

URBAN -
RURAL
ASSEMBLY

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Dialogues

EDITORS

Ava Lynam
Huang Huang
Sigrun Abels
Guiqing Yang



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URBAN-RURAL ASSEMBLY (URA) | 2

Dialogues

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Prof. Dr. Philipp Misselwitz
Prof. Dr. Vera Susanne Rotter
Dr. Sigrun Abels
Prof. Dr. Sigrun Langner
Prof. Dr. Wolfgang Wende
Prof. Anke Hagemann

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The URA periodical is an annual open access publication, which will accompany the Sino-German research and development project Urban-Rural Assembly (URA, 01LE1804A-D), sponsored by the German Federal Ministry of Education and Research (BMBF) as part of the FONA program Sustainable Development of Urban Regions (NUR).

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

Issue editors:

Ava Lynam, Huang Huang, Sigrun Abels, Guiqing Yang

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Sigrun Abels, Guiqing Yang, Ava Lynam, Huang Huang

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Editorial: Dialogues

Dr. Sigrun Abels ^{1*}, Prof. Dr. Guiqing Yang ^{2*}

Ava Lynam ¹, Dr. Huang Huang ²

¹ Centre for Cultural Studies on Science and Technology in China (CCST), TU Berlin

² Department of Urban Planning, Tongji University

* URA Principal Investigator

The complex relationship between urban and rural areas is a topic of worldwide relevance. Whether in Europe or Asia, the social evolution from agriculture-oriented civilisations to industrial and technological societies has shaped the physical form of rural settlements, cities, and metropolises – and thus their social, cultural, and historical meanings. With the development of transportation, infrastructure, trade, and communication networks across the globe – and simultaneous changes in social and economic structures – it is inevitable that human settlements of varying spatial form increasingly interact with each other through highly dynamic urban-rural relations.

Such daily connections, exchanges, and dialogues between urban and rural areas represent a form of ‘urban-ruralism’ (城乡性). Under the influence of globalised urbanisation corridors, two-way flows are formed between urban and rural regions through materials, energy, people, commutes, as well as economic and cultural activities, which continuously shape and reshape socio-spatial development patterns. This has had a profound impact on the quality of life of every person, family, social institution – and therefore local culture – and plays a role in determining regional prosperity and decline. It is therefore essential to identify and investigate the underlying factors behind these dynamics, and their varying and complex socio-spatial expression.

The interdisciplinary ‘Urban Rural Assembly’ (URA) project aims to play such a role. In view of the urban-rural relationship of our case study region of Huangyan-Taizhou in Zhejiang Province, China – and with reference to the comparative case of Thüringen in Germany – our studies provide evidence for describing the interactions behind everyday ‘urban-ruralisms’ (城乡性), and more. It is hoped that our joint findings will inspire the development of urban-rural planning and design interventions – as well as supportive policymaking – to promote a more sustainable dialogue between people and nature, and people and the built environment.

At the same time, our Sino-German research project has also faced challenges to cross-border and trans-disciplinary dialogue in recent years. The call for more China expertise has been heard frequently and loudly in Germany and Europe for some time – for dialogue and cooperation with China on an equal footing, but also in the opposite direction, for a greater distancing from China. In the realms of business, science, politics, and civil society, we are thinking about how to work together successfully in the future. Within the URA project, the Covid-19 pandemic has also restricted possibilities of research visits between Germany and China, as well as locally in Huangyan-Taizhou. This inability to engage with one another face-to-face and closely observe the research region on the ground has made our ongoing dialogue more challenging, but it has not broken off.

The changing conditions have required a re-thinking of the research cooperation between our two countries and have called for an adaptation of our shared project toward new ways of exchange. We have explored alternative research methodologies and cooperation formats, while we longingly wait for the time when we can resume our lively discussions and joint field research and data collection in person rather than virtual channels. In the current context, it is valuable if you can look back on many years of trust and cooperation in practice, which we are fortunate to be able to do in the URA project.

Dialogues is the second Issue of our URA Periodical series, and the contributions within it are impressive proof of our partnership-based research collaboration which has been forged over several years of cooperation. They show that mutual learning from one another, research in the field, and good intercultural communication are possible even under difficult conditions. Together, the actors in the URA research project have thought critically and strategically about realigning project milestones without losing sight of original goals, and have navigated the shoals of time well.

Dialogues addresses both our adaptations toward new ways of dialogue between Sino-German contexts, as well as knowledge exchange across different disciplines. This has promoted further depth to our joint research in terms of the cases we select, the theories and methodologies we apply, the terminology we use, and the findings we derive. We have used the production of the Issue itself as a vehicle for exchange and communication across the Sino-German URA consortium. This Issue includes research articles written collaboratively by Sino-German teams, graphic contributions incorporating voices from various geographical contexts, and puts emphasis on our interviews with experts in China and Germany, Sino-German Advisory Board members, as well as contacts from the field. *Dialogues* is structured in three primary sections:

1. **Discourses** The first section focuses on shared theoretical conceptualisations for rural-urban transformation that the Sino-German consortium is exploring through our URA Glossary. It aims to develop a common language for current terms, concepts, policies, and planning approaches that contribute to the wider global discourse on rural-urban transformation. Employing a cross-cultural and interdisciplinary lens, examples include circular economy, floating population, territorial planning, and rural revitalisation.
2. **Methodological innovations** The second section showcases the creative and exploratory methodological adaptations that have emerged as a result of our shared response to this 'new normal' research and cooperation context. Contributions reflect on new methods, data types, and cross-disciplinary approaches that have been integrated into URA's research design. This includes explorations of digital methodologies through our WeChat photo exchange group, as well as formats that have been introduced to strengthen engagement across the Sino-German consortium, such as the URA Glossary.
3. **Exploratory practices** The third section presents our most recent findings that showcase collaborative mechanisms in our interdisciplinary and cross-cultural research process. Exemplary case studies and intervention approaches have been highlighted from recent field work and data analysis. This demonstrates the application of our methodological innovations and participatory approaches, such as the introduction of Location Based Services data, as well as the workshop in our Living Lab of Beiyang Town, in collaboration with Zhejiang University. These site-specific perspectives become an evidence base to stimulate wider dialogue and exchange on rural-urban transformation across the Sino-German consortium – and beyond.

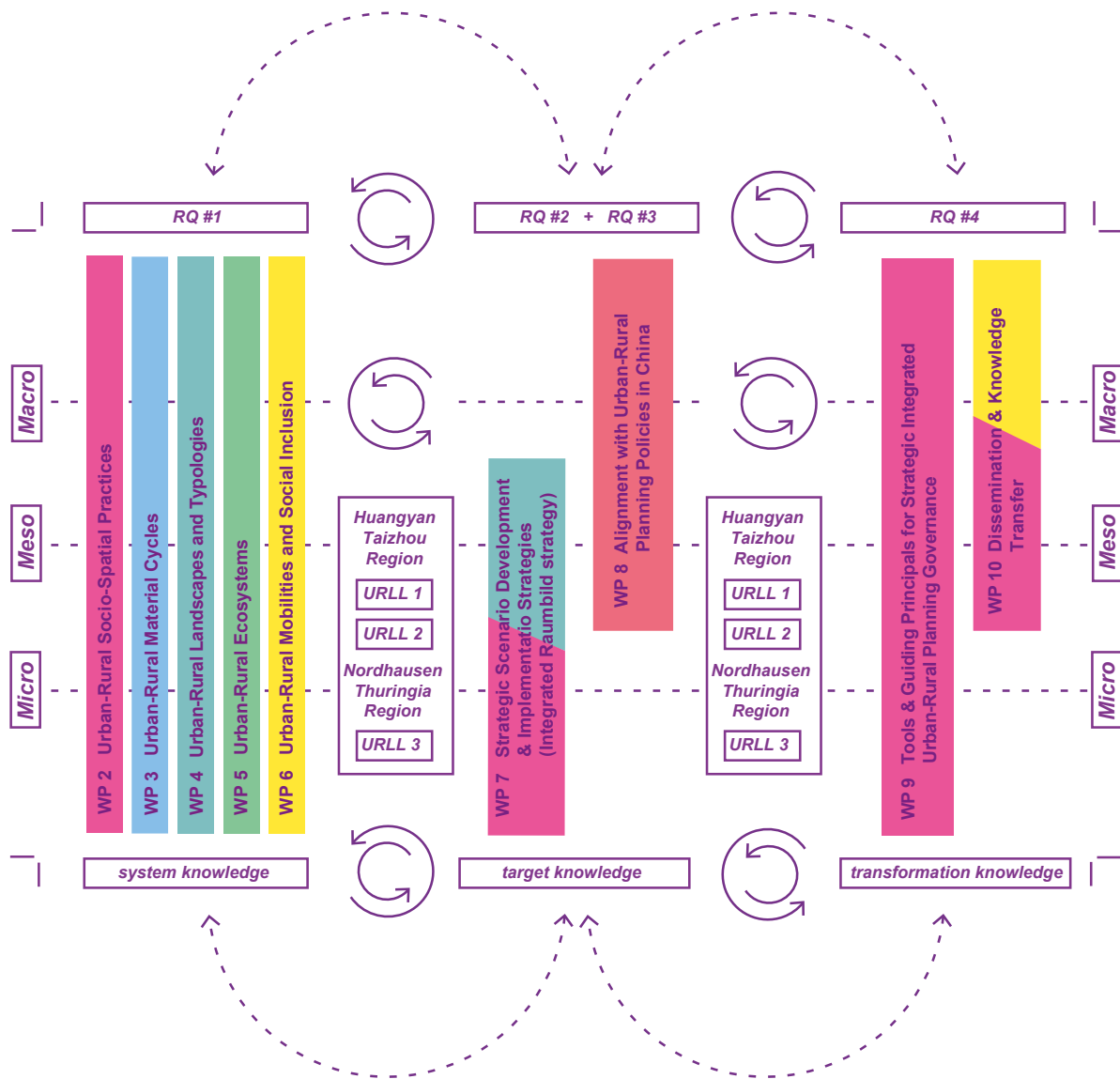


1 ←

During the Covid-19 pandemic in 2020, the URA team delivered our first international conference online: 'Integrated Urban-Rural Planning and Governance: A Global Perspective'. The hybrid livestream conference was hosted by ANCB Aedes Metropolitan Laboratory, Berlin and IBA Thuringia, and brought together international researchers, practitioners, city and regional representatives, policymakers, and global networks from China, Europe, Africa, and Latin America. Over two days, dialogues were held on current development challenges, experimental approaches towards integrated urban-rural development, and possibilities for trans-national learning. Source: Photo by Henry Sowinski

2 →

The systematic working approach of the URA project, oriented around interdisciplinary and cross-cultural dialogue. Source: Illustrated by Hannes Langguth and Lukas Pappert



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 they manifest 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 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 Sustainable Development Goals (SDG) -oriented urban-rural territorial planning? How can Huangyan-Taizhou benefit from global experiences developing -- sustainable transformation pathways through strengthening urban-rural linkages?

- TUB HU: TU Berlin, Habitat Unit, Prof. Dr. Philipp Misselwitz/ Prof. Anke Hagemann
 - 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)
 + IBA Thüringen GmbH (WP 10)

Working Package (WP)
 Urban Rural Living Lab (URLL)



3 ↑

As a cooperation between URA partners Zhejiang University and Bauhaus Universität Weimar, an interdisciplinary workshop was conducted in 2021 in our Living Lab of Beiyang Town. An open call invited students from across China for seven days of collaborative field research and discussion, and focused on exploring ecological food production and inclusive eco-tourism through participatory implementation strategies. While Covid-19 restricted German partners from travelling to China, they were able to provide theoretical and technical support through online lectures.

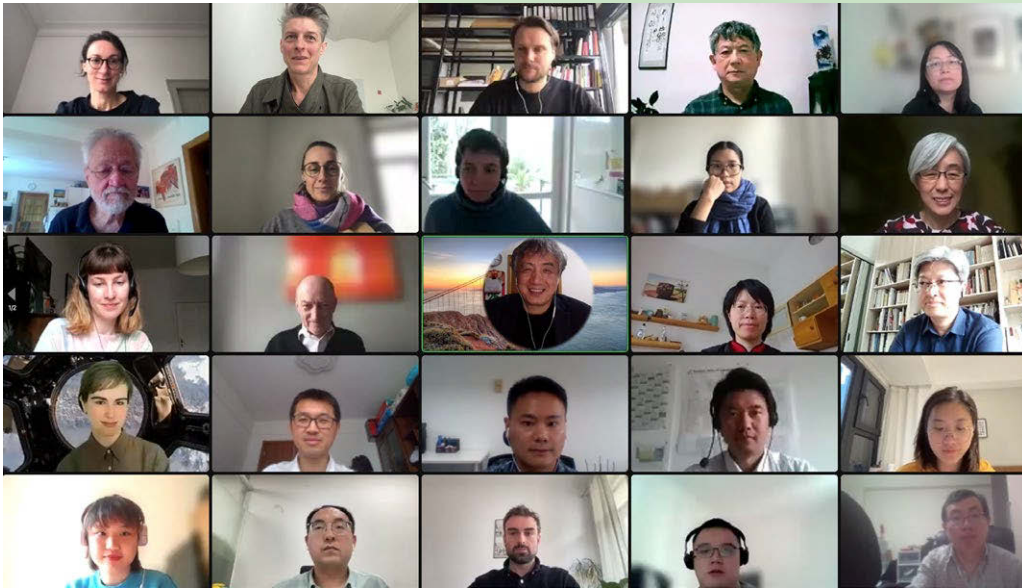
Source: Photo by Dong Wang



4 ↑

Despite mobility limitations, the URA team has found ways to continue rich field research and dialogues with local people in our Living Labs in Huangyan-Taizhou. Chinese partners have been the 'eyes on the ground' for researchers in Germany while the team eagerly waits for borders to reopen. Some Chinese colleagues based in Germany have managed to travel to China over the course of the pandemic, to join partners in conducting mapping, household interviews, survey questionnaires, and participant observation collaboratively in the field.

Source: Photo by Yuting Xie



5 ←

The Sino-German consortium has become well acclimatised to using various digital platforms to support fruitful cooperation within our team situated across borders. The researchers have also maintained regular dialogue with URA's Advisory Board members – such as Prof. Dr. Beate Jessel, Prof. Min Zhao, Dr. Eduard Koegel, Prof. Dr. Jian Liu, Prof. Dr. em. Johannes Kuechler, Prof. Antje Stokman, Prof. Dr. Elena Meyer-Clement, and Associate Prof. Dr. Hou Wei – who offer critical insight and strategic recommendations to direct the project's future development. Source: Screenshot provided by Anke Hagemann

6 →

Raubild / 图景共构: as part of our project readjustment plan, the URA team has carried out a series of multi-actor workshops in 2022 with participants in our Living Lab of Nordhausen, Thüringen. The aim was to explore how strategic planning processes could contribute to the development of a more climate-friendly shared 'image' of the local region. The experience in Nordhausen aims to support a trans-local dialogue and knowledge transfer between German and Chinese partners on possible participatory approaches toward sustainable urban-rural transformation. Source: Photo by Miriam Mathein



Understanding China's urbanisation process (1978–2022) from the perspective of the 'floating population'

A conversation with:

Prof. Min Zhao

College of Architecture and Urban Planning, Tongji University

Prof. Min Zhao is the former Chair of the Department of Urban Planning at Tongji University, and one of the most influential professors in China's planning and urbanism fields, having published numerous prestigious monographs. Prof. Zhao is an Advisory Board member of the URA project.



Interviewed by:

Associate Prof. Dr. Fengqing Li

Architecture Department,
Shanghai University

Translated and edited by:

Associate Prof. Dr. Fengqing Li, Architecture Department, Shanghai University
Ava Lynam, Centre for Cultural Studies on Science and Technology in China
Centre for Cultural Studies on Science and Technology in China (CCST), TU Berlin

Note:

This interview was conducted in Chinese, then later translated into English and edited with the consent of the interviewee.

MIN ZHAO (MZ):

Urbanisation is a shared topic in the Global North and South. The urbanisation rate you mentioned is a relatively common measurement, which can be understood as the degree of density of residents and economic activity in cities and towns.

China did not prioritise urbanisation during its previous planned economic era, and was cautious towards the development of big cities¹. The economic reform took place in rural areas, and the release of rural surplus labour initially promoted the development of township enterprises, which in turn led to the development of small towns. At that time, the Chinese Central Government proposed a development orientation known as, 'Small towns, big issues' (小城镇、大问题) and 'Small towns, big strategies' (小城镇、大战略). Since the 1990s, the focus of the RO shifted to large cities, with the urban economy experiencing substantial development. Entering the 21st century, China joined the World Trade Organisation and the development of the manufacturing industry has accelerated, attracting a large number of farmers to work in cities. This caused the urban population to increase rapidly, and several megacities have emerged as a result.

FENGQING LI (FL):

As a prominent expert in the field of urban planning, over the last 40 years you have witnessed China's economic and social development in relation to its urbanisation processes, since the 1978 'reform and opening-up' (RO). The country's urbanisation rate has seen continuous increases since then – from 18% to approximately 65% – in 2021. How would you characterise China's urbanisation process in comparison with other regions with a high rate of urbanisation, such as Europe, North America, and Latin America?

Responding to the global economic crisis in 2008, the Chinese Central Government shifted its export-dependent economic development model toward domestic demand. National development plans thus began to focus on urbanisation as a tool to "drive economic growth and stimulate consumer demand" (带动经济增长、拉动消费需求). This was underpinned by two key issues: one was the prediction of the speed and scale of future urbanisation in China, with the central government's aim for urbanisation to increase by 1% annually; the other was the prediction that the increasing urban population would stimulate domestic consumer demand. However, whilst historic experience shows that economic growth in developing countries generally promotes the urbanisation process, the opposite is not necessarily true. Urbanisation in some countries is accompanied by economic growth and prosperity, whilst in others by urban poverty and expanding slum communities. This can be identified as a distinctive difference between countries in Europe and North America, and those in South America with similarly high urbanisation rates.

After the 18th National Congress of the Communist Party of China in 2013, China's development orientation was adjusted again. Generally speaking, more emphasis was put on development quality, ecological environment protection, social equity and people's well-being – in comparison with previous focus on rapid development through production capacity and spatial expansion. Following this, the 'National New Urbanisation Plan (2014-2020)' (NNUP) was formulated, which proposed "people centred urbanisation, rationalising population flows and orderly integration of the rural-to-urban population". As well as this, it high-

¹ Due to food and energy shortages, amongst other things, during the planned economy era (added by Li Fengqing).

lighted the necessity to “synchronise industrialisation, informatisation, urbanisation, agricultural modernisation (四化同步) and promote urban-rural coordination” and to “lead the development of rural areas through urbanisation, with mutual benefits between industry and agriculture.”

Looking back on the decades since the RO, China has maintained consistent economic growth with industrial development and high employment rates, which have played a positive role in the urbanisation process. China's 2021 urbanisation rate of 65% is gradually approaching the level of more developed countries. Having been fundamentally industrialised, the proportion of the service economy has continued to rise in China; but, like Germany, China has maintained its manufacturing to sustain employment rates and the foreign trade of goods. This promoted economic growth, encouraged the development of urban and rural areas, and formed a huge domestic consumer market.

At the same time, China's advancing economy and the reform of its social management system failed to eliminate the urban-rural dual structure. Whilst the country had by and large avoided the phenomenon of large-scale slums that occurred in South Asian and Latin American countries, it nevertheless received a lot of criticism due to the urban-rural divide. Under the current institutional arrangements, Chinese farmers go to work in cities whilst still retaining ‘three rights’ in the countryside: contract rights over arable land, the right to the use of curtilage, and the right to their share of the collective economy. While this helps to cope with fluctuations in international and domestic economic development and forms a kind of structural resilience, it also generates differences in urban and rural employment, education, and public services. Amongst other challenges, it has also created obstacles in the transformation of rural-urban migrants, or the ‘floating population’ (流动人口), into urban citizens with regard to their household registration status (also known as hukou²).

