity, a possible breeding ground for innovation[63]. These can stimulate innovation from the bottom up, through co-creation and transformative action (Grin, 2010) by citizens themselves. Yet, for the local government, it apparently comes down to steering the city in one direction, as a leading 'Global City', in which there is no place for a fine-meshed urban fabrics – except in the former international concessions. On Chongming Island local communities do not benefit from the new development either, but the wetlands there are particularly threatened. If an Ecological Civilization approach expects to bring harmony by balancing environmental, economic, and social dimensions, then the real estate projects along the waterfronts are not yet a convincing demonstration of this potential. They aim

61 According to the UN's definition of a 'slum' (United Nations, 2015A) a considerable share of these houses could be defined as slum, although do they offer urgently needed low-income accommodation. Also, their architecture and urban fabric offers opportunities for technical upgrading and enhancement of the local identity and historic continuity, which is not considered as these houses, according to decisionmakers, do not fit into the desired image of a 'civilized city'.

62 The pandemic does not appear to be a moment of reflection here to protect these threatened conditions, but to remove them extra quickly, including many fresh markets that are disappearing – perhaps partly because the first virus variant was found on an informal fresh market in Wuhan, but that requires further research.

63 This seems to be a repeat of the controversy between Robert Moses and Jane Jacobs in the New York during the sixties last century: modernization with a network of freeways and parkways as the basis for radical modernization, aimed at white-collar (upper) middle class, at the expense of fine-grained urban fabric as a condition for urbanity, with a mix of user groups. This plans by Moses were opposed by Jane Jacobs and resident groups. The ensuing discourse has led to a revaluation and renovation of old city districts in cities in the Global North.

exclusively on high-end income groups[64], which doesn't add to the needed urban vibrancy that is able to attract foreign companies and investment (as highlighted by leading real estate experts and developers during personal communications).

7.2.5 Policy (Governance, Politics)

Policy is undoubtedly the most crucial element in China's shift towards sustainability. Meanwhile, in many countries in the Global North there is a call from parts of society to resume central control, both for local and national policy – for example in the Netherlands, as the author frequently hears from colleagues – in the field of spatial planning . As a result of neoliberalism and current decentralization, there have been serious cuts in essential government services, such as health care and education, and also in spatial planning policies

Within China's centrally led decision-making, the collective interest[65] usually overrides the individual interest, which can lead to significant collateral damage, as clearly underlined in the pandemic approach in Shanghai during the unprecedented lockdown in 2022 (James, 2022; Hurst, 2022). This event was an eye opener for many people, culminating with an important outcry from within the society itself (Hurst, 2022).

Urban planning and design policies and practices are central controlled in China, although there is increasing interaction with residents and other end-users (Li & Zhong, 2020; Miao & Lang, 2014; Winter et al., 2021). Ecological Civilization is claimed to be "the key to realizing the great rejuvenation of the Chinese nation, which is the greatest dream of the Chinese people since modern times" and "a key element in the new national ideology of socialist development" (Xi, 2017). Moreover, it is aimed against neoliberalism and globalization (Bougon, 2018), and states to give answers to overconsumption.

Both within Sustainability Transitions theories and within Ecological Civilization thinking, a new balance is sought between grassroots initiatives, governance and market forces, within Sustainability Transitions theories especially through the scaling up of (citizen) initiatives and (niche) experiments.

64 Which is striking knowing that Shanghai is the birthplace of the Communist Party of China.

65 From a Chinese point of view (personal communication) capital accumulation can be seen as a form of public interest in terms of wealth accumulation, in the geopolitical race and improvement of quality of life.

7.2.5.1 Searching for a New Balance Between Government Control, Free Market, and Citizen Participation

Worldwide, especially in the Global North, under the influence of neoliberalism, public services have been increasingly privatized and decentralized. However, a purely market driven approach is not automatic resulting in problem driven transitions. According to some theorists (former) “welfare states are better in this” (Geels, 2020). In Shanghai we see both systems combined: market driven under state entrepreneurialism (Wu, 2018).

In China, the role of the steering[66] government is much more decisive, since the number of stakeholders in decision-making is limited and information is not always transparent. In China the state still has absolute control in everything. Yet, in name, many of China’s public authorities are made semi-independent and encouraged to generate their own income, for example in residential neighborhood units (Bray, 2005), or by state-owned enterprises (Chen, 2017). Moreover, on a city-scale there are development companies that operate independently at sub-municipality level and chase wins such as the West Bund development company (Zhou, 2017; Feng et al., 2022). Harvey (1989) described this phenomenon in a capitalist context as a shift from managerialism to entrepreneurialism. Elements of this are adopted in the Chinese two-track policy of urban governance, such as ‘conservation development’ (Milder, 2007), a phenomenon that we see on Chongming Eco-Island, e.g., for the case of Long Island (see chapters 5 and 6) where turning a blind eye was allowed to generate money with real estate in order to create support for investments in the natural landscape elsewhere (personal conversation with representatives of the planning team). The same can be said for real estate clusters along the Huangpu River, where bling-bling skyscrapers, luxury shopping centers and art clusters are rapidly being erected to generate money for urban renewal. China’s growth model under state entrepreneurialism (Wu, 2018) resulted here in spatial concentrations of investments along the waterfront on permanently collective lands previously used by state-owned enterprises and the navy, and now by district development companies, also state-owned. These compact high-end developments are from a local point of view innovative, because these developments are efficient in terms of land-use, combined with impressive measures to reduce energy-use and carbon emissions. They are transit-oriented developments (although not optimal yet), and there are incentives for start-up and innovation institutes, tech companies, state-of-the-art cultural institutions. Adding lush greenery and high-

66 A fascinating question here is how malleable a society can be through government intervention, a very interesting and topical question that deserves further investigation outside the scope of this study.

quality attractive public spaces with almost continues walking and cycling tracks completes the image. In terms of appearance, this seeks connection with what we find in other world (port) cities, in a superlative way. Shanghai indeed presents itself physically as an excellent global city. Waterfronts are indeed where global ambitions meet local values, with (strong) socio-economic gentrifying effects on surrounding neighborhoods (He, 2007).

Yet, political vigor with drastic spatial and economic measures doesn't automatically result into realization of expectations. Practices in Shanghai as described in this research show that rigid central management is certainly no guarantee for better outcomes – even if well intended – as seen through the lens of someone coming from a (former) welfare state in the Global North. Moreover, it easily can result in derailments. In chapters 2-6 we learned how the changes in appreciation and use of both urban and rural waterfronts, are accompanied by mismatches and limitations in daily life usage. Both functionally as well as socio-economically and spatially these developments are enclaves. They are replications and amplifications of criticized neo-liberal practices in other world ports – e.g., the Hudson Yards (Kimmelman, 2019; Wainwright, 2019) in New York, actually designed by partly the same team as Greenland Bund Finance City (Den Hartog & González Martínez, 2022). Beyond the indeed excellent spatial quality, this does not answer the expectations of an Ecological civilization, rather the opposite.

