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Interfaces

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Interfaces

Urban-Rural Assembly (URA) | 1

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The scientific series Urban-Rural Assembly (URA) of the Technische Universität Berlin is edited by:

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By combining scientific and essayistic writings, photographic works, and/or ethnographic studies including interviews, spatial mappings and drawings, the URA periodical will seek to bridge academic, practice and policy discourses around global sustainability challenges at the urban-rural interface.

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Editorial remarks

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Processes and Pluralities

Since the 1970s, scholars have made prognoses about a globalised urban society and planetary urbanisation whose order is fundamentally different from that in the past (Lefebvre, 1970; Merrifield, 2013). There is nowhere better to prove these prognoses than in China. Since China's economic reform in 1978, a drastic urbanisation process has radically reshaped Chinese settlement patterns, ecologies, economy, and culture. Constituting only 18% in 1978, China's urban population had rapidly grown to over 60% by the end of 2019 (National Statistic Bureau of China, 2020). While statistics point to rural-to-urban migration as a cause for urbanisation, the emerging realities and complex transformation pathways cannot be grasped through a dualistic understanding of urban and rural, natural and cultural, material and non-material, agricultural and industrial. Dynamically transforming physical spaces, materialities, ecosystems, mobility patterns, social practices and perceptions often reveal both 'urban' and 'rural' qualities simultaneously.

To grasp new questions and solutions in our era of planetary urbanisation, this issue builds on and contributes to an emerging discourse that attempts to find alternative conceptualisations beyond urban and rural dualisms. We try to rethink spatial formations as complex wholes composed through interactions among heterogeneous parts that do not necessarily cohere into pristine forms. In planning and governance fields, particularly from the perspective of intervention and implementation, the 'Urban-Rural Interface' (U-R-I) was coined and widely employed in recent years to address the material and non-material entities and multi-sectoral systems of flows (people, goods, capital, information, natural resources, waste and pollution) that affect and constitute urban-rural transitional areas (cf. Allen, 2003; Ros-Tonen et al., 2015). Its analytical foothold has been endorsed by URA researchers from China Center of Science and Technology and Habitat Unit in its reading of the limbo-like social status of urban-rural migrants and their heterogeneous, adaptive patterns of practices in the rapidly changing material and institutional conditions they reside in (article 1 and 6). The research team from ICLEI East Asia also found this notion to resonate with and further shed light on the relation between urban and rural planning, as well as government policy genealogy and goals issued by different levels of the Chinese state (article 2).

Multi-Scalar Localities

Indubitably, various new forms of transitional space are emerging from the urbanisation process around the globe, especially on the edge of pre-existing urban areas. The URA project seeks to understand these transformative processes and their socio-spatial manifestations in the research region of Huangyan-Taizhou, and aims at steering them in the direction of sustainability and circularity. Previous studies of the 'urban fringe' – from 'suburb', 'pseudo-suburbs', 'satellites' and 'pseudo-satellites', inner and outer 'urban fringe', 'exurbia' and 'city-region'; 'desakota', 'village-in-the-city' or 'urban village' – describe similar phenomena morphologically, and reveal their social-ecological driving forces and consequences in the context of particular geographical regions and times (see Bach, 2010; Chung, 2010; Herrle et al., 2014; Kurtz & Eicher, 1958; McGee, 2009; Wissink, 1962; Wu et al., 2013). However, although such phenomena have caught global scholarly attention since the 1960s and stimulated rich intellectual insights, the literature reviews and expert interviews conducted by the research team from Leibniz Institute of Ecological Urban and Regional Development (IOER) (article 7) show that interdisciplinary research tools to understand rural-to-urban transformation pathways and their social-material-ecological manifestations are scarce. This is particularly the case when it comes to understanding the middle-sized prefectural-level cities (the most generic and abundant city units) in China.

The URA project's research region – 'Huangyan-Taizhou', situated in east China (Zhejiang Province) – is part of the Taizhou prefecture-level city (page 08). URA's research activities at the definition phase confirm the existence of such interfacing spaces in the research region, and their multi-scalar, trans-local complexities. For example, by applying a lens of urban and rural material interactions (material flow and the transference between first [rural] and second and third [urban] economic sectors), the urban-rural material cycles team has unravelled the closely interconnected material flows (metal and plastic in particular) between the urban district of Huangyan, and two other central city districts and peripheral counties in Taizhou and the region beyond (article 5). Employing an ecological perspective looking at water as a system, the research team from IOER has shown how various man made hydraulic infrastructures and patterns of land-use practices reinforce each other in exacerbating the risk of flooding (article 4).

At this stage, competing terms naturally exist, which are employed to address distinct manifestations of urban-rural relations in terms of the locally embedded, particular social processes and development models, despite their growing global connectivity. This is exemplified by the notion of "Rurban landscapes", deployed in analysing the urban-rural landscape, to emphasise the exploration and understanding of the manifold entanglements of urban and rural practices, imaginations and spatial structures (article 3). Thus, the location, form and underlying driving forces of urban-rural interfaces cannot be taken as a premise, but rather as a hypothesis open to further exploration and development in the unfolding of URA's interdisciplinary research.

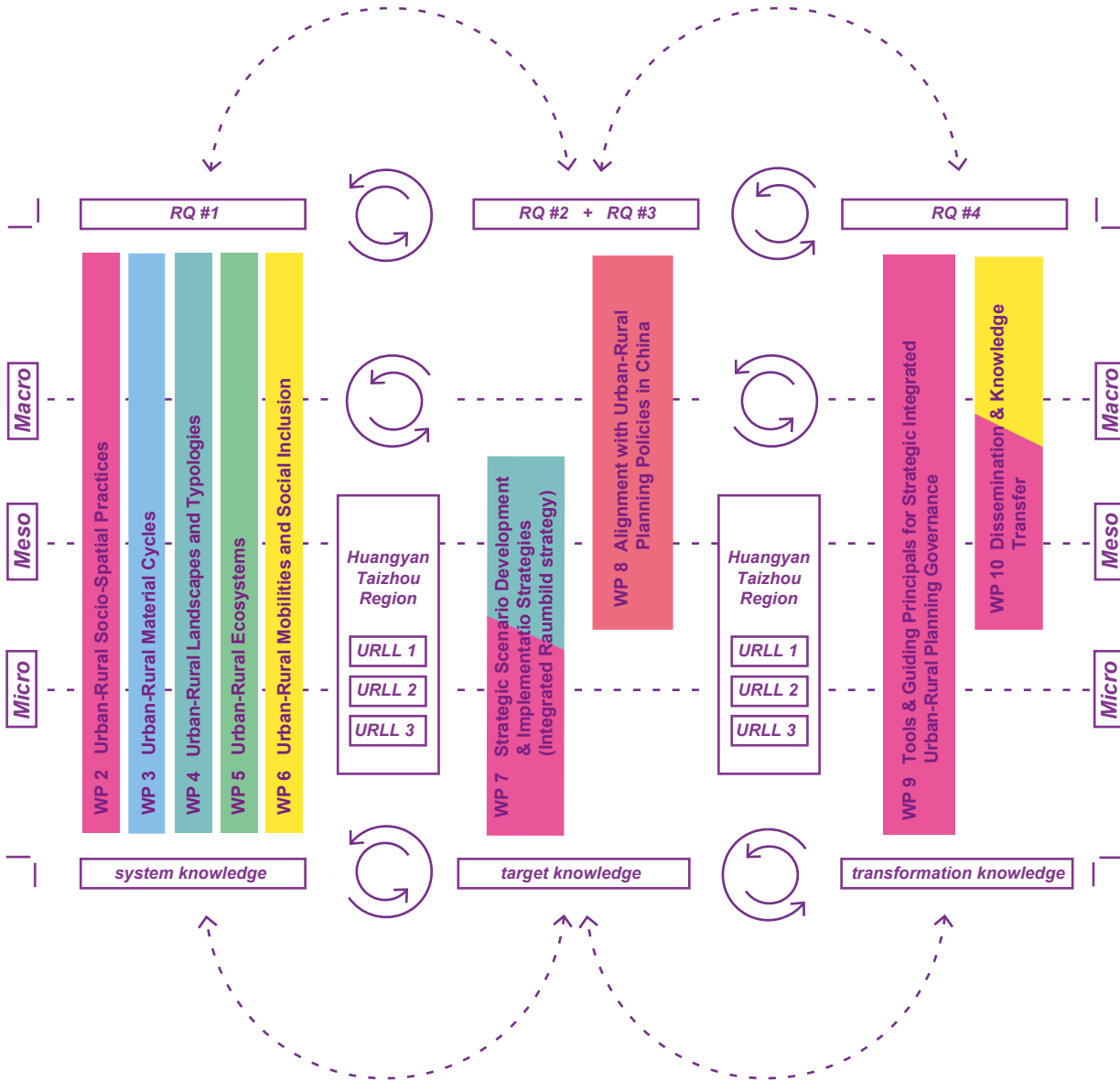
Disciplinary Interfaces

URA research also attempts to enrich the urban-rural interface discourse by overriding singular disciplinary methodological boundaries, in order to bridge conceptual knowledge with implementable guidelines and practices. Current disciplinary studies have revealed the shared social-morphological-environmental features of urban-rural transitional areas — such as mixed and fragmented land-use and land governance, hybrid social values and norms, ambiguous policy coverage and institutional responsibility, increasing social inequalities, high risk of environmental degradation with poor waste, and pollution management, degrading ecosystem services, and so forth. Building on both 'transformation science' and 'transformation thinking' (its ecological, institutional, technological, and sociocultural dimensions) (Schneidewind & Singer-Brodowski, 2013), URA follows a systematic, multi-scalar approach to build inter- and transdisciplinary transformation knowledge (systemic knowledge; target knowledge; transformation knowledge) that can guide future integrated urban-rural transformation in the Huangyan-Taizhou region and beyond. As a team constituted of researchers from multiple disciplinary fields, the URA project brings into focus the disciplinary differences and complementarities employed to understand the entangled features and emergent causes of such a complex topic (see Figure 1).

From a methodological point of view in particular, the URA project takes various interlinked research themes (social-spatial practices; nutrient flows; landscape and settlement entities; land-cover and biodiversity, migrations and patterns of social inclu-

sion; urban-rural planning and governance) as entry points for studying urban-rural interrelations across the case study region. The papers in this first Issue push forward interdisciplinary approaches in order to screen out core entities and relations in the urban-rural linkages from Huangyan-Taizhou's local and regional networks.

The contribution from the urban-rural ecosystem researchers of IOER suggests that although the 'urban-rural interface' can be difficult to define nominatively, capturing the quantifiable and spatial mismatch in the supply and demand of ecosystem services might offer a promising solution. They propose an interdisciplinary and implementable "eco-practice framework system", aimed at uncovering any potential symbiosis between the mind and practices of stakeholders and the environment (article 7). Taking near-far perception, practice and materiality into one relational framework, an urban-rural social practice researcher from Habitat Unit, TU Berlin, has revealed and described the seemingly dysmorphic and heterogenous housing typologies at the urban-rural interface (article 6). In the essay contribution, the urban-rural landscape team from Bauhaus-Universität Weimar and Zhejiang University showcases the participatory engagements with the water system, and its users on the ground, resulting in an understanding of the use of space and potentials beyond functionalism (article 8). In article 9, the research team from Tongji University, CAUP, shed light on how to integrate multi-sectoral practical knowledge on the ground, by describing the process of rearranging orange production and consumption practices at the Gong orange garden in Huangyan.



Research Question (RQ) 1:

What sustainability risks and transformation potentials emerge at the Urban-Rural Interface (place, space, scales) in the Huangyan-Taizhou region? How do these potentials and risks manifest themselves in the nexus between settlement patterns and built heritage, social inclusion/ exclusion, ecosystem services, and circulation pathways of nutritional and waste products?

Research Question (RQ) 2:

How can future-oriented, integrated and participative planning contribute to address transformation conflicts and establish effective transitioning pathways for urban-rural regions in China?

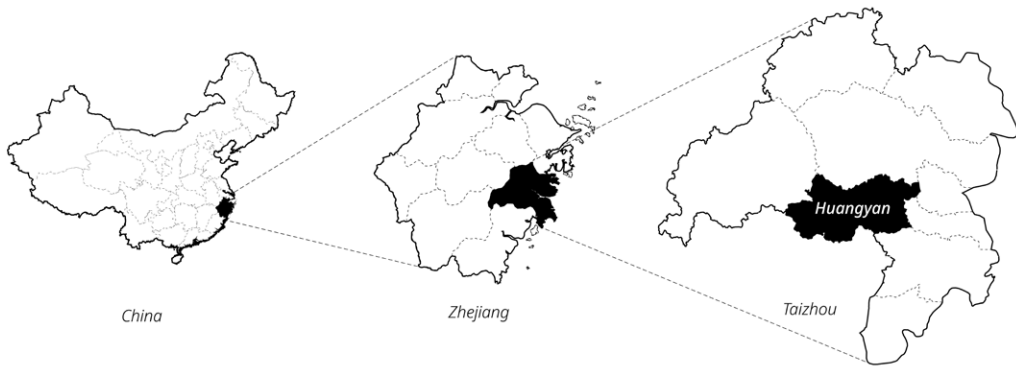
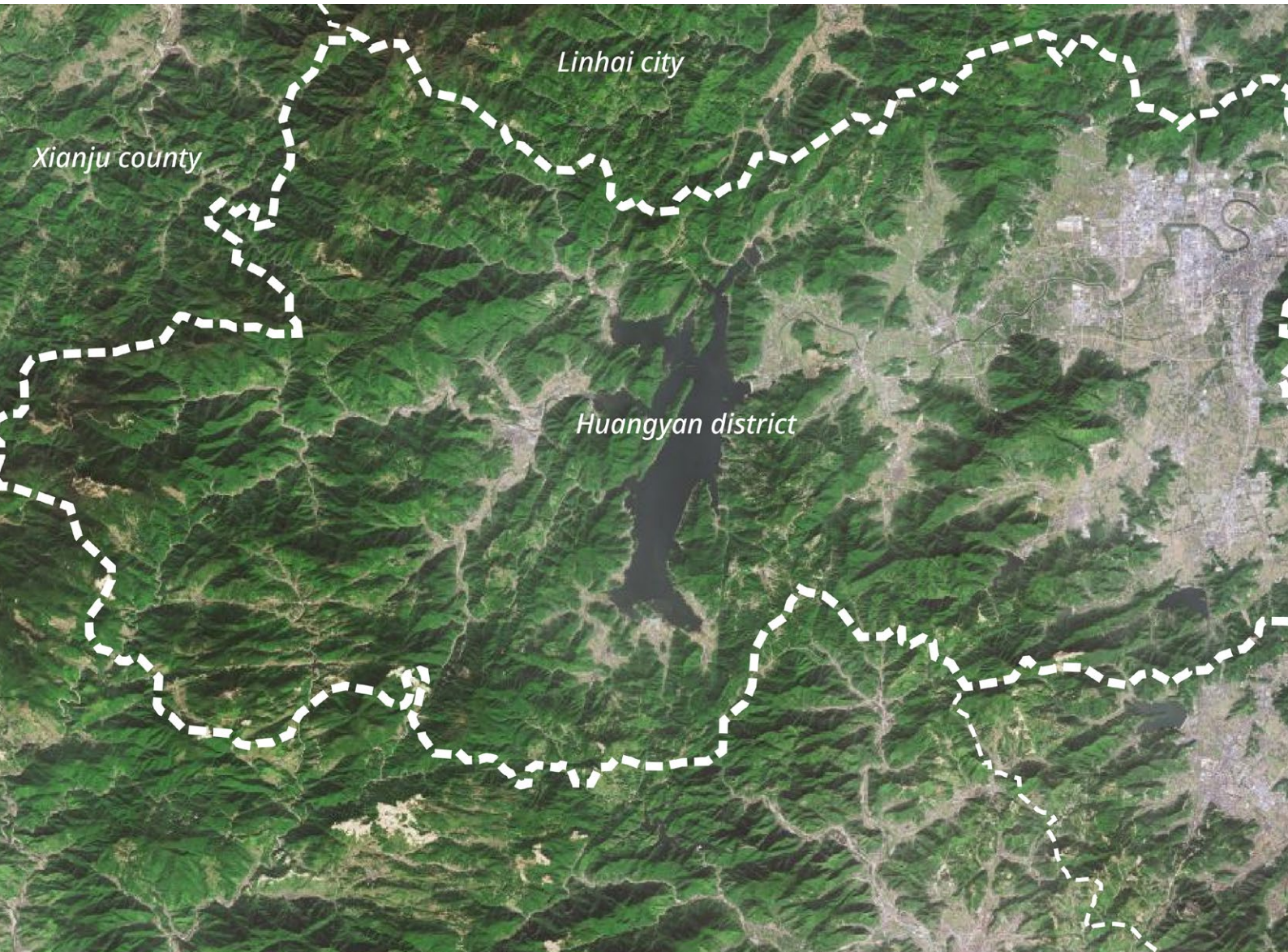
Research Question (RQ) 3:

How can strategic, actor-oriented scenario and implementation planning at the urban-rural interface help to complement the on-going policy reforms (NTSP, NURID) recently rolled out in China and help to operationalize effective implementation approaches? What gaps and problems of coordination remain under-addressed?

Research Question (RQ) 4:

What lessons can be drawn from the Huangyan-Taizhou case towards national and global debates on SDG-oriented urban-rural territorial planning? How can Huangyan-Taizhou benefit from global experiences developing sustainable transformation pathways through strengthening urban-rural linkages?

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- TUB KW: TU Berlin, Circular Economy, Prof. Dr. Susanne Rotter
- TUB CC: TU Berlin, China Center, Dr. Sigrun Abels
- BUW: Bauhaus Universität, Landscape Architecture/ Planning, Prof. Dr. Sigrun Langner
- IOER: Leibniz Institute of Ecological Urban and Regional Development, Prof. Dr. Wolfgang Wende
- ICLEI Local Governments for Sustainability e.V.
- ICLEI EA Secretariat Beijing/Seoul (sub-contracted)
- + UN-HABITAT (WP 9)
- + Urban Catalyst GmbH (WP 7)
- + China Association of Circular Economy (WP 7)
- + IBA Thüringen GmbH (WP 10)
- + AEDES Berlin GmbH (WP 10)





↑
URA case study research region
Huangyan-Taizhou including Huangyan,
Jiaojiang and Luqiao district
Source: Map adapted by Habitat Unit
TU Berlin (Ava Lynam) from Baidu Maps
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Urban-rural Migration and Social Inclusion at the Urban-rural Interface

Huang Huang¹, Lukas Utzig², Sigrun Abels³

Migration and urban-rural interface (URI)

Rural-to-urban migration, both international and internal, is deemed to be an inevitable outcome of urbanization and economic development while it also encourages efficient resource allocation within these processes (Wang and Yu Benjamin, 2019; Chen, 2016). Migrants attach themselves to the existing society at the destination, which has previously been formed by its culture, habitual everyday life and social networks, supported by institutional and social settings. At the same time there may be implicit or explicit barriers to this process of arrival. (Zhang, 2002; Wang and Yu Benjamin, 2019). As it is mainly the peri-urban villages around large urban centres that receive those migrants, urban-rural integrated development (UID) has become a critical topic across the world and an important approach to enhance urbanization in China (Belugina et al., 2017; Chen et al., 2020). Urban-rural interfaces, “conceived as a peri-urban transition zone with mixed livelihoods and spatial uses and flows of people, goods, capital, information, natural resources, waste and pollution between urban and rural areas”, offer opportunities but also expose challenges for inclusive urban-rural governance (Ros-Tonen et al., 2015 p.86) as the rapidly evolving, diverse dynamics formed here often follow an informal, unplanned fashion (Zhang, 2002). In addition to the more frequently mentioned measures of integration such as economic and spatial aspects, the social integration of urban and rural migrants with the local population has been a critical one, while having often been overlooked (Meng, 2019).

At the same time debates have arisen about the underlying assumption that segregation always needs to be eliminated and full assimilation is the desired state. As Peach (1996) argues, “segregation is not all bad. Segregation is in fact, one of the key methods of accommodating difference”. Thus, a differentiation needs to be made between voluntary clustering for reasons such as religious communities, maintaining cultural preferences or community support networks (Kerшен, 2004; Vaughan, 2007; Kerшен and Vaughan, 2013) and on the other hand involuntary exclusion through, cultural, institutional or economic means, as incoming migrants are often economically disadvantaged and vulnerable in relation to the host society (Castells, 1977). The term social integration in this paper therefore focuses on the opportunities for migrants who want to be included in the local social networks and the facilitation of the process of joining.

In China, urban-rural integration has been considered a key strategy for development since 1990 (Jing, Zhang, 2003) while the social inclusion of migrant work-

ers remains challenging as differences lie in economic development and long-standing institutional barriers. In the past 30 years, migrants either moved from less developed regions, such as Western and Central China towards Southern and Eastern China, called inter-provincial migration, or they migrated within a region, mostly from rural to urban areas, called intra-province migration (Chen, Zhao, 2016; Qi et al., 2019). Both processes have greatly contributed to the Chinese urbanization (Zhao, 2002; Zhao et al., 2013; Chen, Zhao, 2016; Meng, 2019). During previous migration movements, industrial agglomerations used to attract most of the migrants as there were sufficient job opportunities and the salaries were higher than those from farming, while a new model of part-time farmers and workers with local urbanization characterizes the current trend (Zhao et al., 2013). Rather than settling down, this group of people have adapted to high mobility, moving from one region to another for better job opportunities in terms of income, connections with hometowns and affordable housing among others (Zhu 2007; Zhu, Chen, 2009; Zhao et al., 2013). Their hometowns and Hukou play a critical role in most of the cases (Zhang, 2002). They are thus called floating population in the Chinese context (Chan et al., 1999; Zhang, 2002; Qi et al., 2019). Many of the floating population start their new lives in urban villages and urban-rural interfaces for various reasons such as affordable housing, (informal/part-time) job opportunities, and comparative flexibility (Zhao et al., 2013). They are either commonly found to migrate by themselves or in couples and leave their children back in their hometown with their parents while only a few bring their children along, sometimes with their parents to help out. Some scholars argue that this phenomenon, unlike evidence found in the western world, is indicating a family should be taken as a fundamental unit when analysing the floating population in China (Chen, Zhao, 2016). This phenomenon also derives from a distinct Chinese policy known as household registration (i.e., Hukou) that directly controls and constrains the mobility of rural-to-urban population, as socio-economic benefits such as public education, health insurance, social assistance programs and housing programs among others, are only available to local-Hukou residents (Zhang, 2002; Meng, 2019; Wang, Fu Benjamin, 2019). Social inclusion, therefore, is more challenging.

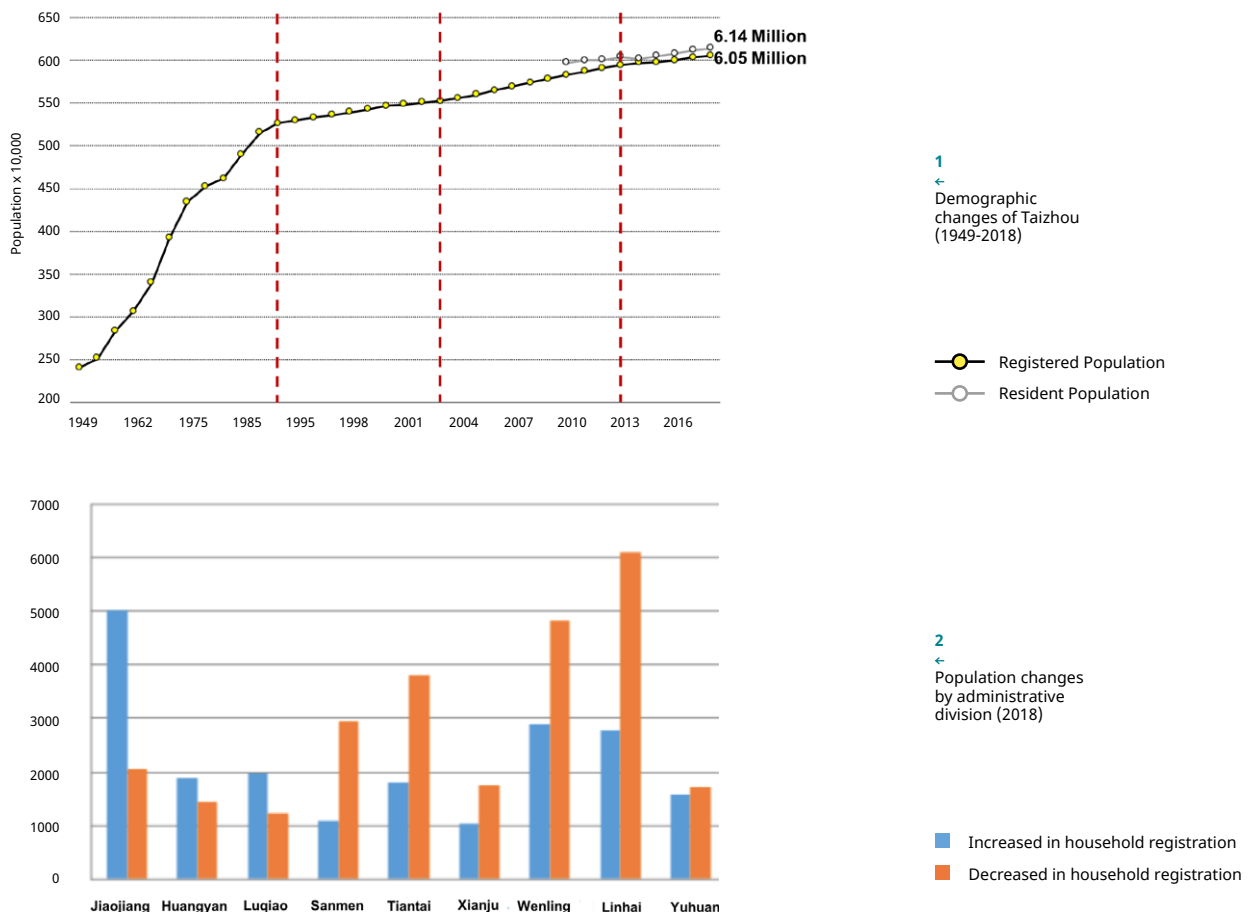
Against this background, this research tries to situate the discussion of migrants and mobility at the urban-rural interface where most socio-spatial transformations are being initiated and great heterogeneity can be witnessed. With Huangyan-Taizhou Region be-

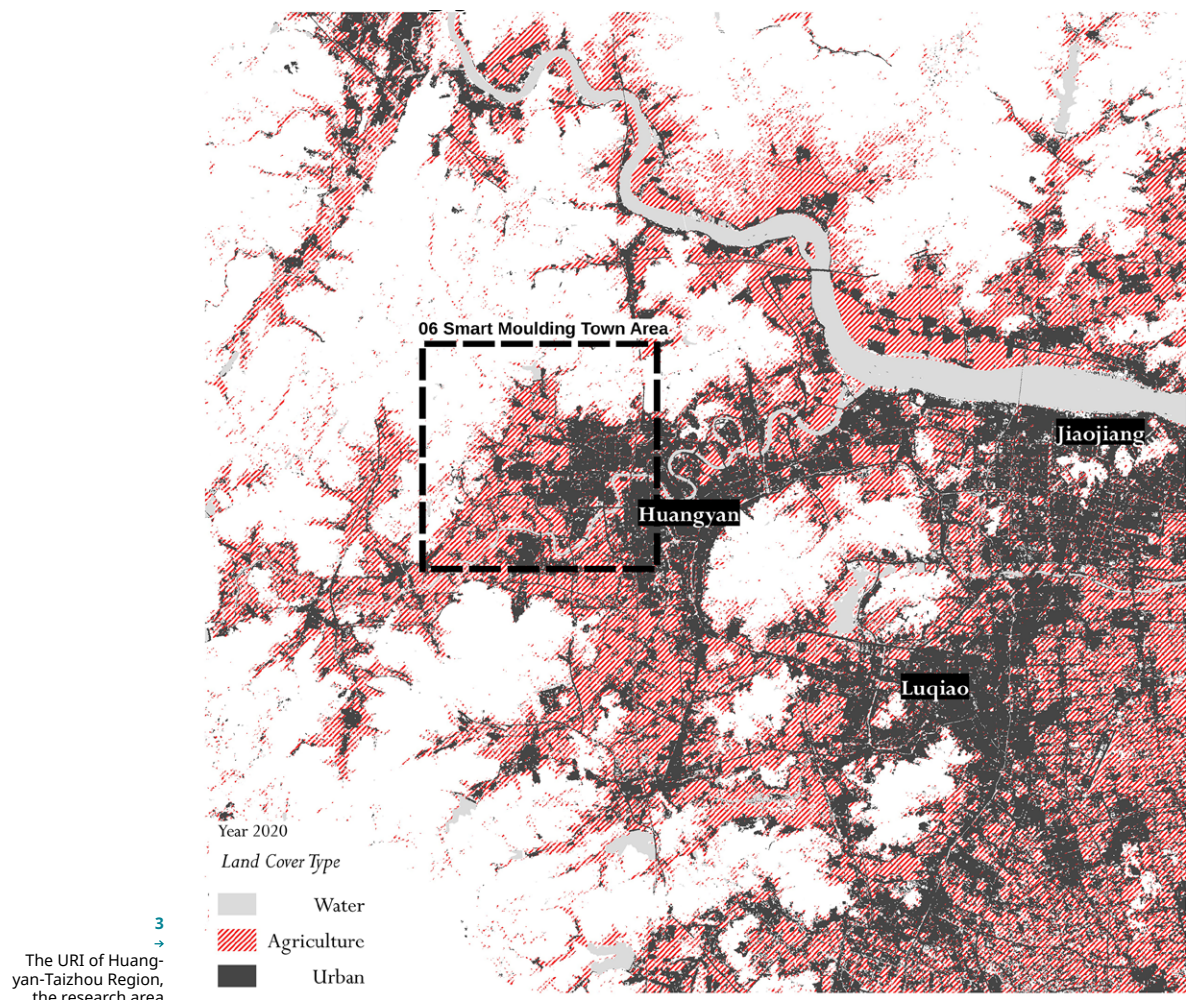
ing the case study region, it is looking into the questions of what are the effects of fast transformations on urban-rural migration and mobility and what are the most related factors affecting social inclusion/segregation. These questions are embedded in a context where the urban-rural space and society were formed in a rapid urbanization process and are still experiencing critical transitional challenges (e.g., upgrading industries and emerging new types of agriculture) affected by global factors. Additionally, at a more general level, Chinese institutional settings, especially the constantly changing Hukou system, also constituted the research context. Census analysis, participatory observation and semi-structured interviews, therefore, are the main methods employed.