According to the National Bureau of Statistics, the total floating population nationwide reached 290 million in 2021, the majority of whom moved to urban areas (including cities and towns). This accounts for 20.7% of the total population of the country, and is an increase of 60 million from 2011. According to China's Seventh National Census from 2020, the national urban population is 902 million, with an urbanisation rate of 63.9%, whilst the urbanisation rate of residents registered with urban hukou is only 45.4%. This means that the contribution of the floating population (mainly rural-to-urban) to China's urbanisation rate is as high as 18.5%. A comprehensive understanding of population mobility and related policies and reform trends is therefore of great significance to understand the trajectory and characteristics of China's urbanisation.

FL:

You specifically mentioned a ‘floating population’ moving between urban and rural regions. What is the difference between this definition and the common understanding of migration between urban and rural areas in a Western context?

MZ:

According to Chinese law (such as the ‘Regulations on Household Registration’ (hukou) of the People's Republic of China), citizens should be registered as permanent residents in the place where they constantly live – and this can only be in one place. A rural villager who has migrated to an urban area and lived there for more than half a year will be registered as a permanent resident there. However, a villager may not be willing to give up their original rural hukou, or are unable to obtain an urban hukou where they reside. The majority of people who leave the place associated with their hukou status (known as the ‘floating population’), are those who hold rural hukou and enter cities and towns. Amongst them, those who carry out work in cities and towns are known as ‘nongmingong’ (农民工), or migrant workers.

Because the floating population does not hold urban hukou, they do not have access to urban benefits and services on an equal basis, in relation to their urban hukou holding counterparts. This is distinctly different to the general understanding of rural-urban migration in other global contexts. In recent years, the welfare and services available to the floating population and nongmingong in cities and towns has been gradually improving, and the number of people who have obtained urban hukou is also increasing due to ongoing reforms of the hukou system. In practice, most cities and towns have now relaxed limits on urban hukou (apart from large cities and metropolises). It should also be pointed out that promoting the ‘Urbanisation of Nongmingong’ (农民工市民化) was an important policy goal of the NNUP (2014–2020), but progress on the ground has lagged, and the reasons behind this are complex.

² Hukou (户口) is a system of household registration in China tied to urban or rural status, with impacts on public service and social welfare access (added by Ava Lynam).

FL:

You have previously conceived the notion of the 'economic family' as a key factor that affects demographic transition in rural China, which has become an influential concept published in renowned urban planning journals. In the context of ongoing hukou reform in China, how would you explain the 'economic family' to European readers?

MZ:

There are numerous studies on the relationship between China's hukou system and urbanisation. Many scholars believe that the hukou system is the main obstacle towards the process of integrating nongmingong in urban areas. This sounds reasonable, but beyond a moral point of view, you cannot ignore an obvious fact. As part of the recent hukou reform, official restrictions on urban hukou access have started to be eliminated for cities and towns with a permanent population of less than 3 million. Large cities of over 3 million people will also loosen the conditions for long-term residents to obtain local hukou. However, based on a survey conducted by our research group – and through our observations of the situation on the ground – most rural residents and nongmingong who have moved to cities still chose to maintain their rural hukou. A simple inference would be that the benefits of rural hukou have continued to increase due to the ongoing introduction of favourable policies in rural areas. This is indeed true, but further research is needed to come up with a more comprehensive explanation.

In our ranking analysis of China's Sixth National Population Census, we observed a significant asymmetry between the out-migration of young labour in rural China and the out-migration of the total rural population, in that the out-migration rate of young and middle-aged labour is higher than that of other age groups. The reasons are economic. This is similar to the large numbers of young and middle-aged Turkish labourers who came to work in Germany after the war. Objectively speaking, the out-migration of young and middle-aged rural labour is relatively easy and of great benefit to all parties (i.e. family and government). On the other hand, out-migration of other rural age groups are associated with higher family living costs, as well as public service costs. In the context of market-oriented reforms in China, I think the notion of the 'economic man' in economic theory can be interpreted as an 'economic family', which helps us analyse the micro-scale and dynamic mechanisms behind the decisions of hundreds of millions of out-migrating rural households.

The first aspect of this are strategies employed for the optimal allocation of household labour. Rural households tend to organise their labour force in a way that maximises household income: the young and middle-aged members go to cities to work in order to earn the highest possible income. They are thus often willing to travel long distances from central and western regions of China to more developed eastern regions. The elderly – and others that are considered to have weak economic competitiveness in cities – tend to stay in rural areas where they can still manage leased agricultural land to make some money. Some people also work part-time in towns near the countryside, farming and taking care of their families. Such a household labour allocation is a rational choice for 'economic families' under hard budget constraints, but at the same time brings long-term separation of family members – the social cost of which is self-evident.

The second aspect relates to rural household assets. The behavioural logic of the 'economic family' is to maximise the value and use of household assets and minimise economic risks. In my opinion, the focus on common discussions around the hukou system's preferential welfare provision for urban residents – and the related exclusion of the floating population – only explains the 'opportunity costs' for the floating population in cities and towns. In reality, many rural households choose to keep their rural hukou because there is also an 'opportunity cost' of leaving the countryside.

Thirdly, China's rural collective land system is a unique institutional arrangement. Farmers have land ownership in the form of collectives – they do not have the right to sell arable land and rural housing individually. Family assets are therefore linked to the collective, and families who maintain their rural hukou status can share the assets and benefits of rural collective economic organisations. In other words, leaving the collective implies giving up their assets. Even if they keep their rural hukou when moving to cities and towns, their family assets may lie idle. Considering these options, some family members continue to operate leased agricultural land and use and maintain their assets, such as homesteads and private houses.

Through these dynamics, we can see how the economic trade-offs of countless individuals and families at a micro-scale have shaped the unique conditions of China's urbanisation process.

FL:

Do you think it is necessary to eliminate the dual hukou system as soon as possible to realise the integration of urban and rural development? What is your prediction of China's urbanisation development trend going forward?

MZ:

Eliminating the urban-rural dual system should be an overarching goal, and institutional reforms have indeed been advancing. There has been significant progress in the delivery of basic public services for rural migrants in urban areas, and policy experiments are underway in a number of designated areas.

To avoid sudden drastic impacts on rural land ownership, the current rural land reform clarifies the rights and interests of agricultural land leasing, and gradually liberalises rural land management rights, including cultivated land and commercial construction land. Such gradual reforms can help to avoid huge social risks caused by rapid transformation – for example, if a nongmingong were to lose their job in an urban area, they would still maintain their rights and livelihoods – protected by rural collectives. On the other hand, the drawbacks of this mode of social mobility between urban and rural areas are increasingly criticised. The migration of a large number of rural workers to urban areas has resulted in the ‘hollowing out’ of villages with a ‘left behind’ population of children and elderly. At the same time, nongmingong in the city do not receive the same treatment as those considered urban citizens, and thus face multiple challenges.

At the same time, we should not deny the substantial impact of population mobility and the migrant economy on China's development. There are risks to changing the situation too quickly. We should not aim at quick benefits and expect to free up consumption in urban markets by increasing the number of ‘urbanised citizens (人口市民化)³ through the granting of urban hukou. In the context of huge regional differences, in addition to aims of ecological protection, the export of rural surplus labour from underdeveloped areas is currently still the most feasible development option. Although the migrant economy does not directly contribute to GDP indicators of out-migrant regions, it remains an effective way for many rural areas to alleviate poverty and improve their economic situation.

The difficulty of implementing policies of integrated development through promoting the ‘urbanisation of citizens’ lies in the fact that the huge group of nongmingong that have settled down in cities and towns are also directly linked to hundreds of millions of rural families who would also have to be accommodated. In addition, as previously mentioned, migration is not only related to employment opportunities and income levels in cities and towns, but also largely dependent on the conditions of the countryside. The fact that many farmers are reluctant to give up their rural hukou – in addition to the relatively low consumption behaviour of migrant workers in cities – suggests that income levels in urbanised areas are not high enough to support their whole family to settle down in cities and towns. In addition to the economic value for leased agricultural land and rural houses, they are unable to consume like other citizens in urban areas, but instead use their income to support family members who have remained in their rural hometown.

The notion of ‘urbanising citizens’ is thus a very complex social project involving the balancing of interests in both urban and rural areas. Looking to the future, establishing a mechanism for the integrated development of urban and rural areas and promoting sustainable development of society, economy and environment – but also respecting people's will to choose – are the goals we should be aiming for.

³ The term ‘urbanised citizen’ refers to the floating population who are officially registered in the city in which they work. (added by Fengqing Li)

Territorial and spatial planning as a driver for multi-scalar urban-rural integrated development in China

Junseong Park¹, Beatrice Chng¹, Ji Xu¹

¹ICLEI - Local Governments for Sustainability e.V.

With urbanisation policies aiming at 'getting rich first' from the 1970s to 1990s, China has achieved massive economic development by focusing primarily on cities. However, urban-biased policies have led to a lopsided urban-rural dual structure, including regional inequalities between eastern and western regions in China, and more evidently, between villages and cities (Liao & Wei, 2016). As a result, China now aims to transition from the existing urban-rural dual structure towards a more people-oriented and high-quality growth through an approach of urban-rural integrated development. The question is no longer about the rate of urbanisation but the quality of growth in cities and rural areas with varied localised needs and aspirations. Therefore, optimising the land spatial development pattern has become a vital measure to implement differentiated policies for expanding, shrinking, and stable towns, cities, and city clusters for a balanced and integrated urban-rural development.

'Spatial planning' is the process of shaping the built and natural environment, going beyond traditional land use planning to integrate land development policies with other policies and programs, influencing how they function in space. It is not merely about designing the land use, but also the management of space based on environmental, societal, and economic needs (Matthaei, 2018). The absence of integrated spatial plans at national and subnational levels may overlook communities' needs, aggravate conflicts, and misuse resources, leading to spatial disparities (Matthaei, 2018; CIRAD, 2018). Territories are not just geographical areas, but are also governance structures and social, economic, cultural, and political assets and processes. A territorial approach to spatial planning departs from traditional rural development that has no urban-rural interrelations to address interdependencies between different places, scales, and governance levels, including urban-rural linkages (CIRAD, 2018).

The 'New Urban Agenda' highlights the relevance of territorial development through spatial planning and the integration of urban and rural functions into spatial frameworks, to promote coherent sectoral policies and sustainable development within the urban-rural continuum (UN-HABITAT III, 2016). Chinese President Xi Jinping also emphasised the importance of spatial and urban-rural planning when he claimed that, "The territory is the spatial basis for ecological civilisation", in the 6th collective study of the 18th CPC Central Committee in 2013. However, what is the role of multi-scalar spatial planning within China's urban-rural integrated development trajectory? This paper identifies measures to optimise spatial land patterns, and discusses how spatial planning can be integrated with sectoral focuses and urban-rural linkages.

SPATIAL PLANNING IN THE NATIONAL CONTEXT: **CHINA**

China's first 'National Urban System Plan 2007' recognised the need to integrate rural residents with cities and towns for economic growth, by developing 'city clusters' where urbanisation could be systematically planned and promoted. This was the first paradigm shift that viewed cities and villages from a policy perspective as functional territories, rather than as administrative units. In 2014, the National Development and Reform Commission released the 'New Urbanisation Plan' (2014–2020) and emphasised China's shift in focus from urban growth to balanced urban-rural development, revitalising rural areas and addressing the 'Three Rural Issues' defined by the national government: agriculture, farmers, and villages.

In March 2021, China released the '14th Five-Year Plan (FYP) for National Economic and Social Development (2021–2025)' and 'Long-Range Objectives for 2035', which both outline high-quality, innovation-driven growth, and green development. The FYPs are significant policy guidelines for the entire country, and subnational governments must also plan and localise the principles according to the national FYP. What is most notable in the 14th FYP is the aim to promote a coordinated spatial layout of effective city clusters as well as a simultaneous strong emphasis on counties. As a result, there has been an evolving narrative towards county development as a critical link for urban-rural integration.

Administrative level	Categorisation	Examples
Provincial level 省级行政区	Province (省)	Zhejiang Province
	National autonomous regions (自治区)	Xichang Autonomous Region
	Directly-governed municipalities (直辖市)	Beijing, Chongqing, Guangzhou
	Special Administrative Regions (特别行政区)	Hongkong
Prefecture level 地级行政区	Sub-provincial-level city (副省级城市)	Chengdu, Nanjing
	Prefecture-level city (地级市)	Taizhou Municipality
County-level 县级行政区	County-level city (县级市)	Yuhuan city (under Taizhou), Yiwu city
	County (县)	Wenling Kangbao county
	Districts (市辖区)	
	Banner (旗)	
Township level 乡级行政区	Urban Administration Street-level (街道)	Xicheng Street-level (under Huangyan District)
	Towns (镇)	Wenqiao Town (under Wenling County-level city in Taizhou Municipality)
	Rural Administration Townships (乡)	Beiyang Township (under Huangyan District)
Village level 基层群众自治制度 农村基层组织	Ethnic townships Ethnic-minority Townships (民族乡)	Kaili City (under the Qiandongnan Miao and Dong Autonomous Prefecture)
	Community (社区)	Taizhou Huangyan Fangshanxia Community
	Village (村)	Dongshayu village (under Yuhuan City, Taizhou)

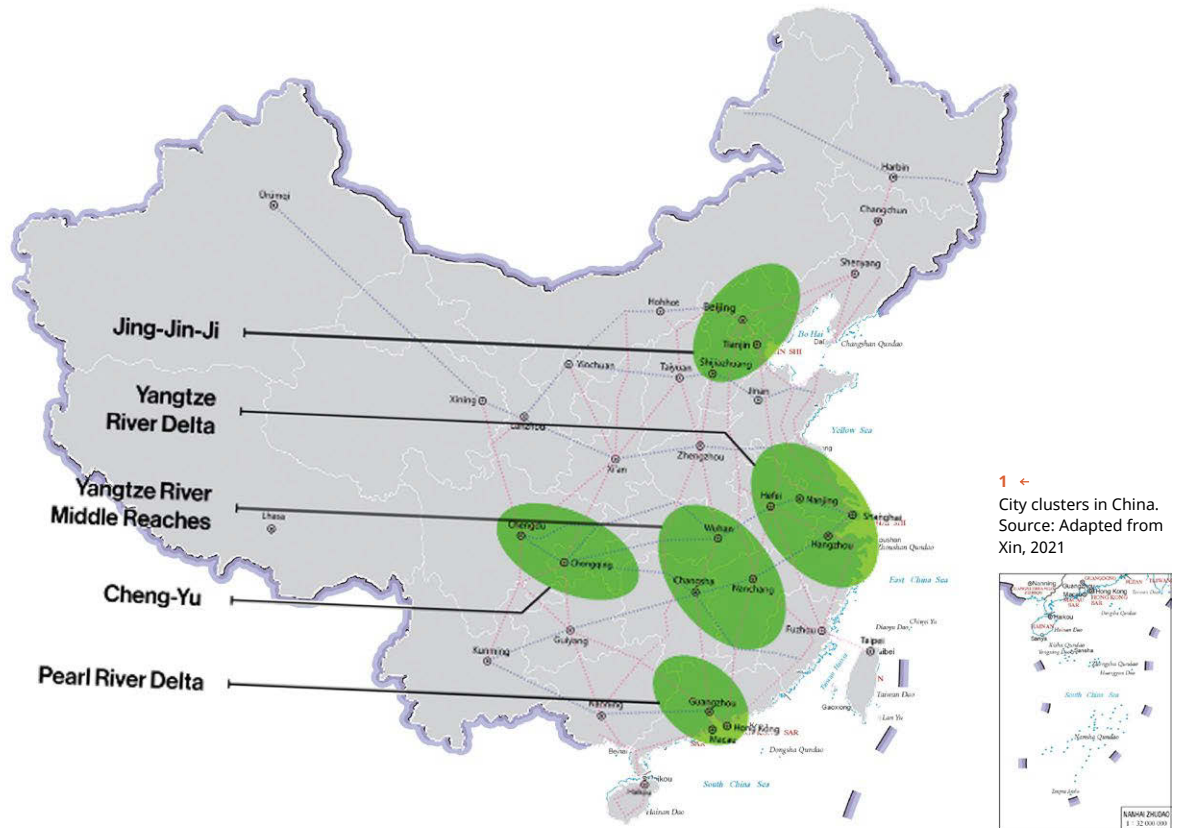
Table 1 ↑

Administrative units in China. Sources: Xinhua News Agency, 2019; The State Council of China, 2014; Taizhou Municipal Government 2019

Focus on city clusters for regional economic growth

During the 14th FYP cycle, China will strengthen the development of the five most significant city clusters (the Beijing-Tianjin-Hebei region, Yangtze River Delta, Yangtze River Middle Reaches, Cheng-Yu, Pearl River Delta) by 2035 (Fig. 1). The combined GDP of these clusters is estimated to contribute 50% of China's GDP. Between 13-15 million people from rural areas will be 'urbanised' under this new plan, by providing an urban 'Hukou' (户口) household registration, with priority given to spread the benefits from significant city clusters to their surrounding rural areas. In addition,

the national government aims to connect these clusters by implementing 16 new high-speed railway lines (Xin, 2021). City clusters are seen by the state as key to achieving China's carbon neutrality goal by 2060, realised through improvements in public transportation, logistics, and manufacturing practices through circular economy concepts, as well as coordinating environmental management (Liu, 2021).



1 ← City clusters in China. Source: Adapted from Xin, 2021

Focus on counties for urban-rural integrated development

The Chinese administrative division can be divided into five levels (Table 1). A county is the third basic administrative unit of China's national economic development. As of 2021, there are around 160 million permanent residents in 1,473 counties, and 90 million permanent residents in 394 county-level cities, accounting for nearly 30 percent of the permanent resident population in China's urban areas when combined (NDRC, 2022). According to the 'High-Quality Economic Growth in China's Counties 2019' report, the county-level economy represents 41% of China's entire economy with 39.1 trillion Yuan (5.69 trillion Euro) (Xu & Xia, 2019). Therefore, counties are key to urban-rural integration.