Another cause is that central policy guidelines (from Beijing) provide limited handles and can be explained in various ways. As a result there are many mismatches and disconnections between policy ambitions and daily life reality and needs of residents (Den Hartog, 2019). Yet lessons are learned swiftly, and mistakes are adjusted in a process of improvisation[67].

This makes clear that even in a central controlled political system it is essential that participating stakeholders (Kern & Bolay, 2014) are well-informed and well-prepared and use shared definitions and a long-term (Braudel & Wallerstein, 2009; Hooimeijer, 2021)[68] shared vision. Personal conversations with various stakeholders

67 This improvisation is also seen in urban planning and design practices, which are usually based on international design competitions, followed by combining elements from various best plans leading to an improvised new plan (Den Hartog, 2010).

68 Although the Shanghai 2035 Master Plan claims to introduce a longer planning horizon for the first time (Shanghai Municipal People's Government, 2016), in practice we still see a domination of short-term interests – e.g., local officials who want to guarantee their position or other personal targets – resulting in improvisation, e.g., the practices on Long Island (see chapter 5) with swift corrections after derailment.

explain that the examined real estate projects are seen as investments for the future, built during a time of prosperity. This is a legacy, which must however be appropriated and adapted by future generations.

Superlative approaches dominate in Shanghai's (China's) geopolitical race to become a world leader, also in sustainable transitions in urban planning and design. With huge amounts of greenery (chapter 6), 1000 new pocket parks (!), huge stretches of waterfront transformations, dozens of world class museums, and other iconic buildings by star-architects[69], and super-tall skyscrapers – filled or not (chapter 4) – Shanghai makes a big impression. This is reinforced by the seductive image of luxury, glitter and glamour. However, in more than a few cases this is happening without taking existing qualities and values into account, without further research into real needs. In summary:

- Shanghai has currently an oversupply of office and retail space, and a shortage of (affordable) housing, especially along the Huangpu River. Simultaneously there are thousands of homes built on remote, and sometimes even vulnerable peri-urban locations that remain vacant because of speculative practices (see chapters 4-6).

- Despite concerns in the real estate world (personal communication) and despite the lopsided growth of the market, another new extremely ambitious expansion of the North Bund was announced in mid-2022, and is currently under construction, with more than 8.4 million square meter(!) floor area, mostly malls and offices. Construction has now started on a 480-meter-tall landmark building (450,000 square meters) which will be the third tallest in the city and the tallest on the west bank of the Huangpu River.

- The variation in the new program along the waterfronts is very limited, it focuses on select target groups. However, urban diversity is crucial to attract foreign companies and investment (personal communication with key figures from the real estate world).

- There is no 'leisure society' in Shanghai, and the main target group for the cultural institutes lives far from the water, while office workers sparsely use the waterfronts in their 996-workpace[70]. However, most of these institute are well visited during weekends and holidays by a new generation of international-oriented Chinese youth.

69 International input by (star)architects is often used to add extra appeal and alure, which translates directly into real estate value (Ren, 2008; Den Hartog, 2010; Den Hartog, 2021A).

70 In 2019 Alibaba's Jack Ma introduced the 996-schedule: working '9'am to '9'pm, '6' days a week. This was adopted by many companies nationwide, often in even more extreme forms.

- The urban waterfront is definitely very attractive, and more and more people are using it. New restrictions became apparent when I and a group of 25 students (visiting from outside Shanghai) were told by security guards in March 2023 to disperse immediately as gatherings – notably in an oversized space at the waterfront of the South Bund – were not allowed. This can be explained in view of events in November 2022 (Hurst, 2022). The waterfronts were also largely inaccessible before, during and after the lockdown in 2022 (personal observation). Of course, these were temporary measures, it is accessible again today, but it indicates that it is not yet the promised "living room of the city" (Shanghai Municipal People's Government, 2016).

- Corrective action was taken when the 'illegal' construction of large-scale housing complexes on the Long Island wetlands received national media attention. After a warning that the buildings would be demolished, an adjustment was made, the towers that had been built were retained and the planned towers of an average of 20 floors were converted into new low-rise complexes and a maximum of 6 floors. These new low-rise complexes are also speculative and are still largely empty, years after completion.

This ad hoc way of working also became visible to everyone during the zero-Covid policy, a rigid uncompromising approach. It is impressive but not automatically effective and there is a risk for (severe) collateral damage. This improvisational approach needs a lot of correction afterwards, which does happen, but often results in mediocre solutions. Even for showpieces such as the West Bund, substantial investments were made after completion with multiple necessary corrections afterwards. This way of working is fast, but costly and unsustainable as seen through the combined lenses of Sustainability Transitions theories and Ecological Civilization thinking.

However, contrary to what is often suggested in the international discourse, China is not in a race 'to catch up' – with the Global North – but follows its own pathway (Mahbubani, 2008; Kissinger, 2011; Wang et al., 2014; Global Times, 2023), by learning from existing (foreign) practices and adding new insights to this. Instead of following the Western model of a modern nation-state, aimed toward a 'civilization-state' (Jacques, 2009) this could be labelled as 'neoliberalism with Chinese characteristics' (Harvey, 2005): interweaving local practices with neoliberal elements, with different values, habits, and appreciation. And market forces here are not an ideology but a means.

TABLE 7.1 Comparing the main aspects of Ecological Civilization thinking and Sustainability Transitions theories related to urban planning and design and their relation to daily-life reality (by author).

	according to Sustainability Transitions theory	according to Ecological Civilization thinking	daily-life reality along Shanghai's main waterfronts
Expectations	fundamental socio-technical changes with new ways of thinking, living and producing	general and holistic vision for a sustainable future; fundamental socio-technical changes, new ways of thinking, living and producing	multiple gaps with promisses (see previous chapters)
	requires a radical change in basic systems (Schot & Geels, 2008)	radical paradigm shift (Pan, 2016)	
	involves every aspect of life (Grin et al., 2010)	"Ecological Civilization is the key to realizing the great rejuvenation of the Chinese nation, which is the greatest dream of the Chinese people since modern times" (Xi, 2017)	
Socio-technical experiment	(community-led) niches	(national) demonstration zones with embedded pilots (with guarantees for success)	the discussed practices are grounded on global practiced (urban) development strategies: culture-led regeneration (zones); innovation complexes; place making strategy; city branding
Sustainable innovation journey	based on co-creation and co-learning	practice rather vague because missing empirical predictions and specific targets	the discussed practices are grounded on global practiced (urban) development strategies: culture-led regeneration (zones); innovation complexes; place making strategy; city branding
Pillar 1: People (civilization)	public participation	people-centric approach for the public interest (Pan, 2016); People-oriented (Xi, 2017)	public participation in "embryonic stage" (Li et al., 2018)
	social justice	public participation	lower- and middle-income groups are increasingly outplaced and excluded
		justice, social efficiency, harmony, and cultural development (Pan, 2016)	exclusion of groups via hukou policies (Den Hartog, 2015)