DIFFERENT MIGRANT GROUPS AT THE URBAN-RURAL INTERFACE OF HUANGYAN-TAIZHOU

Various migrant groups (trans)forming at the urban-rural interface

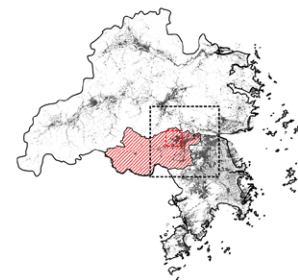
Taizhou is a prefecture-level municipality in Zhejiang Province at the Yangtze River Delta (YRD). Its total residents in 2018 were 6.14 million, among which 6.05 million were registered in Taizhou (Taizhou Statistics Bureau, 2018), indicating that about 100,000 residents were floating population without Hukou [Figure 1]. In 2018, residents with Hukou declined for the first time in Taizhou. Many regions in Taizhou faced serious shrinking in population since 2018 except for the three urban regions of Taizhou [Figure 2]. Huangyan, as one of the three urban regions of Taizhou, is connecting the mountainous rural hinterland in the west to urban Taizhou in the east. It is a place famous for its moulding industry agglomeration, mostly private enterprises, and has been attracting floating population to work there. Right at its urban-rural interface, there is a new industrial development taking shape called the Smart Moulding Town (SMT) [Figure 3] which accelerates the socio-spatial transformation of the neighbouring village areas and attracts increasing numbers of floating population.





The floating population here consists of various social groups. Most of the floating population moved from rural to urban regions while some of the temporary residents also moved from urban regions. They either came from Taizhou region or some less developed regions, such as Sichuan and Anhui Province. Only a few of them came from cities within the YRD. There were also a few urban-to-rural migrants, mostly engaging in new types of agricultural startup-businesses. According to our observations and interviews, language is a bonding factor here. The floating population tends to cluster together as they speak mandarin while the locals use their dialect. Migrants from the same hometown, sharing the same dialect, tend to socialize together.

From the perspective of family structures, the floating population also showed heterogeneity. Some of them came to Huangyan by themselves, such as apprentices in different industries (e.g. moulding industry) and some others may move as couples and suffer from long-term family separations from their children. One taxi driver who used to work in the moulding industry said, "I came to Huangyan because of my girlfriend, and she is now my wife. Her boss moved her business to Taizhou, and she followed. However, we had to leave our child back in our hometown because we could not afford bigger accommodation here and we work all day long." (In-depth interview, 10/2019). Another migrant worker shared a similar experience saying, "I had to leave my wife and child back at Tiantai, another district in Taizhou, I cannot afford moving them here." Floating population who migrated with a larger family are also found in the region. An old man who was watering his vegetables grown on vacant land between several factories and his community said, "I lived here for several years because my son has a factory here. He and my daughter-in-law are very busy, so my wife and I have to help with taking care of our grandchildren" (In-depth interview, 10/2019).



Segregation among migrations an the impact on residential patterns and daily commute

The heterogeneity of the floating population is reflected in the variety of living patterns according to the field observation. Only a very small proportion have their own properties in gated communities, including high-end communities, while the rest of them rent. “We rent a new rural house in Xifan (a village close to the SMT), so that my husband can go to work conveniently and my parents-in-law can also go out to work,” a young mother taking her daughter playing in the village centre said, “We have our own house in our hometown. Even though my husband earns about 20,000 RMB a month, we will go back and open a small business one day which is my husband’s dream” (In-depth interview, 10/2019).

Some members of the floating population rent one room in either a rural house or an apartment, depending on how many family members are living together and what kind of accommodations are affordable to them. Shared washing machines are therefore very common in the research area. Several large-scale industries provide dormitories close to the workplace for the workers. The worst living situations in comparison were containers transformed into living spaces and shabby constructions attached to rural houses [Figure 4].

On the other hand, for the daily commute, electric motorcycles/bicycles are found to be the most favourable and frequent choice for the floating population as they mostly travel within a neighbourhood distance. Motorcycles/bicycles are convenient and affordable while the shared ones in the region are easy to get and used frequently by the floating population [Figure 5]. However, this area is not well connected to the urban centres within Taizhou by public transport. For example, it takes 2-3 hours by bus to travel to the urban centres of Luqiao and Jiaojiang (the other two urban districts of Taizhou). The floating population at the URI of Huangyan, therefore, rarely travel to those places.



4
→
Varying types of accomodations for floating population

The shifting dilemma of job opportunities at URI: Hard-to-meet needs

The floating population supports the very fundamental functions of a city. A considerable proportion of the floating population at the urban-rural interface of Huanyang work in industries like moulding and garment. Many are also employed in service jobs such as delivery and hospitality. One taxi driver said, "I worked in the moulding industry before, but the working hours were not satisfying as you have to work 12 hours in a row every day. I changed my job when I got some savings. It is not hard to find a job here as long as you are qualified. I feel no big difference between locals and the floating population in finding jobs."

In the local human resource market, effective formal and informal channels and platforms to link up the migrant workers and business owners were also found. However, there is a transforming trend of local industry, caused by globalisation and local urbanisation. Both local authorities and business managers expressed concerns that unskilled jobs in factories used to be easy to get in this region. Now however the need for unskilled workers has been decreasing, and skilled workers are increasingly needed. Currently there is a surplus in ordinary workers and this region is not very attractive to skilled migrant workers.

SPATIAL AND SOCIAL FACTORS AFFECTING SOCIAL INCLUSION

Spatial accessibility exacerbates rural-urban spatial inequality

While the spatial accessibility was comparatively equally distributed in the past, there were differences that can be traced to some areas urbanising faster than others. At the urban-rural interface of Huangyan-Taizhou this is especially the case for Xifan village that benefitted from a good connectivity both locally and in the wider region and as a result, formed one of the main centres of rural-to urban transformation [Figure 6]. This process not only heightened its importance as a destination in the wider region but also left the villagers and village committee rather wealthy and resourceful. Other, less accessible villages are not transforming as rapidly and thus struggle to develop a rent-based income model in the transition away from agriculture. With the urbanisation of better accessible areas, the more remote rural areas become increasingly segregated in relative terms which further exacerbates the rural-urban spatial inequality. This is reflected in the setting up of markets, restaurants and shops, which rely on customers and thus spatial accessibility which is described as the "movement economy" by Hillier (1996). Those are also found in the better accessible, faster urbanising areas, forcing rural villagers to travel to more urban areas.



↑ 5
Shared electric motorbikes, bicycles and cars

Uneven accessibility to public resources

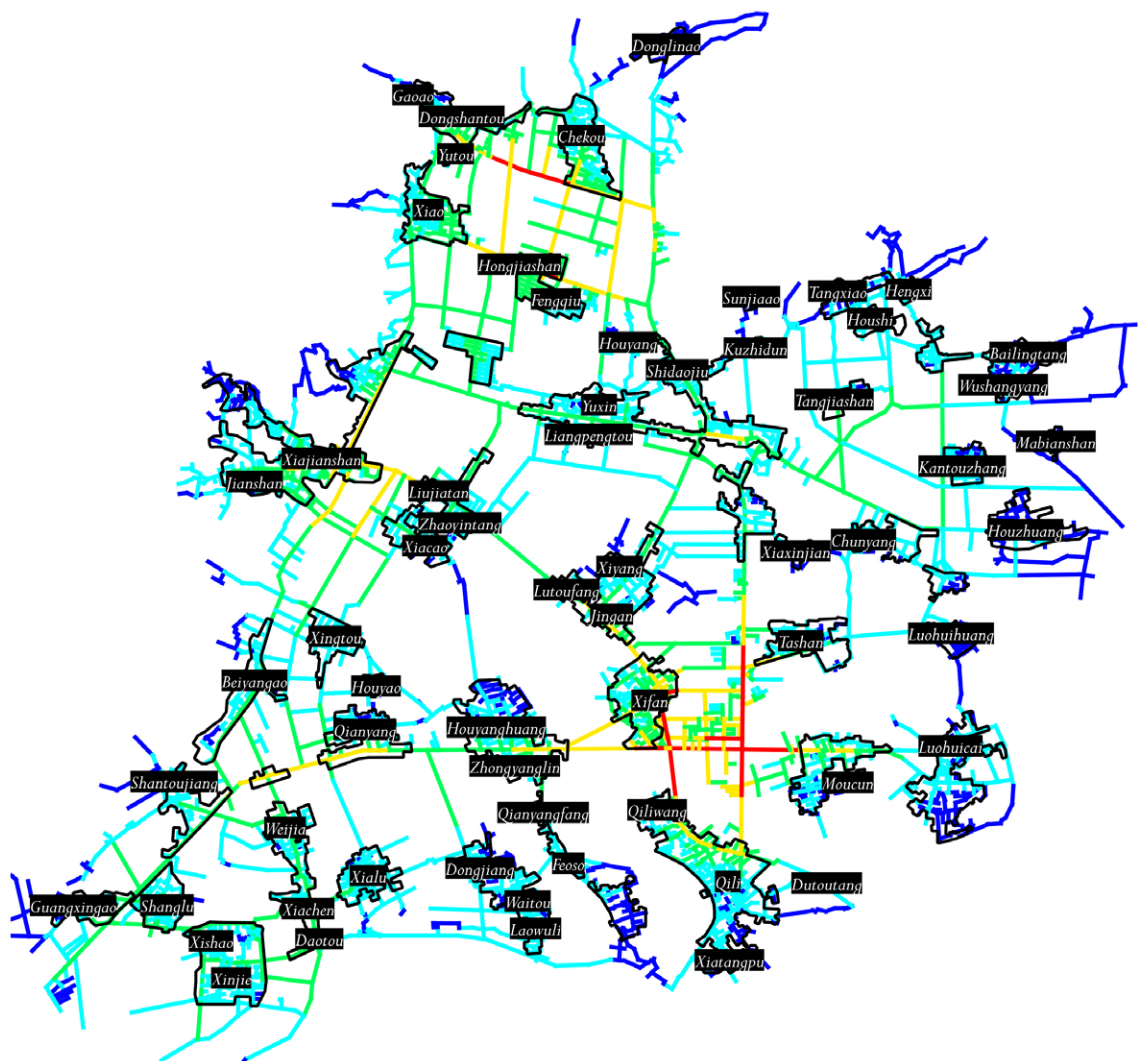
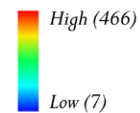
In addition to a disequilibrium of spatial distribution, differences in accessibility to public resources are also found in this region, which directly or indirectly affects social inclusion. These differences are mainly caused by institutional settings, family structures and individual action alike. Related policies such as Hukou and social welfare were the most influential ones. For instance, migrants without local Hukou cannot send their children to the local public primary schools. "Private schools are expensive and the quality of education is not guaranteed," one temporary resident said (In-depth interview, 10.2020). Family structures also turned out to be a decisive factor. In the observation, the floating population with children were found to be much more in need of access to public resources such as community centres and playgrounds among others. They are therefore to a greater extent involved in local communities. Individual differences, especially personal preference and future plans, also directly affect the needs of public resources. People who have no intention to settle down for example, are less aware of public resources and rarely use them to communicate with others and extend their social networks.

Additionally, access to public resources is also reflected in the time dimension. For instance, workers in the factories work 12 hours every day which left them very limited time to use public resources such as community centres, green belts and street gardens among others while people with more leisure time or more flexible working schedules can use the public space much more often and, therefore, have better chance to extend their social networks.

Spatial accessibility in 2003 at the beginning of the rapid urban expansion, calculated using the spacesyntax framework (angular integration 1600m radius)

6 ↓

Space Syntax Accessibility Analysis
Integration (Radius 1600m)
Year 2003



Informality plays a critical role in accommodating the floating population

Figure 7 shows a commonly found composition of space at the urban-rural interface. Contrasting dynamics co-exist within a limited space. On the one side of the road is a high-end community that is almost empty as most of the lights were out in the evening. On the other side of the road are rural houses with informal construction added in between them. Workshops were operating on the ground floors while the workers lived in the upper floors or in the added constructions. Small vacant plots along the path next to the rural houses were planted with all kinds of vegetables for daily use.



7 ↑
Informality at
the urban-rural
interface

The combination of formal planning and informal initiatives characterises the urban-rural interface. Informality in terms of construction, industrial patterns and space use plays an important role in affording the everyday life of the floating population. Informal places to live provide temporary and affordable housing for migrants who just started their lives in a new place or those who have to wire most of their earnings back to their hometown. An informal place for work supports people with insufficient time or skills for a formal job. Informal land use such as farming also connects the predominantly rural migrants with the local villagers and encourages people from different regions to maintain their habitual behaviours in everyday life and to be accepted by the people with the same ones.

Conclusion

Internal migrant workers, often referred to as the floating population in the Chinese context, formed different social groups at the urban-rural interface and showed different degrees of mobility. They showed heterogeneity in various ways and integrated into local communities to varying degrees, mainly affected by types of jobs and family structures. Even though the competition for job opportunities is comparatively fair between locals and floating population, institutional barriers (e.g., Hukou and welfare) still make it impossible for the floating population to be included officially. The flexibility and informality that characterizes the urban-rural transitional zone, however, increased the ability to accommodate people from different regions with different skills, incomes and habits.

Additionally, unaffordable housing plays an important part in preventing migrant workers to settle down. Furthermore, long and fixed working hours in the moulding and garment industries also make it hard for people to have real social connections and therefore establish social networks. The floating population at the urban-rural transitional zone, therefore, shows high mobility in moving from one city to another, as they are inhibited from settling down through exploitative working conditions and institutional discrimination. This happens against the backdrop of a rapidly urbanising urban-rural interface where the inequalities between rural and urban population are also increasing and job markets are transforming from low-skilled to skilled labour demand, creating more challenges to China's floating population.

The combination of formal planning and informal initiatives characterises the urban-rural interface. Informality in terms of construction, industrial patterns and space use plays an important role in affording the everyday life of the floating population. Informal places to live provide temporary and affordable housing for migrants who just started their lives in a new place or those who have to wire most of their earnings back to their hometown. An informal place for work supports people with insufficient time or skills for a formal job. Informal land use such as farming also connects the predominantly rural migrants with the local villagers and encourages people from different regions to maintain their habitual behaviours in everyday life and to be accepted by the people with the same ones.

The Policy Interfaces and Integrative Momentum Propelling Urban-Rural Governance

Merlin Lao¹, Huiling Zhu²

Since the reform and opening-up, especially after the 18th CPC National Congress, China has been emphasizing the focus of boosting high-quality urban and rural development. To support this objective, a couple of high-level national policies have been released. Besides, spatial planning is also seen as a relevant means of urban-rural governance after 2018, the ministerial reform in China. As the preliminary research result of the URA definition phase, this article identifies and analyses some of the latest relevant policy developments at the national, provincial (Zhejiang) and local (Taizhou) levels that would influence the local and regional urban-rural dynamics in our research region for the years to come.

A Series of National Policies: Reflecting China's Interest in the Subject

With the rapid urbanization in China, the gaps between rural and urban areas continue to widen in different aspects including age, education level, service accessibility, etc, putting pressure to the national government on addressing the differences. In the last decade, three main policies can be seen as relevant on urban-rural interfaces: the “New-type Urbanization” in 2014 focusing on urbanization of rural areas, the “Rural Revitalization Strategy” in 2018 concentrating on agriculture and rural modernization, and the latest “Urban-rural Integrated Development” in 2019 initiated a new concept to modernize the country by eliminating the boundary between urban and rural areas. A clear understanding of national policies is significant, as the national policies are references for the subnational policies. Therefore, the above-mentioned national policies will be briefly elaborated below to reflect how national interests on topics of urban-rural interface governance have been evolving in the last decade, and understand the latest narrative to benchmark the approach taken in the Urban Rural Assembly Project.

The New Urbanization (NU)

In 2014, the concept of “New Urbanization” was proposed to tackle problems in the era of rapid urbanization when the number of towns and rural immigrants was increasing. Those problems include unstrategic urban spatial planning, inadequate provision of public service, occupied farming land, incomprehensive immigration system and mechanism, poor protection for natural and historical heritage (State Council of the People's Republic of China, 2014). The key purpose of “New Urbanization” is to facilitate resources flow from rural to urban areas smoothly. Therefore, the National New Urbanization Planning (2014-2020) (国家新型城镇化规划 2014-2020) introduced actions including designing targeted objectives for cities urbanizing in different extent; developing agriculture industry and public service in rural areas; providing urban Hukou or public service to rural immigrants; devising sustainable planings for cities; enhancing transportation network to cover towns and cities, establishing urbanization system and mechanism to complete reform of population, land, housing, capital and ecological resources (State Council of the People's Republic of China, 2014).

After the 5-year implementation of National New Urbanization Planning, in 2019, the Key Tasks of New Urbanization Construction in 2019 (19年新型城镇化建设重点任务) was issued with focusing on the settlement of the rural migrant population employed in urban areas, and promoting decisive progress in the goal of 100 million non-registered population settling in cities (National Development and Reform Commission, 2019). Therefore, promoting the rational distribution and flow of urban-rural elements, such as population, public service, infrastructure and resources, is still a key issue that China and its local governments need to solve.

The Rural Revitalization Strategy (RRS)

Until 2018, in many places, the gaps between many urban and rural areas, like absolute per capita income and public service availability, continue to increase as people are convinced that urban areas have more opportunities and better livelihood (Xinhua News Agency, 2018). Rural areas are sometimes considered not appropriate for young people to stay. Due to the long-term “urban-rural dual structure” problem in the past, China's rural development is seriously lagging behind. Some found it providing a counter-effect on attaining a well-off society in China (Xinhua News Agency, 2018). To improve rural development, the RRS was proposed in 2018, which attempts to distribute resources into rural areas.

The Strategic Plan for Village Revitalization (2018-2022) (乡村振兴战略规划 2018-2022) lays out comprehensive actions in rural areas and sets specific objectives for 2020, 2022, 2035 and 2050 (Xinhua News Agency, 2018). The action-scheme is systematic and can be broken down in five thematic areas which align well with the URA Project’s research questions (work packages) that the consortium is trying to explore in the Huangyan-Taizhou.

The five thematic areas of RRS can be summarized as economic, ecological, sociological, cultural and political perspectives. Specifically, the institutional struc-

“The year after RRS introduced, in 2019, a new holistic political system for urban-rural development, URID, was initiated, addressing the development at the urban-rural interfaces.”

ture will first be adjusted, and supportive policies will be implemented to create a more open environment for agriculture business to develop. Secondly, ecological factors will be taken into consideration in rural development, and a series of environmental friendly measures will be introduced to protect and assist reasonable utilization of ecological resources. Thirdly, the living quality of residents will be improved through the enhancement of infrastructure and social services in rural areas. Fourthly, unique rural culture aspects will be emphasized through promoting cultural industry and raising awareness of residents. Finally, the RRS also aims at strengthening political leadership at rural levels (Xinhua News Agency, 2018).

The Urban-Rural Integrated Development (URID)

The year after RRS introduced, in 2019, a new holistic political system for urban-rural development, URID, was initiated, addressing the development at the urban-rural interfaces. Unlike the NU and RRS attempting to influence the resources flow and allocation between urban and rural areas, the introduction of URID policies intend to eliminate the boundary between urban and rural areas to integrate resources and promote efficient allocation.

In 2019, the Opinions on Establishing and Improving the Institutional Mechanism and Policy System for Urban-Rural Integration Development was issued by the CPC Central Committee and the State Council (中共中央国务院关于建立健全城乡融合发展体制机制和政策体系的意见) as the referenced for URID policy framework were issued (Xinhua News Agency, 2019). This policy framework distinguishes URID from UN and RRS by eliminating the boundary between urban and rural areas through recommendations like improving the property-right system and the market-oriented allocation of resources (Xinhua News Agency, 2019). To accomplish this objective, the following relevant systems and mechanisms are proposed to be established or improved in the following areas: (1) allocation of urban-rural elements and resources; (2) public service; (3) infrastructure; (4) rural economy; (5) income increment of farmers.

By the end of 2019, the Plan for the Reform of National Urban-rural Integration Pilot Zones (国家城乡融合发展试验区改革方案) has been issued to guide implementation at local levels. Aims to promote the two-way free flow of production factors in urban and rural areas and the rational allocation of public resources. The above-mentioned Pilot Zone Plan proposed to carry out in-depth exploration and experiments in 11 aspects,

such as orderly population migration between rural and urban areas, entry of collective operating construction land into the market, transformation of villages in urban, and ecological industrialization, building shared infrastructure and unified social services system, establishing mechanisms to increase the income level of farmers (National Development and Reform Commission, 2019).

Actually the idea of co-development of urban and rural areas through integrated spatial planning has been proposed in the early 21st century via the national initiative Overall Development of Urban and Rural Areas (城乡统筹). By then the city of Jiaxing in Zhejiang started to practice the components by implementing its Comprehensive Planning for The Administrative Region of Jiaxing City (嘉兴市域总体规划). These led to practices of integrated spatial and function planning in Jiaxing by regarding urban and rural areas as a whole. As a result, it enhanced the resources flow between urban and rural areas, co-construction and sharing the function of lands, infrastructure and social service systems, and most importantly, strengthened political cooperation among multiple government departments (Zhu, Cui, & Huang, 2020). In addition, after the national ministerial reform, the newly established Ministry of Natural Resources released the National Territory Spatial Planning (NTSP) in 2018, which also reinforces such concept of integrated planning when defining the functionality of land.

Zhejiang Province: Policy Localization and Innovation

There is evidence which shows that Zhejiang is ahead in the country on urban-rural interface governance policies related to industries, investment, employment and social security sectors. In the year 2019, the income ratio between urban and rural residents was 2.01:1, which is the second-lowest in the whole country (average at 2.64:1) (Survey office of National Bureau of Statistics in Zhejiang, 2020). Additionally, the public service accessibility rate difference between rural and urban areas is below 10% (State Council of the People's Republic of China, 2018). The achievements of Zhejiang can be attributed to the important narrative on provincial and local development provided by the national policies and its own continuous innovation in rural development.

Rural development in Zhejiang has been spearheading since 2003 when Zhejiang's Green Rural Revival Program was first proposed (People's Daily, 2020). Then, Zhejiang mainly focused on improving the rural living environment and building new infrastructure shared between rural and urban areas. Based on the Green Rural Revival Program, in 2011, Zhejiang Beautiful Villages (BV) Scheme was proposed for further rural development in terms of economics, environment, culture and resources conservation. In the process of implementing these initiatives, the mechanism of multi-level government cooperation and integrated planning has been established through the experience of local municipalities like Jiaxing (Zhu et al., 2020). These bottom-up trials have accelerated rural development and laid a good foundation regarding economic development, environmental protection and political governance for the later release of urban-rural governance policies.

Ambitious Provincial Rural Revitalization Strategy

Aligning with the national policies, Zhejiang adopted and localized RRS. In 2018, two related policies were released: Comprehensive Implementation of the Rural Revitalization Strategy, A High-Level Action Plan to Promote Agricultural and Rural Modernization (2018–2022) (全面实施乡村振兴战略高水平推进农业农村现代化行动计划 2018–2022) and the Strategic Planning for Rural Revitalization in Zhejiang Province (浙江省乡村振兴战略规划 2018–2022).

Aligned with the national RRS, these two RRS provincial policies set specific objectives in 2020, 2022, 2035 and 2050 with focus on improving the economy, life quality and environment in rural areas, and Zhejiang tried to set itself at a leading role among other provinces (CIYEW, 2018). For instance, per capita disposable income of rural residents annually is set to be increased to 35000 CNY and the income gap ratio between urban and rural residents, as well as between farmers and low-income farmers is set to be reduced to within the ratio 2:1 by 2022 (Ministry of Agriculture and Rural Affairs of the People's Republic of China, 2018). Compared to the national RRS, Zhejiang's RRS also integrates its Beautiful Villages (BV) scheme, setting a target that 90% of the villages shall fulfil the provincial standard of Beautiful Villages by 2022 (CIYEW, 2018).

Latest Provincial Initiatives on Urban-Rural Interface Governance

Following the success of the BV scheme, In 2019, Zhejiang issued its Opinions on Advancing High-Quality, Beautiful Township Construction (关于高水平推进美丽城镇建设的意见) and the corresponding Criteria for Beautiful Township Construction (美丽城镇建设评价办法). The Criteria concentrate on improving life quality, public service provision, industrial development, culture, governance reform for town residents (New Blue, 2019; The People's Government of Zhejiang Province, 2019). In 2020, to respond Opinions on Beautiful Township Construction, the leadership group of Beautiful Township released The Key Tasks for Zhejiang to Develop the Indicator System of Beautiful Township Construction (2020-2022) (浙江省高水平推进美丽城镇建设工作重点任务指标体系 2020-2022) to assign the objectives and tasks to 23 provincial government departments. The Beautiful Township(BT) Scheme is considered an innovative and completed policy system at the provincial level to extend urban-rural interface governance (Leadership Group of Beautiful Township, Beautiful Township Office, 2020).

Until now, Zhejiang has yet to publish other localized Urban-Rural Integrated Development policies to reflect and reify national guidance. However, the above-mentioned provincial official documents have all suggested the establishment of designated criteria on URID elements. It would be worth noting that two cities (Jiaxing-Huzhou interface) in Zhejiang are selected as part of the 11 pilot zones for the national URID pilot plan.

When we examine the Jiaying-Huzhou interface pilot project, we can identify the following components as critical for their success, which can serve as a good reference for the URA project. Firstly, Jiaying and Huzhou have been pioneering cities even before being selected as URID pilot zones. They are strong in economics, urban-rural integrated spatial planning and rural environment protection. The income ratio between urban and rural areas was 1.687:1 in Jiaying and 1.71:1 in Huzhou in 2018, both were already lower than the target Zhejiang set to achieve by 2022 (2:1) (Tianjin Communist Party Construction, 2018; Huzhou City Development and Reform Commission, 2019). Another success of Jiaying is due to the rich experience in integrated planning, while that of Huzhou is resulting from advanced development in agriculture and environmental protection in rural areas, and the mechanism to attract capital, human and land resources to flow to rural from urban areas. Finally, some innovative components can be identified, including incubating eco-friendly product industries in rural areas, creating synergies for other industries between urban and rural areas, establishing a compensation system for rural residents if they have to forego rights and migrate to cities, etc.

Urban-Rural Assembly in Taizhou

The URA project specifically explores the Taizhou-Huangyan interface. While Taizhou is not included in the 11 national URID pilots, our initial research shows that its urban-rural interface governance mimics Zhejiang's provincial initiatives, mainly in the aspects of spatial planning, environmental protection and rural development. Taizhou has previously released its own Comprehensive Planning for The Administrative Region of Taizhou City (2004-2020) (台州市城市总体规划), which considered urban and rural areas as a whole during the planning. Zhejiang's rural strategies, the BV and BT have prescribed a number of objectives and indicators for Taizhou to take into consideration. In December 2019, Taizhou released its Taizhou Rural Revitalization Strategic Planning (台州市乡村振兴战略规划). The main focus areas of the Planning are rural environment improvement and agriculture industry development (Taizhou Development and Reform Commission, 2019). Taizhou emphasizes the provincial Beautiful Villages Scheme with additional focus on ecological restoration. The latest provincial Beautiful Township Scheme also has an influence on the municipality's policy approach. The municipal government recently responded by highlighting the following priorities: reasonable consideration of natural resources in development, cultural industry development, rust belt transition focusing on tourism, e-commerce and service industry enhancement (Zhejiang Housing and Urban & Rural Construction Department Government Affairs Handling Center, 2020).

Our initial research also indicates, 'revitalization' is still the driving agenda for urban rural interface policies in Taizhou, it contextualizes the URA project in its Definition Phase in the District of Huangyan. Our analysis of key sectoral planning documents relevant has been made (urban master plans, land-use plans, documentation and plans for ecological preservation, etc.), but there is still a missing connection policy decision making process at the district and municipal levels. Three Urban-Rural Living Labs (URLLs) have been identified for the R&D Phase for more practical research. At the governance level, the research consortium will, through the exercises at the URLLs, define a more robust governance picture between the District and the Municipality, explore planning governance tools to ensure integrated development between the two levels, and most importantly bring in city-level policymakers into the tasks of the URLLs.

So far, our research findings also suggest that it is important to align the URA project components, the Taizhou Municipal Government's engagement with that from the national and provincial (arguably more influential) policies given many new policies are recently announced (mentioned earlier in this article). We would also argue, it is necessary to bring two observer cities with their own experience of urban rural interface governance on board in the R&D Phase as the benchmark to the URA project implementation in Taizhou-Huangyan interface. Such a practical approach would help to ensure the smooth integration of the recommendations introduced by the sino-german consortium into the political context in China.