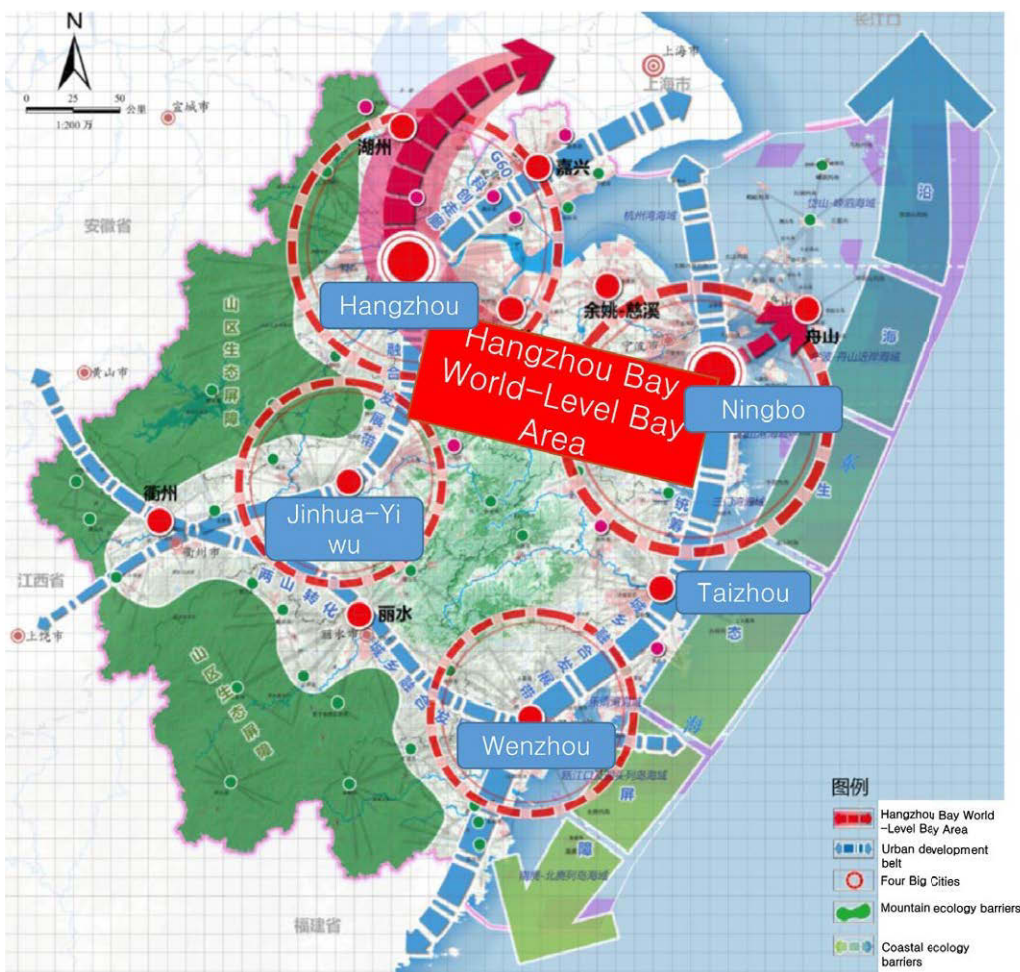
Counties garnered attention and provided an entry point for urban-rural integrated development following the 14th FYP, and subsequently on 6 May 2022 the State Council issued the 'Opinions on Promoting Urbanisation with Counties as Important Carriers' (关于推进以县城为重要载体的城镇化建设的意见). Whilst urban areas provide job opportunities, attaining Hukou (户口) household registration cards in cities has been challenging; this has limited access for rural Hukou holders to education, healthcare, and other social services in urban areas. Based on the 'Rural Revitalisation Survey', conducted by the Chinese Academy of Social Sciences in 10 provinces and 300 villages, the majority of rural Hukou holders were found to prefer counties for working and living (33.6%), followed by prefecture-level cities (Ma, 2022). Counties provide favourable conditions to enhance rural villagers' livelihoods, whilst strengthening rural industries and leveraging the economic power to supplement agricultural income.

TERRITORIAL AND SPATIAL PLANNING IN ZHEJIANG PROVINCE

After China's Ministry of Natural Resources was tasked with developing the country's first 'National Territorial and Spatial Plan' (NTSP) in 2019, Zhejiang Province released its 'Zhejiang Province Territorial and Spatial Plan (2021–2035)' in 2021. By adopting a 'multi-plan integration' concept, territorial spatial planning enables an integrated approach with other functional themes or sectors, such as protecting ecological space, rural revitalisation, urban-rural integration, and improving city resilience. It is also a shift from 'urban planning' towards 'spatial planning', including both urban and rural areas.

Spatial planning for territorial development

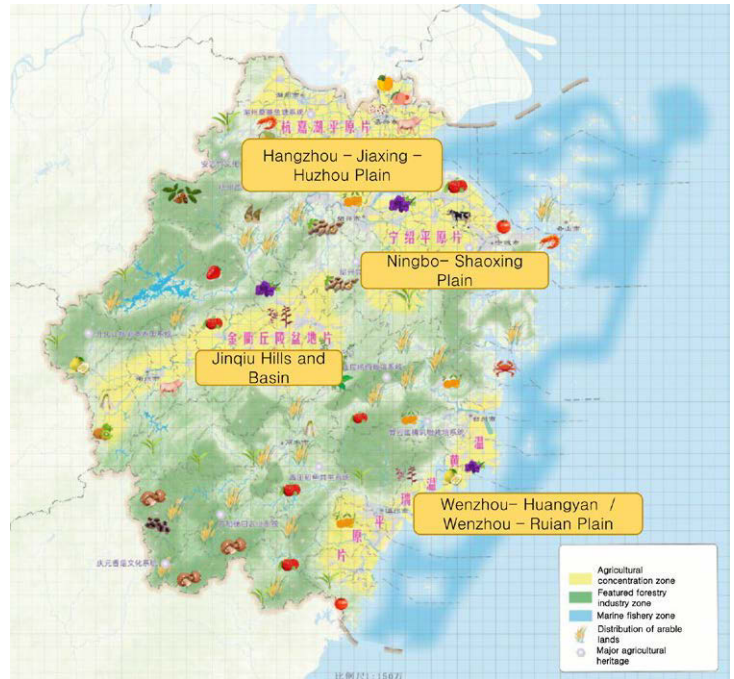
In Zhejiang, three city belts have been established by connecting the 'Four Big Cities' (the four main metropolitan cities in Zhejiang): Hangzhou, Ningbo, Wenzhou, and Jinhua-Yiwu, to maximise the spatial agglomeration effect for economic development (Fig. 2). Hangzhou Bay, located near the Chinese financial centre of Shanghai and the manufacturing hubs of Suzhou and Hangzhou, plays an essential role in the economic development of the province. According to the 'Master Plan of Hangzhou Bay New Zone', the focus is on developing the 'Advanced Manufacturing Industrial Zone', 'New Business District', and 'Wetland Leisure Area'.



2 ← Overall pattern of territorial space development and protection in Zhejiang Province. Source: Adapted from Department of Natural Resources of Zhejiang Province, 2021

Spatial planning for rural revitalisation

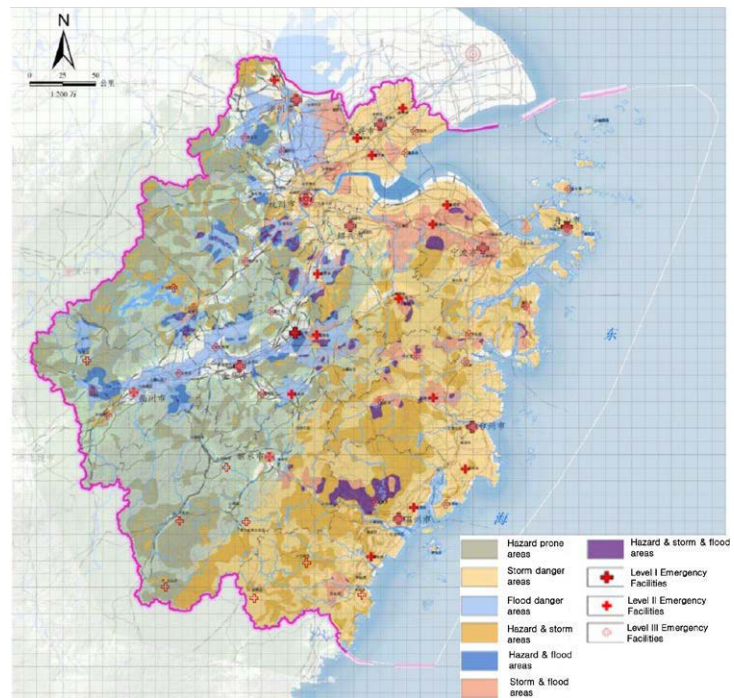
Based on the 'Implementation Opinions of Zhejiang Province on Promoting the Comprehensive Revitalisation of Rural Areas with High Quality in 2022', Zhejiang aims to demonstrate agricultural and rural modernisation, create 'Beautiful Villages', and address the core 'Three Rural Issues' for rural development. The theme of rural revitalisation has also been reflected in the NTSP, identifying four core demonstration regions to pilot rural modernisation efforts that include forestry, fisheries, and agriculture (Fig. 3). In addition, since 2021 Zhejiang has implemented the five-level "Field Chief System" (田长制) in the province, cities, counties, townships, and villages. This is a management system of village communities in which prominent leaders of municipal, district (county, city), and township governments become the first, second, and third level liable person for permanent farmland protection within their jurisdiction. Such a governance structure plays a critical intermediary role for spatial plans to function effectively.



3 ↑ Spatial pattern of modern agriculture in Zhejiang Province. Source: Adapted from Department of Natural Resources of Zhejiang Province, 2021

Spatial planning for urban-rural resilience

Recognising the fact that natural resources are shared and interlinked between the urban and rural interface, Zhejiang province aims to increase its resilience through three aspects: (1) efficient use of water resources, (2) protection of mineral resources, (3) establishing a disaster prevention system. To manage water efficiently, the province will categorise areas into three groups based on their water abundance: abundant water zone (富水调配区), water sufficiency zone (丰水发展区), and water-scarce zone (缺水限制区), and manage these zones accordingly (Fig. 4). In terms of protecting mineral resources, the spatial layout will be optimised so that mineral resources exploration, mining, and restoration can be carried out more efficiently. Finally, the province strives to become more resilient by identifying areas prone to storms, floods, and other natural hazards, and implement disaster prevention methods by increasing the number of emergency facilities.



4 ↑ Disaster zoning and public health safety layout in Zhejiang Province. Source: Adapted from Department of Natural Resources of Zhejiang Province, 2021

TAIZHOU: SPATIAL PLANNING AT THE LOCAL LEVEL

Taizhou is a coastal city separated by mountains and seas within the Yangtze River Delta, a location that has many economic benefits. However, inequality exists between rural and urban residents, and between the north and south geographical regions. In 2017, the average per capita disposable income of permanent urban residents in Taizhou was 51,375 Yuan (7,452 Euro), but only 25,239 Yuan (3,661 Euro) for rural residents, less than half of the former (Taizhou Survey Team of National Bureau of Statistics, 2018). The income gap between the northern districts (Linhai, Tiantai, Xianju, and Sanmen) and southern districts (Jiaojiang, Huangyan, Luqiao, Wenli, and Yuhuan) of the city is significant

as northwestern Taizhou is less densely populated with low mountains, whilst the southeastern region is coastal. The per capita disposable income of the southern Luqiao District was 62,286 Yuan (9,035 Euro), which is 1.68 times higher than the rural Xianju County in 2017 (Taizhou Survey Team of National Bureau of Statistics, 2018).

The trend of focusing on counties is also observable in Taizhou (Table 2), as the city aims to promote the integrated construction of infrastructure and public services, strengthen local service functions, and accelerate the formation of a functional service circle around the centre of the city (Taizhou Government 14th FYP, 2021).

County-level administration in Taizhou	Development focus areas (2021-2025)
Yuhuan city	Establish the Yuhuan economic and trade cooperation zone
Tiantai county	Implement green and high-quality development in integration with the Yangtze River Delta
Xianju county	Develop eco-tourism destinations, build into a beautiful landscape city
Sanmen county	Strengthen connection with Shanghai and Rongyang

Table 2 ↑

Development focus areas of county-level cities/counties in Taizhou within the 14th FYP. Data Source: Taizhou Municipal Government, 2021

The following section presents how Taizhou infuses spatial planning with transportation and economic planning for more inclusive growth. These two themes have been selected as transportation is pivotal for China's strategy to connect across multi-scalar planning and implementation, to foster urban-rural integration. In terms of economic planning, the marine economy is highlighted to showcase how Taizhou drives economic development that capitalises on territorial advantages.

Spatial planning in terms of city transportation networks

An efficient transportation system is identified as one of the cornerstones of urban-rural integration, as emphasised in Taizhou's 14th FYP on 'Comprehensive Transportation Development' (台州市综合交通运输 "十四五" 发展规划), released in 2021. Integrating Taizhou into the overall Yangtze River Delta integration plan enhances accessibility to other critical economic powerhouses and allows flows of technology and human resources within the city, such as through transport interconnections, bay area development, and a cross-regional cooperation system (Yang, 2020). Highways that connect Shanghai, Hangzhou, Ningbo, Jinhua, and Wenzhou will also be established. The ambitious goal of Taizhou city's '1123 traffic circle' (1123交通圈) is under implementation, which promises a maximum of one hour of travel within the city, one hour to the provinces and surrounding cities, two hours to cities in

the Yangtze River Delta, and three hours to many other major cities in China. This reflects how transportation is the backbone for connecting and developing urban-rural integration and facilitating economic and social interactions across a multi-scalar network.

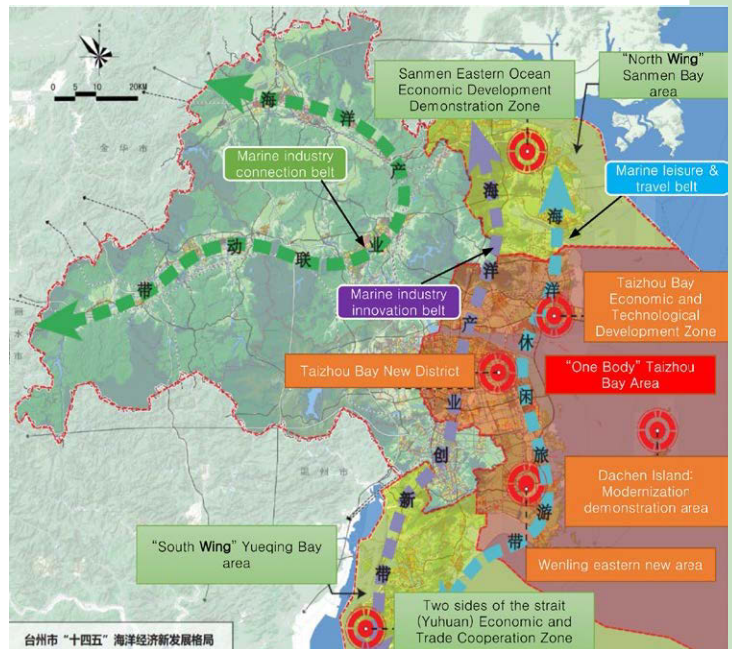
Spatial planning for the marine economy

In 2021, Taizhou released the 'Taizhou Municipal People's Government 14th FYP for Taizhou Marine Economic Development' (台州市海洋经济发展 "十四五" 规划), to bolster Taizhou's economy based on its geographic advantage as a coastal city. The plan focuses on building a new spatial pattern of marine economic development featuring four elements: 'One body, two wings, three belts, and six areas'.

'One body', (an area marked in red in Fig. 5) is the core area of marine economic development within the Taizhou Bay Area. The city plans to comprehensively integrate the entire area and port industry using high-end services, innovation agglomeration, and industrial manufacturing, whilst enhancing the spillover effect to nearby bay areas. 'Two wings' refers to the northern and southern bay areas as regional growth nodes. In the 'North Wing' (referenced in Fig. 5), a new marine industry cluster will be built in the Yangtze River Delta, whilst the 'South Wing' focuses on cooperating with neighbouring cities (e.g., Wenzhou) in manufacturing, modern logistics, and marine agriculture.

To ensure that this plan also benefits non-coastal counties, the 'Three belts' (identified in Fig. 5) refer to the 'Marine Industry Innovation Belt', the 'Marine Leisure and Travel Belt', and the 'Marine Industry Connection Belt'. The 'Marine Industry Innovation Belt' connects to essential industrial platforms, such as automobile manufacturing. The 'Marine Leisure and Travel Belt' focuses on improving various tourism spots in the region. At the same time, the 'Marine Industry Connection Zone' relies on three economic development zones, including the 'Huangyan Economic Development Zone', and ensures that the marine economy is developed in a coordinated manner.

The 'Six Zones' shown in Fig. 5 refer to the 'Taizhou Bay New Area', the 'Taizhou Bay Economic and Technological Development Zone', the 'Yuhuan Economic and Trade Cooperation Zone', the 'Dachen Island National Island Modernisation Demonstration Zone', the 'Eastern Wenling New Area', and the 'Sanmen East Marine Economic Development Demonstration Zone', which focus on boosting the manufacturing industry, through aerospace, high-end equipment, port, and shipping logistics. By optimising the spatial layout for the marine economy, Taizhou hopes to boost land-sea coordination, as well as urban-rural economic growth, that will benefit northwestern counties.



5 ↑
New pattern of marine economic development during Taizhou's 14th FYP.
Source: Translated from Taizhou Municipal Government, 2021

CONCLUSION

This article explored multi-scalar spatial planning in China at national, provincial, and local scales to foster urban-rural linkages and integrated development. Metropolitan areas and city clusters are the basic spatial unit supporting international and domestic circulation, whilst counties are the entry point of urban-rural integration. Counties can be seen as an intermediary vehicle to facilitate dialogues and interactions between urban and rural areas, allowing for financial, social, resource, and technological flows.

The theme of dialogues – a form of meaningful exchange and interaction – can be reflected through the territorial spatial planning process and plans that emphasise a multi-scalar planning paradigm shift. Unlike a divided planning process based on administrative units, the territorial spatial plan becomes an anchor for the multiple governmental levels to recognise interactions, urban-rural exchanges and flows beyond administrative units, but rather, between functional territories and spatial scales. Furthermore, it lays a solid foundation for sectoral integration, for example with rural revitalisation, the transportation system, and economic development within the urban-rural interface.

Nonetheless, success in urban-rural restructuring is dependent upon the local governance framework and capacity to implement policies. This will involve multiple sectors, including the departments of economics, natural resources, land and space, agriculture and rural affairs, as well as the environment. There is a risk that their cooperation is not synchronised. This sectoral problem could be fragmented into a chaotic disarray of plans and policies with blurred responsibilities, where it is difficult to coordinate effective implementation. Therefore, how municipalities and counties interpret and implement solutions is critical to building a socio-ecologically inclusive development model.

Integrating circular economy into spatial planning to promote urban-rural integrated development: an interview with experts from China

Prof. Dr. Vera Susanne Rotter¹, Dr. Bing Xue¹, Yanzi Zhou¹

¹ Chair of Circular Economy and Recycling Technologies, TU Berlin

In the past 50 years, China's urban-rural relationship has been transformed from a dualistic structure to a vision of urban-rural integration – a process of comprehensive change to economic, social, physical, and environmental conditions that offers the opportunity for a regional transition to a circular economy. Strengthening urban-rural material cycles and building a circular economy system can promote the flows and allocation of resource elements between urban-rural areas, supporting integrated urban-rural development. However, the realisation of a circular economy is not only a matter of technological application, but is also affected by the planning system. In China's policy context, leading economic and social development through planning is an essential manifestation of the country's development model. 'Territorial Planning' plays a fundamental role that provides guidance – but also constraints – for economic activities and environment protection. In contrast, the 'Circular Economy Plan' is a unique sectoral plan to enhance circular economy development. Under URA's research theme, 'strategic tools for integrated territorial planning enhancing urban-rural integration and circular economies', a comprehensive and trans-disciplinary understanding of the circular economy and territorial planning is necessary.

To address this topic, we hosted a dialogue with 11 carefully selected and reputable experts in China who work with circular economy across various relevant fields. The interview is structured around six questions (Q1-6) derived from our field research and thinking in the city of Taizhou. The first question relates to a general understanding of the Chinese planning system and connection points with the circular economy, while the five remaining questions focus primarily on the relationship between county-scale territorial planning, the circular economy, and the practice and perception gap. We focus questions on county-level as this is also the scale of the URA research project (Huangyan District, Taizhou City).

Note

The responses were recorded in English or Chinese; for those who answered in Chinese, the response was translated to English and subsequently approved by the interviewee.

Q1

In the Chinese context, how is the concept of the circular economy reflected in urban planning?