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TABLE 7.1 Comparing the main aspects of Ecological Civilization thinking and Sustainability Transitions theories related to urban planning and design and their relation to daily-life reality (by author).

	according to Sustainability Transitions theory	according to Ecological Civilization thinking	daily-life reality along Shanghai's main waterfronts
Pillar 2: Planet (ecological, environment)	aiming for ecological services, energy conservation and protection, promotion of nature-based solutions, etc.	emphasizes the need for fundamental changes in the way we live, work, and interact with the natural world	ecological corridors are implemented; flood protection is well-integrated
	multiple small-scale low-carbon initiatives, etc.	low-carbon reduction programmes and policies (Pan, 2016)	still gaps between (low-carbon) promisses and reality (Den Hartog et al., 2017)
		aiming for a circular economy (Pan, 2016); promotes harmony between humanity and nature (Pan, 2016); contributes to global ecological safety (Pan, 2016)	
Pillar 3: Prosperity (economy, well-being)	critic on market-driven (western) post-war model of development (Wieczorek, 2008)	promises alternative for market-driven (western) post-war model of development (Linster and Yang, 2018; Gare, 2020)	massive real estate speculation and consumption oriented practices
		"To develop a socialist economy with Chinese characteristics" (Xi, 2017)	neoliberalism with Chinese characteristics (Harvey, 2005)
Pillar 4: Culture	individual interests weigh heavily	collective action aimed at the good of society as a whole; individual subordinate	city and river are reconnected: large amounts of attractive green and continuous public space, industries relocated, but (affordable) housing is absent and access is not optimal yet
		"Build a Beautiful China" (Xi, 2017; Xinhua News Agency, 2017)	
		promotes cultural diversity	
Pillar 5: Policy (governance, politics)	bottom up initiatives	state controlled experiments: "The construction of an Ecological Civilization is a key element in the new national ideology of socialist development" (Xi, 2017)	pragmatism and improvisation, with swift corrections
	small scale and slow	large-scale and fast implementation / upscaling is possible	transparancy is missing in cooperation
		multi-disciplinary & interdisciplinair approach	
	multi-disciplinary & interdisciplinair approach	believe in malleable society	
		aimed against neoliberalism and globalization (Bougon, 2018).	

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8 Learning from Shanghai

A Process of Trial and Error

8.1 Reflection on Research Questions

Before answering the main research question the five sub questions (see 1.5) will be answered firstly here.

In answer to the first sub question – *How can an 'urban lab' as promoted in Sustainability Transitions theories be identified in the context of Shanghai and how can these experimental and pioneering projects contribute to a sustainable transition effort?* – in chapters 4 and 6 we read that the urban planning and design practice in Shanghai (China) mainly consists of centrally managed pilots and demonstration zones where the outcome of the experiment is predetermined. This forms a fundamental difference with the concept of an 'urban lab' as defined in Sustainability Transitions theories, which are experiments based on public participation and co-learning in a process of disruptive (Loorbach et al., 2017) system or regime change during an open-ended (Van de Ven et al., 1999) unfolding 'sustainable innovation journey' (Geels et al., 2008), full of uncertainty (Garud et al., 2014). However, participation of all stakeholders (including citizens) is also seen as essential element within Ecological Civilization thinking, though limited in practice (Li et al., 2018; Tu et al., 2019; Li, 2022). In order to approach the discussed projects as urban labs, the experimental character will have to be made more open-ended in a process (journey) of co-creation and co-learning with all stakeholders.

The answer to second sub question – *How can Sustainability Transitions theories be applied in a useful way in the context of Shanghai, with additional insights from Ecological Civilization thinking?* – follows on the discussion in chapter 7, and

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the answer on the first sub question. When using key-concepts of Sustainability Transitions theories – especially (ST1) expectations, (ST2) socio-technical experimentation (in an urban lab), and (ST3) sustainable innovation journey – as sensitizers (Blumer, 1954) to structure the empirical analysis and argumentation they need to be approached not only from a global (international) point of view but also from a local point of view, especially with additional local cultural and policy aspects. Tailormade solutions are needed for every situation. This applies not only specifically to these Chinese cases, but worldwide, in a process that it is more inclusive and effective.

In answer to the third sub question – *What can we learn from differences in governance approach when comparing waterfront transformation processes in Shanghai's central city and peri-urban fringes?* – follows on findings in chapters 4, 5 and 6. When comparing the central urban located Huangpu River case and the peri-urban Chongming Eco-Island case we can learn that supervision in the central city is stronger, since the Huangpu Riverfront project is more visible and direct controlled by the municipality (province) Shanghai, while on Chongming Island the decentral district authorities are more decisive and leading in implementation processes. In both cases the tension in land use (real estate, recreation, ecology, water, transportation) in a context of high population concentrations and world's highest real estate values are present. In both cases decision-making is highly motivated by financial interests, and not always supported by scientific insights (chapters 4-7). As explained the case of Chongming Island showcases spatial consequences if adequate governance and supervision is lacking. At Long Island (chapter 5), swift corrections were made – since the great importance of adjacent National Demonstration Zone – but not in convincing way. An important cause is differences in land use rights in urban and rural areas. Moreover, in the Central City there is more connection with central guidelines and direct involvement of the central urban planning department of the municipality[71] – most likely local decissionmaking on Chongming Island is also influenced by the phenomenon 'guanxi', a personal business network (Yen et al., 2010), especially at Long Island.

71 For key projects at high-visibility locations (long the river), the aesthetic requirements are a higher, especially for public functions, and there is more attention to detailing during the implementation process, and also to energy performance requirements.