Reading and Revealing the Rurban Landscape of Huangyan-Taizhou Region

Maria Frölich-Kulik, Sigrun Langner, Yulin Zhang

Introduction

The highly dynamic urbanisation processes underway today go hand in hand with migration flows from the countryside to the city and have a corresponding demographic and economic impact on both the emptying rural areas (i.e. Friedmann, 2006) and the "arrival cities" (Saunders, 2011), especially in the areas, districts and urban agglomerations in which migrant rural populations first arrive. With expanding global networks, communication and transportation systems, the boundaries between the so-called urban and rural areas are becoming increasingly blurred and everyday life is characterised by complex socio-spatial urban-rural relations (i.e. Allen, 2003; Ros-Tonen et al., 2015; Simon, 2008). This phenomenon is occurring in many regions of the world where, from the viewpoint of agricultural populations, cities are seen as holding the promise of economic prosperity (Gillen, 2016; Madaleno and Gurovich, 2004; Matthaei, 2018).

According to Friedmann, urbanisation processes in China exhibit a dual characteristic: their "relative newness and [...] ancient pedigree" (Friedmann, 2006). As such, when reading and examining urbanising regions, one must consider both their historical development as well as current spatial typologies. What emerges is a pattern of landscape and settlement structures that are synthesis of the rural and urban. They are what one can call "rurban landscapes" (Langner and Frölich-Kulik, 2018), areas in which rampant rural industrialisation processes, competing urban and rural jurisdictions, and urban-to-rural remittance flows are, among others, the main drivers of transformation.

A case study example of such rapid urbanisation and rural transformation processes is the coastal growth corridor of the region Huangyan-Taizhou in China, which belongs to the Chinese prefectural-level city Taizhou: as a rapidly urbanising region, it is subject to diverse and seemingly contradictory transformation processes that take place simultaneously and in close proximity, creating multiple dimensions of urban-rural interrelations. The complex effects of the reconfiguration of urban-rural relationships are noticeable: one finds "hinterland villages" struggling with demographic change, such as an exodus of young people to the cities. Highly dynamic urbanisation processes are evident, especially around the urban cores along the newly developed or developing infrastructure such as highways and express railway links. The former agricultural villages in this growth corridor are being transformed by new industrial and residential settlements. These industrialisation and urbanisation processes have a spa-

tial and structural impact on both the pattern of settlement and the structure of the landscape as well as on the interrelationships between social and natural processes. This is particularly apparent in the changing relationship between the regional water system and the settlement and management structures. The natural water system has undergone major changes in recent decades in both rural and urban areas. These changes in the settlement-water-relationship exemplify the process of transformation towards rurban landscapes.

Urban-Rural Relationships

The categories of the "urban" and "rural" have always represented particular societal orientations and consequently distinct realms of societal negotiation (i.e. Nell, 2014). But as the spatial distribution of the categories "urban" and "rural" become less clearly defined, it is the specific social practices, structural conditions or economic parameters that are being ascribed to these categories. If we attempt to allocate specific functions to urban and rural areas, however, it becomes apparent that functions overlap or are represented in both subspaces (Castells, 2001; Lefebvre, 2014; Sieverts, 2013).

Over the course of increasing urbanisation and globalisation dynamics, these categories have begun to blur into "different urban configurations" (Schmid, 2010, p. 155). At present, however, current spatial and social transformation processes are often described from a purely urban perspective. The term "different urban configurations" itself reveals that current ongoing dynamics are still generally observed, described and analysed from an urban perspective. New forms of reading and describing urbanisation processes are therefore needed (Angelo and Wachsmuth, 2014).

To better describe the intertwining of urban and rural lifestyles, realities and spatial structures, and to "navigat[e] between the urban and the rural perspective" (Langner, 2016), the term "rurban" was introduced and is now part of the contemporary discourse (i.e. Balk, 1945; Bauer and Roux, 1976; Henkel, 1993; Pretterhofer et al., 2010). Depending on the perspective and professional background, this term is used to describe urbanisation processes, settlement structures, cooperation and governance structures or spatial qualities (Langner/Frölich-Kulik 2018: 13). The term "rurban" helps to describe the intermingling, dependencies and conditions of everyday urban and rural practices from a perspective that is neither that of the city nor the country.

The Rurban Landscape Approach

From a landscape planning perspective, landscapes can today be understood as a dynamic "Raumgeschehen" (von Seggern, 2018) produced and re-produced by urban and rural practices. The concept emphasises the relationships between the natural conditions, human activities and economics, and also includes the temporal dimensions. By adopting a "landscape perspective" to a region, these different processes are viewed in an integrative manner making it possible to examine the dependencies and interrelationships between natural and social processes (von Seggern and Werner, 2008, p. 50).

This process-oriented understanding of landscape emphasises an approach that is primarily aimed at describing dynamic relationships in space. This view of space also includes the search for productive connections between previously isolated elements and the levels of meaning of space. Given this multi-layered characteristic and complexity of landscapes, conducting research within landscapes means dealing with "'wicked' problems [since they] cannot be simulated in a laboratory setting" (Rittel, 1972, p. 392). The process of research through design, in which the designer looks for connections between existing physical and social structures based on the findings from different perspectives, makes it possible to read and understand the complexity of landscapes (Lenzholzer et al., 2013). This is not a single valid truth but rather a possible constellation of knowledge (Nowotny, 2008) which can lead to further research and design.

"Rurban landscapes" stands in particular for the exploration and understanding of the manifold entanglements of urban and rural practices, imaginations and spatial structures. It makes it possible to capture the current dynamic spatial relationships detached from the conventional dualistic understanding. At the same time, it does not negate the attributions and particularities associated with the urban and the rural in various contexts of meaning. The "rurban landscape perspective" requires simultaneous and equal consideration of urban and rural practices, structures and imaginations. It reveals the ambiguity of the existing categories "city" and "country" and entails a critical view and (re)positioning of the complex network of relationships between "the" urban and "the" rural (Langner and Frölich-Kulik, 2018, p. 13). To establish or re-establish a position within the shifting conditions of rurban landscapes, urban and landscape designers and researchers must read and perceive the existing situations and structures carefully, and interpret and understand it to reveal relevant future questions that can serve as starting points for possible investigations and actions. Mapping practices are a very helpful instrument in this process of (re)reading and (re)interpreting rurban landscapes (Langner, 2019).

Focus: Rurban Water – Settlement Structures in Huangyan-Taizhou

In the Huangyan-Taizhou region, the interdependencies and interrelationships between urbanisation and natural processes, between "urban" and "rural" practices are particularly evident through the diverse aspects of water management and use in connection with settlement development. The rurban water-settlement relationships can be read and interpreted at the individual macro, meso and micro levels of landscape development: The macro-level provides an overview of the large-scale natural elements in the Huangyan-Taizhou region and the urbanisation dynamics of the past decades. The interdependencies and interrelationships between urbanisation and natural processes become particularly evident through the diverse aspects of water regulation in connection with settlement development. The meso level focuses on the Yongning river system that dominates the Huangyan-Taizhou region while the micro level details specific local daily water places along the river, within the villages, and the ditch system of the former alluvial plain of the river.

MACRO - The Region

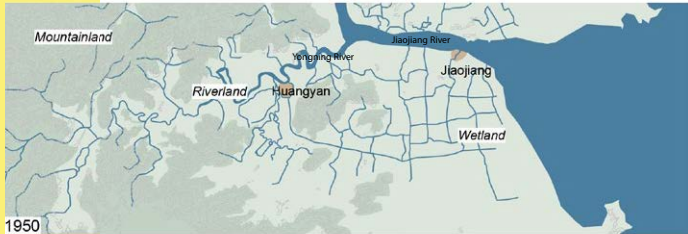
Western Taizhou is shaped by mountains and forestry. Settlement development in the MOUNTAINLAND is therefore restricted predominantly to the relatively narrow valley areas. The mountainous region, with its forested areas is of great importance for natural water retention and storage. The eastern side of the region along the coast is a WETLAND - a flat plain characterised by agriculture and a dense grid of trench systems for irrigation and drainage. Here, settlements developed along the raster of the canal and infrastructure system. There is also an industrial belt along the coast. The RIVERLAND with the central Jiaoling-Yongning River connects the key elements that structure the landscape in the east and west.

The wide plain with the old urban centres of Huangyan and Jiaojiang is formed by the meandering Yongning River and is suitable for the development of settlements in a broad corridor on the river's former alluvial land. To ensure a supply of drinking water, controlled water irrigation for the surrounding farmland as well as flood control and protection, the Chantan Reservoir was constructed in the 1950s/60s. The construction of the main flood gates at the mouth of the river Yongning led to further containment of the river and curbed the natural flood balance. Flood protection is based primarily on technical measures to regulate and control natural water dynamics and less on preventive measures, such as keeping and creating floodplains or improving natural water retention. This has an ecological knock-on effect as the natural ecological systems and interactions have been interrupted. Today, the river has become virtually a standing body of water (see the article by Xiao, Wende, Fügner in this periodical). Despite the extreme changes of the natural river flow, the Riverland is marked by a

dense mesh of canal systems extending up to the hilly forest area.

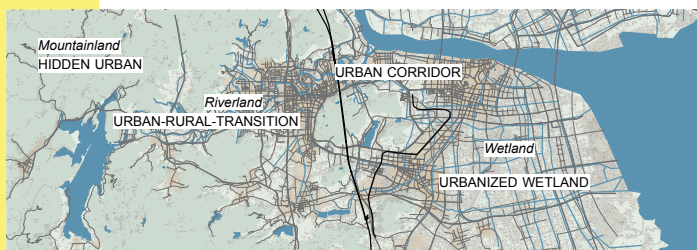
The development process of the core urban zones shows that in the 1950s, the settlement structures were limited to the urban centres of Huangyan and Jiaojiang on the banks of the Yongning River and Jiaojiang River. By the end of the 20th century, the urban centre of Luqiao had developed. Due to migration processes as well as urban-rural policies, those three central urban areas rapidly grew into a metropolitan area (see Fig. 1) that is no longer subject to the daily ebb and flow of high and low water.

Within that urbanising region, different types of urban settlement typologies can be characterised, for example, the "HIDDEN URBAN" located in the MOUNTAINLAND where spatial urbanisation tendencies are still barely visible but by looking for economically viable future models for the villages such as tourism concepts, urban structures and processes are becoming apparent as demographic change. In the RIVERLAND one can see two different types: on one hand, the "URBAN-RURAL TRANSITION" zone along the Yongning River stretching south into the wetland area, characterised by the industrialisation of former rural villages; and on the other, the "URBAN CORRIDOR" dominated by the cities Huangyan, Jiaojiang and Luqiao, with the transport infrastructure driving rapid urbanisation between the cores. The "URBANISED WETLAND" shapes the coastline, where settlement structures develop along and within the canal structures (see Fig. 2).



0 5 10 km

↑ 1
Changes in the urban built environment and water infrastructure in the years 1950-1999-2019



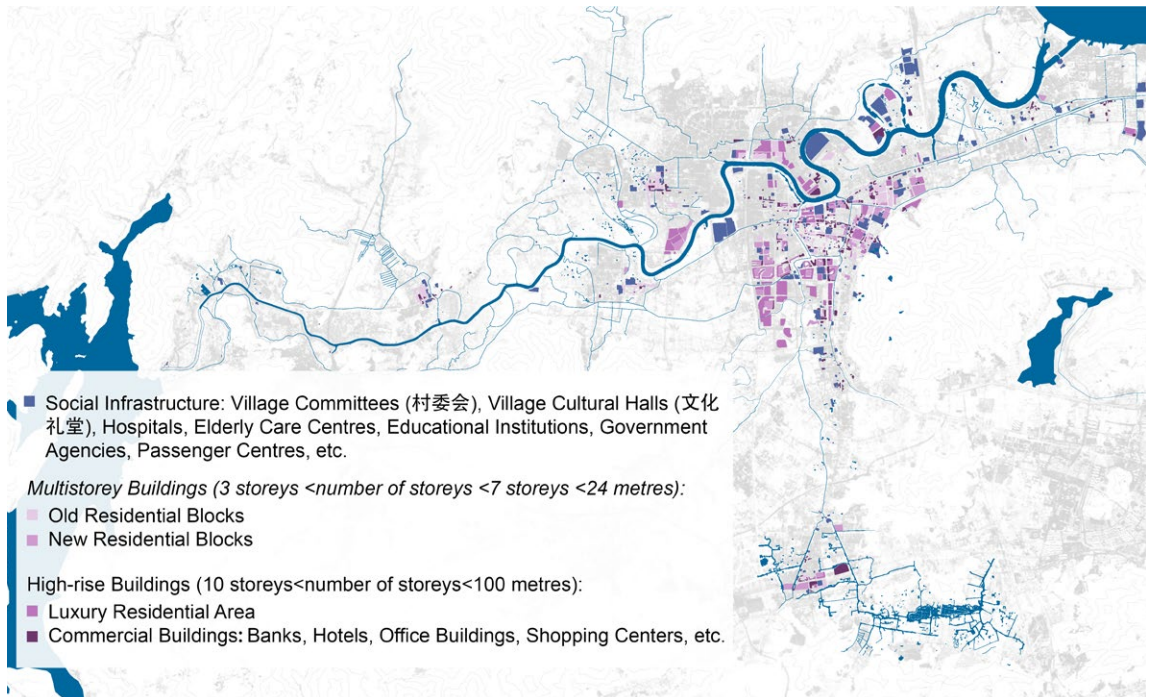
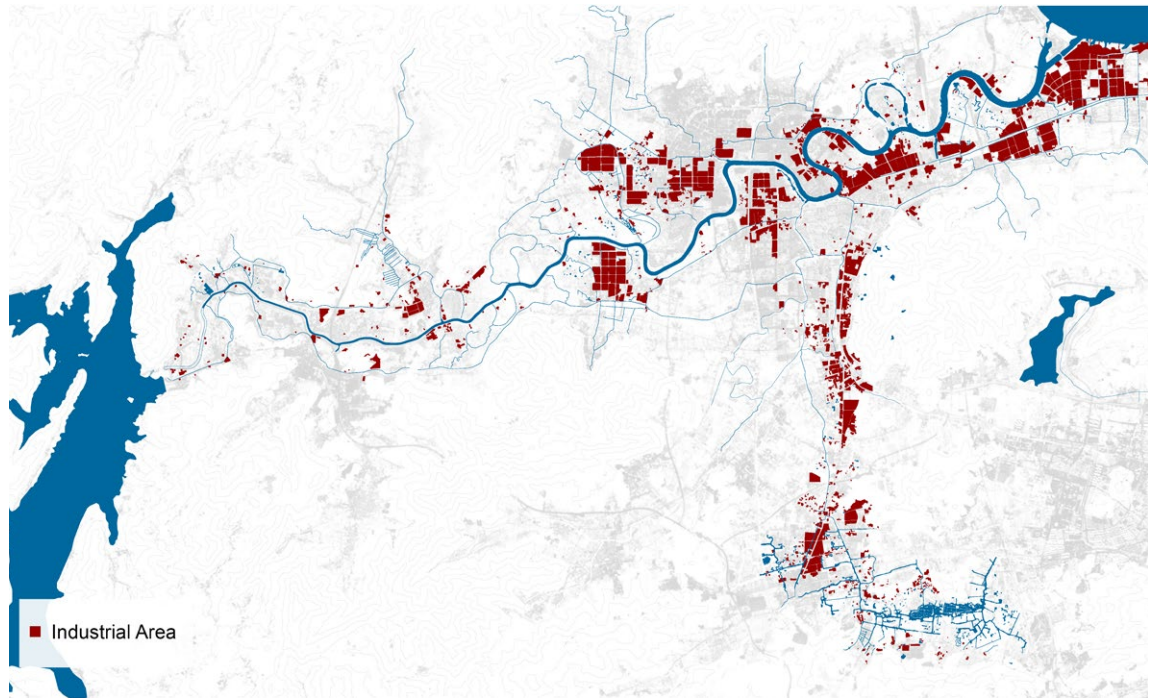
0 5 10 km

↑ 2
Types of urbanisation in the Huangyan-Taizhou region

MESO – The Riverland

The river has a significant structuring effect on the urbanisation dynamics in the RIVERLAND as can be seen in the transformation of the former alluvial land and the spatial and structural pattern of settlement development: in the old village centres across the entire river valley, one sees an even distribution of traditional house structures, while industrialisation is developing in and around Huangyan at the mouth of the river and along the infrastructure routes to the south. In addition, urban centres with new buildings, high-rise buildings, business centres and social infrastructures are consolidating the urban cores (see Fig. 3).

3
 ↳ ↳
 Cartographic stratification –
 Built settlement structures at
 the meso level

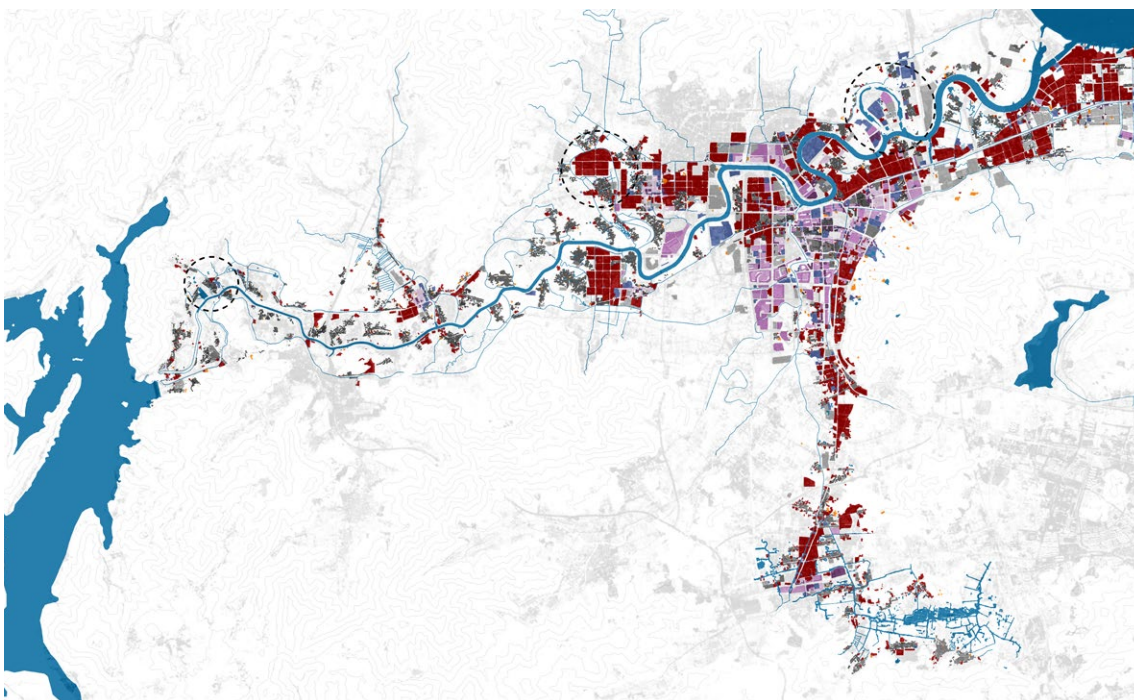


Examining the pattern of built settlement in the Yongning River valley reveals emerging rurban structures in the formerly rural area. They are all linked and influenced by the regional water system and represent distinctive urban-rural transformation processes, and are thus termed here as "AGRICULTURAL VILLAGES", "INDUSTRIALISED VILLAGES" and the "NEW URBAN".

"AGRICULTURAL VILLAGES" still exhibit the original village structure as a semi-organised conglomeration of settlement and are characterised by a variety of ponds and canal structures for irrigation as well as the agricultural fields in and around the villages. "INDUSTRIALISED VILLAGES" show structures of new villages as well as industrial areas. In many cases villages have merged around the industrial areas. According to local sources, many villages joined together to commonly rent out former farmland for use by industries. In the

Huangyan area, moulding industries are most prominent but the old canal structures are still readable. The "NEW URBAN" areas represent the development from agriculture village patterns to industrialised village structures or representative settlements with new residential and commercial areas and sometimes also high-rise buildings. In these areas, visual and leisure aspects are becoming increasingly important as the riverside park or the greenbelt along the river shows (see Fig. 4).

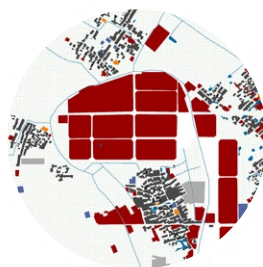
The socio-economic, demographic and ecological reasons driving the formation of these rurban spatial structures can be better read and understood in the context of the specific water situation and can be seen as being representative of the rurban water-settlement relationships in the region.



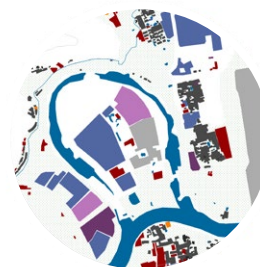
4
←
Rurban village types identified in the region: Agricultural villages, industrialised villages, new urban



Agricultural villages



Industrial villages



New urban

MICRO – The Water Places

The former alluvial area of the RIVERLAND is still marked by irrigation, drainage ditches and sewage canals networked with the river. In the former villages in the region, water from the ditches flows into village ponds to cover everyday water needs.

Despite major changes to the original watercourses, three typical water structures are still evident in everyday use in the RIVERLAND: The river, the system of ditches and the village ponds. They are not only cultural, economic and ecological resources but also correspond to distinctive functions as everyday spaces.

The Yongning river is still in constant use for irrigating agricultural fields as well as for daily practices such as washing clothes. At the same time, the visual aspects of the river are beginning to play an increasingly important role as a quality of living in the new residential/high-rise building areas.

In the more recently built-up areas, the dense system of ditches previously used for irrigation and drainage have partly lost their central function, but in less developed and built-up areas, and in agricultural areas they continue to play an important role.

In the course of the urbanisation processes and the transformation of agricultural structures into industrialised villages or residential and commercial areas, the village ponds are disappearing as the corresponding land surfaces are increasingly sealed. Where they still remain, the ponds are used as irrigation basins, drinking water reservoirs, industrial waste pools but also as communal meeting places. In the industrial areas, new and modern-looking water basins have been created, seemingly as visual highlights.

With the help of interviews and portraits developed from them, the significance of these water resources for the everyday life of the inhabitants was revealed and examined more closely. The following portraits in Fig. 5 provide an indication of the everyday use of water in the region (see also the article "Walking through Rurban Landscapes" in this periodical p. 55-67).

An examination of the water structures shows that the topological integration of natural elements in settlement development must be considered not just in the categories of urban and rural. By revealing the layers of landscape transformation at different scales, one can identify specific questions for the future of the areas, and possible avenues of action with respect to the water-settlement structures, for example: How can technical flood protection be more strongly supplemented by preventive measures/nature-based solutions and the improvement of water retention? How can the concept of "sponge city" influence the development of the areas? How can one improve the accessibility and biodiversity of riverbanks? Can the system of ditches be re-conceived as a multidimensional close-knit blue-green network for a porous and water-related settlement pattern? How can one improve the quality of the water in the ponds and strengthen their importance as communal spaces?

The river, the ditches and the ponds – everyday uses of water in the region

5 ↓



The river
People come here to get water for growing vegetables as there is no access to water adjoining their fields. This is also where nearby residents gather together to wash clothes every morning from 6 to 8 o'clock



The ditches
The land surrounded by new residential quarters has already been sold, but many residents still use it as temporary farmland for vegetables. They are aware that the land may be developed in future.



The ponds
An old lady carries water from the ponds to her surrounding fields

Conclusion

Reading and revealing landscape and settlement structures and typologies across different scales provide a better understanding of the various constellations, relations and interdependencies between natural conditions and urbanisation processes as well as between "the" rural and "the" urban. Through their interweaving, the structures and processes of the region can be read as emerging "rurban landscapes". Revealing these interdependencies also opens up possible perspectives for further research, discussion and (re)thinking of productive interrelationships within the landscape. In this sense, mapping practices help uncover the internal mechanisms and underlying structures of landscapes.

Understanding the genesis of the landscape and the interdependencies between natural processes and urbanisation processes is a prerequisite for identifying the risks and challenges as well as possible drivers of sustainable development in the region. This approach of uncovering the existing logic of landscapes as a basis from which to reformulate reality is described by K. Shannon and S. Manawadu as "descriptive landscape urbanism": "A descriptive landscape urbanism could evolve from the careful reading of layered contested territories and the designerly investigation of potential" (Shannon and Manawadu, 2007, p. 17).

The aim of our further study in the framework of URA's research and development phase is to reveal the underlying logic of water-settlement topologies within the urban-rural transition zone and to identify starting points for a water-related development of the region. The multi-functional quality of the landscape elements investigated here raises new possibilities for sustainable water-oriented planning as a spatial networking system that can serve as a productive connection between the urban and the rural dimensions of the region. Future questions with regard to, among other things, the quality, management, use and accessibility of water as well as inclusive and integrative urban-rural governance and planning tools need to be explored and resolved in close interdisciplinary collaboration. This will entail networking across various levels.

Finally, the perspective of rurban landscapes as a concept of urban-rural relationships intends not only to critically reflect on the commonly used categories of the urban and rural, but also to include the rural perspective in the discourse on research into the urbanisation processes taking place.

The Urban-Rural Interface as a Gradient of Ecosystem Transformation: Tracing and Analysing the Flood Risk of Yongning River in Huangyan-Taizhou Region

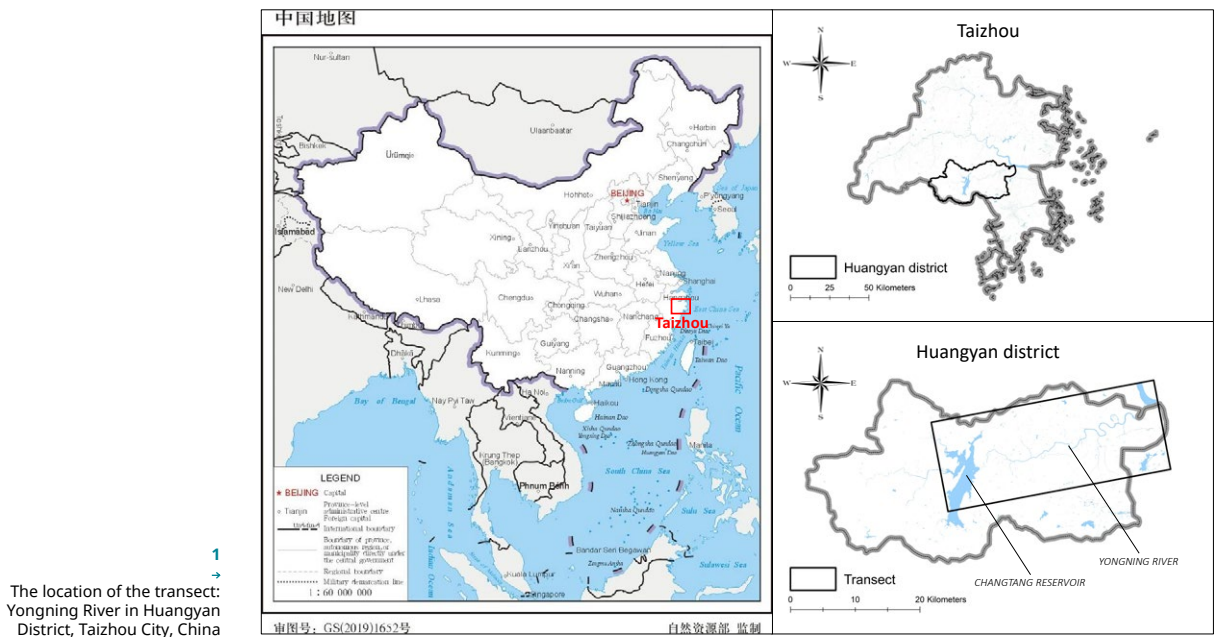
Suili Xiao, Wolfgang Wende, Till Fügener

In May 2019, the river flowed from the lush mountainside down through the village of Wuyantou, shaded by green trees and bushes on both sides. Located in the mountainous area of Huangyan district (a part of Taizhou city), Wuyantou is a vibrant settlement of friendly villagers and inquisitive tourists. Under the local government's policy of "rural revitalisation", the village is striving to become an official "Beautiful Village", preserving and using the rich natural and cultural landscape in a sustainable way by renovating old houses, preventing water pollution and recycling garbage. The fostering of rural tourism seems a promising pathway for this village to boost its social-economic development and improve environmental protection. However, in October 2019, the scene changed drastically following the devastating flooding of the super-typhoon Lekima: the sides of the river had become strewn with debris and the embankments destroyed, many shops were closed or in need of repair; indeed, silence reigned throughout the village. One older woman living at the foot of the village almost died when floodwaters engulfed her house due to the convergence of the mountain streams. Obviously, in our research area Taizhou, the ecological risks were overlooked by current Beautiful Village measures. Similar consequences can be found in other regions in China as well. For example, in 2010 the county of Zhouqu in Gansu Province, northwest China, was struck by a massive landslide, which swept through one-third of the entire city, leaving 1,492 dead and destroying much farmland and many houses (Wang et al., 2016).

Recently, there has been much discussion of flood vulnerability and water management in the wake of rapid urbanisation, particularly the question of whether transformation should be achieved "by design" rather than "by disaster" (Sommer & Welzer, 2014). Unlike well-established urban centres, low-density suburban and ex-urban communities are more vulnerable to flooding due to a lack of adequate storm drainage systems and other infrastructure to accommodate increased surface runoff (Brody et al., 2014).

The issue of flooding is complex, rooted in factors such as social-economic development, ecosystem dynamics and policy responses. Indeed, policies and solutions for flooding have evolved over time to reflect the changing interaction and relationship between people and nature. As the transitional space between urban and rural areas, i.e. the nexus between people and nature, has been described as crucial for the productive forces of global economies and at high risk of flood impact, it should be a primary concern of researchers and policymakers (Allen, 2003).