LU, ZHENGHUA

Urban Planner, Senior Engineer, Vice President of Shenyang Urban Planning and Design Institute:

In the past, our urban planning and construction was focused on seeking incremental growth — for example, developing new areas or tearing down old areas for redevelopment. In recent years, there has been a significant change in thinking which has begun to emphasise revitalisation and regeneration of existing building stock, showing that the concept of a circular economy has started to be incorporated into planning. On one hand, reusing old buildings significantly reduces construction waste. On the other hand, old buildings are given new functions and the city's historical heritage is continued. In my opinion, the implementation of a circular economy in planning can be realised with the following points. Firstly, we need to consider the demand for land for circular economy facilities and build a low-carbon, sustainable urban and rural structure. Secondly, we need to strengthen the coupling of transportation modes and urban space to reduce the energy waste caused by traffic jams or uneconomic speed. Third, we need to guide the spatial clustering of industries, strengthen the integration of industries and cities, and the balance of jobs and housing, and improve the economic efficiency of land use.

HAN, BING

Ph.D. candidate in Industrial Ecology and M.En. in Urban Planning, University of Chinese Academy of Sciences:

The circular economy concept is reflected in urban and rural planning mainly through optimising industries' spatial layout, promoting infrastructure renewal, and advancing green and low-carbon architectural design. For example, planning and building green communities and fully-integrated community architectural design schemes that incorporate energy, water, waste, rainwater, and wastewater systems to maximise local resource utilisation and minimise environmental pollution. Furthermore, in the planning and design phase, indigenous materials should be emphasised so that the landscape design aligns with natural climatic characteristics and effectively reduces energy use.

Q2

Will the circular economy be well considered in national territorial planning, especially at the county level?

YUE, WENZE

Ph.D., Professor of Land Management, Vice Director of the Institute of Land and National Development, Zhejiang University:

According to our experience, county-wide territorial planning mainly focuses on strategies, spatial patterns, and ecological restoration, and generally considers the circular economy in specific or thematic studies. It remains more of a conceptual introduction and lacks a systematic framework and strategy for implementation. To better integrate the circular economy concept into the county territorial spatial planning system, we believe that it is necessary to clarify further the fundamental base and bottom line of regional resources. We can build a circular economy system from a higher dimension to strengthen the regional functions and divisions of the labour system, and establish a systematic compensation mechanism for the inter-regional transfer of development rights.

HAO, QING

Ph.D., Chief Engineer, Research Centre of Tsinghua Tongheng Planning and Design Institute:

Accelerating green production and lifestyle, as well as promoting the economical and intensive use of resources, are the basic principles of territorial spatial planning. I can mention several specific measures to integrate the circular economy from my experience. First, we incorporated circular economy concepts into an indicator system of territorial spatial planning. For example, we set indicators such as water or energy consumption per unit of GDP, the proportion of new or renewable energy, and the recycling rate of urban domestic waste in the planning schemes. We suggest implementing a differentiated spatial access system and resource allocation policy based on the 'Catalogue of Restricted Land Supply Projects' and the 'Catalogue of Prohibited Land Supply Projects' to guide the government and enterprises in demonstrating the circular economy. Secondly, we highlight the circular economy concept by proposing specific planning measures. For example, improving the utilisation rate of non-conventional water resources by laying out recycled water reuse facilities, promoting the construction of intrave-

nous recycling industrial parks, and coordinating the management methods of domestic waste, construction waste, medical waste, and municipal sludge through different recycling and reuse methods (such as classification and recycling, incineration, fermentation and building materials utilisation). Third, we promote the use of waste heat and other untapped resources, combined with waste incineration, sewage source heat pump, biogas power generation, and distributed energy, to utilise the energy ladder comprehensively. At the same time, in area development and unit design and according to the layout of the land, the facilities with upstream and downstream industry chain relations, for instance, are combined and arranged to form a composite land structure with complementary functions.

Q3

At the county level, how should we use the circular economy to promote urban-rural planning?

CHENG, YEQING

Ph.D. & Professor of Rural Geography, Hainan Normal University:

In order to protect the ecological environment and establish a resource-saving and environmentally-friendly society, urban-rural spatial planning should promote the development of a circular economy. Spatial planning at the county level often faces an unclear and insufficient understanding of resource output, consumption, and utilisation, as well as waste emissions. At the same time, governance faces several obstacles, such as inadequate mechanisms and institutions, lack of concrete implementation, and lack of post-performance evaluation and assessment. Therefore, we believe that planning should further strengthen the circular economy system design, process implementation, and post-performance assessment.

DONG, LIANG

Ph.D., Assistant Professor, Department of Public Policy, City University of Hong Kong:

When applying the concept of circular economy to improve spatial planning, a crucial point is to design and plan the urban system and industrial layout with due consideration to regional resource circulation. The circular economy is not only a process of the resource supply chain, but is also a value chain. Therefore, applying the principles of circular economy to the urban-rural industrial supply chains will generate co-benefits of economic outputs and environmental credits. For example, in environmental future city initiatives in Japan, symbiosis is an industrial activity in which the waste or by-products of one participant become a resource for another, promoted according to regional characteristics, such as forest-agriculture symbiosis or urban-industry-agriculture symbiosis.

Q4

What are the main barriers to implementing waste separation and recycling or agricultural waste resource recovery in rural areas? How can these barriers be overcome?

WU, WEIXIANG

Ph.D., Professor of Solid Waste Management, Director of Solid Waste Research Center, Zhejiang University:

The first challenge is how to change the habits of rural residents towards household waste disposal; the second is how to strengthen rural residents' knowledge about the significance of waste separation, recycling, and resourcefulness, and what social, environmental, and economic benefits they can obtain through it; the third is how to coordinate the investment of human resources, financial resources, and operation and management; and the fourth is the difficulty in addressing the lack of recycling outlets and resource facilities. Therefore, we suggest that (1) government leaders should pay more attention to rural waste separation and recycling, (2) publicity and education should be increased to raise rural residents' awareness of waste separation and recycling, (3) assessment, evaluation, supervision and management should be strengthened, and (4) land for the construction of recycling facilities should be safeguarded, and sustainable funding should be secured.

Q5

What could we do to raise the support of farmers or related collectives in developing a circular economy?

ZHAO, XUEYAN

Ph.D., Professor of Regional Sustainable Development, Northwest Normal University:

My thoughts mainly focus on recycling organic waste from urban and rural livestock, and poultry breeding activities. I think the government and local organisations should consider the establishment of circular economy cooperatives, and the construction of livestock and poultry manure recycling facilities. During a project's feasibility study phase, a resource inventory and stakeholder survey must be carried out, recycling pathways should be determined, and potential market consumers and product demand should be identified. During the project implementation phase, economic and cultural levers should be used to promote the development of a circular economy. 'Economic leverage' relates primarily to financial subsidy measures, such as for farmers using organic fertilisers and for enterprises implementing circular economy projects. 'Cultural leverage' relates to the cultivation of awareness around circular economy among residents through strengthening publicity and education.

SU, FANG

Ph.D., Professor of Population Resources and Environmental Economics, Northwest University:

I would suggest three steps. Firstly, to raise public awareness. In our past work, we would develop science brochures and combine them with Wechat groups and other means of promotion. Farmers are given factual information about the benefits of developing a circular economy, such as adding extra income or improving product quality. Secondly, policies should be developed from a whole life cycle perspective. For example, rural households are now required not to burn straw — and farmers support this policy — but a large amount of crop straw is discarded at the edge of fields or in ditches, becoming a new potential source of pollution. Thirdly, we must strengthen the dialogue between science and society to increase positive public response. Sometimes it is not that policies are inadequate or farmers do not support them, but a lack of effective communication in the policy implementation can eventually lead to policies and projects being rejected on a local level. For example, some rural areas now need centralised sewage treatment, but the project implementation process has caused much inconvenience to farmers, making them lose patience and trust in the project, and eventually stop supporting it.

Q6

How can the circular economy concept be applied to county economic development and rural revitalisation practices?

LU, CHENGPENG

Ph.D., Professor of County Economy and Rural Revitalisation, Lanzhou University:

It is necessary to realise an economic closed loop of the county-level region so that the economic model can achieve internal circular development at a regional scale. Production, consumption, and environmental governance include the economic categories of the county region to build an economic ecosystem. Local governments should emphasise the promotion of the circular economy and develop related master plans. Furthermore, policy research should be increased, using policy safeguards to maintain the order of circular economy development. The practice of a county-level circular economy requires a scientific and rational industrial structure layout, and the original industries that cannot adapt to the development of the circular economy should be adjusted.

MU, ZHILIN

Ph.D. in Legislation, The Environmental Protection and Resources Conservation Committee, The National People's Congress of China:

I think we can focus on two aspects. Firstly, we must create a circular economy industry chain in line with local characteristics. Based on the goal of high-quality devel-

opment of the county-level economy, we should build a new development pattern of 'domestic circulation as the main body, and domestic and international circulation to promote each other', with the central task to improve the efficiency of resource utilisation. Secondly, we need to coordinate the collaborative treatment of urban-rural solid waste and household waste to promote synergistic disposal technologies. This should be combined with the development of circular agriculture under different objectives of utilisation (e.g. economic or ecological). Finally, at the grass-roots level, we need to promote waste recycling networks and domestic waste separation networks, and integrate the concept of the circular economy into everyday practices.

REFLECTIONS FROM THE AUTHORS

Incorporating the concept of the circular economy into territorial spatial planning — and thus promoting integrated urban and rural development — is an inevitable requirement of China's new urbanisation path, and a critical approach toward achieving sustainable development. There is wide consensus on the vital role of the planning system within China's socio-economic development model. Therefore, full integration of circular economy concepts and actions with planning is an essential aspect of the practical realisation of urban and rural circular economy development. Through the above expert interviews, we have found that the circular economy concept has been reflected in the current Chinese planning system, but there remain several substantial challenges, especially at the implementation level — for example, the issue of securing land for circular economy facilities. The discussion pointed out that strengthening the assessment of resource reuse potential and stakeholder analysis in urban and rural areas is fundamental to better integrating the circular economy into planning. Furthermore, developing and realising a circular economy in urban and rural areas requires interdisciplinary dialogue and cooperation. To support waste recycling, for instance, a combination of tools to support farmer awareness, economic leverage, cultural climate, and policy support is needed. Going forward, the interview highlighted the need to strengthen communication with Chinese experts from various fields to explore ways of achieving the effective integration of the circular economy with territorial planning based on shared interdisciplinary experience.

An alternative paradigm for the agricultural industry through Rural Revitalisation: a two-way flow of urban-rural development in Huangyan

Liyao Wang¹, Dr. Huang Huang^{*}

¹ Department of Urban Planning, Tongji University, Shanghai.

^{*} corresponding author

Introduction

China's development strategy of urban-rural integration emphasises a two-way flow of development factors, including capital, labour, and policies. By doing so, it aims to lessen the negative effects of rapid urban expansion and promote rural development toward sustainability. This is in contrast to historic dual urban-rural policies, which generated a one-way flow of development factors – from rural to urban – aimed at rapid economic development in cities. This dual development orientation was reflected in land use, industrial development, and household registration (hukou or 户口) policies, which led to population flows from rural to urban areas, the decline of rural industries, under-developed built environment in rural areas, as well as a gradual loss of local culture and identity. In response to these issues, for the last eighteen years since 2004 China has promulgated policies focusing on rural development in terms of the promotion of agriculture, the countryside, and farmers (Chen, 2017). To further support a two-way flow of urban-rural development factors, the 'Rural Revitalisation Strategy' was introduced in 2018 as a top-down approach to enhance urban-rural linkages (Wu, 2018; Luo et al., 2018; Shi, 2019).

Industrial development, as one of the key priorities in the Rural Revitalisation Strategy, aimed to provide job opportunities and stimulate new development dynamics in rural areas. In many areas of rural China, the agricultural industry (the primary rural sector) has been challenged by a lack of organisation and management in terms of networking production to the market, as well as insufficient channels and platforms for improving skills and farming techniques for agricultural workers (Li and Huang, 2015). In such rural regions, discussions around moving toward rural revitalisation are focused on alternative approaches for the agricultural industry and increasing its competitiveness. Traditionally, the agricultural industry consists of farming and selling agricultural products to a limited region (within a township or a county, for instance), and through limited channels. However, with the increasing in-flow of investment, information, and labour, as well as supportive policies, a new technique-led character of the agricultural industry has emerged in the last two decades. In such cases, local revitalisation of small villages has been promoted through specialisation in certain farming techniques, which have supported income generation as well as regional reputation.

To illustrate this alternative paradigm of agriculture-led revitalisation – and its promotion of a two-way flow of urban-rural development factors – this article takes the case of Maoshe Township in Zhejiang Province, China. Characterised by the local watermelon planting industry, the study investigates how a village in the township has been transforming in recent years, and the extent to which these transformations have resulted in the revitalisation of the local agricultural industry.

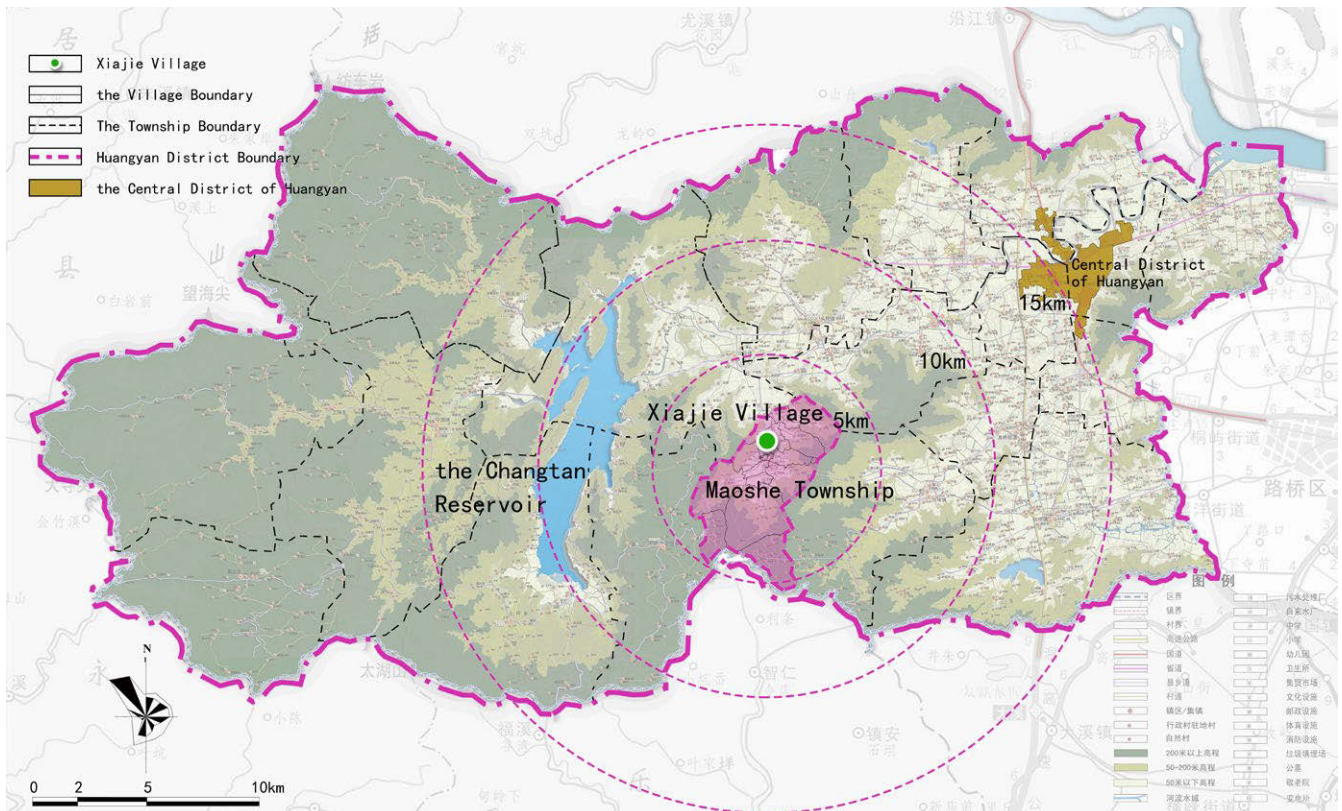
Case selection and research methods

This research considers Xiajie Village and its township – Maoshe Township in Huangyan District, Zhejiang Province – to study rural revitalisation processes driven by the watermelon industry (Fig. 1). Xiajie Village is located in the north basin of Maoshe Township, in proximity to the well-known Maoshe Old Street, which has historically accommodated supporting facilities for the watermelon planting industry in the region. Xiajie Village has been selected as a representative case because of its historic agricultural industry in terms of watermelon planting, its significant impact on the wider watermelon planting industry in China, and the growing network of watermelon planters who have developed planting techniques and technology – such as advanced site selection and seedling grafting – and assembled relevant resources, supporting platforms, and flexible cooperation structures.

This study introduces an alternative paradigm for the local agricultural industry, characterised by its technology-led orientation for planting and the unique social networks and local cooperation that support its development. By revealing the mechanisms behind the development of the watermelon planting industry – and the networks of local people engaged in it – the research demonstrates an emerging development dynamic, driven by agriculture and initiated from the bottom-up. Multiple visits to the field between 2021–2022 included participatory observation of the spatial distribution of the watermelon planting industry and its impacts on the local built environment, in-depth interviews with officials in the township government and local villagers, and mapping of watermelon planting related resources and actors. In addition, relevant local planning documents were obtained and reviewed. This combined data supported analysis of the relationship between urban-rural development factor flows stimulated by the watermelon industry, and the emerging networks of planting technology and local cooperation-led rural revitalisation.

Location of Xiajie Village, Maoshe Township in Huangyan District.
Source: Developed by Huanglong Li and Liyao Wang based on Xiajie Village planning documents¹

1 ↓



¹ Provincial historical and cultural traditional village protection planning documentation of Xiajie Village in Huangyan District, Zhejiang Province.

CASE STUDY: WATERMELON PLANTING IN XIAJIE VILLAGE, MAOSHE TOWNSHIP

Development of the local watermelon planting industry

Farmers in Maoshe Township have been engaged in promoting technology-oriented watermelon planting since the early 1980s. Throughout these years, the industry has extended its networks in the region and beyond, which has improved local farmers' incomes and has established a 'watermelon planting headquarters' in the township (a platform and network supporting technique-led watermelon farming across the country). Several factors influenced this outward facing trajectory: firstly, the per capita area of arable land was less than 0.067 hm² (1 mu)² due to local geographic restrictions; and secondly, local development was hindered by limitations on cattle and poultry breeding – as well as the manufacturing industry – to protect the nearby Changtan Reservoir, which provides drinking water for the region. Therefore, to seek income opportunities in the early 1980s, farmers in Maoshe Township started to explore other possibilities using their farming skills, such as cooperating with other local villages in the region or planting watermelons on rented land in Shanghai (Village head, personal communication, 2022, August).

During a period of almost four decades, local village cooperation with relatives and other members of the local community in watermelon production took the form of 'husband-wife cooperation (夫妻西瓜棚)' and 'villager companionship (村民合作社)'. These cooperation mechanisms helped to reshape local social networks along with the development of the watermelon planting industry. A collaborative and technique-led mode of watermelon production was emerging, which gradually extended to the development of the industry across the country. As of 2021, farmers in Maoshe Township plant watermelons in 17 other provinces in China, including Shanghai, Jiangsu, Fujian, Sichuan, and Yunnan province, supported by technology guidance. The local government claims that 7 out of 10 watermelons in China are planted by farmers from Huangyan (Wang, 2022). The experience of these farmers – as well as the farming technologies they have developed – have also since spread further afield to countries such as Myanmar, Nigeria and Vietnam (Shi, 2021).