As answer to the fourth sub question – *How can Shanghai manage to implement large-scale waterfront transformations while integrating significant ecological improvements and place-making and the preservation of industrial heritage and flood defense in relation to Sustainable Development Goal 11 – also known as 'the Urban SDG 11' in which inclusive, safe, resilient, and sustainable development is emphasized?* – as mentioned in previous chapters (2-6) the central government in China has total control, and land ownership – in rural situations there can be a form of private landownership but not unconditional – and also has considerable ownership positions in business and real estate. Significant stretches of waterfront along the Huangpu River are owned by the People's Liberation Army Navy, which means absolute direct involvement from Beijing in decision-making. Currently Shanghai's main source of income is from issuing land-use rights and related taxes. In combination with the red lining that limits urban expansion (see appendices E and F) this creates a lot of pressure to develop more real estate, especially in the city center, often at the expense of existing characteristic neighborhoods where migrant workers live or at the expense of wetlands at the peri-urban fringes, as described in previous chapters. However, despite these tensions, large parts of the ecological framework (see appendices G and H) are being realized and the overall quality of life improved significantly. A question remains whether and how the ecological framework will become fully functional and strong enough to withstand tensions – e.g., unplanned developments due to inefficient supervision, as at Long Island – in the coming years, and how it can offer safety and resilience.

The answer to the fifth sub question – *How can the urban planning and design approaches of the direct-controlled municipality Shanghai be understood as proactive and exemplary through the lens of the combined concepts of Sustainability Transitions theories and Ecological Civilization?* – follows on the discussion in chapter 7. Shanghai's governance showcases a strong proactive approach in economic development, modernization of the housing stock, excellent transportation, and improvement of the overall quality of life for the majority of the people. In special zones, such as along the Huangpu River, proactive policies have been implementing to stimulate and promote innovation, high-tech industries, and also high-end creative industries. Also, significant actions have been taken to improve the air quality, by relocating polluting industries, promoting electric vehicles, bike sharing systems, and improving the overall ecological environment with enormous amounts of new green. Last but not least attractive and important new public spaces have been introduced, to accommodate a new lifestyle. In short, the urban planning and design approaches of the direct-controlled municipality Shanghai have many

proactive aspects and could[72] be seen as exemplary. Yet, in terms of social issues, inclusivity, public participation, and transparent policies, the (local, provincial, and national) authorities are taking a restrictive or interventionist approach. This dichotomy makes it difficult to describe the current approach in Shanghai (China) as proactive, although the progressiveness and ambitions to achieve goals are obvious.

In paragraph 1.6.4 is explained how insights from Sustainability Transitions theories and Ecological Civilization thinking can be combined as framework which is tested in chapter 7. When Ecological Civilization policies are expected to bring an alternative, and a People-oriented approach – since it is the People's Republic – than both discussed National Demonstration Projects contain too many discrepancies with this stated expectation. Both National Demonstration Zones, and especially the embedded real estate projects and recreative green landscapes, have high esthetic qualities and are appealing, but are not convincing yet in their sustainable transition expectations. In fact, they express exactly the same as practices along (urban and peri-urban) waterfronts worldwide, but in an amplified form, as showpiece to demonstrate that things are going well. Moreover, there are significant tensions with local social (people), ecological (planet), economical (prosperity), and cultural (paragraph 7.2.4) and even policy (paragraph 7.2.5) values. Despite the fact that a very welcome attractive public space with appealing cultural facilities has been added to the city. In addition to Harvey's statement: this is 'neoliberalism with Chinese characteristics' (Harvey, 2005), but in an amplified format.

This leads to the answer on the main question of this research: *How can the Global North oriented and welfare state rooted Sustainability Transitions theories be enriched with the Chinese and communist state rooted Ecological Civilization thinking to make it able to evaluate the making of the direct-controlled municipality Shanghai into an institutional frontrunner of sustainable transitions in urban planning and design with its prime waterfront as exemplary 'urban lab'?*

Shanghai's waterfronts are the scenery of various tensions, but also offer opportunities. Shanghai's urban planning and design practice has the capacity to become exemplary. To realize this potential, it is recommended to work more transparent, to involve all stakeholders including citizens in a process of social

72 In other countries, this Chinese approach is sometimes viewed with envy, especially the decisiveness and quick solutions, but the argumentation of this dissertation shows that this approach offers certainly no guarantee for success. In some situations, this approach is indeed much better, especially if it serves a general collective interest, for example flood protection. In most other situations, a more subtle inclusive approach is essential, to avoid collateral damage or costly corrections afterwards.

learning, and to conduct thorough preliminary research for needs. Fortunately, this happens more and more often, though still on a marginal incidental scale and indirectly.

8.2 Recommendations for Policy Makers and Practitioners

By distilling the answers to the research questions, and based on observations and research results in previous chapters, some practical recommendations are given in this paragraph aimed to reduce discrepancies between expectations and implementations in daily life reality. By meeting these recommendations, China's central-controlled urban planning and design policies and practices can proactively contribute to inclusive, safe, resilient sustainable transitions, with the case of Shanghai as institutional frontrunner. These recommendations for policy makers and planners are aimed to improve the effectiveness of spatial planning policies and urban planning and design processes, and are categorized here following the three key components of the Urban SDG 11: (1) inclusivity, (2) safety, and (3) resilience and sustainability:

Recommendations on improving inclusivity:

- Provide sufficient (affordable) housing along the waterfronts.
- Improve the functional mixture in office clusters to create 24/7 liveliness (e.g., by adding more housing, transform vacant spaces into temporary housing and/or startup workspaces, etc.).
- Stimulate spontaneous usage of public space on more places and for different groups of users.
- Stimulate public participation: co-create a shared vision for the future, and involve all stakeholders, especially citizens, already from the start and during the whole planning and implementation process (i.e., the innovation journey). This will help to increase support and effectiveness and creates conditions for learning and improving.
- National, regional, and local authorities need to systematically partner together, and with all stakeholders.
- More transparency in information provision is needed to increase public support and to prevent mismatches during implementation.

Recommendations on improving (ecological) safety:

- Stop building on vulnerable locations (i.e., not on wetlands or on locations vulnerable for flooding or subsidence).
- Stimulate public awareness of ecological limits (this is happening, but not yet for all target groups, i.e., local farmers).
- Use clear definitions, e.g., multi-interpretable terms as 'ecological', and 'beautification' need to relate to "long term" (Braudel & Wallerstein, 2009; Hooimeijer, 2021) effects, aimed toward achieving sustainable development (goals), and Ecological Civilization ambitions.
- Policies must be clearly communicated and defined. The implementation of the lockdown of Shanghai during spring 2022 illustrates this, since every local neighborhood committee started making their own set of rules without coordination. Off course this can be explained as a tailormade approach but it was a form off improvisation with serious shortcomings.
- Openness in information provision helps to quickly get important stakeholders on board and to encourage them to realize sustainable transitions.
- Set clear priorities for all stakeholders. Effective collaboration and partnerships both globally and locally is needed.
- Supervision is essential and needs to go beyond administrative boundaries (see chapter 5).
- Try to step beyond an anthropocentric approach, as in Ecological Civilization thinking.