This essay discusses flood risks in the urban-rural interface of Huangyan-Taizhou. For our analysis, we adopt two theoretical lenses, namely flood management and ecological security, to systematically investigate the causes, manifestations and consequences of flood risk. The transect method was used to gather base data from across the urban-rural continuum. Specifically, in October 2019, our research team traced the Yongning River in Huangyan District, Taizhou city, Zhejiang province, China (see Figure 1). To delineate a complete picture of flood risk in Huangyan-Taizhou, we consider historical, political and ecological factors in an integrated fashion to uncover the ecosystem dynamic behind flooding as well as to pinpoint alternative measures for ecological security in the urban-rural interface.



Being a coastal city with a dense population and fast economic development, Taizhou faces the difficult challenge of lowering the risk of devastation through typhoons and flooding. The typhoon season from July to October regularly brings strong winds, rainstorms and storm surge. Due to their massive energy and large radius, typhoons not only destroy low-lying dykes and ponds as well as houses and farmland but also endanger the life and property of local people. Statistics show that from 1949 to 2008, Taizhou city was hit by 142 typhoons, i.e. an average of 2.6 per year. Over this period, there were more than 70 major floods, 60 of which were caused by typhoons. Examining historical records, it has been shown that a five-year flood will inundate 43.6% of the city centre (including three districts), whereas a ten-year flood will engulf 48.3% (Li, 2008).

One of the constituent districts of Taizhou, Huangyan is at high risk of flooding due to its particular biophysical and social-economic development. Covering an area of 988 km² and with a population of approximately 570,000 (statistical yearbook of Huangyan 2019), Huangyan is surrounded by mountains and hills to the south, west and north, making up 68.7% of the total city precincts. The terrain is high in the west and low in the east, where flatland makes up part of Wenhuan plain, an important centre for the growing of grains and citrus fruit in Zhejiang Province. Yongning River runs through the entire territory of Huangyan from west to east, serving a drainage basin of approx. 889.8 km² (Yu, 2010). On both sides of the river, there are large orange plantations and vast paddy fields. Thanks to a warm climate, fertile soil and the river network, Huangyan has long been called the “granary” of Taizhou.

Known as Huangyan’s “mother river”, Yongning River brings many benefits in the form of irrigation, water transport and fishing; at the same time, the local people are regularly hit by flooding and tidal surges. In the face of an ever-increasing risk of flooding combined with breakneck ur-



2 ↑
The dam of Changtang Reservoir

banisation and industrialisation in the early twentieth century, the authorities in Taizhou have long adopted technocratic and engineering-led solutions to flood risk, especially following the establishment of the PRC in 1949.

Hydraulic Engineering and Flood Control

Changtan reservoir, the second largest of the 347 reservoirs in Taizhou, was constructed in 1964 in the upper reaches of Yongning River. Designed to prevent 100-year floods, it is also used for irrigation and hydropower. The reservoir controls half of the drainage area of Huangyan district and 60% of the total water volume of Yongning River. The storage capacity was increased to 691 million m³ through upgrading work completed in 2004 (Tu, 2012). In addition to flood control, the reservoir also supplies drinking water to three million citizens in the city centre and suburbs of Huangyan-Taizhou.

Clearly, the flood control, irrigation and water supply services of Changtan reservoir are hugely important for Huangyan district and Taizhou city. The hydrological features of Yongning River were transformed by its construction, for instance, the water flow fell in some critical sections by as much as 70% to 99% (Han et al., 2001). In some middle and downstream sections, however, such as agriculture areas near the riverside, the flood risk actually increased somewhat due to increased siltation (Jia, 2000).

To assist the reservoir in controlling floodwater and in improving the problem of waterlogging in downstream river sections, another hydraulic engineering project, the Yongning River Control Project, was launched in 1993 with the aim of “storing water in the upstream, dredging in the midstream, blocking in the downstream”. This project developed the largest sluice, named Yongning Great Sluice, at the estuary of Yongning River; furthermore, 37 km of the river below the reservoir were dredged, 300 sluices were constructed and some river sections were straightened to speed up the river flow for better flood control (Archives of Huangyan).

Yongning Great Sluice completely changed the hydrological characteristics of Yongning River, which became an inland waterway with no tidal flows. Consequently, water is no longer saline. New plant species and microorganisms thrived, while the soil characteristics in the waterbed or the riverbanks were altered. According to a comparative analysis conducted before and after the construction of the sluice in the 1990s, the current was weakened and the water quality significantly impaired.

The construction of the Changtan reservoir and sluices (Figure 2) has certainly boosted the flood management of Yongning River. However, new challenges have arisen due to the irregular discharge of floodwater from the reservoir, water level jacking from the sluice, as well as siltation in the tributaries and increased soil-sealing in urban areas (both of which cause flooding and waterlogging) (Lin, 2014).

Land Use and Flooding

Many scholars have investigated and quantified the hydrological impacts of urban development (e.g. Im et al., 2003; Tourbier & Westmacott, 1981). In particular, a large number of studies have confirmed the negative repercussions of urbanisation and changes in land use, in particular the danger of increased flooding and waterlogging.

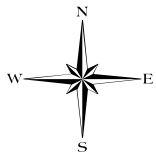
From 2000 to 2019, the urbanisation rate of Taizhou grew from 51.5% to 63.7% (Taizhou Municipal Bureau of Statistics). In line with urban development plans, Huangyan district has vigorously implemented the strategy of “development along the river”, creating an urban landscape that features a combination of “river, mountain and city”.

Our research project has shown how land use and land cover along Yongning River has been transformed over the past 25 years. Much green space has been lost due to the expansion in urban settlements. By analysing and interpreting satellite imagery of the transect area, we found that from 1995 to 2019, urban or built-up areas increased by 14% while areas of forest and grassland decreased by 17% and 6%, respectively. The extent of agricultural land also fell by 7% (see Figure 3). Land use and land cover along the river have changed dramatically due to expansion of the city as well as rural urbanisation in the form of thriving town and village enterprises in rural areas (Wheater & Evans, 2009). In Huangyan, vast swathes of the natural landscape and permeable surfaces have been replaced by built-up structures and impervious surfaces, increasing surface runoff and reducing the general functionality of the hydrological system. Similarly, along Yongning River, the development of industrial parks and intensive farming has led to a fragmentation in land use. Drainage in the separate plots is often managed individually, with some private businesses simply removing runoff through the riverway system or concrete channels.

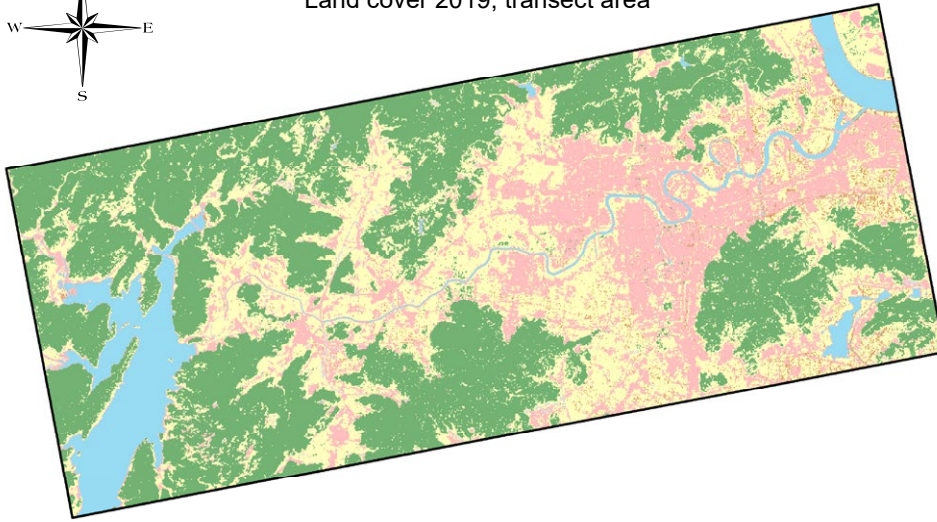
Collaborative Governance and Nature-based Solutions

In October 2013, typhoon Fitow reached Zhejiang province, triggering severe flooding in the whole province and inundating many towns and cities. This encouraged the authorities in Zhejiang to consider managing the natural and artificial hydrological systems in an integrated way in order to better solve problems such as flooding and water pollution. It is seen as essential to govern the “five waters” in parallel, namely sewage treatment, flood control, the discharge of collected water, a reliable water supply and water conservation. Such integrated water management is clearly an essential policy to ensure continued economic growth and sustainable development while constituting a vital step forward in the institutional reform of urban water management.

Huangyan-Taizhou was also severely affected by typhoon Fitow. In upstream Yongning River, the storage capacity of Changtan reservoir was exceeded; downstream, the impact of the typhoon and heavy rainfall was compounded by an extremely high tide, prevent-



Land cover 2019, transect area

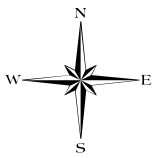


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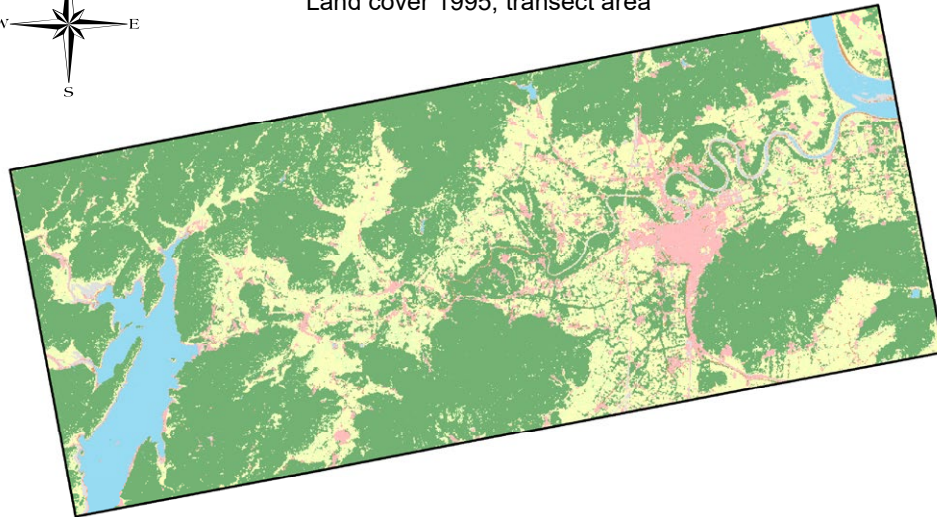


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Comparison of land use and land cover in the transect area along Yongning River for the years 1995 and 2019. The maps were illustrated by Till Fügener, based on remote-sensing data.



Land cover 1995, transect area



0 2,5 5 10 Kilometers



ing the sluice from working effectively. The river discharge was severely restricted, leading to flooding in nearly all of the villages and towns in Huangyan. Under the impact of climate change, floods are very likely to become more frequent in coming years, especially in mid-latitudes and the Asian monsoon region (IPCC 2007).

We note that, in general, the concepts of flood management have constantly been updated in an attempt to reduce flood risk: on the one hand, technocratic solutions are sought, specifically engineering-led responses featuring far larger and powerful defensive structures; on the other hand, nature-based solutions are also employed. As an example of the latter approach, Yongning Park was designed in 2002 under the concept of “making friends with flooding”. This park

replaced a concrete flood dike with natural riverbanks as well as restoring riparian wetland along the floodplain. Then in 2012, the project “Dissemination and application of plant measures for river ecological restoration” was praised by the Ministry of Water Resources, even winning the national Dayu Award. Subsequently, 45 km of greenways were developed along Yongning River from 2012 to 2017, linking urban-rural areas and increasing recreational services. Current development policies for the river encompass not just flood control measures but also multifunctional ecosystem services. Therefore, the flood defence of Yongning River in Huangyan-Taizhou is a useful example from which we can draw insights into the ecological transformation of the urban-rural interface.

Stakeholder Analysis and Qualitative Description of the Metal, Agricultural, and Plastic Sectors in Taizhou City

Oliver Larsen¹, Julia Santolin², Xin Qi², Shuang Wang², Z. Yang¹, Bing Xue¹, Vera Susanne Rotter¹

Introduction

Taizhou city is internationally known for its plastic industry and its worldwide connected metal recycling sector. At present, Taizhou has nearly 12,000 plastic-related manufacturing and service companies (Fan & Zhou, 2019), which produce about 70 % of the plastic daily-use products in the domestic market (Fan & Zhou, 2019), and contributed to nearly one-third of China's total export trade of plastic products in 2018 (Taizhou Statistical Bureau, 2019; Chinese National Statistics Bureau, 2020). Taizhou is also known as the "Capital of Recycled Metals," with an annual production of 400,000 tons, 350,000 tons, and 1,000,000 tons of recycled copper, aluminum, and iron & steel, respectively (Luo & Zhou, 2019). As early as in 2013, Taizhou's Industrial Metal Recycling Base (abbr. the Base hereafter) was selected into the fourth batch of the "Urban Mining" pilot program by the National Development and Reform Commission (NDRC) and the Ministry of Finance of China, with the overall goal of accelerating the development of recycling industries, cultivate new economic growth points, and accelerate the construction of a resource-saving and environment-friendly society. In 2019, after six years of development, the Base officially passed the final evaluation (National Development and Reform Commission, 2019). Taizhou is also known well for its popular agricultural products such as Huangyan tangerine and Manchurian wild rice, making Taizhou one of the essential fruits and vegetable production bases in China. The area of the crops and orchard in Taizhou is about 199,000 hectares and 67,790 hectares, respectively, with an annual production of 1.5 million tons of fruits and 0.5 million tons of crops (Taizhou Statistical Bureau, 2019).

Today, the recycling industries of plastic, metal, and organics (particularly in the agro-food systems) have become a priority area for the development of a circular economy towards long-term sustainability at both global and local level, due to their various direct or indirect effects on the natural ecosystem and human health. For example, the NDRC of China issued a particular policy in 2010 to strengthen the recycling and utilization of "urban mining" such as steel, plastics, and rubber (National Development and Reform Commission & Chinese Ministry of Finance, 2010). And the "Program of Promoting the Utilization of Agricultural Waste" was jointly launched in 2016 by the Ministry of Agriculture and five other ministries, which aims to improve the resource utilization level for materials such as livestock and poultry manure, and crop straw. Addi-

tionally, the program seeks to protect the rural ecological environment (Chinese Ministry of Agriculture et al., 2016). Regarding the plastic sector, a study published in Science by Jambeck et al. (2015) estimated that globally 4.8 to 12.7 million metric tons of plastic pollution entered the oceans each year with a Chinese contribution of roughly 2.4 million tons. Field evidence showed that the micro- and macro plastics enter terrestrial food chains (Huerta Lwanga et al., 2017). Therefore, recycling plastic waste is taken as an environmentally sound and friendly solution due to its ecological and economic advantages (Almeshal et al., 2020). When we apply a lens of urban and rural material interaction (material flow and the transference between rural - first and urban - second and third economic sectors), we see such interactions to be little understood and frequently characterized as disrupted. At the same time, a transition toward a Circular Economy (CE) also requires a holistic view of production and consumption systems along the value chain and lifecycle of products at the local scale. Therefore, this paper aims to identify and categorize relevant local stakeholders and describe the material flows of metal, plastic, and organic sectors in the case study region, Huangyan-Taizhou. These outcomes will provide the knowledge and communication foundation for the upcoming material flow analyses (MFA) to identify the material flows and quantify the recycling potentials of plastics, metals, and organics and tracing disruptions in material cycles. In terms of developmental practice, particular at the local level, stakeholder analysis and MFA constitute a critical basis for the development of a circular economy (Coenen et al., 2020). For instance, governments play a central role in the collaboration that will close the resource loops (Gupta et al., 2020). Through MFA indicators, policymakers can understand the relationship between economic and environmental development within a region, thus offering evidence to develop scientific and rational management policies (Gao et al., 2020).

Material and Methods

The iterative approach of the field study comprised stakeholder analyses, top-down, and bottom-up data acquisition, followed by the analysis, interpretation, and reconciliation of obtained data. Firstly, we outlined preliminary material sector structures and potential stakeholder categories. Based on that, a focused literature review and online research allowed the identification and contact of relevant stakeholders. We categorized these stakeholders according to their position in the

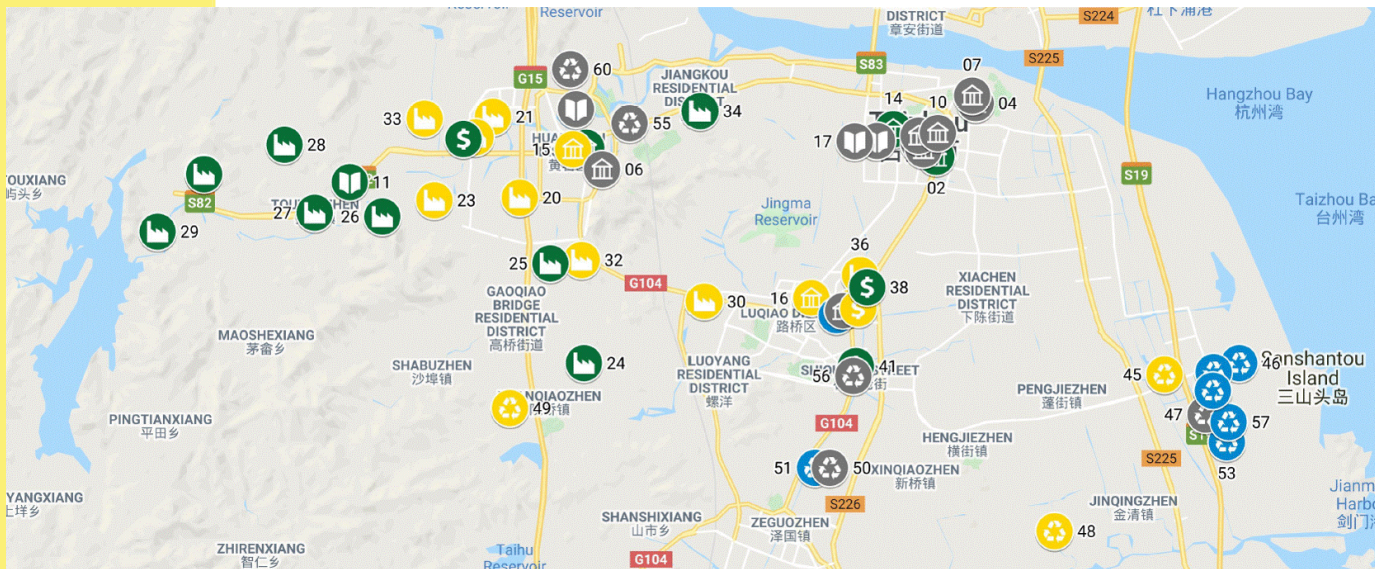
material flow chain, which included (1) governmental, (2) educational and non-governmental organizations, (3) cultivation, manufacturing and processing, (4) sales and services, as well as (5) waste management actors. Iterative data conciliation steps allowed the tracing of missing stakeholders along with material flows.

For the quantitative and qualitative description of the material sectors, we applied a hybrid integrated approach that combined bottom-up and top-down data acquisition methods in in-house desk analyses and fieldwork. For instance, the top-down screening method comprises data collection from literature reviews, academic articles, and the statistical yearbooks of Taizhou, Zhejiang, and China from 2010 to 2020. For the bottom-up approach, scientific, tailor-made, stakeholder-specific questionnaires were developed, followed by semi-structured interviews. Within a 35-day field trip in October and November 2019, the master students Julia Santolin, Shuang Wang, Xin Qi, supported by Oliver Larsen and Zheng Yang, conducted 105 interviews with identified actors, such as business leaders or government officials. The question focussed on the identification, spatial localization, and quantification of material flows and treatment or disposal. This bottom-up approach allows the reconciliation of partly abstract, general, and unspecific national and regional statistics with actor-specific, spatial, and local data. The stakeholder-category-specific questionnaires aim to display the current material flows situation, to track chronological sector and material flow dynamics, and to identify further material-relevant actors. Examples of questions are: How many tons of metal were recycled last year? Where do you sell the products? Which methods do you use for the recycling of trimmings? How many tons of fertilizers do you use per year? How do you manage agricultural residues?

Subsequently, the harmonization and verification of the obtained data and the closing of data gaps followed. Necessary calculations are based on further statistical and literature data. This publication contains the preliminary descriptions and assessments of Taizhou's metal, agricultural, and plastic sectors. The detailed material flow analyses will follow in upcoming publications.

Results and Discussion

We identified 60 stakeholders and assigned them to the investigated material sectors (listed in Table 1 in the attachment). The organic (green) and plastic (yellow) related stakeholders are mostly related to the category cultivation, manufacturing, and processing. Metal stakeholders (blue) are mainly linked to recycling and therefore belong to the waste management category. As figure 1 shows, the stakeholder's geographical locations show a spatial pattern of the material sectors and actor types. Stakeholders related to metal processing (blue) are concentrated in the rural east of Luqiao close to the Taizhou Bay in the Base. Stakeholders related to flows of organic material (green) are located throughout Taizhou City. Farms are spread in the rural west towards the Changtan Reservoir and the rural south of Huangyan. Processing companies are situated in the surrounding area of the urban center of Huangyan. The majority of plastic related stakeholders (yellow) are located in these areas, too. Educational, non-governmental, and governmental stakeholders (grey color with the symbols of building and book) are mainly allocated at the downtowns of Huangyan, Jiaojiang, and Luqiao.



Governmental

- 01 Huangyan Agriculture and Forestry Bureau
- 02 Taizhou Agricultural Bureau
- 03 Taizhou Bureau of Commerce
- 04 Taizhou Bureau of Commerce Jiaojiang Branch
- 05 Taizhou Environmental Protection Bureau
- 06 Taizhou Environmental Protection Bureau Huangyan Branch
- 07 Taizhou Environmental Protection Bureau Jiaojiang Branch
- 08 Taizhou Environmental Protection Bureau Luqiao Branch
- 09 Taizhou Statistics Bureau
- 10 Taizhou Urban Administrative Enforcement Bureau

Educational and non-governmental organizations

- 11 Institute of Citriculture, Zhejiang Academy of Agricultural Sciences
- 12 Metal Resources Recycling Industry Association (in Luqiao)
- 13 Nonferrous Metals Industry Association, Recycling Metal Branch (in Beijing)
- 14 Taizhou Agriculture Leading Enterprises Association
- 15 Taizhou Mold Trade Association
- 16 Taizhou Plastic Industry Association
- 17 Taizhou University
- 18 Taizhou Vocational College of Science and Technology
- 19 Zhejiang Taizhou Institute of Public Education for Waste Classification

Cultivation, manufacturing, and processing

- 20 Banyanghong Village (mold testing company)
- 21 Beicheng Industrial Zone
- 22 Beiyang Manchurian Wild Rice Farm
- 23 Chengjiang Industrial Zone
- 24 Fan Rong Tomato Farm
- 25 Gong Orange Garden
- 26 Huangyan Duanjiang Orange Cooperative
- 27 Juyuandi Farm
- 28 Liang Jun Manchurian Wild Rice Farm
- 29 Lovochun Farm
- 30 Luqiao Plastic Industrial Zone

- 31 Maofeng Street
- 32 Nancheng Industrial Zone
- 33 Smart Molding Town
- 34 Taizhou Yiguan Food Co. Ltd.
- 35 Xihe Ecological Agriculture Development Co.
- 36 Zhaoqiao Industrial Zone
- 37 Zhejiang Judong Co., Ltd.

Sales and services

- 38 China Agricultural Tradecity Wholesale Market
- 39 Huangyan Market
- 40 Luqiao Plastic Chemical Market
- 41 Luqiao Wholesale Market (with composting)
- 42 Taizhou International Plastic Mall
- 43 Taizhou Hardware Market
- 44 Zhejiang Judong Trading Market

Waste management

- 45 Binhai Industrial Zone (recycled granulates company)
- 46 Chio Metal Recycling Co., Ltd.
- 47 Luqiao Waste to Energy Plant
- 48 Sanyou Holding Group
- 49 Sulou Village
- 50 Taizhou Dafengye Metal Co., Ltd.
- 51 Taizhou Fengjiang Metal Renewable Park
- 52 Taizhou Ouchen Metal Material Co., Ltd.
- 53 Taizhou Pingyun Waste and Old Materials Utilization Co., Ltd. (Southwest Gate)Ltd. (Southwest Gate)
- 54 Taizhou Renewable Metal Resources Industry Base (Northwest Gate 2)
- 55 Waste Sorting Centre (with composting)
- 56 Zhedong Waste Automobile Recycling Co., Ltd.
- 57 Zhejiang Fanrongchangsheng Metal Co., Ltd. (Southeast Gate)
- 58 Zhejiang Judong Co., Ltd. (Southeast Gate)
- 59 Zhonghuan Biotechnology Co., Ltd. (not in the map, close to Linhai, northwest of Taizhou city)
- 60 Zhulingtou Landfill (with composting)

The Metal Sector in Taizhou City

Before 2019, Taizhou's metal sector focussed on the treatment and recycling of global scrap metal material streams. Most of the recycling companies were located in the Base in the rural east in the Luqiao district. And more than 100,000 people were employed by Taizhou's metal recycling industry by 2015 (Luo and Xia, 2015). In 2016, about 2 million tons of scrap metals were imported from foreign countries, dismantled, and used as secondary raw materials in metal manufacturing companies, with an output value of the metal recycling industry in the Base of 17 billion RMB, accounting for 34 % of the total yearly industrial output value of the Luqiao District (Li et al., 2017).

In 2018 the Base comprised 38 metal recycling companies (Luo, 2019; Li, 2019). In general, waste hardware and waste engines were the primarily imported metal wastes. Most of the waste got dismantled manually; only a small part of the large items was treated with the help of machines (Luo, 2019). After these partly environmentally harmful dismantling steps, the recycling companies sold the secondary raw material metals (e.g., Cu, Al, and Fe scrap) to metal product manufacturers in the affiliating counties of Taizhou city (Yuhuan, Wenling, etc.). Hereafter, mainly unsophisticated metal products like valves, water faucets, or car spare parts are manufactured locally and sold to domestic and foreign markets.

Such metal flow established locally and globally got severely interrupted in 2019, as the Chinese government introduced the ban of imported solid waste (Ministry of Environmental Protection, 2017), which essentially banned the import of metal scrap in China. Recent numbers of the impact of the metal scrap import ban on the economic situation and employment do not exist; however, due to the collapse of the past waste metal material flow system, we hypothesize significant detrimental effects for Taizhou's social and industrial sectors. The crumbling effect manifested in the fourth quartal of 2019 when the imported volume of metal scrap shrank by ca. 98% to approximately 0,008 million tons (Luo, 2019). Our field data show that in October 2019, only 11 out of 38 companies kept their import permission for metal scrap. Companies, which lost their license either shut down or changed their business. Some companies outsourced the metal scrap dismantling to countries in Southeast Asia and started to import secondary raw material metals to China. Other remaining companies are planning a shift from the dismantling and recycling of metal waste to the manufacturing of metal products.

These findings are mainly based on information from statistical yearbooks and literature data. The data acquisition from the bottom-up data approach yielded in sobering results. Despite interviewing six of eleven recycling companies from the base, solely few quantitative data could be obtained. The willingness for data sharing was low. Overall we note an inferior data availability and quality for the metal sector.

The Plastics Sector in Taizhou City

Plastic sector in Taizhou primarily serves national and international exports. According to our on-site survey, in 2019, about 3.7 million tons of plastics products

were produced in downtown (Jiaojiang, Luqiao and Huangyan) of Taizhou, and more than 95% of the plastic products were exported to other Chinese provinces and abroad. We calculated for Taizhou a total plastic product consumption of about 0.37 million tons, which was mainly distributed in six segments: (1) construction & building, (2) automotive, (3) electrical & electronic equipment (EEE), (4) packaging, (5) household, and (6) agriculture. Among them, the construction & building and the packaging segment are the two most significant segments, with each contributing about 40% to the plastic product consumption.

Based on the processing of our collected integrative data, the plastic waste generated in Taizhou amounts to about 0.34 million in 2019, of which, about 0.17 million tons originated from plastic products consumption. Nearly 60 % of that is caused by packaging waste. Further circa 0.167 million tons were production wastes from the plastic industry sector. In addition, as the center of the Chinese casting molds production, Taizhou also generates plastic waste from the testing of new casting molds. We estimate about 2,000 tons of plastic waste in 2019 from casting mold testing.

Our field study revealed that the informal sector dominates the plastic waste collection and recycling in Taizhou city. In 2019, about 26% (44,000 tons) of post-consumption plastic waste were collected for recycling and subsequently processed to recycled plastic granulates. We observe that the recycling rates of plastic waste varies with the plastic consumption segments. We value about 100% in the automotive sector, followed by 89%, 44%, and 30% for EEE, agriculture, and packaging, and no recycling in the construction & building segment. According to our calculation, the majority (about 0.13 million tons) of the generated plastic waste in Taizhou was landfilled or incinerated in 2019.

The informal plastic recycling system occurred in the 1990s. Under this system, families gathered in specialized preprocessing and recycling villages and conducted the majority of the informal plastic recycling. The recycling of plastic wastes offered job opportunities and income, but it also causes safety (fire), health, and environmental complications due to missing safety standards, improvised dismantling approaches. According to our findings, the local government met the challenges in 2018 with a gradual implementation of a new waste collection system based on separation at the source waste collection at household level and the launch of an official waste sorting center. Until recently, the amount of plastic waste treated by the waste sorting center was 3 tons in 2019 (Zhang, 2019; Zheng, 2019). The goal of the new waste collection system is to improve waste recycling. Along with that, the government shut down most of the informal recycling activities. Our on-site investigation showed that at least five out of six informal collection villages were forced to reduce the preprocessing and recycling activities by the end of 2019. This regional ban on informal waste plastic recycling caused flows of collected waste plastics to recycling companies in surrounding cities.