Engaging in watermelon planting comes with several challenges. Planting sites need to be rotated every two years to maintain soil fertility, whilst watermelon growth usually takes 6–8 months, making skill and experience of appropriate planting site selection essential. Meanwhile, the expense of land rental, employees, and facilities is usually beyond the affordability of watermelon farmers, which often requires them to take out a loan to cover the initial costs of engaging in the industry. In addition, watermelon farmers face harsh physical labour and working schedules; to avoid high temperatures and humidity levels in the greenhouses,

they usually begin to work at 4 a.m. and return home late at night. These factors mean that the watermelon farmers have developed a high degree of resilience, adaptivity, and specialised skills, which are passed on to their successors – strengthening and updating local techniques in the process.

"World of Watermelon Farmers"

On recognising the development trend of the watermelon industry, the Huangyan District government launched a mobile application named the 'World of Watermelon Farmers'. The app provides a supportive web-based platform for watermelon farmers across the country, offering diverse services such as information and guidance, supply and marketing resources, and networking possibilities (Wang, 2022). In addition, it aims to support improved production by offering guidance on site selection, agricultural material procurement, bank loans, insurance services, and planting techniques (ibid.). In this way, the local government helped watermelon farmers avoid economic risk and supported villagers' income. At present, the platform has already linked 48 high quality watermelon production bases in China. In addition, Maoshe Township has established the Watermelon Farmers Association to enhance the management of the watermelon industry, provide relevant business training, and support exchange and cooperation between farmers. The association also played a networking role by supporting watermelon 'start-ups' to initiate businesses in different regions, serving both local as well as homecoming villagers.

Xiajie Village as a hub of the watermelon planting industry

By the end of 2020, of a total population of 933, or 340 households, 631 villagers in Xiajie Village (Village head, personal communication, 2021, August) were considered to make up a permanent or long-term resident population³. There were 54 in-migrants and 302 out-migrants (ibid.), indicating that the village population has been shrinking. Xiajie Village is one of the essential hubs of the watermelon planting industry, from where farmers travel to various other provinces to plant during busy seasons, returning home during the off-season. Statistics for 2021 showed that there were 67 watermelon farmers in Xiajie Village, 53 of whom were over 50 years old, which accounts for 79% of the total number (ibid.). The per capita disposable income of watermelon farmers is 70,000 yuan (approximately 10,050 Euros) per year, which is 2.1 times higher than that of other rural areas in Huangyan District (Village head, personal communication, 2022, March).

Xiajie Village is also considered a hub for supplying products relating to the watermelon planting industry, such as plastic films (Fig. 2), farming tools (such as hoes and special baskets) (Fig. 3), watermelon seed sales (Fig. 4), and water pumps and their accessories (Fig. 5). In the early spring, farmers can purchase a whole set of agricultural supplies to prepare themselves for the



² Mu is a traditional and universal measurement of land area in China, where 1 mu equals 2/3 of a hectare.

³ In national statistics, residents registered as living in one place for at least 6 months annually are regarded as the long-term resident population.

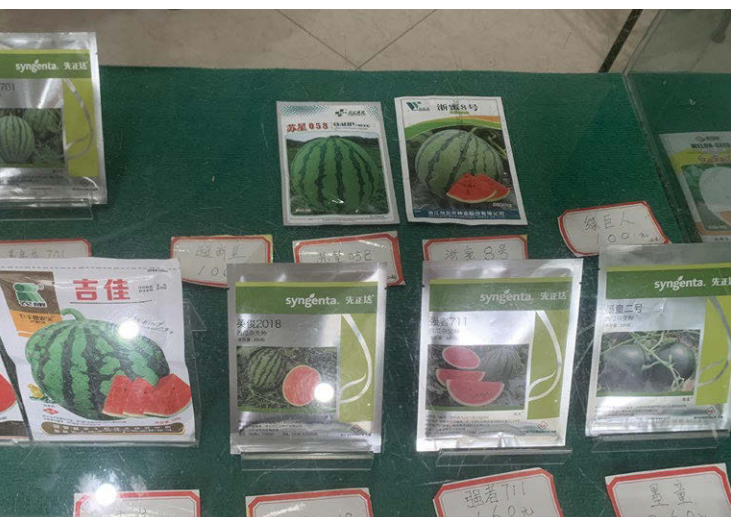
planting season – in nearby Baiwang Road and Maoshe Old Street Market – and then travel to different areas around the country to continue to plant. The physical scale of watermelon planting sites now ranges from 0.33 hm² (5 mu)–3.33 hm² (50 mu), distributed in planting sites all over the country. However, despite many advantages – i.e, the far geographic reach of the industry, its ability to supply products, and its position as a regional hub for watermelon farmers – Xiajie Village still faces several crucial challenges in the development of the industry. There is low willingness from younger villagers to work in labour-intensive positions demanded by the watermelon planting industry, who prefer to seek more attractive types of employment (Village head, personal communication, 2021, August). In addition, there is a lack of technology and skills for advanced watermelon seed breeding in the local area (ibid.).



2 ↑
Plastic films
Source: Photographed by Xuebin Xin



3 ↑
Farming tools
Source: Photographed by Xuebin Xin



4 ↑
Sale of watermelon seed
Source: Photographed by Xuebin Xin



5 ↑
Water pumps and accessories
Source: Photographed by Xuebin Xin

DISCUSSION AND CONCLUSION

Rural revitalisation in China has been employed as a national strategy to support urban-rural integration, emphasising two-way development factor flows between urban and rural areas. This study provided empirical evidence of a new paradigm of rural revitalisation, driven by agriculture industry development, in the case of Xiajie Village, Maoshe Township. Rather than 'importing' technologies and techniques from elsewhere, or imposing a top-down development vision in the area, this local development was supported by local farming skills and technology that have accumulated as a result of the long-term watermelon planting history in the area. Local villagers in Xiajie Village have valuable collective experience in developing and upgrading watermelon planting technology, which are passed on through generations in the village, and have also been brought to other regions. These factors have provided overarching support for promoting local rural revitalisation in the region through increasing local incomes by 'exporting' farming skills, resources and networks to support local development.

Drawing from this case study, several key learnings can be identified in terms of understanding the role of the agricultural industry within rural revitalisation:

1. An alternative paradigm for rural revitalisation can be observed. Cases of rural revitalisation of villages oriented around agricultural development usually take the form of top-down modernised, eco-friendly, and leisure-oriented agricultural projects which largely rely on external technical support and investment. On the other hand, the development of Xiajie village has been based on specific local skills and was initiated from the bottom-up, with later support from the township government. The villagers' accumulation of experience and ex-

pertise – as well as well-developed resource networks and services – supported the village and the township to which it belongs to transform into one of the 'headquarters' of the watermelon industry at a regional and national scale.

2. A new understanding of population loss in the context of rural revitalisation was obtained. In the study of Xiajie Village, the number of out-migrating villagers greatly exceeded that of the in-migrating villagers. In literature on rural development, population loss of this kind is generally taken as one of the critical indicators for rural shrinkage. However, this is not the case in Xiajie Village, where a significant mobile group of villagers out-migrated temporarily to engage in watermelon planting in other regions, but returned to Xiajie during off-seasons.
3. The case of Xiajie Village and Maoshe Township shows how development factors flowing from rural areas to other rural areas can support the local revitalisation processes, rather than only relying on urban-to-rural, unidirectional development factor flows, as seen in some previous modes of development.
4. This alternative paradigm for the agricultural industry also faces challenges in terms of prospects for future development. The younger population has shown a decline of willingness to participate in the watermelon planting industry. Questions around who will carry out such labour-intensive work into the future, and how to make the practice more attractive to younger workers, will need to be addressed. Furthermore, new initiatives are needed to support the development of advanced skills and technology for the hub at Xiajie Village to develop its own advanced seed breeding practices.

Funding

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A visual exploration of urban-rural linkages

Ava Lynam¹, Dr. Huang Huang^{2*}, Dr. Li Fan³

¹ Centre for Cultural Studies on Science and Technology in China (CCST), TU Berlin

² Department of Urban Planning, Tongji University, Shanghai

³ Habitat Unit, TU Berlin

* corresponding author

‘Urban’ and ‘rural’ spaces have long been treated as separate entities in urban planning and research, with the countryside conceived as lying outside the clear administrative boundary of the city (Woods & Heley, 2017). Similarly, in everyday life, specific qualities and images are conjured in people’s minds when thinking of urban or rural areas. However, as a result of global urbanisation processes over recent decades, such classifications have become increasingly seen as redundant, misleading or superficial (IIED, n.d.). Instead, urban and rural interactions have become “recognised as central in the processes of social, economic and cultural change in both cities and countryside” (Tacoli, 1998). Moreover, the interdependency of urban-rural territories has had profound impacts on a broad variety of factors, from flows of people, products, services, and information, to urban and territorial planning, ecological systems, and governance structures (IIED, n.d.; OECD, n.d.; UN Habitat, 2022). Whilst activities perceived as ‘rural’ – such as urban agriculture – have become increasingly present in urban centres, ‘urban’ activities – such as manufacturing – have equally become a central component within many rural settlements.

At the same time, socio-spatial inequalities between and within rural and urban communities have been observed, which have deepened along with the globalisation of labour, industry, and finance (Tacoli, 1998). Despite the interdependence of rural and urban areas, the development gap between cities and countryside areas continues to broaden (UN Habitat, 2022). As increasingly more areas become touched by the processes of global urban expansion, the impacts on the environment and the livelihoods of marginalised social groups also heighten. It has thus become more vital than ever to deepen our understanding of urban-rural interlinkages, which form not only crucial aspects of local livelihoods and economies, but also act as the engines that drive regional transformation (IIED, n.d.). As a result, the integration of urban and rural areas is a priority among scholars, policymakers, international development organisations, and local governments, in order to enhance social, economic, and environmental resilience at both local and regional scales (ibid.; OECD, n.d.; UN Habitat, 2019). This is enshrined in both the 2030 Agenda for Sustainable Development (SDGs) and the New Urban Agenda (NUA). However, the very different resources, capacities, and policies between the city and the countryside remain a challenge for achieving a more integrated and inclusive management of urban-rural interactions.

In 2021/2022, researchers Ava Lynam and Huang Huang designed a seminar on Rural Transformation in Contemporary China at the China Centre of Technische Universität Berlin, where we explored theoretical perspectives and characteristics of the urban-rural relationship with students. Through our discussions, we observed that the concept of urban-rural linkages was often perceived differently by people with diverse geographical backgrounds, which offered a rich visualisation of urban and rural qualities. To build on this multi-dimensional reading of the concept, we decided to extend the conversation by inviting more people within fields relating to urban planning, architecture, or social sciences in various geographic locations to submit an image relating to their perception of urban-rural linkages. The result is shown here. Rather than imposing our own interpretations of the images, in this contribution we let the images, we let the reflections of their author speak for themselves.



1 ↑
Photo by Joanna von Essen, taken
in Niedersachsen, Germany.

“To me, this photo shows a very Euro-centric understanding of the ‘rural’. Since the beginnings of the European city, and especially with the subsequent Renaissance ideal, the dualism between the ‘wild rural’ (that needs to be tamed) and the ‘civilised urban’ has been reinforced. The needs of reproduction and sustaining human life were outsourced to the countryside, which became a resource for the urban. For the ‘urban being’ the rural has become an ephemeral image, something only seen from afar. Driving through Niedersachsen, it passes vast, flat landscapes covered by power lines, corn or rapeseeds – planted to feed human livestock and biogas plants.”

“Urban-rural linkages often take the form of conflict in towns. The collision of ‘urban’ and ‘rural’ form has resulted in the coexistence of single high-rise buildings and groups of private houses, and large factories and rural buildings, for instance.”



2 ↑
Photo by Zhe ZHOU, taken in
Wenzhou, Zhejiang, China



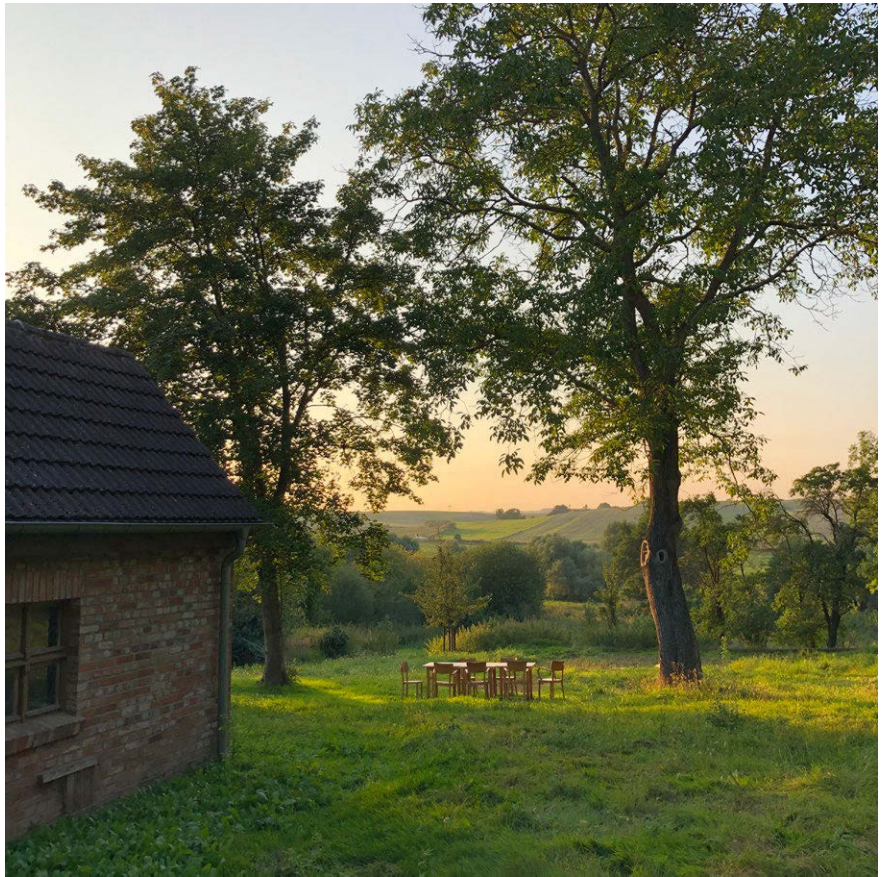


“Dagon Seikkan Township was developed back in 1990 to connect with Dagon Seikkan Industrial Zone, but most of the plots are not connected to sewage disposal or water supply.”

3 ↑
Photo by Win Htein Lin, taken in
Yangon, Myanmar



"Can we see a renaissance of the rural?
In the Uckermark, a rural region north
of Berlin in the state of Brandenburg, a
group of so-called 'rural pioneers' has
set an agenda to revitalise a former
church community centre into a collab-
orative working and living space. Here,
they are seeking new collective models
of living and working surrounded by
nature. Keeping one foot in the city for
half of the week, a new urban-rural link-
age emerges between two previously
distant places."



→ 5
Photo by Tino Imsirovic, taken in the
Uckermark in Brandenburg, Germany



"Maya q'eqchi people trasporting goods
using carts in San Pedro Carchá. A shopping
mall in the background."

4 ←
Photo by Alejandro Alvarado,
taken in San Pedro Carchá,
Guatemala



"Green amenities can become important connections between urban and rural areas, providing convenient and relaxing spaces for people to enjoy the natural environment – like the green belt in this photo, located in the highly urbanised area of Chongqing municipality."

6 ←
Photo by Fengqing LI, taken in Chongqing, China



"New housing and commercial units outside Chinchero on the road leading to the Sacred Valley. In July 2021, the construction of the new Chinchero-Cusco international airport resumed in this area."

7 ↑
Photo by Andrea Tapia, taken in Chinchero, Cusco, Peru



8 ←
Photo by Liyuan FEI taken in Taizhou, China

“This image shows an open space in the centre of a city that was planned to be built as a park. However, it has not been completed and the spaces surrounding the residential areas are full of growing vegetables. Though they live in an urbanised area, these residents retain the living habits of the countryside. Here, urban-rural linkages are represented by a continuation of farming culture and customs in urban areas.”

→ 9
Photo by Will Casey taken in Dublin, Ireland

“Set against a backdrop of the city’s gentrification and growth, Dublin’s urban horses have been a tradition among the inner city’s working class, enduring the many peaks and troughs of the city. In the midst of Dublin’s thriving economy and property development, along with the demonisation of the working class, there has been a steady decline of places where these horses can live and breed, leading to the disappearance of a traditional way of life. There are now calls to protect the last remaining stables in the city in order to keep this culture alive for the next generation.”





10 ↑
Photo by Bernardo Rosero,
taken in Calderón, Ecuador

“In Calderón, a territory northeast of Quito, urban expansion has caused the dispersion of activities, structures, and landscapes. The ‘diffuse’ begins to be the pattern of territorial development, creating an unproductive use of the land in contrast to what rurality should generate.”



11 ↑
Photo by Qingyun TANG,
taken in Suzhou, China

“Rural tourism is an example of a complementary linkage between urban and rural areas. Villages provide urban residents with places to relax, bringing positive social and economic benefits. Rural residents generate income through tourism, and part of the income can be used for improving spaces and amenities within the village.”



"This photo was taken from the balcony of my parents' house in Hanoi, 8km from the city centre. This area was a suburb of Hanoi 20 years ago and was surrounded by trees and only small houses. Now you can see there are more and more big houses and infrastructure – but I can still see signs of the countryside here."

12 ←

Photo by Hang Vuong, taken in Hanoi, Vietnam



"This photo was taken from my Uncle Tom's home on Quadra Island, Canada, much of which he is building himself. Quadra is one of 6,000 small and mostly uninhabited islands that dot the coast of the Pacific Ocean between America, Canada and Alaska, and it took me two ferry rides to get there from the closest city, Vancouver. In these wild places where human and non-human life are still intertwined, once-urbanites are arriving in great numbers. Some are here merely to acquire more capital, but there are many others who arrive with a wish to honour the old ways of balancing social and ecological worlds - as Musqueam, Squamish, Tsleil-Waututh and other Coast Salish Indigenous Peoples have for many generations."

13 ←

Photo by Kit Braybrooke, taken on Quadra Island, Canada



14 ↑
Photo by Jiaxin QI, taken
in Guangzhou, China

“In Guangzhou, cities and villages are interpenetrated and integrated. We can see this in the spatial patterns of urban villages, where there is a flow of urban and rural elements. In the villages that I investigated, these elements blend together as part of the metropolis at much larger scales.”