Recommendations on improving resilience and sustainability:

- Be prepared for unexpected developments by integrating open endings instead of blueprints.
- Provide more adaptability, for example in floor plans, so that it is easier to change functions when vacant. Additional regulations are required for this.
- Mid-course corrections are frequent in Chinese practice, which is from a sustainability perspective in some cases positive, but can be avoided (e.g., in the case of Long Island, the damage was already done when the correction was made, which is too late).
- Foster a more experimental approach, as in the concept 'urban lab'.

Based on findings in this research above recommendations can contribute to making Shanghai's waterfronts into excellent laboratories for institutional strategies toward sustainable urban planning and design transitions. Above all, if Shanghai wants to play a guiding role in the discourse and practice of urban planning and design and sustainable transitions, both local and international, it urgently needs to go beyond beautification strategies and GDP-driven motives. International academic and practical collaborations and open knowledge exchanges are essential to proactively tackle existing and upcoming major problems in urban planning and design, in Shanghai and elsewhere.

FIG. 8.1 West Bund November 2021: a contemporary *Qingming Shang He Tu* (Photo by author).

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Epilogue

Uncertainty happened to me during the lockdown in Shanghai, Spring 2022. This shocking event[73] offered unexpected empirical evidence about the effectiveness and consequences of ad hoc[74] and rigid top-down decision-making when a mechanism of checks and balances is absent. The sudden release of the disputed zero-covid policy in November was equally ad hoc and rigid as its introduction, with dire consequences (Den Hartog, 2023B). When the lockdown was largely lifted on 1 June 2022, a striking number of people went to the waterfronts of the Huangpu River to celebrate 'freedom' and to get a breath of fresh air. Picnickers, skaters and joggers gathered mainly on the West Bund, but also in other places along both sides of the water. This was exacerbated by the fact that a significant proportion of retail, hospitality, and indoor leisure facilities remained closed in the city, as well as imposed travel restrictions (Den Hartog, 2023B). However, in some places, such as the waterfront at Hongkou District and also at the classic Bund, rigid access restrictions were put in place to prevent gatherings.

This proves the value and need for the new waterfronts. The Covid-19 pandemic clarified differences in policies worldwide. At first, during 2020 and 2021, China's extreme rigid zero-covid approach with total control seemed to be more effective than laissez faire approaches elsewhere, however, with significant collateral damage, such as growing societal inequalities[75], an increase in mental health problems, loss

73 The citywide lockdown was officially imposed from 1 April till 31 May 2022, but lasted much longer for many, including universities. During this period every citizen had to stay indoors (in some cases more than three months). During the first weeks there was no supply of food and other essentials in this metropolis, with dramatic consequences (Den Hartog, 2023B).

74 Shanghai's lockdown during Spring 2022 was announced three hours in advance, and implemented immediately, during a so-called test-round. By means of the advanced QR-code system, which is linked to identities and travel histories, and the hukou system (Den Hartog, 2015) all travel movements in China can be controlled and even halted.

75 The number of rural migrant workers fell dramatically as many lost their jobs in Shanghai due to the pandemic measures. Exact dates are not known since rural migrants are not registered with their hukou (Den Hartog, 2015) in Shanghai, but according to estimates by various experts this concerns between 1 and 6 million people. Most wet markets and informal street markets were closed, sometimes temporarily, often permanently. Meanwhile, the fear of infections – and especially the associated brutal policy of being isolated in special decentralized isolation rooms – caused many communities to refuse newcomers into their community.

of privacy[76], economical losses, and uncertainty about long term consequences (James, 2022; Hurst, 2022).

Compared to the start of my research major improvements have been made at the waterfronts, such as an increase in variety of usage, more resting areas, and improved accessibility, despite the temporary pandemic restrictions. There is an increase of visitors from all walks of life and the scenery became more vibrant. It has become a place for people, dynamic, varied. Along the enourmous lenght a place can be found for every use. Nevertheless, there are still considerable pieces that are hardly used and improvements and maintence is continuously needed. In addition, the use is seasonal, during the warm summer months the space is mainly used after sunset, after working hours, because it can be extreme hot during the day. According to Shanghai's greenery authorities, bird populations are also increasing, and more diverse species are being spotted (Hu, 2022). The International Union for Conservation of Nature noticed several critically endangered species for the first time, especially along the coast of Pudong and at Dongtang on Chongming Island. This is also apparent from own observations during frequent walks and comments from bird spotters (Brelsford, 2022; Zhang, 2022).

China (including Shanghai) faces the challenges of first world problems as well as third world problems at the same time. China, and Shanghai, are facing very different challenges than countries and cities in the Global North. As an emerging economy, and fast developing urban society, multiple transitions are taking place simultaneously. When you see Shanghai's glittering skyline today it is hard to believe that in the first decade of this century a considerable number of houses didn't have their own sanitary facilities in this city. I have seen open sewers in several neighborhoods (which have been bulldozered meanwhile). Omnipresent polluting industries and coal-fired kitchens and fireplaces meant that your face could be literally smeared with black dust particles in minutes in some parts of the city, as I experienced the first time when I arrived in Shanghai. This all changed in just a few years, accelerated by Expo 2010. Today Shanghai's streets are filled with Ferrari's, Prada stores and multiple other expressions of luxury, while wet markets and street vendors are becoming increasingly rare, especially in the wake of the Covid-19 pandemic. Transitions are a way of life in Shanghai. These transitions are often more drastic and complex than in the Global North, though to some extend more manageable through an overruling system of central control, with some advantages, but also considerable drawbacks. Sadly, a series

76 With huge amounts of new cameras and street surveillance.

of recent events[77] interrupt Shanghai's journey toward an "excellent global city". The Covid-19 pandemic made people aware of possible consequences of unlimited economic growth and massive urbanization. Gradually there are societal changes. Change starts in the communities where we live in and with the personal responsibilities we take. How we relate to our surrounding society and natural environment is crucial to overcome crises and become better prepared for future challenges. Hopefully, new generations will continue to adjust and improve the urgently needed sustainable innovation journey.

FIG. 8.2 West Bund shortly after the lockdown was lifted: a contemporary Qingming Shang He Tu (Photo by author, June 2022).

77 Especially rising international economic and geopolitical tensions (Kandhari, 2023), in the context of an ongoing trade war and tech war (Demarais, 2019), the severe aftermath of Shanghai's brutal lockdown (Tian et al., 2022; Pak, 2023) and related ongoing brain drain (Bloomberg News, 2023), and a looming real estate crisis (Tian et al., 2022; Stevenson & Li, 2021).