Despite a considerable lower involvement of material waste flows than the metal recycling sector, the plastic recycling sector undergoes a similar elementary

enforced system change. We assume that the pursued formalization of the plastic recycling induces substantial economic and social harms to the stakeholders of the traditional plastic waste recycling sector.

These findings are based on the combined top-down and bottom-up data acquisition approach. We observed a limited statistical data availability for the recent formal plastic waste recycling sector. However we assume an increasing data supply with its expansion. According to our findings, no official statistical data exist for the informal plastic waste collection and recycling sector. Though the stakeholders from the informal sector offered a relatively high willingness to share data, we assume a deficient data quality due to missing processing and quantification standards.

The Agricultural and Food Sector in Taizhou City

Taizhou City's agriculture is polarized in small-scale subsistence farming near residential areas and widespread commercial farming, which can be divided according to their environmental standards into industrial, green, and organic farms. The majority of commercial farming is industrialized; however, the regional government aims to convert them to green farms. Though organic farming plays a marginal role up to now, it shows considerable growth rates in area and product volume.

The most important agricultural products in Huangyan in terms of production output and covered area are the Huangyan tangerine (*Citrus reticulata*) and the Manchurian wild rice (*Zizania latifolia*) (Huangyan Agriculture and Forestry Bureau, 2020; Wang, 2001).

For both products, the agricultural production, which occurs in Huangyan's rural area, is the most waste intensive stage of the life cycle. In the case of the Manchurian wild rice, the amount of waste equals the amount of final product: 42,000 tonnes of this vegetable are produced every year along with around 42,000 tonnes of waste (~60% leaves and ~40% peels) (Huangyan Agriculture and Forestry Bureau, 2020; Xie, 2019). Resulting from the yearly production of 64,100 tons of Huangyan's tangerine, about 126.000 tonnes of woody waste, leaves, and rotten fruits emerge (Huangyan Agriculture and Forestry Bureau, 2020). While the woody waste is currently used for cooking and heating, the rest such as leaves and rotten fruits remains on the farming land, used for animal feeding, burned, or sent to the Zhulingtou landfill (Cheng, 2019; K. Tao, 2019; Y. Tao, 2019).

For both products, further organic wastes occur in the urban-rural interface or urban regions during the life cycle stages of manufacturing, distribution, sales, and consumption. It can be concluded that current urban organic waste treatment patterns are preferably driven by waste disposal than waste recycling approaches such as landfilling of wastes. The rural organic waste treatment provides a partial circulation of nutrients; however, it leads to air pollution and GHG emissions caused by the burning of agricultural residues and the application of leaves in flooded fields (Yang, 2019).

Our findings suggest a lucid potential for reducing the amount of disrupted organic material flows and developing and testing novel, sustainable approaches

like composting or anaerobic digestion to close nutrient cycles and foster circular waste treatment.

Both, top-down and bottom-up data acquisition approaches resulted in a comprehensive and promising data set. We noted an overall high willingness to share data and to participate and conduct joint research studies.

Conclusions

These preliminary findings describe significant recent transformation dynamics in the metal and plastic waste recycling sectors caused by altered legislative frameworks. With the aimed change towards higher-order manufacturing, reduced environmental impacts, and increased circularity, these sectors experience drastic measures like import bans and work prohibitions. Regarding upcoming studies, the results suggest investigations on socio-economic as well as environmental impacts. By comparison, we recognised a more regular development with the goal to achieve higher ecological and sustainable standards for the agricultural and food production sector. Yet, this sector is still dominated by linear and disrupted material flow patterns within the urban-rural interface and environmentally harmful farming and production practices. We therefore, recommend the development of local and regional circular material concepts for following research activities.

We observed notable variations regarding data availability and quality among the material sectors. Caused by the stakeholder feedback during the bottom-up data acquisition approaches, we noted an increasing quantity, reliability, and access of data from the metal to the plastic to the agricultural sector.

In conclusion the agricultural sectors provides the highest potential for the development of circular development concepts and an apparent willingness for joint international research cooperations, supported by a promising data situation. For the upcoming research in the context of the URA project, we thus recommend the investigation and optimization of urban-rural material flows in the agricultural sector.

Acknowledgment

We thank our Chinese colleagues from the Zhejiang, Tongji, and Taizhou Universities, who provided insight and expertise that greatly assisted the research.





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Scenes from urban-rural interface in
Huangyan, 2019.06
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Evolving Socio-spatial Typologies for Dwelling in Huangyan's Industrialising Hinterland

Ava Lynam

The Practice of Dwelling

Globally, and particularly in China, the scale and pace of urban expansion is resulting in uneven and polarising socio-spatial development, with its impact most exaggerated at urban-rural interfaces (Brenner and Schmid, 2014; Soja, 2011; Wu et al., 2013). Interpreting these vast agglomerating regions requires an insight into the everyday struggles and inventive practices of inhabitants, or dwellers, who continuously adapt to and shape processes of extended urbanisation at regional and global scales (Brenner, 2000; Ruddick et al., 2017, p.2). Since the 1960s, sociologists and philosophers such as Henri Lefebvre (1991, 2003) and Michel de Certeau (1984) have employed the lens of Marxist theory to conceptualise the production of space in terms of mundane and repetitive everyday practices, shifting our understanding of urbanisation toward a process made up of socially produced space. This notion remains ever more critical today in revealing how the impact of these everyday practices is materialised and scaled up to inform the socio-spatial development of constantly expanding regions.

One type of everyday space relates to the activity of homemaking, i.e. dwelling (Lefebvre, 1991). Produced by heterogeneous social processes that give it meaning, the materiality of dwelling space reveals wider socio-cultural dynamics and locates them in a particular context (Bertuzzo, 2008, p.6), while also embodying the identity and emotional state of those who use it (Heidegger, 1971). Thus, to facilitate an understanding of the local impact of extended urbanisation, this article presents a selected catalogue of hybrid and dynamic practices, characteristics, and spatial typologies for dwelling uncovered at Huangyan's industrialising urban-rural interface.

Huangyan's Fragmented Transition toward Industrialisation

Within the mega-urban Yangtze River Delta corridor, the Smart Moulding Town (SMT) in Huangyan-Taizhou's hinterland is leading the local moulding industry's regional industrial upgrading process (Zhejiang Provincial Urban-Rural Planning Academy, 2015, p.9). The development is a manifestation of the Characteristic Town (CT) policy, a national rural urbanisation programme aiming to address food security, rural economic development, and urban-rural polarisation through a 'one town, one characteristic industry' model (Liao & Yi, 2018, p.17; Wenfang, 2018, p.449). Often, however, these developments only minimally or superficially address local challenges, instead imposing tabula-rasa developments that simply extend urbanisation into rural areas (Miao & Phelps, 2019, p.50).

This is the case at Huangyan's urban-rural interface, where formerly rural villages surrounding the SMT are undergoing a fragmented transition toward industrialisation, enabled by top-down farmland acquisition to provide profitable development sites. Entire villages are dependent on the renting of land to factories as lucrative income for village collectives, while many ex-farmers are undergoing drastic increases in wealth and/or living conditions. However, this concentration and over-reliance puts the local area at risk of industrial decline, leaving unskilled villagers and landless farmers particularly vulnerable. Despite the physical flexibility and dynamism of use of everyday space in China, in which residential space often serves a dual productive purpose, the majority of the new top-down housing developments instead implement functionalist architecture with compartmentalised uses (Woodman, 2011, p.126).

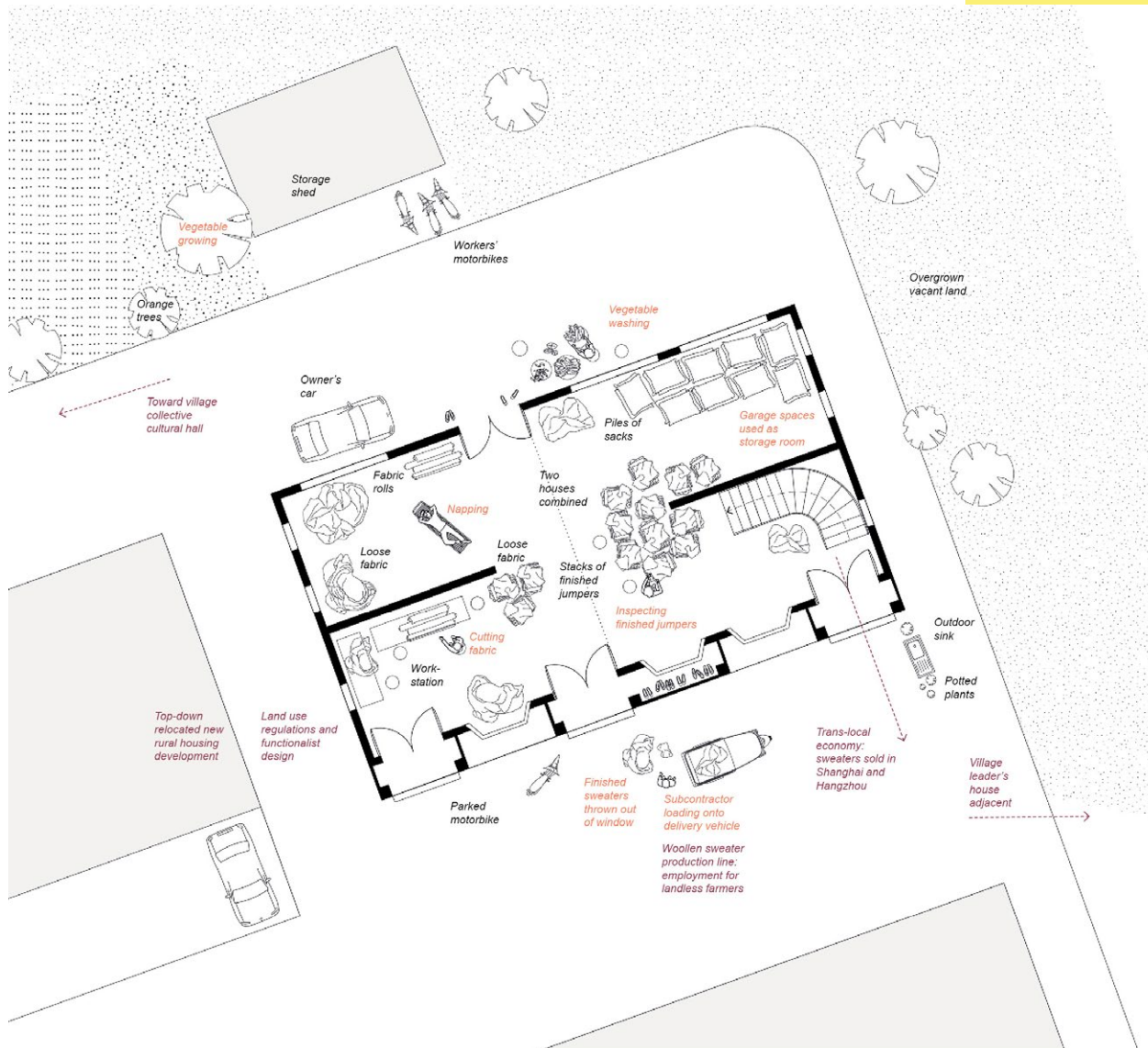
Emerging Socio-spatial Typologies at the Urban-rural Interface

To gain an understanding into the influence of the SMT on the everyday life of villagers living in its vicinity, an empirical socio-spatial methodology was employed by the author in Huangyan's hinterland. Moving beyond the notion of dwelling as an end-product or noun (habitat), towards a process or verb (to inhabit), Lefebvre's framework for spatial production was conceptualised through three interacting dimensions: social (dwelling practices and local rituals); physical (their material reality); and mental (the principle that governs dwelling practices; the way individuals perceive the constraints of their social world) (Kofman & Lebas, 1996, p.17; Stanek, 2011). Focusing on the role of everyday practices within urbanisation processes, it remains an apt critical prism for revealing the complex transitional and informal conditions that characterise the Chinese urban-rural interface. As a methodology, it allows the potential for the relocation of theory production to diverse global contexts (Roy, 2011). Operationalising this framework as a methodology in the field generated several overarching themes – productive dwelling, evolving urban-rural identity, villagers as pioneers – which enabled the definition of emerging typologies for dwelling at Huangyan's urban-rural interface.

Productive Dwelling

Even within the regulated environments of functionalist new rural housing developments, dwelling remains intertwined with productive practices as industrial activity creeps into housing. The extra space offered by new developments is highly valued, for its potential for new income opportunities such as household workshops. In some cases, work space is integrated into living rooms and garages, while in others, entire structures designed as private dwellings are repurposed for productive use. The SMT is often considered indirectly positive in terms of the productive potential of household industries, with opportunistic villagers capitalising on their relocation into more spacious developments. While the rapid shift from agricultural to non-agricultural income sources has a profound impact on villagers' everyday practices, the long-term environmental impact of integrating industry into the everyday environment is largely overlooked by resi-

dents and policymakers alike. Workers endure harsh working conditions demanded by the moulding industry; their everyday lives entirely revolve around long working hours and 24 hour shifts, lacking time for family and leisure activities. Furthermore, the increase of migrant workers due to employment opportunities offered by the construction and operation of the SMT is changing the physical landscape of the surrounding villages. An informal rental market has emerged in response to the manifold constraints faced by these migrants (restrictions of the hukou system, low paid work, lack of affordable housing), generating new dwelling typologies and living arrangements, such as extensions to existing housing, temporary container structures on driveways, or informal subdivisions of new rural housing. By introducing their own forms of spatial appropriation, migrants add to the hybrid everyday dwelling practices in the villages.



- Material space
- Interface
- Everyday practise

↑ 1
Productive dwelling: Socio-spatial analysis of 'the productive new rural house' in Qianyang village, a 3-storey new rural housing block repurposed as a woollen sweater workshop.

2



Productive dwelling: Top to bottom:
growing oranges and vegetables in front
of a grid of identical new rural housing
blocks; subcontractor's delivery vehicle;
gated front porch used for household
activities.

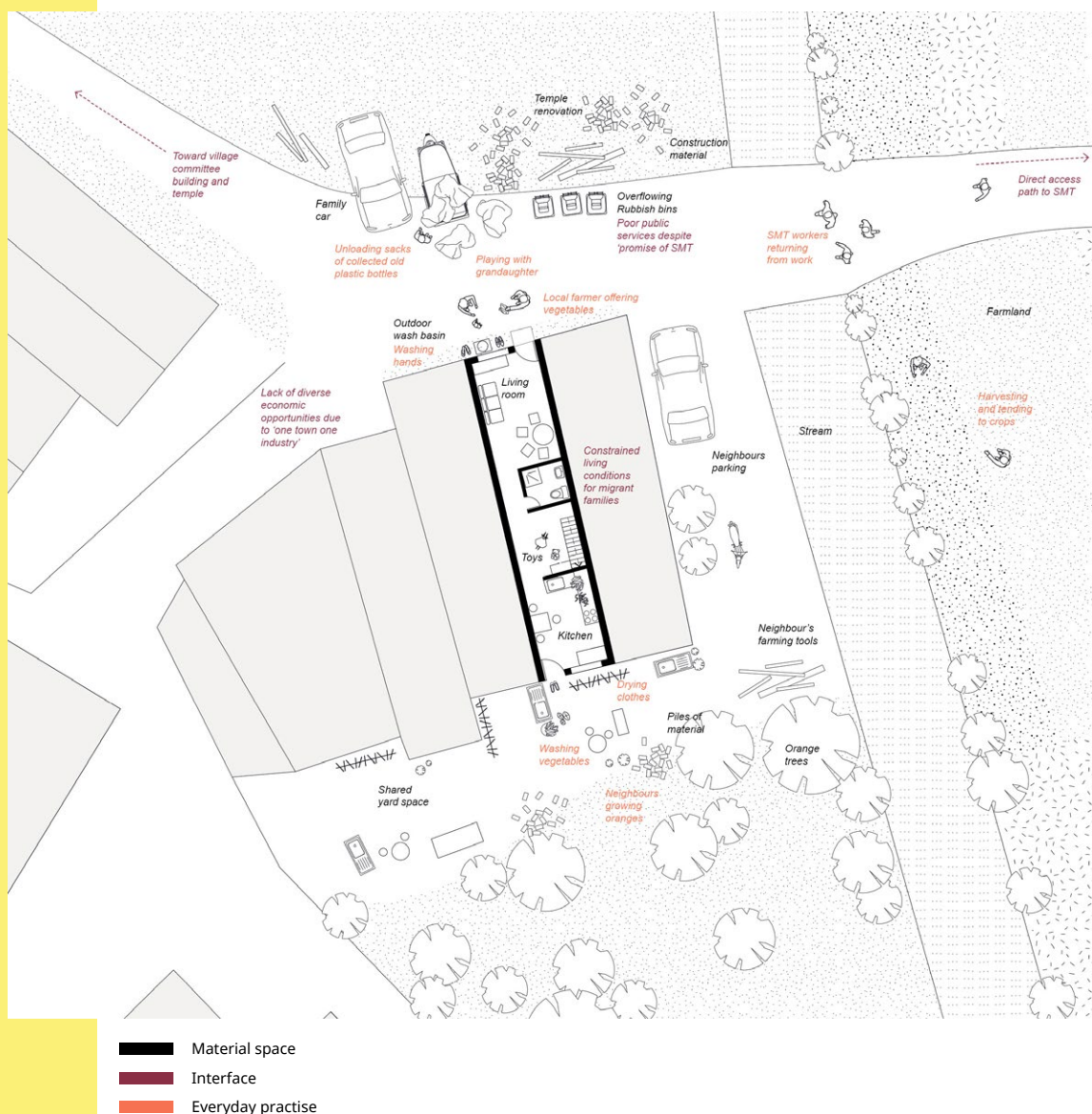


Evolving Urban-rural Identity

The rapid pace of industrialisation is resulting in dramatic lifestyle changes in which perceptions of urban and rural areas differ vastly between villagers of different age groups. While older generations tend to remain attached to traditional rural practices centred around agricultural production, younger villagers more often embrace busy urban lifestyles and struggle to relate to the nostalgia of their older family members or neighbours. Nevertheless, spaces which suggest a persistence of an engrained rural identity remain prevalent, in even the most urbanised villages. While the majority of villages have lost most of their agricultural production, many retain their practice of vegetable growing for household consumption. However, new rural housing developments typically disregard the morphology of existing village and dwelling layouts, failing to provide space which caters for the everyday activities of rural lifestyles. Despite this, the habitual farming practices of older villagers persist in any available space around housing, industrial workshops, and vacant land. Farmland is re-appropriated at a micro-scale, where spaces designed for urban lifestyles, such as parking spaces and driveways, are used for drying rice, vegetable gardens, and keeping chickens. Despite CT rhetoric of promoting local culture, a loss of building heritage is common, with traditional housing structures, many with ornate decorative features, left in a dilapidated condition without inclusion in development plans. Often repurposed as storage, workshop, kitchen, or rental space, these old structures are generally disregarded. This forgotten rural landscape also includes water ponds which were once integral to village daily life, used for drinking water and washing vegetables, the majority of which are now contaminated with household and industrial waste.

Evolving urban-rural identity: Socio-spatial analysis of 'the migrant family's new rural house' in Xingtou Village, a single storey old rural rental house lived in by an elderly migrant couple who look after their granddaughter and are involved in informal waste collection.

3 ↓





Evolving urban-rural identity: entrance to the migrant family's old rural house; shared backyard with the SMT in sight; playing outside while farmers tend to fields and moulding factory workers return from the SMT.

4 ← ↓

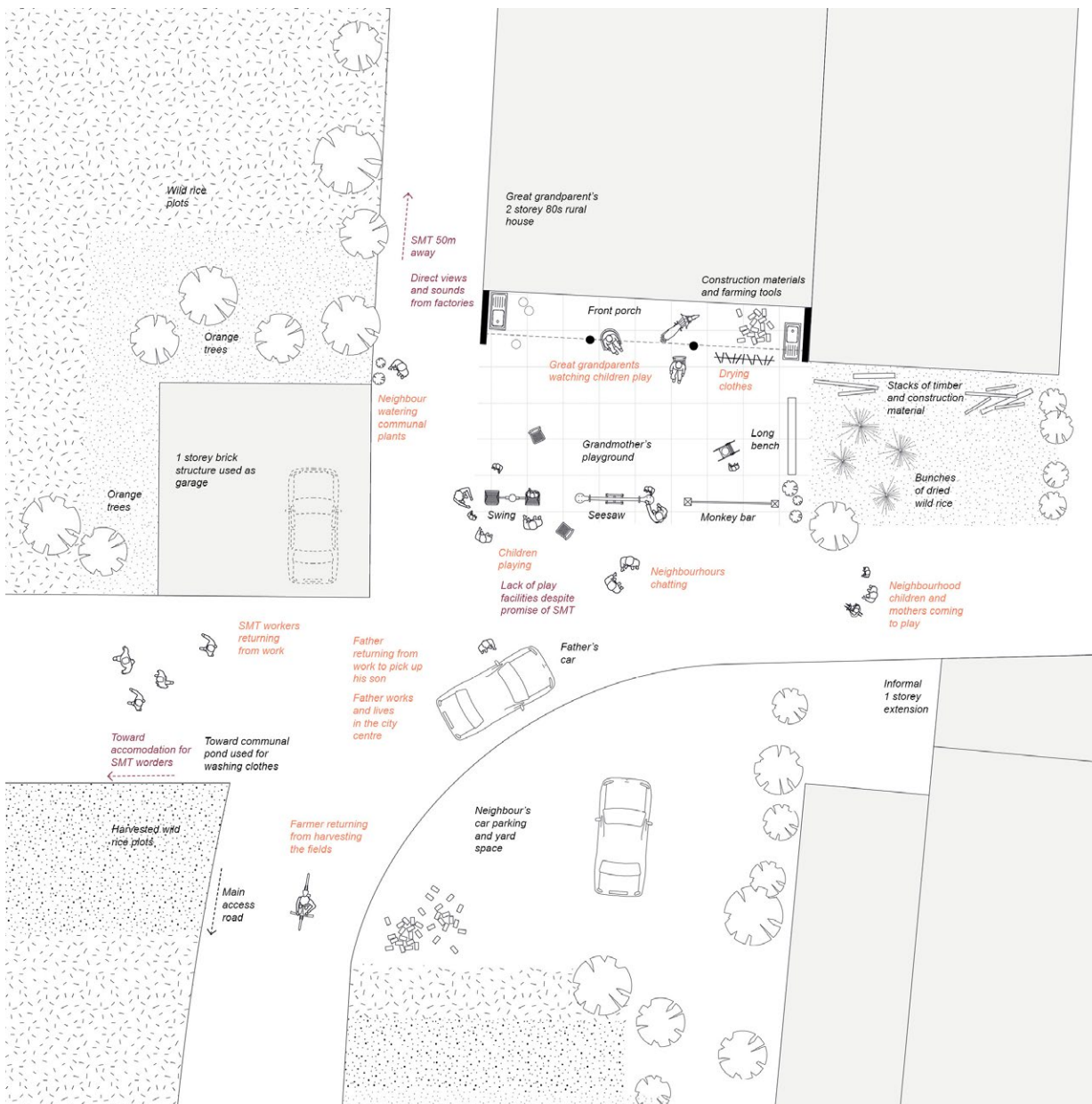


Villagers as Pioneers

Many cases of innovative socio-spatial appropriation can be identified in the villages, often driven by an entrepreneurial mindset. In some cases, creative adaptive reuse of space is perceived as a unique marketing device for a family business, such as the creative craftsmanship of a private dwelling of a local carpenter, and the elaborately designed workshop of a door manufacturer. Others embrace practices that emerge from industrialisation, such as the informal recycling practices identified as an economic incentive in some villages. These entrepreneurial villagers often have an adaptive attitude to transformations in the area and do not remain attached to farming practices. In other cases, villagers take on the role of providing neglected public services, using their own resources to repurpose space toward a social function that can foster networks between neighbours. Particularly within new rural housing developments, it is common for garages to be used as public living rooms and neighbourhood mahjong halls. Simple facilities are often sufficient for the creation of collective dwelling spaces, such as communal vegetable gardens or a temporary tent structure erected on the street for a neighbourhood birthday party. Some institutionalised spaces are appropriated by villagers to serve their own social needs; many village senior centres function beyond their intended purpose, becoming key public spaces for all types of residents. The social capital built by these spaces is critical in allowing for effective informal negotiations, with residents from the new and old village areas negotiating the use of space at different times of the day.

Villagers as pioneers: Socio-spatial analysis of 'the grandmother's playground' in Xingtou Village, a playground built by a grandmother on the street space in front of her elderly parents' old rural house and used by the whole neighbourhood.

5 ↓



Negotiating Multi-scalar and Hybrid Transformations

These emerging socio-spatial typologies offer snapshots of the various stages of the transformation of this productive hinterland, illustrating the pivotal role of the micro-scale tactics of villagers in influencing top-down processes of extended urbanisation. At a regional and global scale, moulding industry investment is transforming villages, with their land critical in providing for industrial uses. Villagers are embedded, formally and informally, in trans-local moulding production lines which generate employment and attract regional labour. At a city and neighbourhood scale, villagers create an informal local economy through their productive households and bottom-up provision of local amenities. At a family and individual scale, micro-scale survival tactics and evolving urban-rural practices play a crucial role in placemaking and facilitating social capital.

Thus, regional industrialisation processes are not only transforming physical space, but also extending into the everyday lives of many people in the area surrounding the SMT: residential space with a dual productive purpose, a family member employed at a local moulding enterprise, a means of informal income in the production line, or the loss of farmland to the construction of a new factory. Furthermore, the empirical research reveals a particular discord between the social and mental dimensions of spatial production at Huangyan's urban-rural interface, provoking the materialisation of emerging dwelling typologies that do not necessarily align with the top-down visions epitomised by the SMT. Instead, these typologies integrate pre-industrial and industrial social structures, pre-urban and post-modern spatial features, and hybrid urban-rural cultural representations of dwelling space.

Despite vulnerable conditions and unequal agencies, these socio-spatial experimentations are redefining rural identity and defying the top-down compartmentalisation of space, through a negotiated urbanism (AlSayyad & Roy, 2004) between various scales and actors who carve out their own needs, identities, and practices (Fokdal & Herrle, 2019, p.90). Uncovering these networks highlights the potential for local actors to take a leading role in more sustainable urban-rural development. In revealing the sometimes contradictory transformation dynamics playing out on the ground, these hybrid urban-rural typologies become a potential tool for challenging increasingly redundant urban-rural binaries, offering a foundation for defining new theoretical categories to capture the complex socio-spatial restructuring of planetary urbanisation.



6 ↑ ↓

Villagers as pioneers: playground as a focal meeting point, crossed by moulding workers, farmers and neighbours; the multi-generational household.







↑
Scenes from urban-rural interface in Huangyan, 2019.06
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Discussing Ecological Wisdom and Practice with Wentao Yan, Interviewed by Suili Xiao

Suili Xiao

Wentao Yan is a Professor at the Centre for Ecological Wisdom and Practice Research (CEWPR) of the College of Architecture and Urban Planning (CAUP) at Tongji University. His research interests include the eco-city and low-carbon settlements, environmental policy and land-use planning, adaptive planning and environmental disaster management. His current research projects address the environmental effects of urbanisation and urban growth, disaster mitigation planning, etc. and introduce quantitative environmental management objectives into the traditional planning technology system. He conducts basic research on how to ensure social and ecological sustainability in urban growth.

The URA senior researcher Dr Suili Xiao had the pleasure to sit down twice with Mr Yan in October 2019 at Tongji University, discussing the relation between ecological wisdom and practice. What follows is an edited version of their conversations.

→
01



SUILI XIAO

What is ecological wisdom? How did you begin to work on this topic?

WENTAO YAN

Wisdom in eco-practice is the ability of human beings, including individuals, groups of people and even societies, to successfully engage in ecological practices based on a deep understanding of the mutually beneficial symbiotic relationship between humans and nature.

I have been interested in this topic since I began to explore the patterns of relationships between humans and nature within the ancient Dujiangyan irrigation system. For over two thousand years, this UNESCO world heritage site has functioned very well to provide flood control, irrigation and navigable waterways. It has significantly contributed to the development of Chengdu Plain, helping it earn the nickname "The Land of Affluence".

In working on this case, we analysed the historical changes in the human-nature relationship as well as the characteristics of the spatial structure of human settlements in different periods through survey methods and historical comparison. We also explored worldviews and practices, the ideological underpinnings and codes of action as well as governance systems that maintain ecological functions. Together, this has helped us grasp the synergistic evolutionary implications of natural and social systems.

We have found that a sustainable environment for human life should be a synergistic evolutionary model in which social and natural systems work together, are rational and inclusive, have moderate redundancy and grow in an orderly fashion.

SUILI XIAO

Why do you think that ecological issues need special attention in the urban-rural interface?

WENTAO YAN

The urban-rural interface displays diverse land-use types while revealing the instability of major changes in land-use structure and the dynamics of rapid change. The overdevelopment of the urban-rural interface, its low density and decentralised development patterns can lead to costly forms of construction or infrastructure as well as the need for ecological restoration. Moreover, the indiscriminate consumption of ecological space may create environmental problems as well as undermine long-term ecological security.

The urban-rural interface faces a number of severe ecological problems such as the problematic functional and spatial separation of urban and rural ecosystems, environmental protection and urban-rural development. Specifically, the spatial spread of construction is causing a sharp decline in the level of ecological services in such boundary areas. Furthermore, there is a mismatch between the supply and demand for ecosystem services in urban and rural areas.