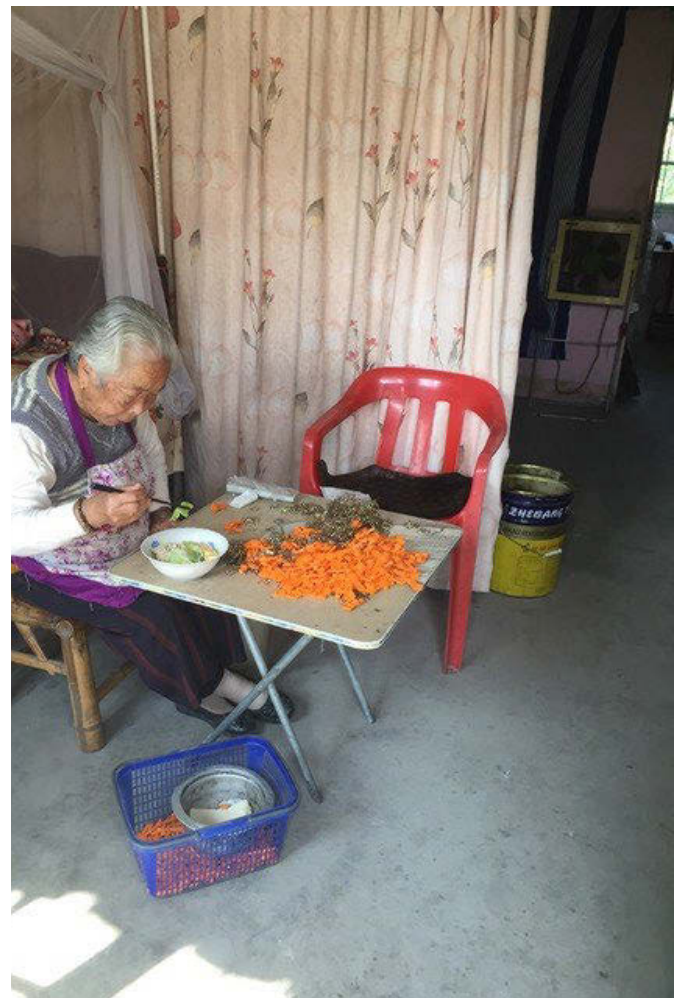
15 ↑
Photo by Szymon Nogalski, taken
in Indianapolis, United States of
America

“The patchwork landscape of farms and residential sprawl characterising the rural-urban edge in the Midwestern United States experiences a new scale of transformation: the arrival of logistics hubs. The expansion of online retail has reconfigured the rural-urban edge as a lucrative geography for land speculation and development. It also forced a juxtaposition of disconnected realities: familiarity and informality of rural scale, character and lifestyle – against a highly controlled, precise and anonymous environment of enormous global fulfilment centres and distribution facilities.”



16 ↑
Photo by Myriam Jácome Guerra, taken in Calderón, Ecuador

"This street corresponds to the boundary between urban Calderón and rural Calderón, where basic services and infrastructure supply only the settlements located in the urban area. In contrast, those located in the rural area must manage water supply for consumption and find additional solutions for sewage by themselves. Calderón is the largest parish in the Metropolitan District of Quito."



"A retired woman at her home in Cajiayang Village takes lunch break while doing the final assembly of industrially produced clothes pegs."

17 →
Photo by Hannes Langguth, taken in Huangyan, China

“Urban-rural linkages mean very good green infrastructure connecting people living in cities and villages, because everyone needs to reach nature easily and quickly. This includes infrastructure such as trails, bicycle paths, and off-road trails for motorcycles as well as the rest stops on the way.”



18 →
Photo by Simin YAN, taken in Heidelberg, Germany



“The Martyrs Bridge connects the chaotic and bustling downtown of Bamako with more suburban neighbourhoods. It stretches over the River Niger, which flows throughout the country, linking urban centres to the periphery and providing a lifeline to tens of thousands of rural communities. On the bridge the ‘Bamakois’ – a nickname for people living in Bamako – race across on their motorbikes, becoming stuck in fume and dust filled traffic during rush-hour. In those moments, the river’s calm provides some respite from the urban hustle.”

19 ←
Photo by Natasja Rupesinghe, taken in Bamako, Mali

“This road is located on the edge of the old city, with convenient transportation connecting the old town with the new town. Many farmers will drive four-wheeled vehicles to sell crops here and buy agricultural products they need. In this area, urban and rural linkages are visible in the form of diverse urban-rural transportation modes, trade, and human interactions.”



20 →
Photo by Xin ZHANG, taken in Zhoukou, Henan, China



“Manyacc is a rural community of 450 people living at 3,700 metres above sea level in the Peruvian Andes. Even though drinking water has not yet reached the village, concrete and mirrored glasses recently arrived in the shape of a brand new community centre and soccer field to amuse the elders and youth.”

21 ↑
Photo by Camila Petzoldt, taken in Manyacc, Huancavelica, Perú

Beyond the URA Glossary: tools for Sino-German intercultural and interdisciplinary communication

A conversation with

Prof. Jian Liu

School of Architecture,
Tsinghua University

Prof. Jian LIU is an Advisory Board member of the URA project. She is a registered City Planner in China, Associate Dean and tenured full professor of Urban Planning & Design at Tsinghua University School of Architecture. Prof. LIU is the Managing Chief-Editor of China City Planning Review, editorial board member of Urban Planning International, Urban Design and L'architettura delle città - The Journal of the Scientific Society Ludovico Quaroni. She was the Executive Member, Vice President, President of Asian Planning Schools Association, Council Member and Vice President of World Society for Ekistics.



and

Prof. Anke Hagemann

Habitat Unit, TU Berlin

Prof. Anke Hagemann is the interim lead PI of URA and co-chair of Habitat Unit at Technische Universität Berlin. She graduated in Architecture and was a research associate in the exhibition project Shrinking Cities, Berlin. She taught at the ETH Zurich and Hafencity University Hamburg before joining Habitat Unit in 2013 as a lecturer and researcher. In 2020–2021 she was interim professor for Urban Planning at BTU Cottbus-Senftenberg. Her research topics include global commodity circulation and urban spaces, holiday architectures, urban mega-events and the spatial regulation of access and mobility.



Interviewed by

Dr. Li Fan

Habitat Unit, TU Berlin

As a joint Sino-German project, URA is challenged by difficulties in developing a common understanding of scientific and planning terms that have been applied differently in Germany and China. Notions of 'urban' or 'rural' are not only constantly evolving, but also carry diverse meanings in different global contexts. Further, the project's interdisciplinary approach – integrating research topics such as circular economy, ecology, landscape, social-spatial practices, and migration – brings challenges as well as opportunities in establishing a joint discourse.

To seek a common language across a consortium spread across geographies, cultures, and disciplines, we have developed a project glossary as a tool to facilitate a more in-depth conversation and interrogation of different terms and concepts relating to urban-rural transformation. The URA Glossary may not only aid communication, but also offers potential to develop our own terms and concepts to contribute to the wider discourse, by more accurately describing contemporary urban-rural transformations across distinct geographies.

Through an in-depth interview, we ask a Chinese and German planning expert how the URA Glossary could help improve dialogues across the Sino-German consortium, and how cultural and disciplinary barriers might be overcome.

LI FAN (LF):

Prof. Hagemann and Prof. Liu, you both have a lot of experience working in international research projects. Which approaches and methodologies have you applied in these projects to facilitate dialogues between partners with different backgrounds, and how successful they have been?

ANKE HAGEMANN (AH):

I have worked on one comprehensive international exhibition project about shrinking cities and the decline of urban areas. Led by Philip Oswalt (Professor at University of Kassel), the project team integrated an international perspective – comparing the development of East German cities, which had experienced population loss since the 90s, with several post-industrial cities in the north of England (Manchester and Liverpool), in Russia (Ivanovo) and the US (Detroit). We were working with an interdisciplinary and international research team, including many artists. I think the artistic methods of documentation we developed served as a kind of common language for the team. Photography, film, and installations brought diverse perspectives and experiences from the four regions together in an exhibition. They helped to communicate the local effects of shrinkage and decline to a common audience, and also built bridges between the disciplines involved.

I have also worked on a glossary as an outcome of a series of seminars held at ETH Zurich. From the perspective of architectural theory, the project looked at technical elements that mediate between the inside and outside of buildings – different types of thresholds such as windows, blinds, toilets, turnstiles or letterboxes. A glossary was used as a format to tell stories about these building components and appliances, and was published in the German architectural magazine Arch+. In that case, the glossary was less about finding a common language, and more about establishing a kind of lexicon or encyclopedia. It helped us dive deeper into the evolution of these technical elements, posing questions such as: “How was the turnstile developed and which purpose does it serve?”

JIAN LIU (JL):

I started thinking about the glossary format when I first went to France and began to learn the language. My French language professor – who was also an architect – did not only teach us different terms; she also tried to explain everything behind the language. This was also the first time I stayed for a longer period in another country, and I realised that Chinese and European cities are vastly different. Although we often use the same academic terms, the context must be considered in order to interpret them. I started to think about building a Sino-Franco glossary of architectural and planning terms, and tried to translate some of the French terms for Chinese professionals to understand the French planning system. This personal experience made me understand the importance of glossaries, which also influenced my teaching at Tsinghua University.

I believe differences in understanding can also be a cultural issue. Compared with French or English, expressions in the Chinese language are more general, and often vague, blending like Yin and Yang without a clear boundary. I think terminology and contextual descriptions are important when we work together with people from different fields and cultural backgrounds. Whenever we have international collaborations, fostering a long-term relationship is important because over time we can really understand each other and build a consensus towards the meanings of different terms.

LF:

You both mentioned examples of finding a common language across disciplines and cultures. What potentials do you see for the role of glossary to support communication in an interdisciplinary project like URA?

JL:

Sometimes interdisciplinary collaboration is even more difficult than international cooperation because, when we come from the same field, we already have a common knowledge on the subject and are aware of the evolution of the discipline. However, when you work with people from another subject it's normal that we may have a different starting point, and communication might become more difficult.

Interdisciplinary research is one of the main aims of Tsinghua University. Professors from different fields are encouraged to work together, but that is not easy. For example, it is difficult for architects to understand economists because they have different systems of knowledge. Sometimes different disciplines even use similar terms applied to very different contexts, for example the term ‘architecture’, which is also used in the field of computer science. In this situation, a glossary could function as common ground.

AH:

I think that a glossary can serve three different purposes, and you mentioned two of them: interdisciplinary and international communication. In addition, a glossary can also respond to change; if there are huge developments in society, planning, or urban development, we need new terms and a common language to identify and describe them.

This is also part of the purpose of our URA Glossary. When we talk about urban-rural transformation in the last 10 or 20 years, we can observe that cities have been growing rapidly. Globalisation is integrating more and more formerly rural areas into global systems: this is what some scholars refer to as planetary urbanisation. We must create words for the new types of global urban development we are experiencing. As Germans or Europeans we may have a traditional idea of cities as bounded entities with rural areas surrounding them, which does not apply anymore to current forms of urbanisation. Some words have emerged in German to describe these new patterns such as ‘Zwischenstadt’, which could be translated to English as

'peri-urban realm', or 'operational landscape'. Another word is 'Stadtregion', or 'city region'. As these processes can take very different shapes in different contexts, we must conceive new words to describe them.

To find an interdisciplinary language is an even greater challenge. When I started to get involved with this project and became familiar with other research projects at Habitat Unit, I learned completely new terms, such as 'ecosystem services', 'blue-green infrastructure', or 'nature-based solutions'. It is really important for us as an interdisciplinary consortium to understand what terms from different fields mean, how they are applied, and what they are useful for.

In terms of international communication, I think we can achieve more within the URA project. Until now, we are using English as a common language, which is much closer to the German language and culture than to Chinese. In the URA Glossary, we are still centring Western concepts and terms; more could be done to develop a two-sided glossary. There is huge potential to encourage the Chinese side to bring in more of their own terms into the dialogue as well.

LF:

This links to our project title Urban-Rural Assembly, or our theme of 'urban-rural linkages'. In international discourse, we always talk about urban-rural linkages as defined by UN-Habitat. But when looking at Chinese publications, scientific discourses, or policies, I don't see this wording so often. Instead, terms like 'rural revitalisation' have been more widely used. How can our glossary contribute to understanding the concept of urban-rural linkages in the Chinese context, or other geographical contexts?

JL:

I think it's similar to the term 'sustainable development'. At first, Chinese people were not very interested in that term because it was seen as already part of our philosophy. In China, we call it 'Tian Ren He Yi' (天人合一), which means 'the integration of human beings and nature'. In terms of urban-rural linkages, coming from a policy perspective we talk more about 'urban-rural integration', 'urban-rural coordination' and 'urban-supported rural development'. I think the term 'Urban-Rural Assembly' is similar to 'urban-rural integration', which refers to taking urban and rural areas as a whole, and promoting the interaction between them from economic, ecological, and social perspectives. In my view, the largest obstacle between urban and rural areas in China is the so-called 'urban-rural dual system', in particular the different 'hukou' (household registration 户口) and land ownership systems between urban and rural areas. Many German readers may not be aware of this, and might have difficulty in understanding why 'Urban-Rural Assembly' is so important for Chinese cities.

For the URA Glossary, the contribution it can make really depends on your aim — whether it will only be used for your project or whether it's a part of the general knowledge produced through your research that contributes to wider discourses. I prefer the latter. The translation of a term itself can be easy; what is more important is its interpretation. For example, in China we talk about 'revitalisation' or 'rural-urbanisation'. How should we interpret that? When we say 'urban-rural integration', what exactly do we mean by 'integration'? Does it mean that we will turn rural areas into urban areas, or something different? Through our work with the journal of China City Planning Review, we are also building a small glossary so that English speakers can understand and interpret the terms we use surrounding the subject of urban-rural development and planning in the Chinese context.

AH:

I also think the glossary is a huge opportunity to transfer our experience and knowledge to a wider audience. It is interesting to make the distinction between translation and interpretation. In our glossary we are trying to explore different definitions, which is slightly different from translation. Perhaps for words that we have in the glossary already, we could try to find the Chinese translation and interpretation, and explore that further.

The way you consider these terms is also dependent on the images that you have of the city and the countryside. Chinese cities look so different from our cities, so Chinese people might have something different in mind when we talk about such terms. We have to include this imagery in the way we consider these kinds of terms. Our Chinese colleagues could translate and define these terms in their own context, so that we can better understand and interpret the approach and meaning behind them.

LF:

Yes, for me, 'urban-rural dual system' is exactly the opposite of 'Urban-Rural Assembly'. Are there any other particular terms in the URA glossary that caught your attention?

AH:

It was helpful to understand the terms that were new to me from different disciplines. The 'Raumbild' concept was also rather new to me. Although I knew about integrated and strategic planning in Germany, I didn't know this regional planning approach. I like that the glossary entry highlighted the double meaning of the word. On the one hand, it refers to a subjective image of a region in one's mind, on the other hand, it's an image for a region drawn up by planners, but created in a collaborative process by multiple stakeholders. It's a multiplicity of images that can include different layers and dimensions, rather than a single vision. However, it is a challenge because 'Raumbild' is a very specific German term, for which there is no precise English or Chinese translation. We usually use the term 'strategic vision' to translate it into English, but it does not fit 100%.

We could think about adding something to each entry in the URA Glossary that explains how we as a project relate to or apply it. It is not just about coming up with an encyclopedia, but also to position ourselves within these terms; why are we using them and how?

JL:

In the Chinese context, there are also other new specific terms when we talk about rural areas that would be important to include in your glossary, for example, 'new villagers' (Xin Nongmin 新农民), which refers to villagers who used to migrate from rural to urban areas. In recent years, many of them returned to their hometown and brought back new ideas from their life in the cities, which have potential to contribute to rural development in their hometown. There are also quite a number of urban residents who don't give up their 'hukou' (户口), or household registration, but move to villages in rural areas and live there for a certain period of time. These kinds of families also become new villagers who influence the local collective, even though they are not members of it, and thus also have an influence on the local development trajectory.

I think the term you just discussed - 'Raumbild' - deserves a full chapter in your research report to explain why you have selected it, and how you have used it in the context of your project. It would also be helpful to first offer a review of the Raumbild in the planning system in Germany, so that we can understand how it works in that context, before we interpret it for other contexts. I noticed in the URA Glossary that there are a lot of foreign terms translated directly into Chinese from other languages, and it may be difficult for Chinese readers to grasp their meanings. 'Urban-rural metabolism' and 'operational landscape' are examples. It was the first time that I encountered these terms. This is why offering context and interpretation is so important.

"The URA Glossary is a living work-in-progress document conceived to provide our collaborators - from planners and scientific researchers to policymakers and community members - with a means of building a collective understanding of the varied and multiple ways of being across disciplines and nations within our Sino-German consortium. Glossary terms have been provided by project participants, and will soon enter a peer-review process between teams who will add their own disciplinary insights and prepare it for public use in English and Mandarin. We are at a critical moment where it is especially valuable to build a deeper understanding of how the glossary - and tools like it - can facilitate exchange across disciplines, cultures, and borders alike."

Dr. Kit Braybrooke, curator of the URA Glossary

Dialogue between the scales: Understanding urban-rural landscapes through water-settlement transformation in Huangyan-Taizhou

Dr. Maria Frölich-Kulik¹, Yulin Zhang¹, Dr. Yuting Xie²

¹ Bauhaus Universität Weimar

² Institute of Landscape Architecture, Zhejiang University

Global urbanisation processes have altered urban-rural relations and landscapes in unprecedented ways (cf. Brenner and Schmid, 2014). In order to understand such landscapes and their various forms, we need to look at their underlying transformation processes (Waldheim, 2006). Landscapes are integral systems with which urbanisation dynamics can be understood in relation to natural conditions; water structures, geomorphic and climatic conditions are the basis for specific settlement patterns. This is tied to the perspective of landscape-based settlement development, as found in discourses on 'Landscape Urbanism' (ibid.), where complex interrelationships between socio-spatial and natural dynamics are revealed. Both everyday practices and strategies of spatial appropriation through master planning and political decisions are the result of - and at the same time, the impetus for - further landscape development through urbanisation. Looking at sparsely populated regions, it is striking that seemingly rural practices also follow an urban logic, connected to trans-local supply chains and modes of production, as well as informal subsistence economies.

Therefore, given the complex and highly dynamic characteristics of such inter-related processes of urbanisation, a comprehensive understanding of everyday landscapes from multiple perspectives and scales is needed. The term 'scale' can be interpreted as the spatial, temporal, quantitative, or analytical dimension that scientists use to measure and study objects and processes (Gibson et al., 2000). Scale is a fundamental concept in the discipline of spatial planning, but also is difficult to define, as it depends on the research objectives or the specific phenomena to be studied in the landscape (Howitt, 1998, Sayre, 2009). Employing different scales with their respective levels of detail and relationships, offers the possibility to open up different insights into a research object. Thus, decoding a landscape and its complex structures through different scales can provide insight into the meanings and values of everyday living spaces embedded in the large-scale dynamics of industrialisation, urbanisation, and globalisation processes.

A multi-scalar approach to water-settlement landscape transformation in Huangyan-Taizhou

Using the example of water-settlement landscape transformations in the region of Huangyan-Taizhou in eastern China, in this article we demonstrate the importance and value of looking at the same phenomenon from different perspectives. In this region, the changing urban-rural relationship is captured by the increasing pressure on water and land resources due to massive demand for water in dense urban areas and agricultural production, which has become a key concern in the region. Examples such as fetching water (Fig. 1), construction site announcements of new settlements (Fig. 2), or changing culinary tourism offers (Fig. 3) refer to transformation processes that can only be understood across multiple scales.