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Appendices

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APPENDIX A

Chapters Linked with Themes, Cases and Keywords

Themes	Cases / Keywords	Chapters							
		1	2	3	4	5	6	7	8
National demonstration zone	**Case 1:** Huangpu River (Urban waterfront)	●	●	●	●	●		●	●
	Case 2: Chongming Eco-Island (Rural waterfront)	●	●	●	●		●	●	●
Theoretical frame & methods	Ecological Civilization		●	●		●		●	●
	Sustainability Transitions			●	●	●		●	●
	Layers-Approach			●				●	
Governance / policies	rural-urban transition		●	●	●		●	●	●
	(urban) lab	●		●		●		●	●
	(urban) megaprojects	●		●		●		●	●
	place-making, appreciation, usability		●	●	●	●	●	●	●
Global influences	global (port) city	●	●	●	●	●	●	●	●
	market forces	●	●	●	●	●	●	●	●
	city branding / identity creation / investment		●	●	●	●		●	●
	cultural branding			●	●	●		●	●
Local consequences	lifestyle changes, quality of (daily) life		●		●	●	●	●	●
	waterfront as investment opportunity, speculation		●		●	●	●	●	●
	land reclamation, wetlands under threat	●	●				●	●	●
	(lack of) citizen involvement		●		●	●	●	●	●
	gentrification, outplacement		●		●	●	●	●	●
Climate change / resilience	river delta and climate change		●		●	●	●	●	●
	flood risk measures		●		●	●	●	●	●
	low-carbon transitions		●		●	●	●	●	●
	green buffers, ecological restoration		●				●	●	●

Source: author

APPENDIX B

Timeline of Urban Renewal along the Banks of the Huangpu River

Year	Urban Renewal along the Banks of the Huangpu River
1986	Bund Area Comprehensive Renovation Planning
1991	The Bund Excellent Modern Architectural Style Preservation Plan
1992	Pudong Grand Development Plan
1994	South Bund Area Detailed Planning
1995	Bund Financial and Trade District Detailed Planning
1995	North Bund Area Detailed Planning
2000	Shanghai World Expo Site Selection
2001	Functional Zoning Plan of Core Sections on Both Banks of the Huangpu River
2001	Planning of key sections on both banks of the Huangpu River
2001	Huangpu River Southern Section Extension Planning
2001	Huangpu River Northern Section Extension Planning
2002	Comprehensive Development Plan for both banks of the Huangpu River
2002	Bund Style Section Extension Detailed Planning
2002	Bund Style Section Extension Comprehensive Planning
2002	Regulatory Planning for the North Bund Area (South of Dongdaming Road)
2003	Regulatory Planning for the North Bund Area
2003	The Bund Historical and Cultural Area
2005	The Bund Financial and Trade District Detailed Planning
2005	Shanghai World Expo Planning Area Master Planning
2006	Shanghai World Expo Planning Area Regulatory Planning
2009	Shanghai Bund Waterfront Urban Design and Detailed Construction Planning
2010	Shanghai World Expo
2013	West Bund Biennial as accelerator for the redevelopment (of the West Bund)
2015	SUSAS (biennial) as accelerator for the redevelopment of the West Bund
2016	13th Five-Year Plan for the Development of both banks of the Huangpu River
2017	SUSAS (biennial) as accelerator for the redevelopment of the East Bund
2018	Pudong Connection Planning
2019	SUSAS (biennial) as accelerator for the redevelopment of Yangpu District Waterfront
2019	Inspection visit of Yangpu District's waterfront by General Secretary Xi, a "demonstration zone for the construction of a people-oriented city"

Source: Ding & Wu, 2020; translated, adjusted, and updated by author

APPENDIX C Ten Key Targets of the Urban SDG 11

SDG 11	Key Targets
11.1	By 2030, ensure access for all to adequate, safe, and affordable housing and basic services and upgrade slums.
11.2	By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.
11.3	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated, and sustainable human settlement planning and management in all countries.
11.4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage.
11.5	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
11.7	By 2030, provide universal access to safe, inclusive, and accessible, green, and public spaces, in particular for women and children, older persons and persons with disabilities.
11.A	Support positive economic, social, and environmental links between urban, peri-urban, and rural areas by strengthening national and regional development planning.
11.B	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.
11.C	Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.

Source: United Nations. (2015B). Sustainable Development Goal 11: Make cities inclusive, safe, resilient, and sutainable. Available online at https://www.un.org/sustainabledevelopment/cities

APPENDIX D

Relationships between the Urban SDG 11 and Ecological Civilization Thinking and the Two Analyzed Demonstration Zones

SDG 11	Aim	Ambitions SH2035 linked with Ecological Civilization thinking	Reality on the ground for case 1: Huangpu River	Reality on the ground for case 2: Chongming Eco-Island
11.1	**affordable housing and basic services**	"People-oriented" approach as key slogan	affordable housing has been replaced by luxurious housing and office parks, often empty and used for investment	luxurious housing has been constructed, mainly empty and used for investment
11.2	**sustainable transport systems**	"People-oriented" approach as key slogan	public transport has been improved but is not full available yet	most of the island has no direct access by public transport (though local taxi service is relatively cheap)
11.3	**inclusive and sustainable urbanization / enhance participation**	"People-oriented" approach as key slogan	there was no participation, but there are experiments with involving neighborhood committee delegates; the real estate projects are exclusive for the 'happy few'	there was no participation; the development is exclusive for the 'happy few'
11.4	**protection of cultural and natural heritage**	SH2035 aims for preservation and reuse of industrial port-related heritage to maintain and strengthen the local and international identity; large green spaces will be created	industrial heritage has been largely preserved and reused for cultural events; many new green spaces have been added; polluting industries have been removed	wetlands have been preserved; but locally there is a conflict with wetland preservation
11.5	**(water-related) disasters mitigation**	flood protection is not specific mentioned in SH2035 but has been implemented already with flood walls along the embankments	there are new flood walls; in most cases well-integrated in the landscape; the safety level is high	there are dams; but these conflict with wetlands which could benefit with eco-system services

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SDG 11	Aim	Ambitions SH2035 linked with Ecological Civilization thinking	Reality on the ground for case 1: Huangpu River	Reality on the ground for case 2: Chongming Eco-Island
11.6	**reduce environmental impact of cities**	red lines around the urban area will limit urban expansion to protect agricultural lands; a green framework will interconnect all main green areas and function as buffer	the land use is optimized in very high density to to save farmland (and nature)	there are conflicts and contradictions in land use
11.7	**safe, inclusive and accessible green and public spaces**	continuous open public space along the Huangpu River waterfronts and creation of ecological connect	the new green spaces are accessible for everyone, but there are limitations in usage	the green facilities are exclusive and only accessible after payment or not accessible (to protect wildlife)
11.A	**economic, social and environmental links between urban, periurban and rural areas by strengthening national and regional**	this is a main key target of the SH 2035 master plan, and 5 new cities play a main role in this	the plan has a regional scope and has meaning for the whole direct controlled municipality	the plan has a regional scope and has meaning for the whole direct controlled municipality
11.B	**mitigation and adaptation to climate change, resilience to disasters**	this is not specific mentioned in the SH2035 master plan	there are new flood walls, integrated in the landscape, the safety level is high	there are dams, but conflict with wetlands which could offer benefits
11.C	**sustainable and resilient buildings utilizing local materials**	this is more on a local project level, en not mentioned in the SH2035 master plan; there is a requirement for low-carbon labels on key locations	all new office buildings and public buildings have energy & low-carbon labels / several buildings with innovative use of materials	most buildings are built following conventional standards without any consideration of local materials or energy labels

Source: author

APPENDIX E

Ecological Protection Lines with Building Limitations

Source: Shanghai Master Plan 2017 – 2035. Shanghai Municipal People's Government, 2016 (adjusted by author).