On 8 August 2010, a massive flash flood and mudslide occurred in Zhouqu County, Gansu Province,

"The urban-rural interface faces a number of severe ecological problems such as the problematic functional and spatial separation of urban and rural ecosystems, environmental protection and urban-rural development."

leaving a large number of casualties and widespread property damage. Within this ecological disaster, it is important to remember the long-term impact on local development:

Firstly, this site was and is, technically speaking, uninhabitable. It is located on the historically formed ancient alluvial fan, which is at the confluence of several large rivers and thus faces a number of geological hazards, in particular mudslides. Marshy ground and floodplains have been rapidly urbanised by high-density construction in a haphazard layout. Clearly, this is a recipe for disaster.

The second issue is the destruction of ecological space. Zhouqu County used to be famous for its beautiful mountains and water. Yet since the 1950s, the large-scale reclamation of hillside land and the felling of forests have not only disrupted ecological spatial patterns that serve to constrain urban sprawl; these activities have severely damaged mountain vegetation and reduced water retention capacity. Exacerbated by persistent heavy rainfall, the end result has been to significantly raise the potential flood level and accelerate the speed at which floods are formed, thereby increasing the likelihood of mudslides.

SUILI XIAO

Based on your experience, what are the main challenges of research on ecosystem services within the urban-rural interface?

WENTAO YAN

It's difficult to define the boundary between urban and rural areas. The urban-rural interface also referred to as the urban fringe or semi-urbanised area, is a continuum of built-up land from around the city centre to include almost all of the periphery. These territorial entities bounded by the purely agricultural hinterlands without any urban dwellings are transitional zones of land use with particular social and demographic characteristics. The radical transformation of the constituent social, economic and ecological elements extends beyond administrative boundaries, with inward effects on the city and outward effects on the countryside. Both are far-reaching. The boundary between an urban and rural area will be different for each location; it can be determined by analysing the specific characteristics such as changes in local ecosystem services.

Comparing urban and rural areas, we find considerable quantitative and spatial mismatch in the supply and demand for ecosystem services. Often ur-



ban areas have insufficient supply to meet demand whereas rural areas are characterised by oversupply. The urban-rural interface, which has a low supply of cultural services and low demand for them, provides important regulating and support services for the larger urban area. Complex and fast-changing land-use structures and high local migration result in a complex picture of supply and demand for ecosystem services in the subregion. This constitutes a major challenge. Key challenges in eco-spatial planning are to balance the supply and demand for ecosystem services as well as to improve human well-being.

SUILI XIAO

How can we illustrate/monitor the spatial variations in ecosystem service within the urban-rural interface? Could you give an example?

WENTAO YAN

The study area can be selected on the basis of a central ring, a sector or a sample zone (transect). The central ring is the entire urban-rural boundary zone surrounding the central city at a certain radial distance from the centre; or a typical sector there-of may be selected. Major rivers or roads that pass through the city are usually selected to define transects across the urban-rural gradient. An example of an urban-rural gradient is one that shows the levels of supply and demand for ecosystem services at different distances from urban centres (Figure 2).

SUILI XIAO

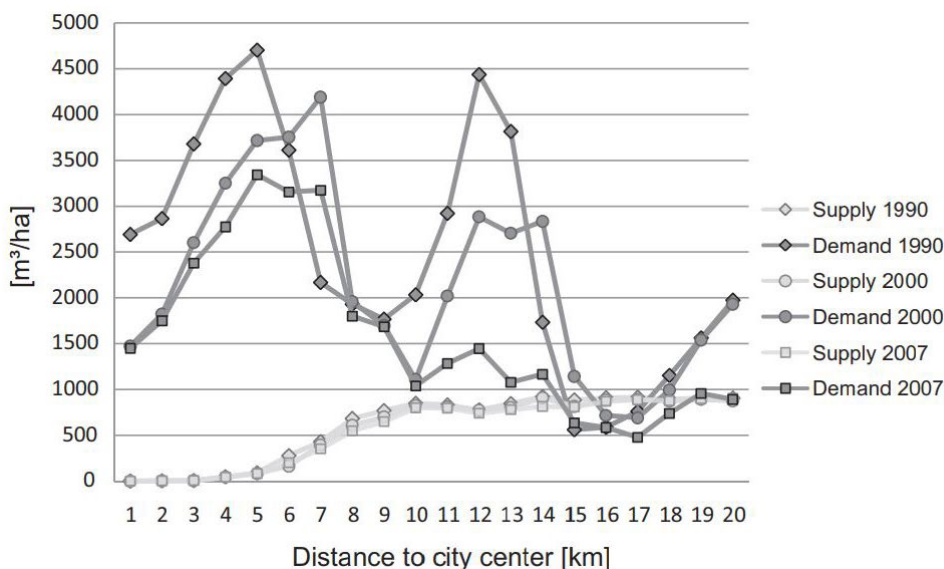
You mentioned that ecological wisdom is ecological knowledge which can be applied in practice. Can I ask how macro-scale analysis and the practice-level conceptual framework are to be integrated into the real world?

WENTAO YAN

Ecological practices are aimed at the social-ecological system, which means “the safe and harmonious social-ecological environment that people create for their own survival and development”. Ecological-social activities encompass not just ecological planning Ecological practices are aimed at the social-ecological system, which means “the safe and harmonious social-ecological environment that people create for their own survival and development”. Ecological-social activities encompass not just ecological planning and implementation but also design, management and feedback, etc. The study of ecological practice is not only about the characteristics of certain cases, but also about summarising the rules of ecological practice.

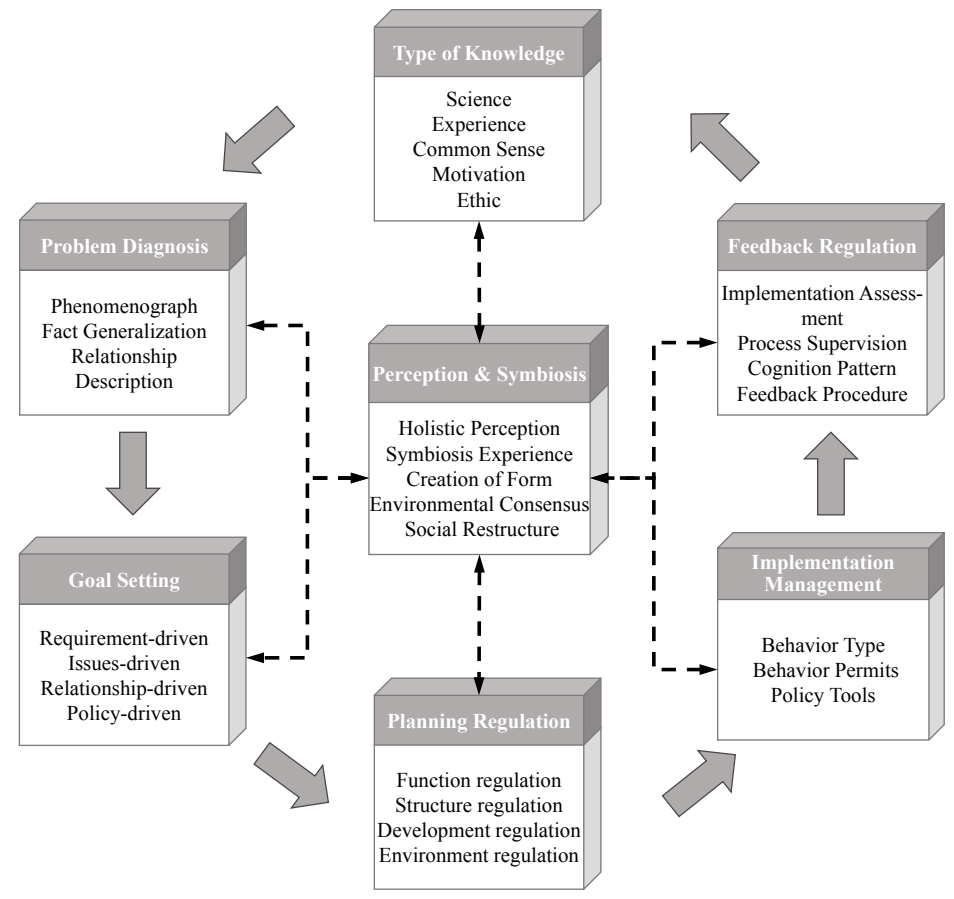
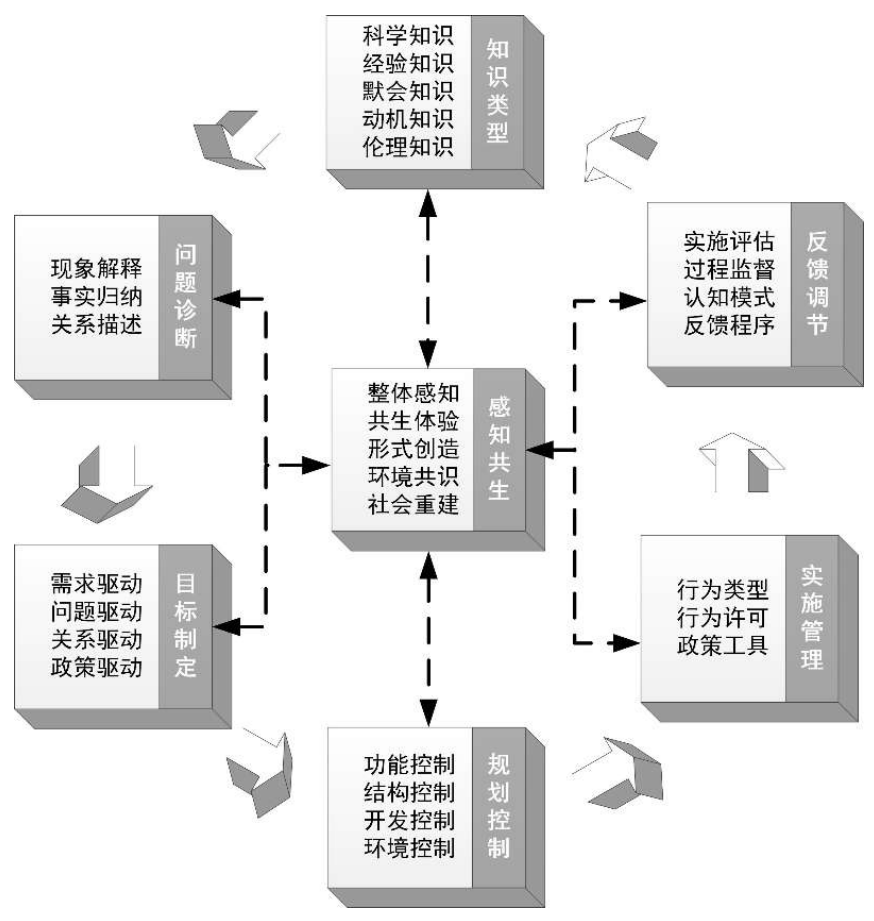
I propose an eco-practice framework system as follows: “types of knowledge → problem diagnosis → goal-setting → planning and control → implementation management → feedback regulation” (Figure 3). A core goal of ecological practice is to uncover potential symbiosis, which can be nurtured and exploited to provide the next round of ecological practice with endogenous motivation. Real-world actors can acquire and improve the wisdom of ecological practice through continuous experimentation and feedback adjustment based on practicable ecological knowledge.

Combining macro-scale analysis and local knowledge of the respective site, practitioners should use specific topographical factors as a basis for identifying and gathering appropriate ecological knowledge before integrating this know-how organically into the practice of planning, design, construction and management. The first step is to change the perception of rainwater floods as disasters and build a symbiotic relationship between humans and water.



2 →
Gradients in the levels of supply and demand for ecosystem services in Leipzig. Source: Kroll et al. 2012

3
Conceptual framework of ecological practice



Secondly, management rules must be established to reflect natural processes and foster decentralised use based on catchment units. Thirdly, the urban community must be taken as the basic unit of stormwater management with the aim of enhancing the resilience of urban and social systems. By integrating the stormwater process with life experience, we can promote environmental consensus and enhance the community's ability to cope with stormwater events. This will help develop a stable and dynamic feedback management model and adaptive management mechanisms.

SUILI XIAO

I understand that ecological practice should link social activities with ecological conservation. Could you give an example of this interaction between people and the environment?

WENTAO YAN

The Taomi community in Nantou County, central Taiwan, used to be a poor and backward anonymous village located near a landfill site. Due to the difficult living conditions, many young people left the community, leaving an ageing population structure. A major earthquake on 21 September 1999 destroyed 80% of the houses in the village. In the ensuing months and years, Taomi was rehabilitated under a multi-organisational approach to rural community resilience (a resilient “eco-social system” perspective).

Taomi community practice aims first to change “people”, namely to restore the bonds between individuals and society as well as between locals and nature, before promoting the reconstruction of the physical environment. This process was divided into three phases, the first of which focused on “human transformation and growth”. Here environmental consensus was achieved by establishing “eco-interpretor” positions and diverse community activities. The second phase was the autonomous operation of the ecological industry in the Taomi community. Ecological and recreational tourism gradually became the leading sector and one of the community's main economic pillars. The third phase was a partnership between Taomi village and a non-profit organisation.

The underlying concepts behind these activities to boost resilience in the community of the Taomi village were: to focus on small incremental steps rather than large events; to view the construction of social networks as the core element in resilience; to guide resilient communities by ecological wisdom; and, finally, to tap into, learn from, innovate, and perpetuate local ecological wisdom, knowledge and experience for improved resilience planning and cultivation.

SUILI XIAO

Regarding our research in Taizhou City, we found that a wetland area could function as a living lab. Do you have some suggestions here regarding social-ecological research?

WENTAO YAN

Jiayang Lake Wetland provides important ecosystem services such as rainwater regulation, recreation, water purification, climate regulation and biodiversity conservation for Huangyan-Taizhou; clearly, it is suitable as a typical living lab for the investigation of social and ecological practices.

I recommend adopting the ecological practice framework of “problem diagnosis → goal-setting → planning control → implementation management → feedback regulation”. By studying the historical evolution of the supply and demand of ecosystem services in the wetlands of Lake Jiayang at different temporal and spatial scales, we can explore the following issues: the characteristics of the settlement structures over different periods; the changing pattern of relationships between community residents and wetlands over time; and, finally, the relationship between locals and the wetlands. Within this process, it will be possible to diagnose problems, explain phenomena, uncover facts and describe relationships.

It is vital to set goals based on needs, issues, relationships and policy drivers. Ecological planning must be established to control the functions, structures and development of nature and the environment. A management code should be drawn up based on natural processes, with the urban community as the basic unit, resulting in a stable management model that applies dynamic feedback and adaptive management mechanisms to enhance community resilience in urban-social systems.

The emphasis should be placed on perceived co-existence, i.e. maintaining and enhancing ecosystem services while combining these with living experiences. It is important to foster environmental consensus among community residents and strengthen their ability to respond to ecological problems and achieve social reconstruction. Ultimately, local wisdom and knowledge of ecological practices should be promoted, emphasising the concept of synergistic social-ecological systems for application in new ecological practices.

Walking through Rurban Landscapes

Maria Frölich-Kulik, Yuting Xie, Yulin Zhang

Introduction

Landscape transformations always go hand in hand with changes in everyday life regardless of whether the spatial changes are driven by political, economic or ecological reasons. Everyday processes, in turn, have shaped and are shaping landscapes.

In order to “get to the bottom of a landscape” (Schultz 2014) an explorative design-oriented research approach can help in reading and understanding landscapes: through the act of walking through landscapes, specific, individual and often hidden references, connections, dependencies but also future questions can be found and raised (Burckhardt 2006; Schultz 2014).

In the research area of the Yongning River, with its delicate system of ditches for irrigation and drainage as well as the village ponds, water flows through and influences different settlement patterns and landscape structures. Building on initial insights into the topographical and structural characteristics of the Huangyan-Taizhou region by reading satellite images, a walking route was designed that was informed by the course of the river and passes through various settlement and landscape structures, sometimes on one side, sometimes on the other side of the river. By walking through the region and being receptive to unplanned random encounters and conversations, the researcher can get to the bottom of everyday processes and landscape uses, and identify historical changes in the landscape, as well as individual, personal references to the landscape (Schmidt 2018).

The four-day hike began at the estuary of the Yongning River and ended at the Changtan Reservoir. On the way, one could observe residents involved in water-related activities or the effects of flooding: fishing, irrigating the fields, harvesting, or the destruction of buildings caused by a typhoon that had just swept across the region. The conversations often revolved around the activities in which the participants were involved and concerned topics such as current water uses and functions but also the perception of water as a resource or danger in everyday life.

These portraits provided an initial overview of the region: they reflect on transformations in the pattern of water resources, in settlement transformations as well as the role that water – i.e. the river, ponds and ditches – plays in everyday life. They are parts of a whole, from which partial hypotheses can be formulated for water use in the entire area, for example for sustainable agriculture, (r)urban swamps or water-oriented settlements. This, in turn, leads to research questions such as how landscape heritage

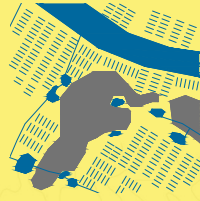
can be managed in future? What could a water-oriented settlement look like? How can wetland along the river provide services and improve the quality of everyday life and daily practices?

Walking through rurban landscapes makes visible rurban settlement patterns and landscape structures and the everyday processes and landscape uses they shape.

Legend



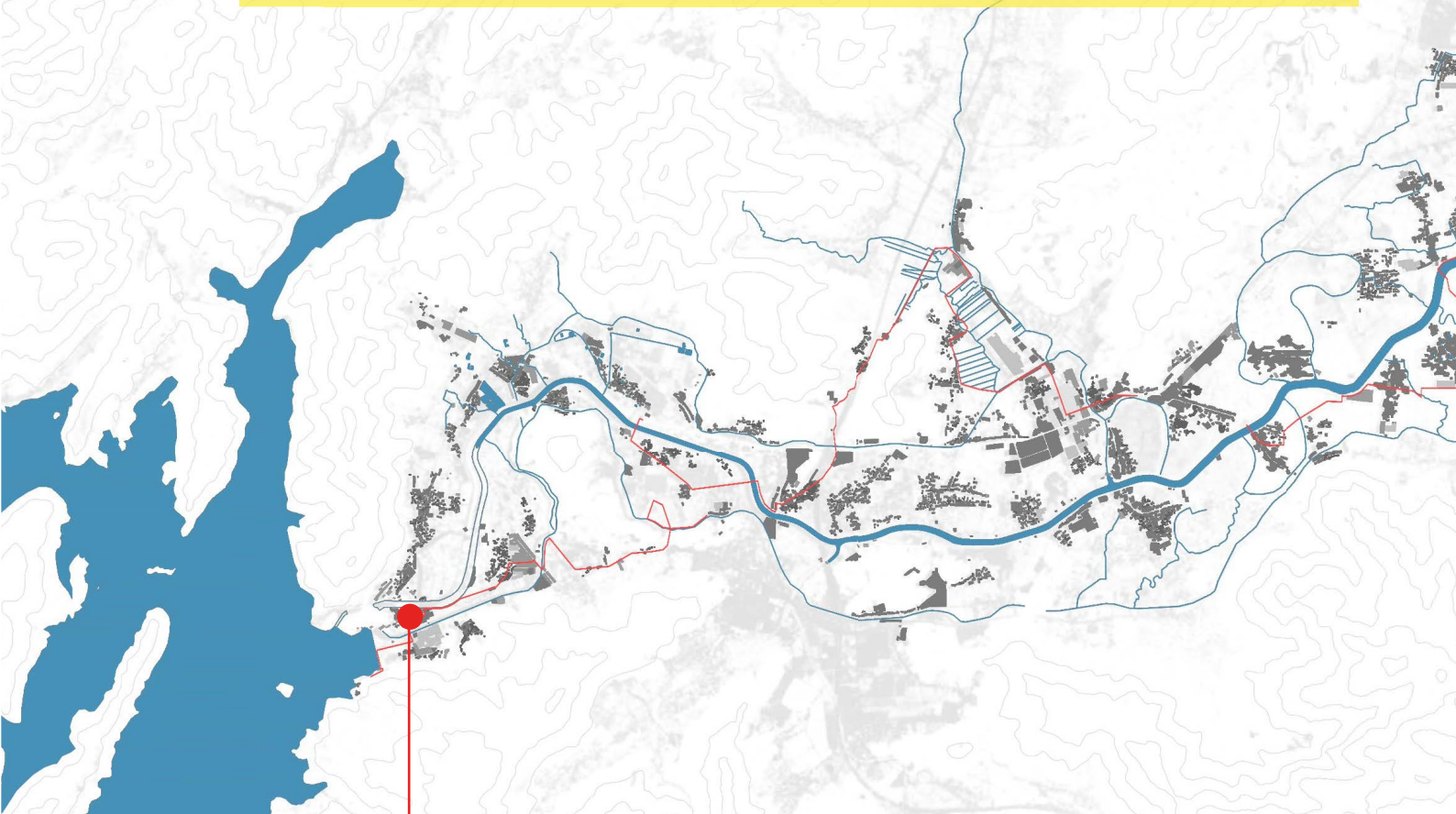
 Yongning River	 Rural Settlement
 Sub-River	 Urban Mosaic
 System of Ditches	 Place of Encounters
 Ponds	 Walking Route
 Changtang Reservoir	



There is an unknown pond in the village where the local elders gathered around for chatting. They recall that the pond has existed from the beginning of the village, at least for a hundred years and there are many old ponds in the village. In the past, due to the better water quality, the high-lying ponds were used for drinking water supply and the low-lying ponds were used for washing and irrigation.

The water flowed through ditches to the paddy fields, but since the local villagers no longer depend on rice farming for a living, those old ditches all dried up, which means now they have to personally carry the water from the pond to their vegetable gardens. But the water from ponds nowadays is a matter of concern, because villagers discharge domestic wastewater directly into those ponds. Since the drinking water all comes from the Changtan reservoir now, they don't rely on ponds anymore.

As for whether the super typhoon 'Lekima' caused any damage in this village, the locals mention that there were a few families in the low-lying part of the village who were affected but nothing serious.

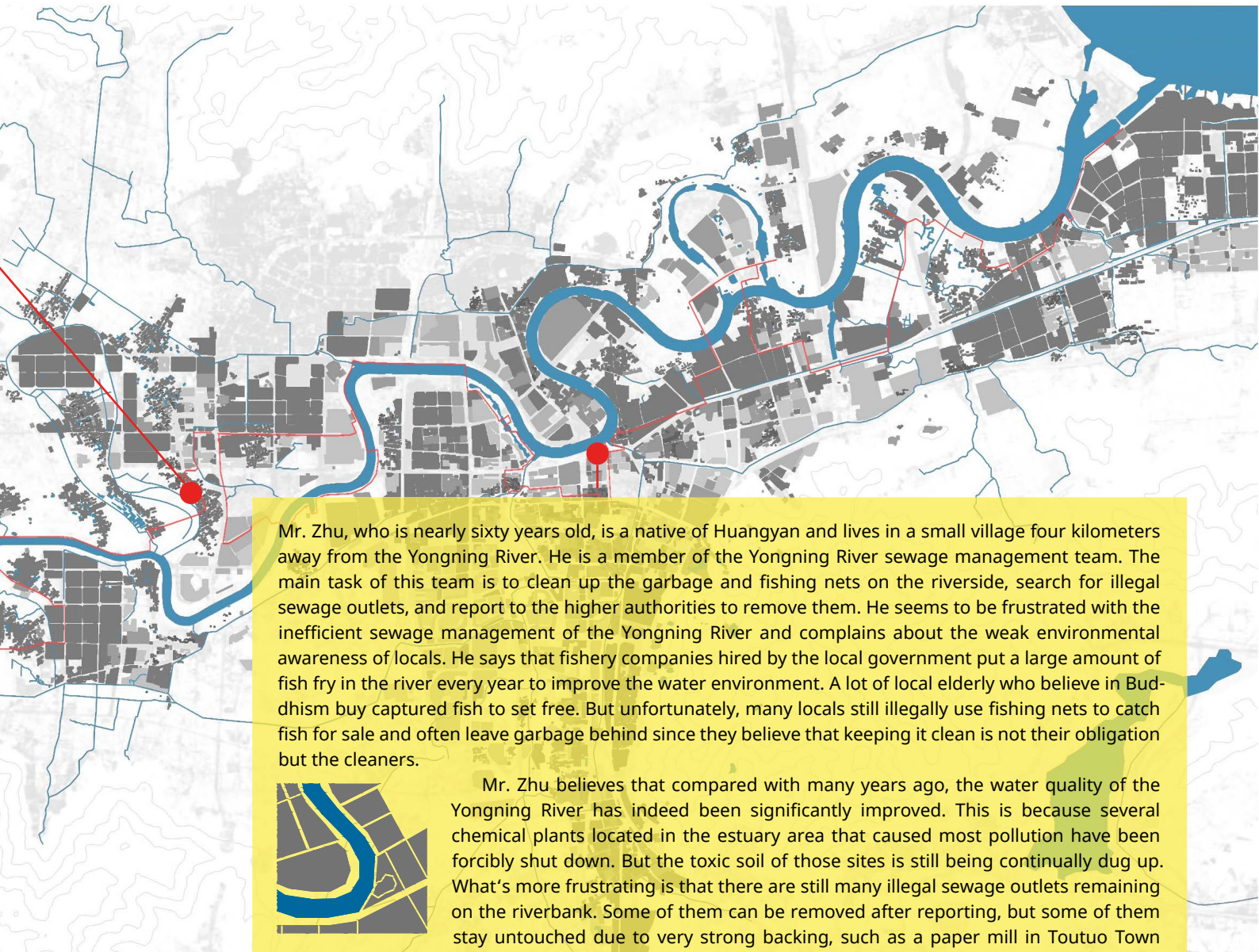


The old man in the vegetable field is 77 years old, he used to work at the Food Bureau, and retired 17 years ago. He recalls that when he was young, he witnessed and even participated in the construction of the Changtan reservoir. Since 1975, he moved into this house right next to the spillway of the reservoir. According to his observation, there is only a total of 7-8 days in a year that the floodgate is opened for drainage and the depth of drainage water never exceeds 1.5m. He explains that the reservoir as the only drinking water supply for the whole Huangyan district will not be discharged much, even in the raining season.



As for the reason why the west Huangyan was relatively seriously flooded during the typhoon 'Lekima', he believes that it is caused by the delayed alarm and drainage from the Changtan reservoir.

Water Transformations



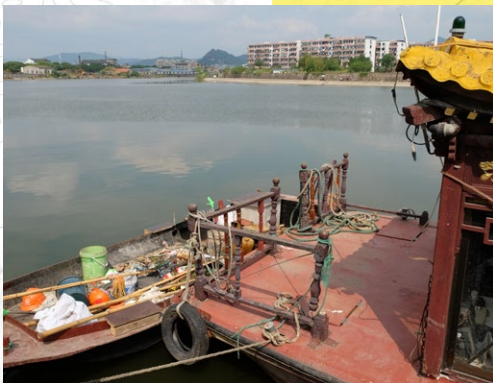
Mr. Zhu, who is nearly sixty years old, is a native of Huangyan and lives in a small village four kilometers away from the Yongning River. He is a member of the Yongning River sewage management team. The main task of this team is to clean up the garbage and fishing nets on the riverside, search for illegal sewage outlets, and report to the higher authorities to remove them. He seems to be frustrated with the inefficient sewage management of the Yongning River and complains about the weak environmental awareness of locals. He says that fishery companies hired by the local government put a large amount of fish fry in the river every year to improve the water environment. A lot of local elderly who believe in Buddhism buy captured fish to set free. But unfortunately, many locals still illegally use fishing nets to catch fish for sale and often leave garbage behind since they believe that keeping it clean is not their obligation but the cleaners.



Mr. Zhu believes that compared with many years ago, the water quality of the Yongning River has indeed been significantly improved. This is because several chemical plants located in the estuary area that caused most pollution have been forcibly shut down. But the toxic soil of those sites is still being continually dug up. What's more frustrating is that there are still many illegal sewage outlets remaining on the riverbank. Some of them can be removed after reporting, but some of them stay untouched due to very strong backing, such as a paper mill in Toutuo Town that is continually discharging highly toxic wastewater directly into the Yongning River. Additionally, there were also numerous outfalls from the surrounding villages. Now they seem to be removed, but just been relocated to the tributaries. As a result, the domestic sewage will eventually converge toward the Yongning River. Thus, he thinks pessimistically that the Yongning River will never be purified according to the current situation.