1 ←
The photo shows a man fetching water in the Yongning River to irrigate his fields manually. Formerly, before the Yongning River had been cut off its natural water flow, everyday tides provided irrigation. Interrupted water cycles lead to independent water management. Source: Photo by the authors



2 ←
These billboards announce new settlements along the Yongning River. A modern, urban-style neighbourhood is advertised. Here, new settlements are a result of relocation processes of people from rural to urban areas, in order to urbanise former agricultural areas. This is only possible due to the rigorous control of the river. Source: Photo by the authors



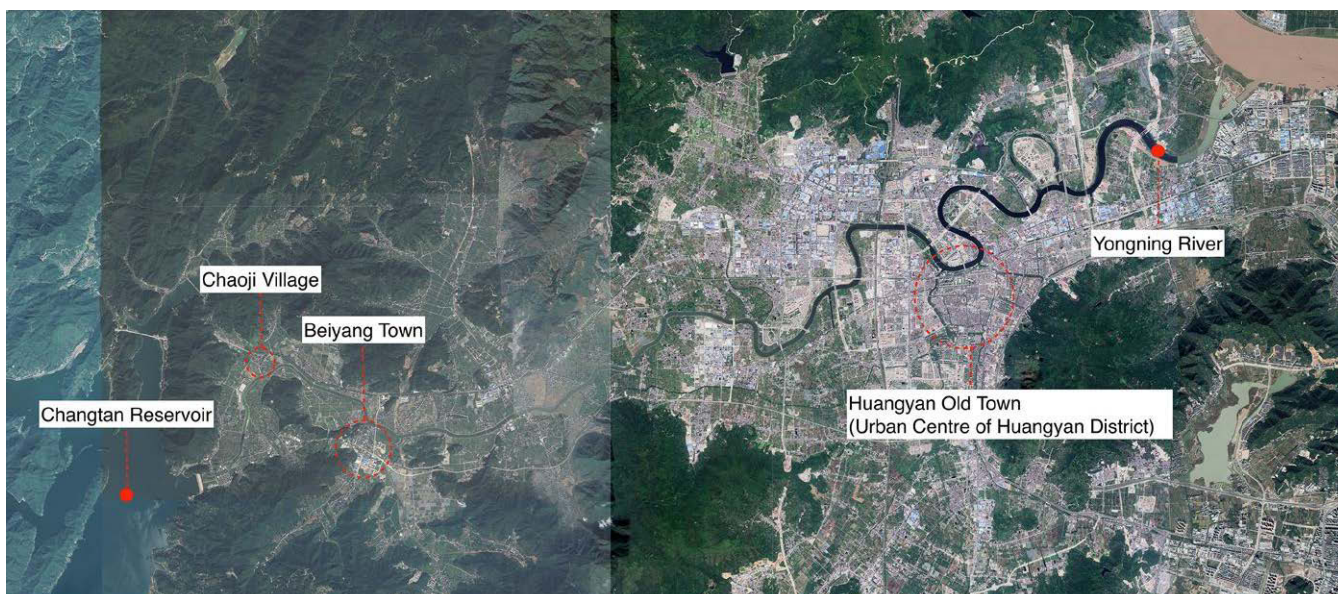
3 ←
In 2019, this fish restaurant next to the Changtan reservoir used to be a lively place for locals and tourists. The new territorial planning system fixed a new ecological red line. In order to avoid potential water pollution from tourism, all restaurants have been closed. Source: Photo by the authors

In order to examine how these dynamics are evident both in water-settlement structures and everyday practices, we investigated the region at three different scales:

Macro scale: We refer to macro scale as structural and systematic processes of social, political and ecological change, and related spatial interrelationships. Through a review of land and water policies and institutional planning (Master Planning of Taizhou City and Zhejiang Province), we aimed to understand overarching systemic contexts relating to water structure and management that are embedded in large-scale strategic planning.

Meso scale: The meso scale introduces a territorial focus in which different landscape layers and their relations can be decisively investigated – such as typologies and transformations of water and settlement structures, and their interdependencies. In our case, we identify the Yongning River at the meso scale as a reference layer for analysis (Fig. 4). Through a literature review and analysis of historical maps, GIS data, and satellite images at meso scale, as well as a walk along the Yongning River (Frölich-Kulik et al., 2020), we were able to capture different perspectives of the river basin in terms of water-related local culture, socio-economic development, urban-rural cluster constellations, and settlement development trajectories. This allows the water landscape of Huangyan district, shaped by ancient water interventions over thousands of years, and now heavily reshaped by modern water engineering, to be represented in spatial-temporal dimensions.

Micro scale: The micro scale reveals everyday spatial use patterns and individual adaptation strategies, which highlight challenges and potentials in landscape use based on local knowledge and practices. For the purpose of this study, we focus on the agricultural area of Chaoji Village, and the town currently known as Beiyang Town – located at the western part of Huangyan, along the Yongning River. This micro scale investigation was conducted through field trips involving observational studies, surveys, and semi-structured interviews.



Through focusing on cross-scale interactions in water-settlement relations, we aimed to understand how the decline of inland river navigation in Huangyan at meso scale, due to interventions and decisions from a macro scale, constitutes new 'urban-rural' linkages, and how this might be mirrored at the micro scale. This dialogue between different scales brings together research findings as well as experiences of different actors (authorities, institutions, social groups, companies, and individuals) who operate at different spatial levels. Most importantly, this helps to identify any mismatches between human actions and ecological systems (Cash et al., 2006), which is critical to achieving sustainable landscape design and management.

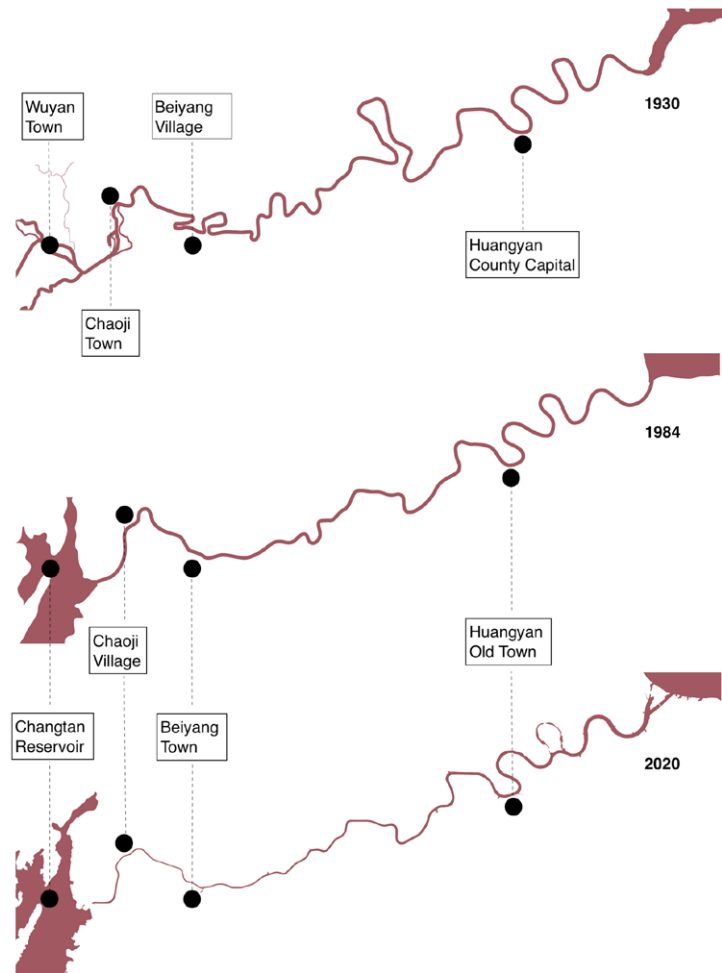
4 ↑
Yongning River as meso scale. Source: Satellite image, based on: Leaflet | © OpenStreetMap contributors, © CartoDB

Results and discussion:
the decline of the inland navigation system and the manifestation of new 'town' and 'village'

Huangyan district in the prefecture-level city of Taizhou has a distinct landscape based on an ancient canal (官河) system and inland water transportation that can be traced back to the Five Dynasties (907-960) period. It connects with the two major natural water systems of the Yongning River and Jinqing River system. The ancient canals used to be a major transportation artery connecting Huangyan and other counties (Rong, 2020). This ancient canal system was integrated with the natural flow of the water, but also carried out multiple functions beyond water transportation (flood prevention, agricultural and domestic water supply, and religious culture). Connecting people's lives and places, it formed a pattern of evenly distributed villages, small market towns, and temples or shrines that were intertwined with the water network.

It is worth noting that, due to the success of inland water navigation, Wuyan (a town located in the western mountainous area that was submerged for the construction of Changtan reservoir) was the second most important settlement after Huangyan county at that time. The fact that there was previously a balance between west and east urban constellations, supported by the inland shipping network, suggests a relatively even socio-economic development between the Huangyan urban centre and its hinterland. However, this balance was gradually broken from 1958, when the construction of the Changtan reservoir started (Fang, 2008). Between the 1950s and 1970s, in order to improve flood resistance and agriculture productivity the massive construction of small and medium sized dams was aggressively carried out nationwide (Liu et al., 2013). In Huangyan, construction of the Changtan reservoir induced massive village relocations and a decline in water transport (Fig. 5). With subsequent emphasis on land transportation – and combined with the impact of global urbanisation – many villages began to rapidly urbanise, whilst small towns that depended on waterways gradually declined.

Chaoji Village is one of the most representative cases demonstrating the process of shifting the administrative status of a settlement from urban (town) to rural (village). Historically, Chaoji was an important market town in the central and western parts of Huangyan and an important traffic node on the Huang-Yong (Huangyan-Yongjia) Ancient Passage. Chaoji gets its name from its distinct geographical location, which in ancient Chinese refers to tidal limits. Before the construction of the Changtan reservoir, the tide in Taizhou Bay rose along the Yongning River and stopped in Chaoji. With the movement of the tides, bamboo, wood, firewood, charcoal, and other mountain products were shipped here for sale, which made Chaoji an important trading hub (Zhang, 2017). As an urban transship point, it had the status of a town. At that time, like the other small towns of Huangyan, Chaoji Town had a street market (Chaoji Old Street) as the core element of the urban layout (Fig. 6). However, with the construction



5 ↑
Maps showing the transformation of the Yongning River in the years 1930, 1984, and 2020. Today, the river is completely controlled via various artificial interventions (such as dams, embankments, sluices), and the former channel network that used to be one with nature is no longer interconnected. Source: Drawings by the authors

of the Changtan reservoir - and the subsequent series of modern water interventions - the natural tides of the Yongning River totally disappeared, and inland shipping declined. As a result, Chaoji as an urban centre gradually became less important. Coupled with a massive exodus of the local population induced by rapid urbanisation, Chaoji was finally administratively classified as a village and became part of Beiyang Town. Today, Chaoji Village hopes to restore the prosperity of the past through rural tourism. According to the field investigation, in order to 'beautify' Chaoji Old Street, local villagers were relocated elsewhere, whilst the current residents are mostly migrants making a living from running tourist shops. Yet, the empty streets that can be observed in the village indicate that reality has failed to meet expectations as planned.



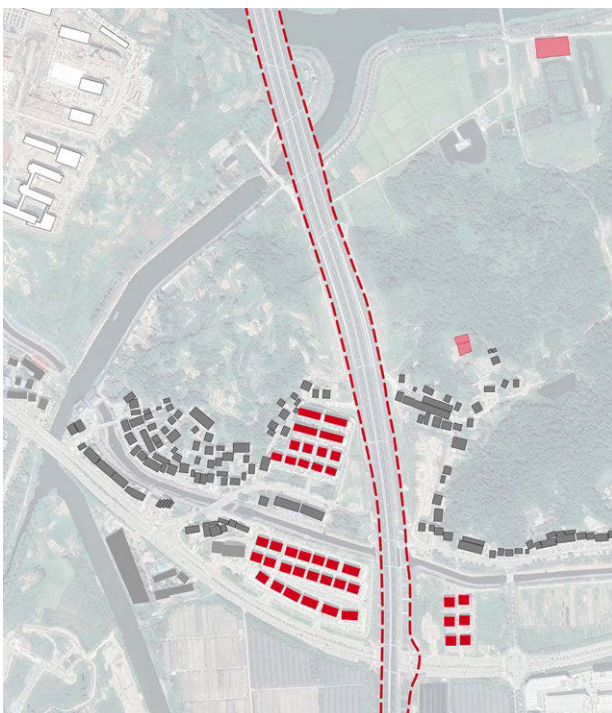
6 ↑
 Tourism-induced village relocation and settlement patterns in 2020 at micro scale, Chaoji.
 Sources: ©OpenStreetMap contributors, ©CartoDB, Image © 2020 Maxar Technologies

In stark contrast to this is the transformation of today's Beiyang Town, once just a tiny village surrounded by paddy fields. The construction of the Changtan Reservoir led to massive rural resettlement. Until 2010, six batches of resettlement were carried out involving 7,537 households and 31,371 people (Jiang, 2010), with a large number of the resettled people being relocated to Beiyang. A mass population influx had accelerated the transformation of Beiyang village into a town. The former village that was shaped by agriculture was transformed into a central town in the region, with a distinct landscape characterised by centralised rural resettlements and industrial zones. However, becoming one of the central towns west of the Yongning River did not bring real prosperity to Beiyang. In response, current development promoted by the local government is orientated towards Beiyang Town being able to support sustainable growth through the promotion of agricultural modernisation and agri-tourism (Municipal Party Committee Office, 2021) (Fig. 7, 8).



- New Settlement
- Industry Zone
- Old Village
- Social Infrastructure

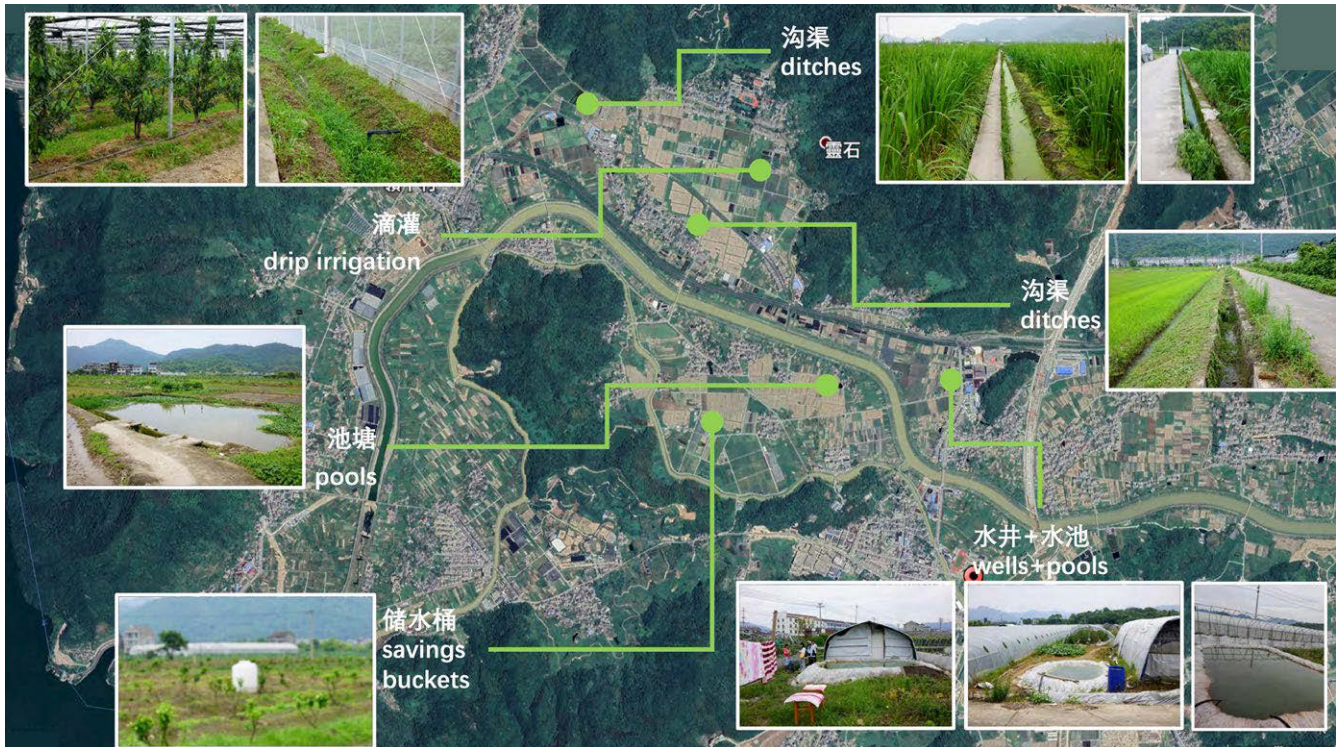
7 ←
 Reservoir-induced village relocation and settlement pattern (2020 at micro scale Beiyang Town).
 Sources: © OpenStreetMap contributors, © CartoDB, Image © 2020 Maxar Technologies



8 ←
 Highway-induced village relocation and Settlement patterns (2020 at micro scale Beiyang Town).
 Sources: © OpenStreetMap contributors, © CartoDB, Image © 2020 Maxar Technologies

The investigation at a micro level shows how regulation of the Yongning River fragmented what was originally a coherent water system, and led to independent water management structures (Fig. 9). The fact that there are difficulties in obtaining irrigation water and different agricultural irrigation systems in Beiyang Town show the need to set up an effective approach to manage those systems, and overcome the challenges and mismatch between reality and local development scenarios.

9 ↓
Patterns of irrigation in Beiyang Town. Source: Illustration by the authors



Concluding words

The understanding of landscapes as a multi-layered system is key to unpicking contemporary global urbanisation dynamics. Fostering a dialogue between scales within specific research foci (e.g., housing, transport, energy and waste, economic development, social inclusion, biodiversity, and green and blue infrastructure) is the foundation of robust research and sustainable planning (Löfgren, 2020). The case study in Huangyan has supported the idea that it is vital to examine cross-level interactions of phenomena (i.e., ecological and social dynamics) to identify mismatches between human action and ecological systems. For example, in water management, political borders or commercial entities often fail to match hydrological and morphological features (Zipper et al., 2020). At the same time, there remains a conflict in which broader scientific knowledge may not be acknowledged by local decision makers, whilst local and indigenous knowledge may si-

multaneously be regarded by national and international actors as insignificant (Cash et al., 2006). Despite this, the example of the Yongning River basin presented in this article makes it evident that employing multiple scales of analysis produces a more complex and dynamic view of landscapes, shaped equally by everyday practices as well as global urban transformation processes on the basis of natural conditions. Focusing on such cross-level interactions may help us to more clearly reveal the logic and cause-effect behind the dynamic and complex urbanisation process, which is embedded in large-scale strategic planning approaches.

Strengthening science-society dialogues for an enhanced urban-rural circular economy

Prof. Dr. Vera Susanne Rotter¹, Dr. Bing Xue¹, Zheng Yang¹, Hongqing Li¹

¹ Chair of Circular Economy and Recycling Technologies, TU Berlin

Introduction

Today, the circular economy is recognised as a robust integrative framework and also a critical approach to realising coordinated development of society, economy, and environment (Circular Economy, 2017; Zeng et al., 2022). Generally, a circular economy aims to optimise the utility and value of materials, products, and components (Virtanen et al., 2019) based on the 3Rs principle – reduce, reuse, and recycle – to ensure sustainable use of materials and energy. Moving towards principles of a circular economy could generate multiple direct and indirect benefits. For example, through the optimal use of waste and the promotion of innovation, the waste-to-energy process in a circular economy can become a solution with positive effects on the economy, finance, society, and the environment (Samarasinghe & Wijayatunga, 2022). In addition, agricultural waste can be used to make biochar which has the potential to improve soil and mitigate hazards associated with food production (Yrjälä et al., 2022). By 2050, it is estimated that the world economy will gain \$2 trillion annually from more efficient resource use (Ekins & Hughes et al., 2017).

If we consider the material and product linkages between urban and rural areas, developing a circular economy is essential to promote sustainable development from multiple perspectives by optimising material and energy flows in urban-rural areas. For instance, rural areas in North America have traditionally benefited from second-hand exchanges due to sporadic access to paid labour and poor markets for new items (Berry & Isenhour, 2019). Furthermore, due to its ability to reduce soil acidity and phosphorus shortage, whilst also restoring soil organic matter, the combined recycling of home waste from cooking and sanitation is a useful resource for sustainable soil management (Krause & Rotter, 2018). Although experts, businesses, and policymakers have paid much attention to the concept of circular economy, studies have largely focused on material flows in the production sectors and industrial fields, both characterised by a strong techno-environmental focus (Alcalde-Calonge et al., 2022; Murray et al., 2017; Korhonen et al., 2018; Kirchherr, 2022). Comparatively less consideration has been given to the multi-level governance dimension, encompassing the role, participation, and, in particular, the dialogues amongst stakeholders, as crucial factors in accelerating the development of a circular economy ("The role of stakeholders in a circular economy", 2017; Marjamaa et al., 2021; van Langen et al., 2021).