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APPENDIX F

Ecological Protection Lines with Building Limitations and Locations of Discussed Real Estate Projects

Source: Shanghai Master Plan 2017 – 2035. Shanghai Municipal People's Government, 2016 (adjusted by author).

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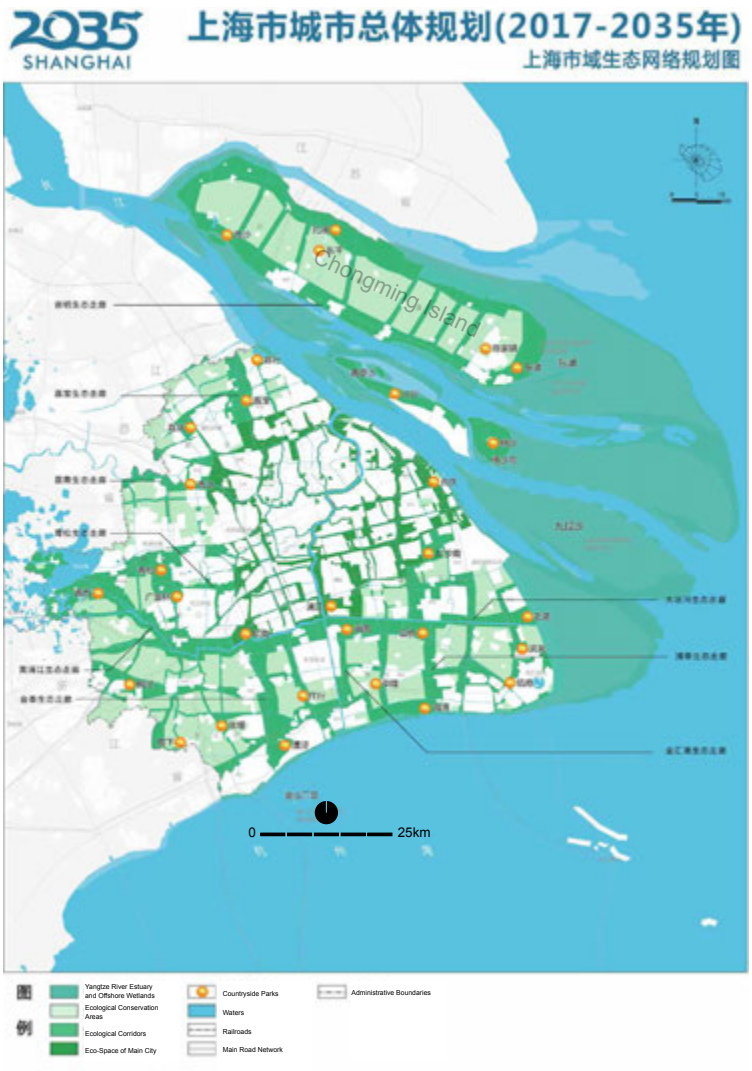
APPENDIX G

Eco-network Plan of Shanghai



Source: Shanghai Master Plan 2017 – 2035. Shanghai Municipal People's Government, 2016 (adjusted by author).

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APPENDIX H

Eco-network Plan of Shanghai and Locations of the Discussed Real Estate Projects

Source: Shanghai Master Plan 2017 – 2035. Shanghai Municipal People's Government, 2016 (adjusted by author).

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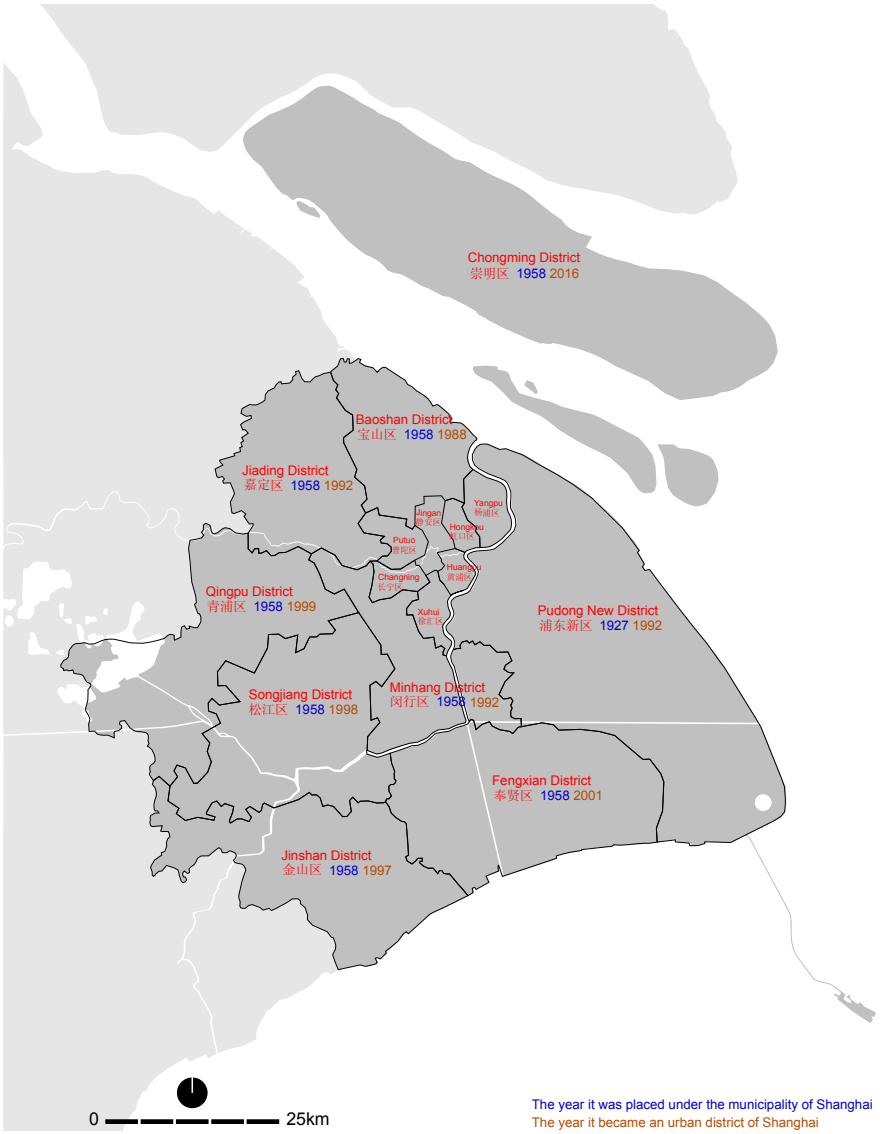
APPENDIX I

Administrative Divisions of the Direct-controlled Municipality Shanghai



From rural county to urban district. (map by author).