In Mr. Zhu's childhood memory, the Yongning River was much broader and always lively. Many ships were coming and going, even large military ships. By then there was no real bridge across the Yongning river, but a kind of floating bridge connected by small fishing boats. When typhoons or floods came, people pulled the boats and collected them from the river. Although after the building of the Yongning floodgate, there is no such bustling scene anymore due to the disappearing of the tides, he still likes the current master plan of the Yongning River, especially

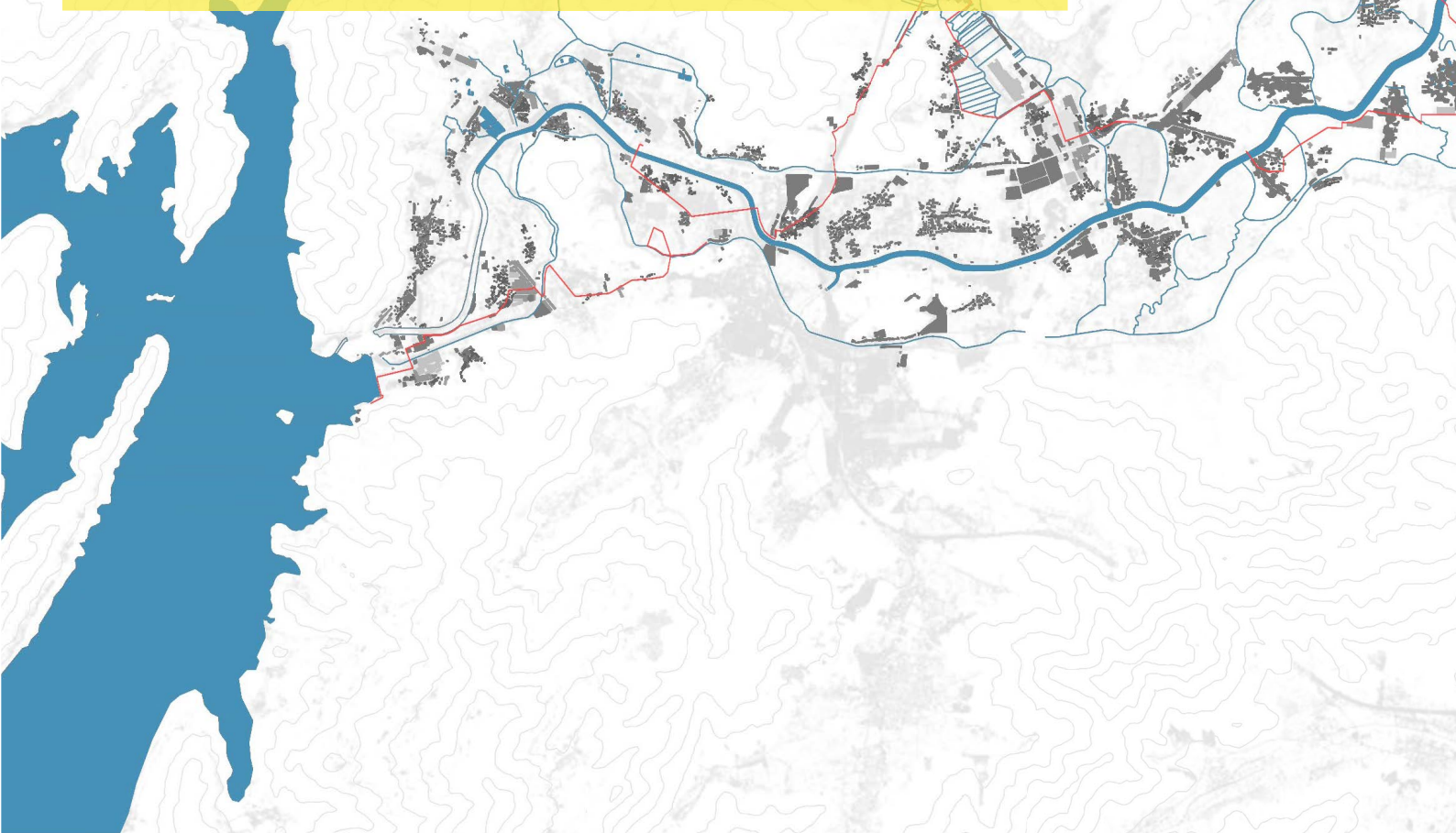
the Yongning Park, as one of the most popular leisure places for people who live in the downtown area. But he also estimates that the residents living in the estuary area may not be as much satisfied because they won't be able to catch all kinds of seafood like old times. And in his opinion, the biggest changes in Huangyan happened in these five years. Many villagers accumulated fortunes by land-transfer. They built new houses or moved into the high-rises in downtown. Nevertheless, he still prefers to live in a self-built house surrounded by old neighbors in a village.

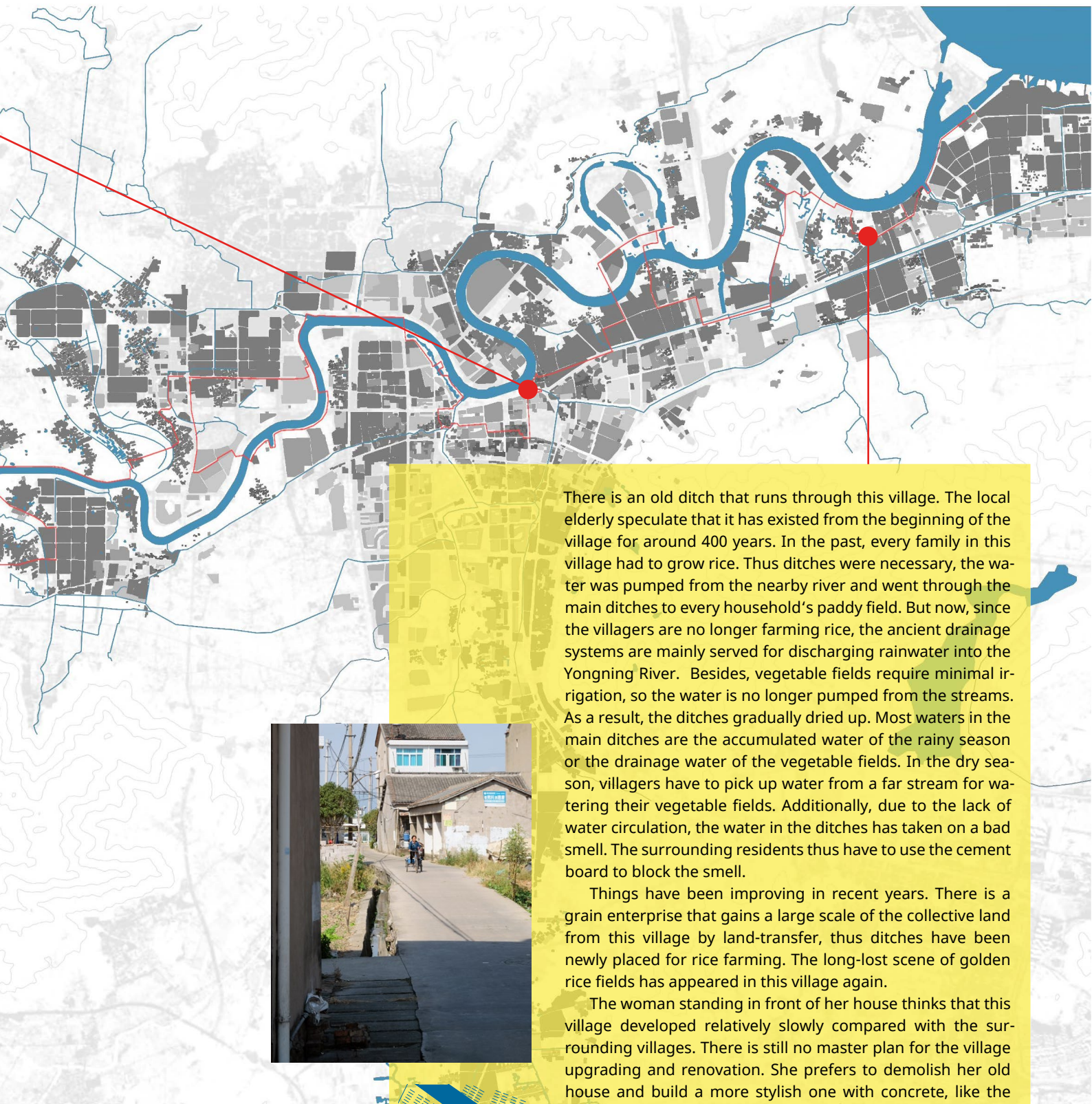


The old man who grew up here is over sixty years old. In his childhood memory, the Yongning River was always bustling with noise and excitement. There were two tides every day, especially on the 3rd and 18th of each month of the lunar calendar, when the dynamics of tides were most obvious. When the tide was rising, a large number of fishing boats and cargo ships sailed into the Yongning River and then docked in the old port nearby for unloading. Meanwhile, many kinds of seafood brought with tides attracted nearby residents to gather together. But since the construction of the Yongning floodgate, the Yongning River has become a quiet inland river because there are no tides, ships are unable to enter the Yongning river anymore. Besides, the serious pollution from the chemical plants in the estuary area has led to the extreme deterioration of the water environment, that fishes and shrimps were once totally disappeared. But since the local government started to put effort into sewage treatment several years ago, the water quality has been significantly improved. Nowadays, the locals can even fish on the riverside.

He also explains that the Yongning River used to be much broader and deeper. There were rice fields on the riverbank, and orange trees could be seen everywhere. But now a part of the riverbed is landfilled to create more urban areas. Additionally, for ensuring the drinking water supply of the whole Huangyan district, the Changtan reservoir rarely discharges water into the Yongning River in comparison with the past. This further leads the Yongning River to become narrower and shallower.

He also complained about the embankment in front of his house that has been greatly raised to coordinate with the master plan of Yongning greenway. Due to the lack of construction funds, this part is remaining unfinished which left a depressing scene. In his opinion, it is unnecessary to heighten the embankment on such a scale because even before the Yongning floodgate was built and the embankment was only half as high as today, there was no serious flood in this neighborhood during the typhoon season.





There is an old ditch that runs through this village. The local elderly speculate that it has existed from the beginning of the village for around 400 years. In the past, every family in this village had to grow rice. Thus ditches were necessary, the water was pumped from the nearby river and went through the main ditches to every household's paddy field. But now, since the villagers are no longer farming rice, the ancient drainage systems are mainly served for discharging rainwater into the Yongning River. Besides, vegetable fields require minimal irrigation, so the water is no longer pumped from the streams. As a result, the ditches gradually dried up. Most waters in the main ditches are the accumulated water of the rainy season or the drainage water of the vegetable fields. In the dry season, villagers have to pick up water from a far stream for watering their vegetable fields. Additionally, due to the lack of water circulation, the water in the ditches has taken on a bad smell. The surrounding residents thus have to use the cement board to block the smell.

Things have been improving in recent years. There is a grain enterprise that gains a large scale of the collective land from this village by land-transfer, thus ditches have been newly placed for rice farming. The long-lost scene of golden rice fields has appeared in this village again.

The woman standing in front of her house thinks that this village developed relatively slowly compared with the surrounding villages. There is still no master plan for the village upgrading and renovation. She prefers to demolish her old house and build a more stylish one with concrete, like the other villages, even though she believes that the traditional timber structure lasts longer.

She also says that the village has never been seriously affected in the typhoon season after the building of the Yongning floodgate. Before, the floodwater can be as deep as a person's height in the most severe case.

The woman who urged her eldest son to do his homework seems not to be disturbed by the super typhoon 'Lekima'. She points to the collapsed neighbor's house and a broken tree in front of her yard says: 'It is normal, the typhoon always brings some damage.' She explains that she and her family lived downtown when the typhoon hit this region. In fact, most villagers have moved to the city. Then she further points to an empty old house at the intersection and said: 'That family also does not live here anymore. The development of this village is not promising. I heard that there was a plan for developing rural tourism, but somehow it didn't work.'



The woman, who sells fruits, had planted watermelon in Haining City for 12 years. Two years ago, she came back in order to take care of her two children who study in Toutuo Town. Now she drives a small truck to sell some fruits grown in her own mountain garden. She frankly says that she simply uses the river water for irrigation. But many farms for white bamboo shoots have appeared in recent years which require a high quality of water, thus farmers normally use water from the Changtan reservoir, and they even specially dug a new channel for that.

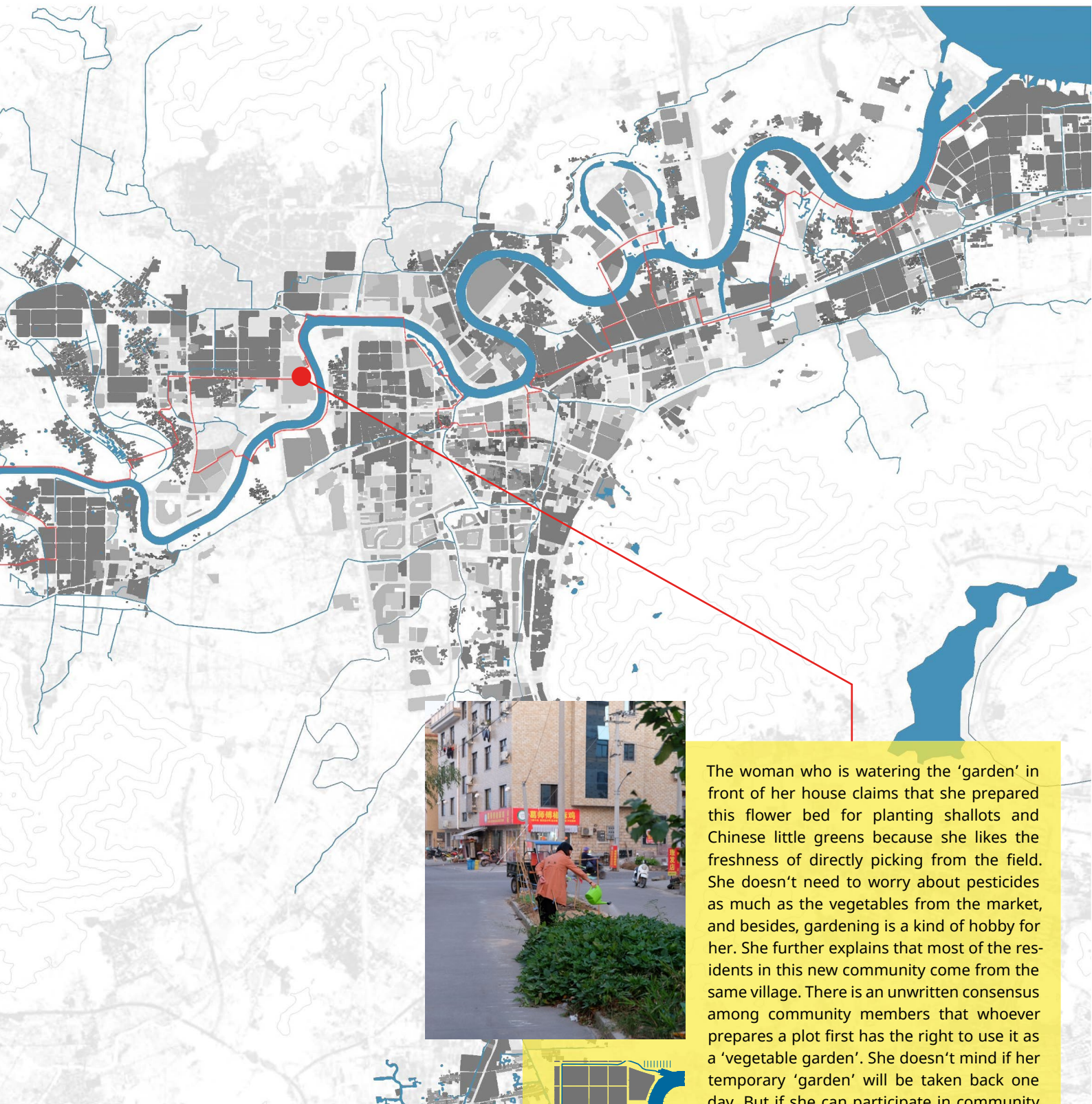


She points to a newly built residential quarter nearby and says that she lives there. The residents there are mainly from mountain villages. Now they are merged into a new community named Yuantong village. Most of them are poor families in their original villages. She points to another residential quarter that is not far away and says: 'It's called Hongsi village, the residents there are relatively rich families who can buy a homestead without any government subsidy and have already moved to the downtown area for a long time.'

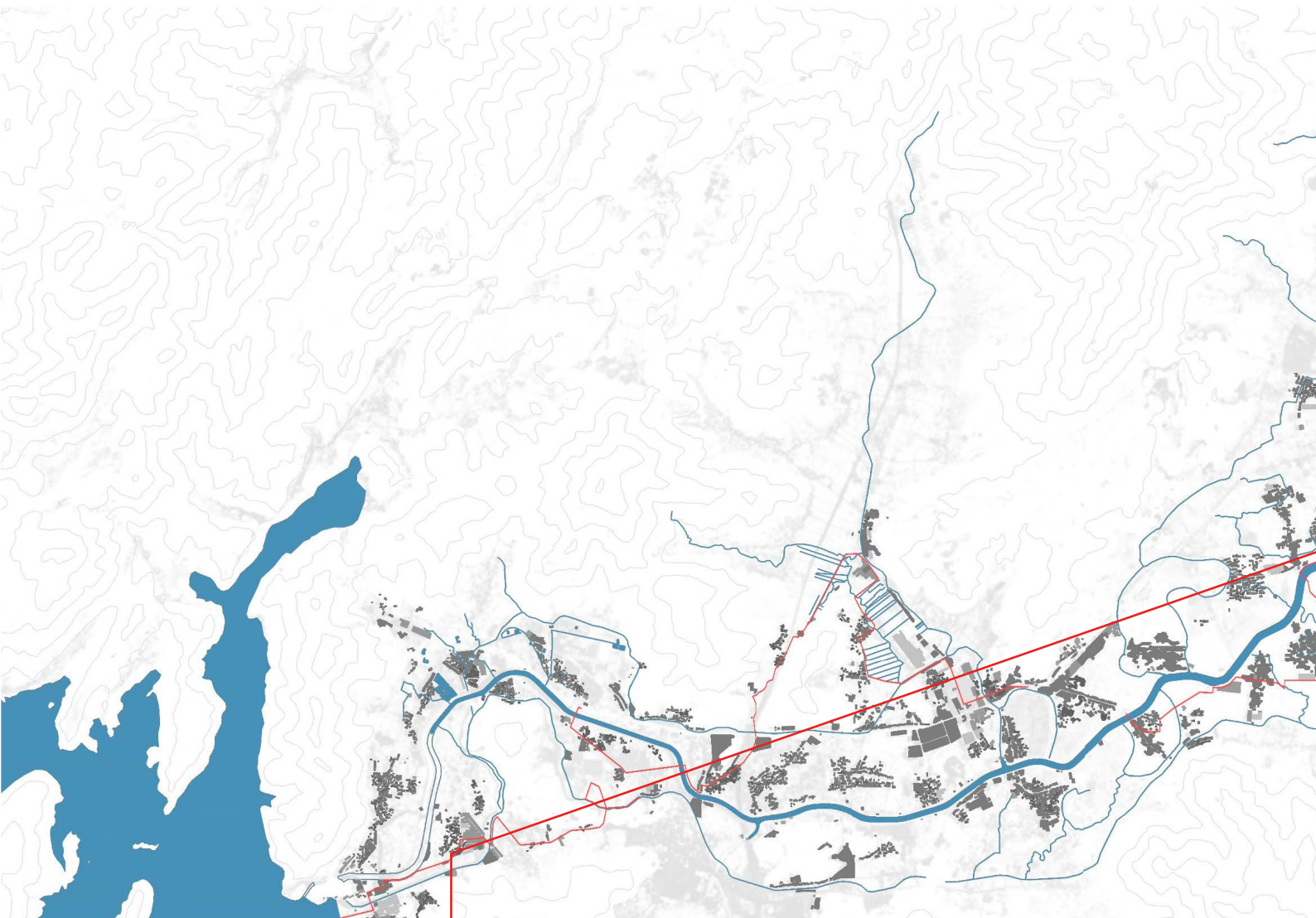
Luckily, due to the poverty alleviation policy for mountain immigrants in recent years, poor families like hers only need to pay 70,000 yuan for a homestead in Yuantong Village. But there are still some families that are not able to afford it and are left behind in the mountain.



Settlement Transformations

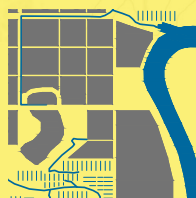


The woman who is watering the 'garden' in front of her house claims that she prepared this flower bed for planting shallots and Chinese little greens because she likes the freshness of directly picking from the field. She doesn't need to worry about pesticides as much as the vegetables from the market, and besides, gardening is a kind of hobby for her. She further explains that most of the residents in this new community come from the same village. There is an unwritten consensus among community members that whoever prepares a plot first has the right to use it as a 'vegetable garden'. She doesn't mind if her temporary 'garden' will be taken back one day. But if she can participate in community planning, she prefers to replace the flower bed with a vegetable garden, even though she likes flowers as well.



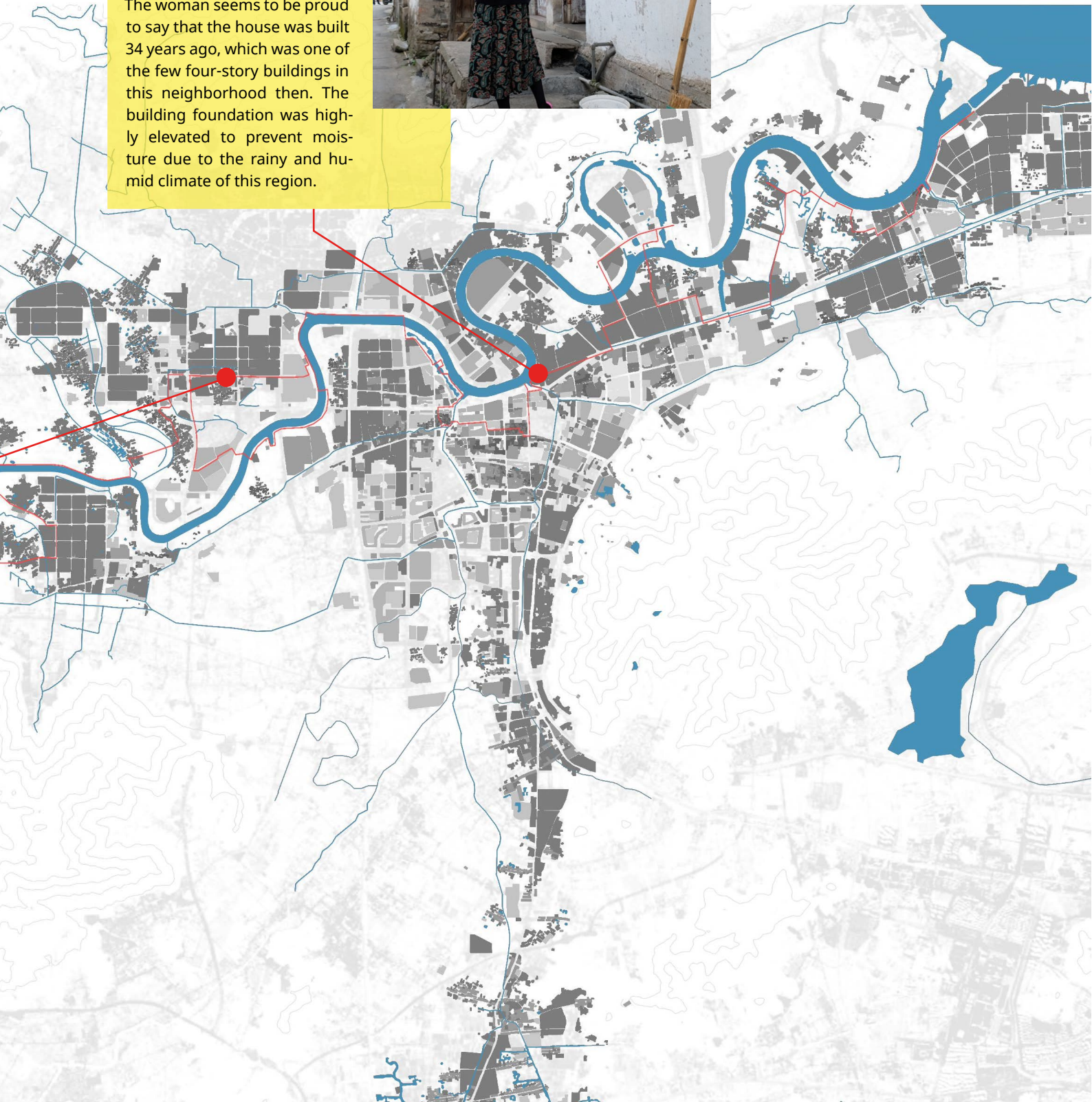
Family Dai has a traditional wooden structured house with a history of over 100 years. Due to the serious subsidence of the foundation, the ground floor is already unable to be used. They originally planned to restore the house by themselves, but the local government didn't permit private renovation based on the regulation of heritage preservation. Thus the house has been vacant for many years. A large area of the roof collapsed, and the overall timber structure inclined. It almost became a piece of ruin that caused safety concerns in the neighborhood. The local government now intends to carry out the demolition and site cleaning, which makes the Dai family very angry and refuse to remove it. According to the urban housing demolition regulations, the dilapidated houses can't be forcibly demolished without consent from the owners. Therefore, for now, the old house neither can be restored nor removed, only left to continually decline and collapse.

Mr. Zeng is the neighbor of Mr. Dai. His nephew used to live in Daqikeng village, Ningxi town, but during the super typhoon 'Likima', many villages in this town were severely damaged, his nephew's house as well. Afterward, his nephew has been allocated a plot on a high-lying slope to build a new homestead. However, the difficulty with house construction drove his nephew's family to move to downtown and to rent a house for living.





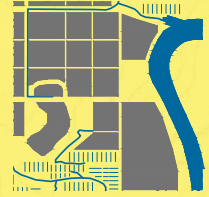
The woman seems to be proud to say that the house was built 34 years ago, which was one of the few four-story buildings in this neighborhood then. The building foundation was highly elevated to prevent moisture due to the rainy and humid climate of this region.



The land surrounded by the new residential quarters has been sold, but a tiny pond and several ditches have remained here. Many residents nearby temporarily use this place as their 'vegetable garden'. A woman who works on the field says that she doesn't care if the real estate developers will take back the land in the future, and if she can't plant her vegetables here anymore, she could just pick them all, since vegetables mature quickly. Regarding the super typhoon 'Likima' this year, she is quite certain that it didn't cause any damage in this neighborhood.

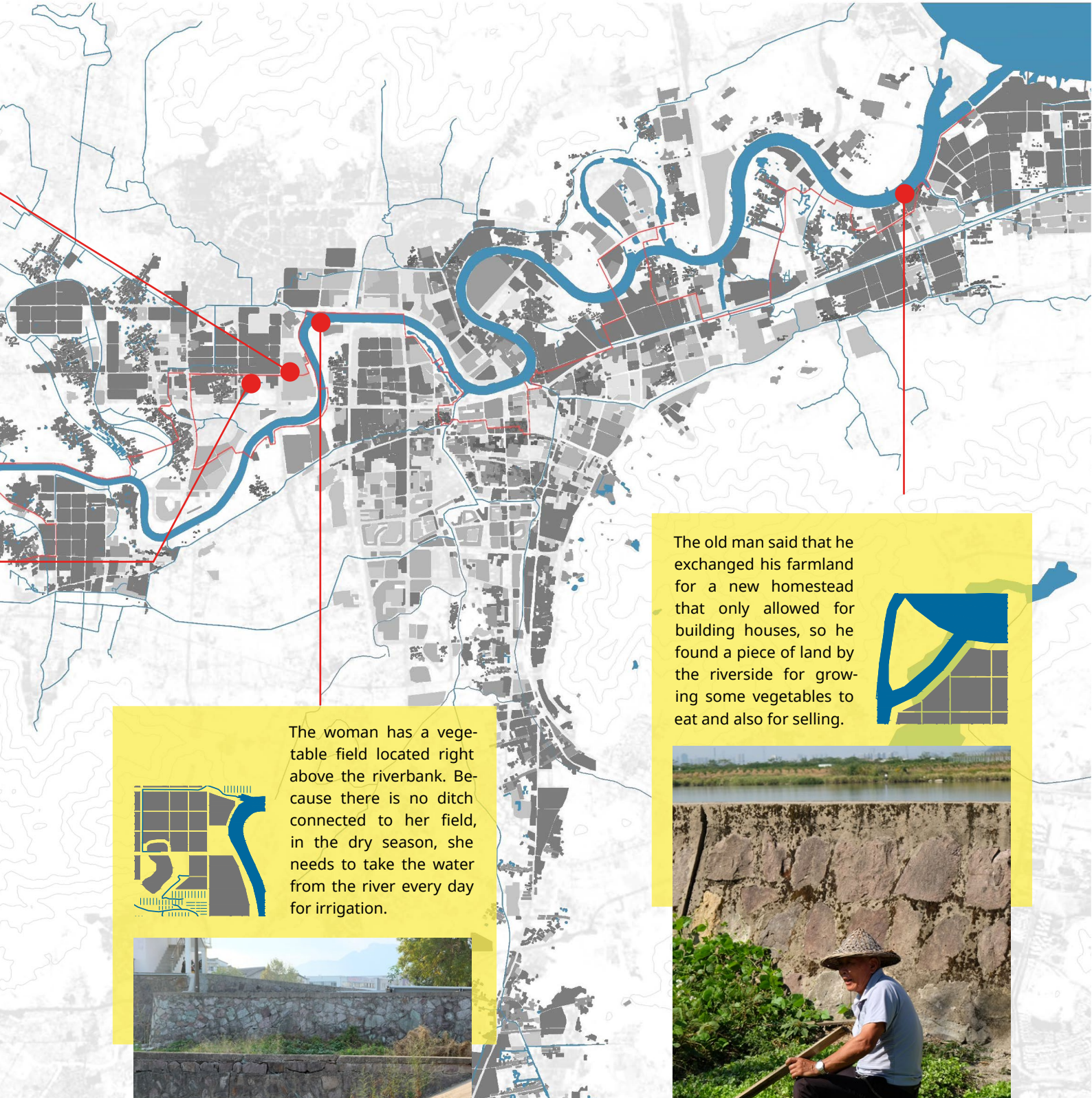


The man who took water from the riverside said that he was heading to his vegetable fields, and this spot is where nearby residents get water for irrigation, also for washing clothes every morning from 6 to 8 o'clock.

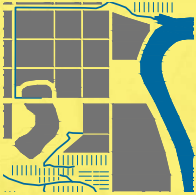


The closer to the Changtan reservoir, the more often the organic farms are seen. Many rice fields have been drained and will be harvested soon. Two farmers who come from the neighboring villages slightly removed some weeds, so the ridges of the field won't be excessively trimmed. They claim that this farm naturally grows grain and only harvests once a year.

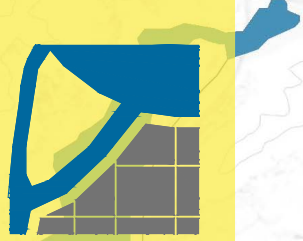
Water in Everyday Life



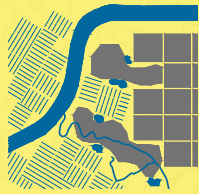
The woman has a vegetable field located right above the riverbank. Because there is no ditch connected to her field, in the dry season, she needs to take the water from the river every day for irrigation.



The old man said that he exchanged his farmland for a new homestead that only allowed for building houses, so he found a piece of land by the riverside for growing some vegetables to eat and also for selling.



The man spraying pesticides explains that the roots of orange trees would easily rot after being soaked in water. They only need to be watered in the dry season and the open ditches are thus especially necessary for preventing waterlogging. He explains that the harvest time will arrive in ten days. Normally women



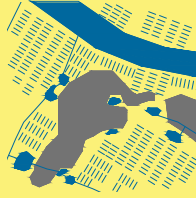
from nearby villages are responsible for picking. He also complains that the orange price is too cheap to make any profit, so they normally store a number of oranges until the new year festival for a slightly better price.



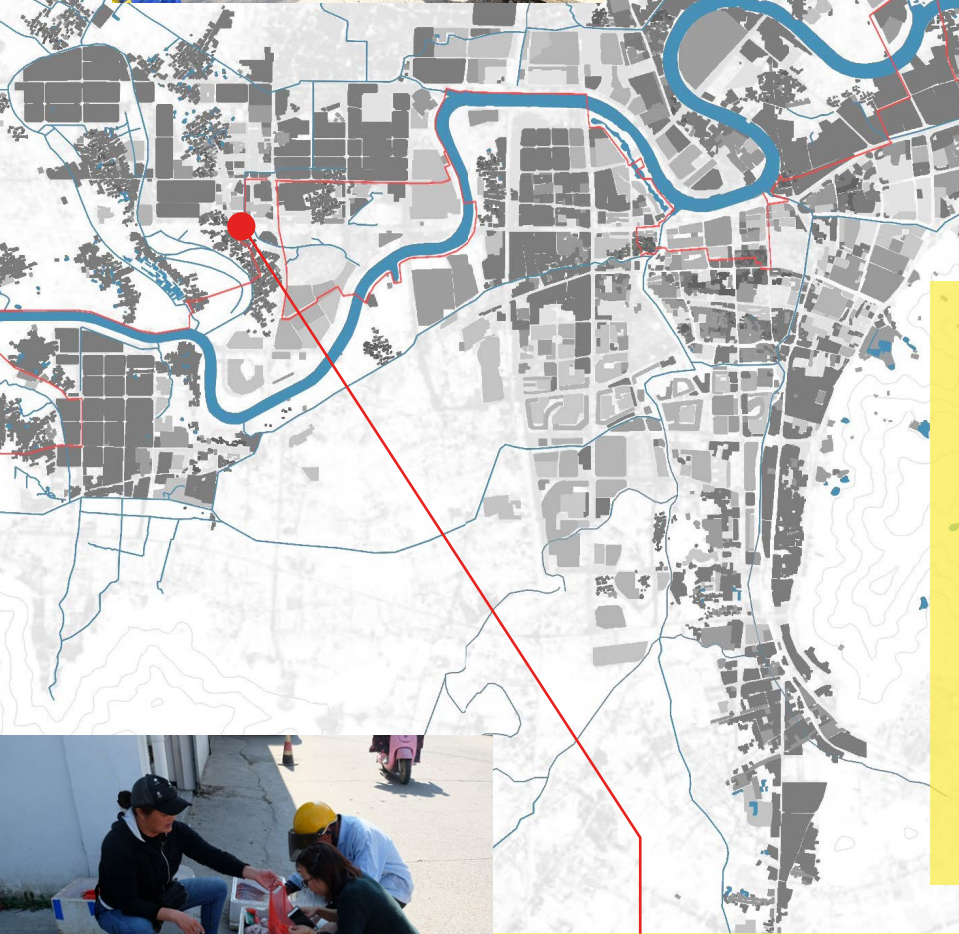
The further along the river you go, the more often you can find people who seek river snails. An old lady says that she has searched for river snails for a while already but hasn't caught any. She is thus going to try another spot.



The old man has to pick water from a distant pond every day in the dry season for watering his vegetable field that is next to a viaduct construction site. He says that because it hasn't rained for a month, the ditches all dried up.



A family farm surrounded by the bridge construction site has just been in operation for around 3-4 months. The operator proudly claims that he runs an organic farm without any state funding. He recalls that the nearby stream connected to the Yongning River was dug around three years ago. Before, there was no access to water in this area. When the land was developed into a farming zone for several family farms and enterprises, a new stream became necessary for the increasing water demand.



A fishing enthusiast, who often comes to the estuary area, complains that the southside of the Yongning River hasn't been well planned, although there is a popular leisure place in the summer evening for the locals. He further says that it would be great to have a park here.



The woman who is busy selling sea crabs is 47 years old. She was married into this village from a neighboring village. She says that her husband was already working in the Huangyan molding industry 30 years ago when most molding workers were locals, but today are mainly migrant workers. The seafood she is selling is mostly purchased from the Zhoushan area. She explains that before the Yongning floodgate was built, people near the estuary area were able to catch some seafood during the high tide, and that there used to be a piece of wetland where the Yongning floodgate is now located.



Rural Complex: An Attempt to Develop a New Model of Rural Planning on the Urban-Rural Interface - case study of Orange Garden in Huangyan

Yizheng Wang¹, Guiqing Yang²

Since China implemented the comprehensive reform and opening policy in 1978, its urbanization rate has increased by almost 1% every year. In 2018, the urbanization rate has reached 58.52%. This has led to historical changes in China's urban-rural relations as a whole, and fundamental changes in the urban-rural spatial structure.

In 1982, when China's urbanization rate was at 21.13%, its agricultural GDP accounted for 33.4%. As of 2018, the national agricultural GDP accounted for less than 9%, thereby signifying hundreds of millions of rural surplus labor. With the progress of urbanization and the improvement of industrialization, the flow of various factors between urban and rural areas has accelerated. The multi-directional flow of land resources, construction materials, capital, labor and other elements has reshaped the current social, economic and spatial landscape of China's urban and rural areas through the ever-shortening distance of time and space.

In this unprecedented large-scale urbanization in human society, on the one hand, China's urban and rural development has been largely modernized, on the other hand, problems of unbalanced and insufficient regional and urban-rural development arise. It has led to a widening differences between regions and brought severe challenges to sustainable development. The critical question is, how to deal with these problems actively? How to scientifically analyze and objectively understand the interaction and mechanism at the urban-rural interface? How to form more systematic and effective policy guidance based on the social structure, cultural traditions and economic stages of different regions, so as to improve the resilience level of regional development and face a more optimistic future? To respond to the problems listed above, it is necessary to carry out systematic research at the local level and to bridge scientific research and policy making.

Based on the above considerations, we present a practical study we carried out in Huangyan District, Taizhou City, Zhejiang Province: the planning and construction of the "Orange Garden" rural complex. We show the process in which through materializing the rural complex model, we link rural communities, cross-develop agriculture, and promote equitable distribution of public resources between urban and rural areas and flow of urban and rural elements.

Interpreting the Rural Complex

In February 2017, the term “rural complex” was first highlighted by the Chinese Central Government Policy on rural development. The original text of the document is as follows: “Support the construction of rural complexes in villages under proper conditions. The rural complex takes farmers’ cooperatives as the main carrier, allows farmers to fully participate and benefit, integrates circular agriculture, creative agriculture, and farming experience. Carry out pilot demonstrations through comprehensive agricultural development and transfer payments for comprehensive rural reforms” (the CCCPC, 2017). Our interpretation is that when synthesizing research perspectives such as regional spatial development, rural development, as well as urban and rural planning, the rural complex is not equivalent to a single building or a concrete spatial form in terms of construction types, but a comprehensive rural transformation development mode of “agriculture + cultural tourism + rural communities”. The idea of the rural complex is a tactic in the reconstruction of the current urban-rural relationship. It mainly promotes the two-way flow of urban and rural elements, presenting the advantages of rural agricultural resources, ecological resources, and cultural resources, and implementing a new industrial model in which government capital, social capital, market and villagers jointly invest in construction. This new model mobilizes the participation of farmers with cooperatives, utilizes agricultural assets, and realizes the joint development of rural areas.

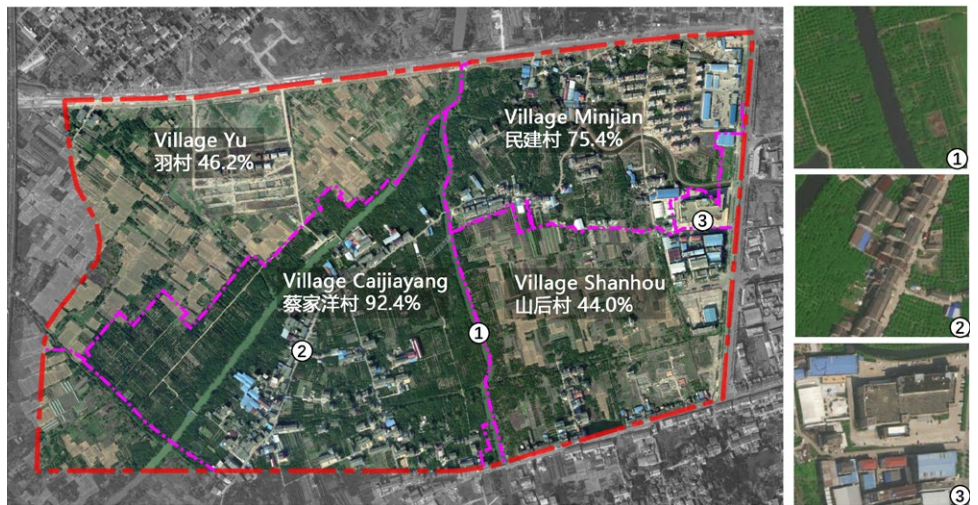
Rural Complex Planning Practice of the Citrus Garden

Based on the above concept of rural complex, the planning strategy focuses on the comprehensive effects, including rural industrial development, historical and cultural inheritance, community spiritual cohesion, and spatial environment improvement. The case is described as following:

Huangyan Citrus Garden is located to the south of the main urban area of Huangyan. Its planning scope belongs to Huangyan Nancheng Sub-District. The Citrus Garden is located on the main axis of the southward spatial development in Huangyan District. Meanwhile, the Citrus Garden lies on the east of the city's Green Core. It is located at the intersection of Shilipu Ecological Corridor and West River Ecological Corridor and has important ecological value. From the respect of administrative divisions, the location of the Citrus Garden belongs to the city, while from the respect of the established environment of space, urban spatial form and rural settlement form coexist within the scope of the Citrus Garden, which has the typical characteristics of the urban-rural interface (Figure 1).

Map of the Three Types of Texture in the Citrus Garden
(1. Farmland, 2. Rural Texture, 3. Urban Texture)

1 ↓



The planned area of the Citrus Garden is 1.91 square kilometers. Nearly 94% of its planned area involves 4 administrative villages. Among them, 46.2%, 92.4%, 75.4% and 44.0% of the land in Village Yu, Village Caijiayang, Village Minjian, and Village Shanhou are within the scope of the Citrus Garden project. Citrus has always been a characteristic agricultural brand of Huangyan. Village Caijiayang in the Citrus Garden has a “Premium Huangyan Citrus Production Base”, where concentrated planting area reaches 1,000 mu.

Different from other rural complexes involving typical domestic markets, the Citrus Garden is a government-led development. The planning of the Citrus Garden aims at comprehensively developing the rural area. The project optimizes the spatial layout of rural settlements, more than simply developing independent industrial and tourism parks. Some non-operating projects that are not purely profit-seeking have the characteristic of improving the quality of rural living environment in the form of “spatial restoration” (ZHOU Shangyi, 2018). Therefore, in the absence of pre-emptive market capital intervention, in order to reduce the risk of public financial investment, the government-dominated plan for the Citrus Garden requires gradual construction of featured functional sections of the park to drive the comprehensive development of the area, including the surrounding villages. It needs to avoid excessive construction of industry and commercial space for tourism, which will cause waste and irreversible damage to government financial resources and rural land resources.



2
 Site Plan of the Citrus Garden Rural Complex

LEGENDS

- railway stops
- WC
- preserved buildings
- new buildings and structures
- three 100-year-old citrus trees
- pathways
- pastoral art park
- pastoral plazas
- road
- river
- village boundary
- boundary of Nancheng Sub-district
- planning scope

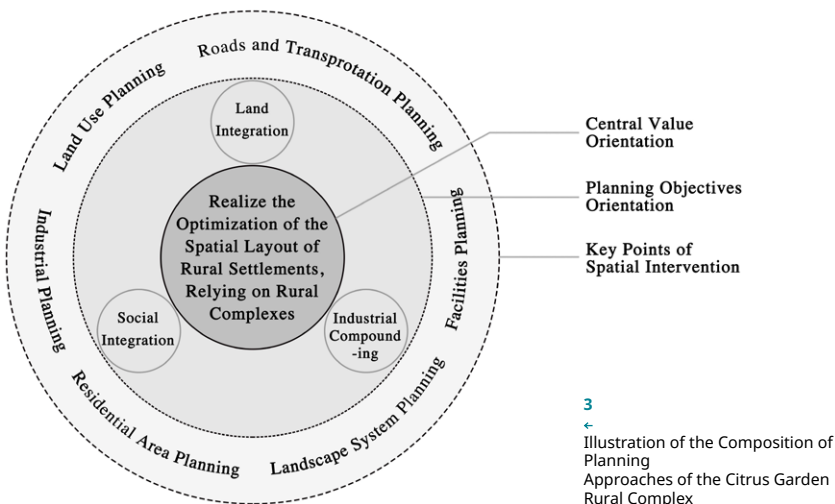
Thus, based on the comprehensive development of rural space, society, and economy, this article proposes the “three-in-one” planning objectives of the Citrus Garden, which involves land integration, social integration, and industrial compounding (Figure 3). It integrates the common development needs of individual villages and characteristic industries of rural complexes. The core planning value of the Citrus Garden Rural Complex is based on its role in driving the optimization of the spatial layout of rural settlements.

Land integration

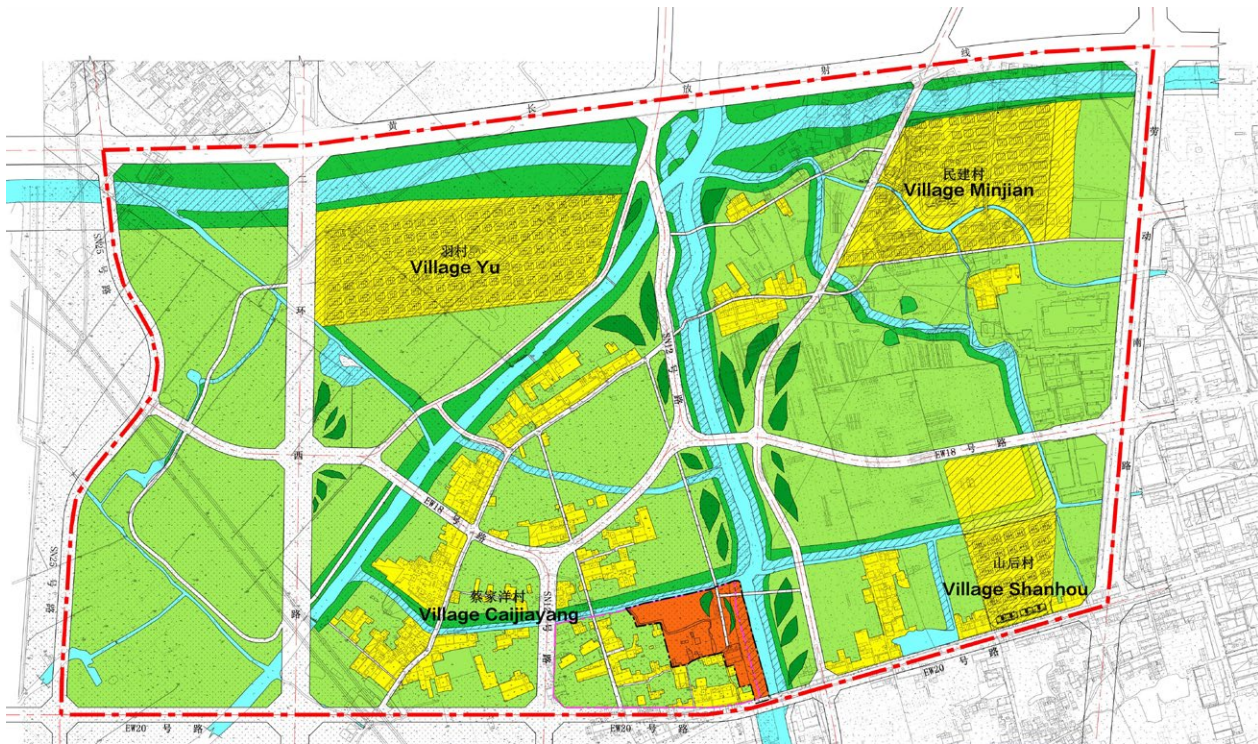
By Land integration, we refer to the rational agglomeration of farmland and construction land to revitalize idle rural land resources, carry out efficient production or commercial activities, as well as enhance and improve rural living and ecological environment.

In the Citrus Garden Rural Complex Planning, in accordance with the planning principles of the citrus planting industry in the conservation area, this plan adjusted the land use structure in the master plan and the regulatory detailed plan (Figure 4). This plan converts the industrial land designated in the master plan into agricultural and forestry land, protecting the ecology of the land within the planning area to the greatest extent. By gathering a certain area of arable land, the planting scale conditions of characteristic agriculture are guaranteed. The plan retains the existing villages, and the proportion of the planned rural construction land remains almost the same as the current situation.

During the implementation of the Citrus Garden starting area, on one hand, the development mode of the rural complex has ensured the proportion of agricultural and forestry land with overflow value in the re-



3
 Illustration of the Composition of Planning Approaches of the Citrus Garden Rural Complex



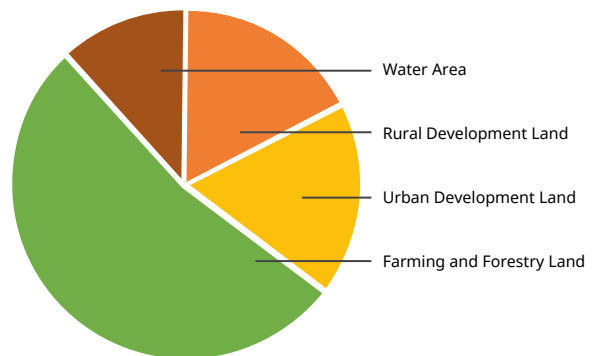
4 ↑
Land Use Planning and Land Use Structure
in the Citrus Garden Planning

gion, and the inefficient spread of urban construction land has been curbed through planning methods. On the other hand, in the process of the government-dominated construction of the Citrus Garden, the trend of nationalization of village collective land has been controlled to a certain extent, by gradually mobilizing the enthusiasm of villagers to participate in the construction. Especially in Village Caijiayang, the village collective has effectively intervened in the entire process of land acquisition, management and construction. As for the agricultural land in the Citrus Garden, the effect of the rural complex on the agglomeration and development of the citrus industry has triggered the emergence of intraregional and interregional farmland transfer. Some leading growers in Village Caijiayang contracted the land with Village Shanhou for citrus Bendizao planting. The largest citrus cooperative in Village Caijiayang has undertaken 100 mu of transferred land in Village Yuchen, which is also within the administrative area of the sub-district, to plant a new citrus breed Red Beauty and improve the yield of citrus industry.

Social integration

By social integration, we refer to the participation of villagers and villages in the planning and construction of the rural complex so that the infrastructure and public service facilities in the Citrus Garden are accessible to villages, and villagers can benefit from the public services provided by the rural complex.

With the reshaping of the spatial environment in the planning and construction of the Citrus Garden, the area has gradually shifted to the stage of consumer agriculture where the agriculture, secondary industry and tertiary are integrated.



In 2019, Nancheng Sub-District, where the Citrus Garden is located, attracted 1800 people for planting, processing, and sales due to the construction of the Citrus Garden. This number is about 300 more than in 2017. In 2019, about 16,000 people came for picking, visiting, painting, calligraphy and photography, parent-child activities, leisure tourism and other activities in the surrounding areas, as well as urban residents attracted by the completion of the Gongju Garden.

First of all, during the planning and implementation of the Citrus Garden Rural Complex, the chief of Village Minjian, as a typical representative of returned rural elites, took the initiative to connect with the construction of the Citrus Garden Rural Complex. This is a manifestation of the village's development towards more democratic self-organization. At the same time, the village chief Chen organized a village meeting to popularize the development prospects of the Citrus Garden with villagers. This has established the awareness of the joint development of the village and the Citrus Garden to the villagers and promoted the villagers and villages to participate in the planning and construction of the rural complex.



5
 ← Visitors tasting Local Agricultural Productions

Secondly, focusing on the accumulation of rural industrial competitiveness, local governments have extensively been organizing the connection between urban and rural elements to promote various activities, thereby enhancing the brand effect of the Citrus Garden. For example, in November 2018, the initial construction of the Citrus Garden came to an end. On the opening ceremony of Zhejiang Huangyan Citrus Tourism Festival on November 17, 2018, the number of visitors reached about 1,000 (Sources: Interview record with the local officials), including leading citrus growers, university experts, and representatives of citrus sales and processing companies across the country (Figure 5). The next day, Village Caijiayang hosted 2018 Caijiayang Citrus Food Festival in the Citrus Garden. The visitors that day were mainly from surrounding villages, with a total of about 300 people. The total area of Citrus Fang and Citrus Leaf Gallery is about 300 square meters. The open space planned in dots is not only a place for villagers' daily relaxation, but also a spatial carrier for holding fairs and celebrations on important festivals and attracting foreign tourists.

Industrial Compounding

The funding structure for the construction of the Citrus Garden consists of three levels: provincial, municipal and district. The funds dedicated to the construction of the Citrus Garden are conservatively estimated to more than 30 million (Sources: Interview

record with the local officials). With the strong support of government funds, the brand building of the Citrus Garden Rural Complex has promoted the compound development of citrus breeds in Village Caijiayang and the diversified development of the sales channels of citrus Bendizao. The traditional citrus sales are mainly retail sales, and the retail price in Huangyan is about 6 yuan/ kilo. But with the rise of the Internet, cooperatives of rather large scales in Village Caijiayang are turning to e-commerce. One-third of the total annual citrus production is sold online. The price is 80 yuan/ box (2.75 kilo), and the unit price of citrus has increased by about 20 yuan/kilo. After the opening of the Citrus Garden, the local government has supported Village Caijiayang to jointly launch Nancheng Citrus Garden Three Citrus Immortals Gift Box. The citrus fruits produced by three hundred-year-old citrus trees are individually packaged, 6 in a box . The compound promotion of sales channels has improved the economic benefits of citrus in the park to a certain extent. On the other hand, in conjunction with the planning and construction of the industrial space in the park, the village collective organizes the Open Garden Food Festival by using the completed plank roads and Citrus Fang. In the early development stage of the Citrus Garden Rural Complex, villagers rely on the collection of tickets and booth rent to obtain income, and the embryonic form of agricultural tertiary industrialization began to take shape.



6
← Scene of the built-up Citrus Fang



7
→ Scene of the built-up Citrus Leaf Gallery

Conclusion

Before the construction of the Citrus Garden project, the suburban rural areas were affected by urban expansion and development, resulting in fragmented development of agricultural land. The rural arable land and public space shrank extensively, and the distinctive citrus planting also fell into development difficulties due to the limitation of agricultural land. Under the guidance of the development mode of the rural complex, through the "three-in-one" planning objectives and a series of actionable spatial intervention measures (Table 1), the layout of rural settlements and agricultural development in the area has been optimized which has developed a new model of rural revitalization on the urban-rural interface.

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Table 1
→ Chart of the Implementation Approaches Structure and Concrete Measures of the Citrus Garden Rural Complex Planning

<u>The perspective of Elements Flow - Planning Decisions</u>		<u>Methods of Spatial Intervention - Implementation Approaches</u>		
Central Value Orientation	Planning Objectives Orientation	Key Points of Spatial Intervention		
		Class I	Class II	Concrete Measures
<u>Realize the Optimization of the Spatial Layout of Rural Settlements, Relying on Rural Complexes</u>	1) Land integration: Promote the ordered flow of land elements and achieve efficient use of rural land through active land integration;	Industrial Planning	Industrial Culture Defining	Ensure a certain scale of citrus planting area, adhere to and carry forward the local citrus agricultural characteristics;
			Industrial System Building	Build a "1+2+3" composite industrial system. Promote the development of traditional agriculture to circular agriculture. Connect characteristic citrus agriculture to the intelligent mould manufacturing industry in eastern Huangyan and the secondary development of "Citrus" products can be carried out. Plan three types of citrus-themed cultural tourism industries, including exhibition, amusement and accommodation;
			Industrial Culture Space Shaping	Incorporate citrus characteristic traditional culture into space design abstractly, and add cultural uniqueness to rural place-making;
		Landing Use Planning	Functional Layout	Construct three main functional sections of "pastoral community + circular agriculture", "core landscape + creative agriculture" and "citrus planting + agricultural experience"; five functional areas: innovative agriculture area, circular agriculture area, agricultural experience area, agricultural development service area (farmer cooperatives) and leisure tourism area;
			Land Use Adjustment	Reserve the rural development land, to ensure the maximum proportion of agricultural and forestry land;
	Rural Existing Development Land Revitalization	Withdraw idle homesteads and inefficient land used by township and village enterprises with compensation, and integrate them into village collective development land, and then balance the land use index within the village to ensure the land demand for village public service facilities and new rural industries;		
		Roads and Transportation Planning	Transportation System Cohering with Superior Planning	Under the premise of ensuring continuity, conform to the topography of the site, change the straight shape of the road to a curved shape, and ensure that the position of the intersection of the secondary road and the main road remains unchanged;
		Transportation System Cohering with Superior Planning	Under the premise of ensuring continuity, conform to the topography of the site, change the straight shape of the road to a curved shape, and ensure that the position of the intersection of the secondary road and the main road remains unchanged;	

3) Industrial compound- ing: Lead the flow of capital factors, realize the leaping utilization of rural agriculture, and cultivate new industries to achieve the compound development of rural industries.	Roads and Transportation Planning	Transportation System Integrating existing villages	Connect the road network of the Resettlement Sites Planning for Three Villages with the roads in the Citrus Garden;
	Landscape System Planning	Production Agricultural Landscape Design	Two states of large-scale citrus planting: separated planting and semi-separated planting;
		Consumer Agricultural Landscape Design	Build a "1+2+3" composite industrial system. Promote the development of traditional agriculture to circular agriculture. Connect characteristic citrus agriculture to the intelligent mould manufacturing industry in eastern Huangyan and the secondary development of "Citrus" products can be carried out. Plan three types of citrus-themed cultural tourism industries, including exhibition, amusement and accommodation;
		Tour Line Design	Incorporate citrus characteristic traditional culture into space design abstractly, and add cultural uniqueness to rural place-making;
		Controlled Adjustment of Agricultural Production Structure	Plant other high-priced cash crops based on the dominated citrus planting to increase agricultural production and landscape output within the same period;
	Facilities Planning	Centralized Layout	Use a centralized layout for tourist service facilities with concentration and evacuation functions (2 tourist centres and four railway stops);
		Decentralized Layout	Cruise ship docks, public toilets, and some catering and commercial facilities adopt a decentralized layout;
		Lightweight Design and Decentralized Layout of Tourist Facilities	The lightweight design of tourist facilities, decentralized distribution of large-scale concentration and evacuation sites;
	Residential planning	small-scale clusters and large-scale dispersion of settlements	Coexist the resettlements area with the texture of the traditional villages, and implement the residential area planning in small-scale clusters and large-scale dispersion;
		Publicity making of transit spaces	In accordance with the overall road and landscape structure of the Citrus Garden, renew the function at the junction of the village and the core functional area along the west river of the Citrus Garden, and create a catalyst for the rural complex to drive the development of villages;
		Public Interface Opening of Public Service Facilities in Residential Areas	At the southeast corner of the resettlement area for Village Yu and in the middle of the resettlement area for Village Shanhou near the water, open the public interface of the village's public service facilities, and form a network with the "transit points" set up in Village Caijiayang in the original plan. Encourage the gather of rural collective development land in the transit mentioned above area and build a compound commercial space for the villages' internal services and the tourism development of the Citrus Garden.





← ↑
Dam connecting Changtan water reservoir
in west Huangyan and Yongning River
(left), View of a new city quarter from side
of Yongning River (right) 2019.06
Copyright: Jörg Gläscher and Habitat Unit
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ISSUE One: Authors' Bios

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Principal Investigator in URA, professor and chair of landscape management and transformation at the Leibniz Institute of Ecological Urban and Regional Development (IOER). Wende studied at TU Berlin as a landscape planner. Following this, he graduated with a Diploma of Planning Engineering, and later a doctorate fellowship of the State of Berlin for young scientists analysing the effectiveness of the German Environmental Impact Assessment (EIA) system. In 2008 – 2009, he changed his position to the Federal Environment Agency Germany. Since 2010 he has been a professor for urban development at the Technical University of Dresden and head of Landscape Research Area at the Leibniz Institute, Dresden. He also has a broad international experience, for example as visiting professor at the National University of Singapore since 2009.

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URA project team and local actors on
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