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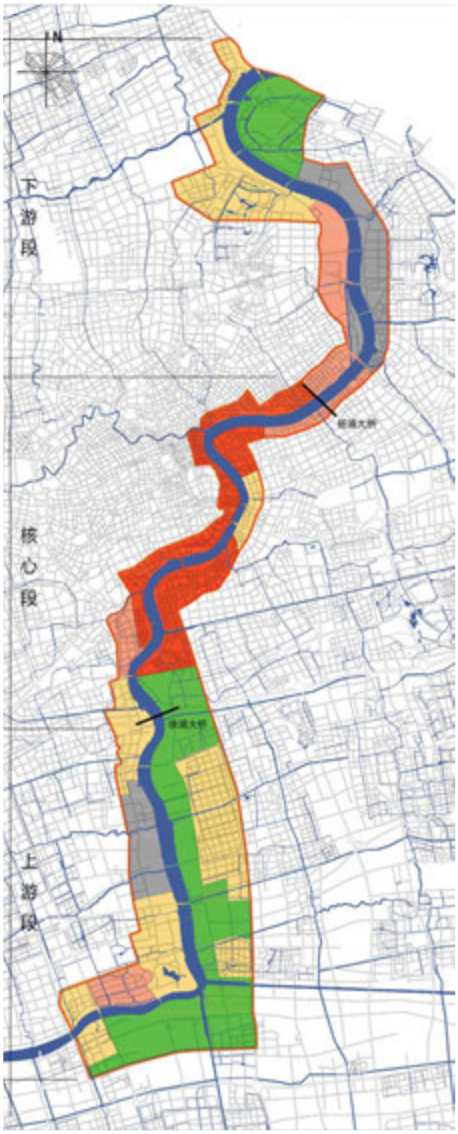
APPENDIX J

Ecological Zoning Current Master Plan Huangpu River (2017-2035)



黄浦江沿岸地区功能类型区划图

Source: Shanghai Municipality.

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APPENDIX K

Ecological Zoning Current Master Plan Chongming Island (2016-2040)

Source: Chongming District authorities.

APPENDIX L

Three types of routes have been created, each of which is more than a marathon

Walking (red), running (green), and cycling paths (blue). Mapping by Mr. Zhou, Supdri, 2023.

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APPENDIX M

Qingming Shang He Tu – original painting by Zhang Zeduan

Twelfth century, Handscroll, 24.8 x 528.7 cm (Source: Beijing, Palace Museum).

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Curriculum vitae

Harry den Hartog

Harry den Hartog is an urban designer, researcher, and critic. After working for urban planning and architecture firms in the Netherlands he founded his own thinktank type studio Urban Language Studio in 2004 in Rotterdam, specialized in urban and rural research and design. With this studio he engaged in research on contemporary transformations of the Dutch rural landscape. In 2006 his book *Exurbia - Living outside the city* (Episode Publishers / Jap Sam Books) provided basic ideas on urban-rural problems and policy making.

In 2008 he relocated to Shanghai, and in 2010 research on Chinese new towns was published: *Shanghai New Towns - Searching for community and identity in a sprawling metropolis* (010 Publishers). This much-cited book was awarded with 'Best Dutch Book Design 2010', and the 'Shanghai Culture Fund' in 2012. Since that moment studio Urban Language continued to involve more and more in international research and design exchanges focused on China's urban and rural development, especially on new town development, residential communities and housing.

In 2012 Harry den Hartog joined the College of Architecture and Urban Planning at Tongji University in Shanghai where he lectures urban planning and design and coaches design studios. Besides academic publications he authored multiple articles for professional magazines including: ArchiNed, Architectural Review, de Architect, Frame, Gebiedsontwikkeling, Geografie, Mark Magazine, Urban China, Time + Architecture, Volume. He is frequently asked as speaker and organisar at workshops and seminars by various local and international institutes and universities.

Online Profile

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Education

- **2018-2023** PhD, Technical University Delft, The Netherlands.
- **1999-2004** Master of Urban Design, Rotterdam Academy of Architecture and Urban Design, The Netherlands.
- **1992-1996** Bachelor Architecture, Building engineering, Civil Engineering, Urban Design, HTS Rotterdam and Dordrecht, The Netherlands.

Original Publications (Books)

- Den Hartog, Harry (2010). Shanghai New Towns - Searching for community and identity in a sprawling metropolis. 010 Publishers. DOI:10.13140/RG.2.2.10539.67366 (bilingual Chinese and English).
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Tensions and opportunities at Shanghai's waterfronts

Laboratories for Institutional Strategies toward Sustainable Urban Planning and Delta Design Transitions

Harry den Hartog

How can the Global North oriented and welfare state rooted Sustainability Transitions theories be enriched with the Chinese and communist state rooted Ecological Civilization thinking that has been included in the Chinese constitution since 2007, to make it able to evaluate the making of the direct-controlled municipality Shanghai into an institutional frontrunner of sustainable transitions in urban planning and design with its prime waterfront as exemplary 'urban lab'? Around this central question, this dissertation examines how Shanghai's coastal and waterfront developments have changed over the past two decades under the influence of shifts in Chinese state capitalism towards what is called an Ecological Civilization. Two cases along the waterfronts of Shanghai – one on former docklands, and one on Chongming Island ¬– have been examined to test how both lines of thinking can enrich each other, and if a sustainable transition can be done more efficiently and convincingly in a centrally controlled society than in a non-autocratic (liberal) society. What lessons does the Chinese approach in Shanghai offer for elsewhere, and how can different approaches and practices reinforce each other in the field of spatial planning and strategies for a sustainable transition? This dissertation emphasizes that ecological civilization thinking can offer hopeful starting points for sustainable transitions but can only work well if 'checks and balances' are included. It gives suggestions to improve the accessibility, inclusivity, and vibrancy of Shanghai's waterfronts, and mitigate ecological degradation in the context of an urban delta.

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