Consequently, bilateral, tripartite, or multilateral science-society dialogue is essential in this process. It is not only necessary to further strengthen an interdisciplinary and multiscale understanding of the urban-rural interface and metabolism, but also to optimise urban-rural linkages through community-driven pilot interventions in order to improve resource efficiency and strengthen regional circular economies. The following two sections will briefly introduce the main findings from on-site fieldwork in the case study region of Taizhou in China, as well as interviews with experts and households relating to the urban-rural circular economy. Finally, we will discuss possible pathways and strategies to strengthen dialogue between science and society.

The case of Taizhou: main findings

Since the launch of the URA project, we have carried out three fieldwork investigations at the urban-rural interface of Huangyan district in Taizhou in October 2019, December 2020, and November 2021, respectively. We have conducted interviews with more than 60 corporate organisations, eight governmental agencies, NGO organisations, five research institutes, as well as 46 rural households. We summarise below our key findings surrounding the science-society dialogue aspect.

(1) *The public, particularly local farmers and/or rural households, still lack a systematic understanding of the definition and content of the circular economy.* According to field investigations and home visits in Huangyan-Taizhou, many farmers lack a concrete understanding of the term 'circular economy', which for them remains a relatively abstract scientific concept. This aligns with the results of a separate study in 2017, which demonstrated that only 41% of interviewees in the Midong district of Urumqi city (the capital city of Xinjiang Uygur Autonomous Region) understood the notion of a circular economy, possibly due to lower educational levels of respondents (Guo et al., 2017). In contrast, stakeholders such as government officials and business owners have a relatively clear understanding of the concept, and with that awareness, a stronger motivation to develop it. However, when using other related terms such as 'environmental protection', 'corn stalks recycling', and 'manure composting', farmers exhibit a more clear understanding. This highlights the need to create an effective communication platform and establish shared cognition for various stakeholders (and in particular, farmers) through discourse improvement.

(2) *There are notable discrepancies in acknowledging circular economy products and technologies amongst various parties.* For example, our field trips in Taizhou indicated that commercial farms (such as the Sino-German Farm) are significantly more willing to use organic fertilisers than traditional farmers. The central logic is that commercial organic farms can sell farm products at higher prices through the 'Organic Product Certificate' to help achieve higher profitability, which also offsets the use of circular economy products (such as organic fertilisers). However, due to their small production scale, traditional farmers cannot independently achieve an 'organic' certification for their products, and thus cannot create added value through market mechanisms. There is also a gap between the government's target expectations and social acceptance in promoting certain circular economy technologies. For example, the Chinese government has invested considerably to promote the development of household biogas. However, the social acceptance of biogas for household use continues to decline, due to a lack of maintenance technology (Huang et al., 2022). This phenomenon also occurs outside of China, such as in Northern Tanzania (Hewitt et al., 2022), Rwanda (Mukeshimana et al., 2021), and India (Talevi et al., 2022).

(3) *The willingness and behaviour of stakeholders is constantly changing with the evolution of spatial and temporal circumstances.* In different spatial and temporal contexts, the willingness and behaviour of stakeholders can also change, sometimes radically, which fundamentally affects the development of a circular economy. For example, a long-term, stable source of feedstock is essential for the operation of a circular economy facility (Samarasinghe & Wijayatunga, 2022). However, because of a pursuit of economic interests, for instance, the willingness of raw material providers to supply feedstock may be negatively affected (Neves & Marques, 2022). Another study regarding the awareness of food waste recycling in restaurants in Gansu, China, indicated that 37.3% of respondents have a high awareness of food waste recycling (Lang et al., 2020). However, if recycling companies can make high profits from the waste resource recovery process, raw material suppliers (i.e., restaurant owners) are more willing to switch from providing free food waste to charging a fee, thereby affecting the operating costs of recycling companies (Prof. Zhang Zilong, personal communication. 2020).

(4) *The current development of circular economy projects is limited to a single perspective and lacks cross-sector, cross-industry, and cross-regional thinking and design.* For a prolonged period, China's urban and rural areas have been regarded as two separate entities, with a so-called 'dual structure' (Yang et al., 2021). This approach to development artificially severed and ignored material and resource flows between urban and rural areas, which poses many challenges to creating an extended urban-rural material circulation system. For example, municipal waste is transported directly to landfills for disposal, overlooking the fact that organic waste can be processed through anaerobic fermentation or composting to provide nutrient supply for agricultural cultivation in rural areas. This phenomenon also occurs in many other developing countries or less developed regions (Schmidt et al., 2021). Recently, the Chinese government has proposed to "smooth out the economic and resource circulation between urban and rural areas" (Xinhua News Agency, 2019). Therefore, we must observe the potential distribution of untapped resources from the perspective of urban-rural integration, and plan circular economy facilities and projects from the perspective of industrial symbiosis and integration.

(5) *Barriers and gaps remain between scientific research results and policymaking.* The circular economy is essential to China's green development strategy, and thus the country has become a global leader in circular economy research (Bleischwitz et al., 2022). However, there remains a significant challenge for the scientific and policymaking communities to translate this research into regional development decisions and to integrate the circular economy concept into China's 'territorial spatial planning' approach. Our preliminary study showed that the amount of untapped resources in Taizhou is substantial and holds much potential,



1 ← Interview with the owner of the Sino-German Farm in Beiyang Town. Source: Photo by Bo Fu

both in municipal solid waste and in the agricultural sectors (e.g., tangerine and water bamboo). However, integrating our research findings into circular economy decision-making processes in Taizhou remains a significant challenge.

Recommendations

Guiding urban-rural integration processes toward sustainability requires a holistic approach to developing a circular economy. This entails an understanding of resources systems along the value chain, as well as more robust engagement with the public and other relevant stakeholders. Therefore, strengthening dialogue between science and society could play an essential role in shaping public understanding of China's urban-rural transformation processes. To conclude, we propose the following recommendations based on our preliminary research outcomes and analysis:

(1) Strengthen the popularisation of circular economy knowledge and establish a pragmatic foundation for effective dialogue between stakeholders. In 2008, China introduced the Circular Economy Promotion Law (revised in 2018), with this legislation providing a clear definition of the concept. However, we believe that the government and relevant authorities must further promote the dissemination of knowledge about the circular economy, and integrate it with other similar concepts such as 'en-

vironmental protection', 'carbon neutrality', and 'ecological civilisation construction'. In addition, creating a shared understanding across actors is necessary for advancing scientific and social dialogue.

(2) Create a combination of bottom-up and top-down dialogue mechanisms with the primary goal of problem-solving. In the current development environment, China's circular economy model is mainly top-down. The central and local governments have implemented several pilot demonstration industrial parks or in cities to promote the circular economy. However, from the perspective of urban-rural integration, there is a need to integrate the bottom-up approach further, to strengthen the dialogue between science and society and achieve a 'win-win situation' for all parties. For example, in the rural straw resource utilisation program, the existing interest and government subsidy mechanisms remain insufficient to encourage farmers to implement straw off-site, and enterprises to collect and store straw. As a result, it is necessary to further coordinate the finance, transportation, natural resources, and electricity sectors, and to fully incorporate the views of local farmers and farmer cooperatives. It is hoped that doing so may help to simultaneously establish multi-level and multi-body coordination mechanisms for development and governance.

(3) Enhance interdisciplinary dialogue, integrate the circular economy concept into the territorial spatial planning system, and highlight its role. Currently, China is establishing a new planning system led by the 'territorial spatial planning' approach, aiming to promote the construction of 'ecological civilisation' through a scientific layout of production space, living space, and ecological space. Considering that circular economy facilities are essential infrastructure for regional green development, territorial spatial planning must put into practice the circular economy concept in specific spaces. Ultimately, interdisciplinary dialogue between circular economy and planning experts should be established and strengthened to promote full integration of circular economy development and territorial spatial planning.

Conclusion

Presently in the circular economy field, the foundation, and effect of dialogue between science and society requires strengthening in order to promote urban-rural integration processes. Neglecting this may in time hinder the sustainable development of the circular economy in China. The current status quo is largely due to varying levels of interest and demand amongst different stakeholders towards circular economy knowledge, acceptance, decision-making, and governance. Going forward, our recommendations would be to take tangible efforts to further promote scientific and social dialogue in the field of circular economy, innovate with (and implement) dialogue mechanisms, and promote interdisciplinary exchange. Moreover, we would advocate for integrating the concept of circular economy with land and spatial planning, for example by strengthening relevant training for farmers and integrating traditional and contemporary circular economy methods and technologies.



2 ↑ Interviews with local villagers in Shanxiajie Village, Beiyang Town. Source: Photo by Zheng Yang

Everyday socio-spatial practices across borders? A photowalk in Huangyan and Thüringen with the WeChat Group ‘URA 照片分享群’

Dr. Kit Kat Braybrooke¹, Gaoli Xiao², Ava Lynam², Dr. Huang Huang³

¹ Habitat Unit, TU Berlin

² Centre for Cultural Studies on Science and Technology in China (CCST), TU Berlin

³ Department of Urban Planning, Tongji University, Shanghai

Introduction

What does it mean to “see the ‘seeing’ of others” (Kato, 2014) through the exchange of photos on mobile devices across two countries, when those involved may never be able to meet each other in person? In this photowalk, we explore the everyday socio-spatial practices that were exchanged on the WeChat group ‘URA 照片分享群’ (Urban-Rural Assembly Photo Exchange) between 23 participants in China and Germany in 2021, and the critical dynamics we observed through these encounters. WeChat is China’s most widely-known messaging platform, which is currently used by 1.2 billion users to share their everyday lives with others – 78% of China’s population aged 16–64 use the app (Statista, 2022).

As social science researchers based in Germany, we were unable to conduct fieldwork with our collaborators in China due to ongoing travel restrictions around the Covid-19 pandemic in 2021 and 2022. We set up the WeChat group as an experimental approach for connecting creatively across borders in a time of great limitations. Informed by digital ethnographic methods such as photovoice (Nykiforuk et al., 2011; Sutton-Brown, 2014), we invited individuals located in and around the URA project’s Living Labs of Beiyang Town and Xinqian Street, Huangyan-Taizhou, to engage in a curated exchange of photos of their everyday experiences – from commutes and panoramic views to intimate moments at home.

We situated our inquiries around the following research question: What can images shared on Chinese digital platforms like WeChat reveal about how urban-rural transformation is experienced by people in their everyday lives? Participants were invited from across the communities we had met so far in the URA project: students, migrant workers, farmers, policymakers and entrepreneurs. We crafted a welcome text in English and Mandarin, which explained that the group was an image-only environment, meaning that photos, videos, GIFs and stickers were welcome, but not words. In doing so, the intention was to offer simple visuals that enabled engagement across languages and cultures. We launched the group as a prototype, intending that our methods and approaches would evolve over time based on user feedback and experimentation with the WeChat platform. Our group has now entered a second prototype stage of development based on these findings.

Let’s take a walk through some of the group’s photos, and learn more about the experiences of participants, along with our observations on the method and its potential applications going forward.



1 ↑
Themed photowalk: physical mobility across geographies. Source: Photos shared by WeChat group participants



OBSERVATION 1:
PLACE COMES ALIVE THROUGH SHARED SOCIAL IMAGINARIES

Applying a virtual photo exchange approach results in outputs that are at once anchored in people's experiences of local places, and at the same time disembodied due to the nature of the platform, with each photo arriving seemingly by magic, its origin spread across geographies. Without geotagging each individual photo, and without words to describe the context, the photos appeared universalised, the only clues to their origin coming from the location of their creator and the particular cultural characteristics they appeared to display. At times, the photos seemed to shapeshift – some photos looked like they were certainly from China, but actually came from Germany or Thailand, while others looked very European, but actually came from China. This produced a kind of dreamlike quality, a stream of consciousness that seemed to transcend language, capturing moments that evoked a variety of responses from participants.

Researcher, Chinese in Germany:

I like to share photos which are beautiful to me, like flowers or landscapes, or something that is related to my emotions, like places, food, views, or when I had a good time with my family. I want to see something which can make me happy.

Student, Chinese in Germany:

I really appreciate the photos from the Chinese colleagues. Having not been able to go back home for more than two years, even some photos of the scenery with Chinese characters in there gave me a bit of a sense of familiarity.

Researcher, Chinese in Germany:

If you like the photos people share, then you are more willing to get to know more about him/her and their life stories... I would like to have further communication with group members who I do not know. Their photos make me curious about their life stories.





2 ↑
Themed photowalk: social practices across geographies. Source: Photos shared by WeChat group participants

**OBSERVATION 2:
FAMILIARITY MATTERS**

Participants in the group became especially engaged when they shared things in common, and had something to compare. People often got involved when they saw photos of places they recognised, and expressed feeling alienated by photos that were too different from what they were used to. When our team had the rare opportunity to get one of our Chinese researchers in Germany, Gaoli, across the Chinese border, her photos of local places in and around Taizhou such as farms, cityscapes and street views resulted in a much higher level of interaction from other Chinese participants, who responded by sharing photos from experiences in common with hers.

Researcher, Chinese in Germany:

I like to see how different everyone's daily life is. Everyone is doing such different things even though we are working on the same project in the same field.

Worker, Chinese in China:

I don't feel too connected to other group members yet as I don't know them. I'm also not too curious about their lives because they are not friends of mine.

Researcher, Chinese in Germany:

I think everything we do is related to our emotions. A Wechat group is a group of personal connections. If you feel comfortable with people, then you feel comfortable with their photos.



OBSERVATION 3:

IMAGES CAN BE A COMMON LANGUAGE – BUT THERE ARE LIMITATIONS

Working with a limited digital format can also constrict the possibilities of connection. It is challenging to make theoretical concepts like ‘urban-rural’ and ‘socio-spatial’ clear in the casual setting of a WeChat group where participants come from many different walks of life, live in disparate cultural or political contexts, and do not share a common language. In this format, there was simply not the room to explain things more deeply. Some participants found the instructions of the group too vague, and others worried about things like personal privacy and the security standards of the WeChat platform – topics which we could not discuss openly with them in the group due to its image-only format.

Student, German in Germany:

I still have some doubts about data protection with this WeChat application... so I feel a bit uncomfortable to post more personal images showing mine or other people's faces, also because no one else is doing it. So I don't really get the level of exchange with our colleagues that would make me feel connected to them.... Of course there is also this separation between professionalism (work) and the private sphere, and this WeChat group is the intersection of both.

Worker, Chinese in China:

I feel restricted to share photos, because the group is quite small and I don't know anyone. When I want to share photos I would usually go for Wechat Moments. For me the function of this group overlaps with Wechat Moments. I think if the group is not limited to photo sharing, and if there are more talkative people chatting about their daily lives, people will become more active.

Student, Chinese in Germany:

I don't feel there is a restriction when it comes to sharing photos, but rather in terms of interacting with each other. At least for me, I want to comment something like, 'This is so nice, this looks so creative, where is this?' when I see something interesting, but I also noticed that there is a 'no words' rule, which I want to respect and obey.

OBSERVATION 4:

CONNECTING ACROSS CULTURES CAN BE MYSTERIOUS (AND FUN)

During the photo exchange prototype, participants who could not meet in person gained an intimate view into each other's unique life experiences across China and Germany. Participants chose to share a variety of diverse images based on what they were comfortable with, what they found funny or interesting, and which kinds of activities or places they felt appropriate to share in the group. This meant that with each image that people make the decision to share, we also got a little glimpse into their personality. While some people shared photos quite spontaneously, others took more time to carefully curate their selection, and only shared a photo every now and then. A few participants expressed their motivations for sharing images when we asked them about their experience, but for many who did not respond, the reasoning behind the photos remains a mystery. At the same time, participants also articulated clear personal preferences about what kind of content they would like to see. In particular, we observed that humour enables unexpected possibilities for connection to emerge between cultures and languages, despite the limitations of the medium.

What kinds of photos do you like to share?

Student, Chinese in China:

I prefer to share photos of natural scenery, and I would like to see more photos of others, or interesting content with local characteristics.

Researcher, Chinese in Germany:

I prefer to share scenes of the city streets, which can reflect the changes and essence of the city in my eyes. For example, a construction site or a tram crossing a city street.

Student, German in Germany:

I like to share funny scenes from my neighbourhood, and nice or interesting objects and practices I have observed...

Researcher, Chinese in Germany:

There are various types of photos in the WeChat group, and they are all from different perspectives and observations. Some people like close up views of flowers and plants, and some people like distant scenery, which are very diverse. I think it's good that we can get to know each other through photos like this.

RESEARCHER REFLECTIONS

The assorted materials of this photowalk reflect an ongoing work-in-progress, which has important implications for the URA project as we attempt to work with local stakeholders in our Living Labs in Beiyang Town and Xinqian despite continued Covid-19 limitations. It is clear from our experience that there are significant challenges to be faced with regards to communication between Chinese and German participants. We also recognise that it is important to ensure that efforts to introduce 'European' methods in Chinese spaces are done with sensitivity to local contexts, in a space of mutual care and trust. In this section, the researchers involved in facilitating the group reflect on its future possibilities for URA.

Ava, researcher, Irish in Germany: "With borders closing up around the world, digital formats became essential for maintaining connection, in our research and in our everyday lives. The photo exchange group is an experimentation of how this might be possible, and

our first prototype has highlighted several lessons: first is the issue of trust. Our inability to go to the field and establish personal connections has made it difficult for many participants to feel comfortable joining a group only known to them by their Wechat name. It is possible that some participants do not fully understand our aims, or are skeptical of our intentions. In the current climate, surveillance and data protection is a real concern for many participants, making them wary of sharing intimate moments. Building trust means investing time and listening to participant feedback to create a more familiar and comfortable space. Second, the participants come from very different walks of life, culturally and socio-economically. The first prototype has highlighted that we have to be sensitive to different dynamics between participants, and perhaps introduce guidelines to limit the type of images that may highlight inequalities. Inviting participants to send photos relating to a specific neutral theme may support common ground. Third, is our positionality as researchers.

As a foreign researcher in China, I experienced curiosity as well as reservations from people in the field. As much as I was interested in people's everyday lives, some people were equally curious about my life in Germany and asked for my Wechat contact. One contact was very actively posting personal photos on the Wechat public feed, but when approached by a Chinese researcher who they were not familiar with, they did not join the Wechat group. This shows that some people feel more comfortable using different formats to share their personal moments, but also offers us lessons in thinking about how we approach people to engage in our group."

Gaoli, researcher, Chinese in Germany: "Our WeChat group brings people from different social, cultural, economic, and geographic backgrounds together, and places them in a small, private, focused virtual room. This is different from any other forms of public social media (blogs, Facebook, Instagram, etc.), as the group members could have direct human contacts and connections with each other. This level of intimacy could provoke a stronger emotional reaction of participants towards what they see other people have posted. Because of this, I have been hesitant to invite my respondents from Huangyan to the WeChat group, as they come from very different social backgrounds compared with the group members from Germany. Most of them are low-skilled workers who might have never traveled abroad. In our group they not only see the "seeing" of others, but also their lifestyles. How would they feel when they see landscapes, food, streets, and lifestyles that are completely alien to them? How would they feel about a lifestyle they might not be able to afford, but have always longed for? What immediate impressions would they get after seeing these strong visual materials, and how would they react to them? Would they hold back from sharing their own lives, after seeing how others' lives are like? With these questions in mind, the next step of our research is to transform our group into a mutually beneficial platform with minimal risks for both Chinese and German participants."

Huang, researcher, Chinese in China: "Social network platforms (SNPs) have become a popular place for people to communicate daily and exchange everyday experiences. Affected by the Covid-19 pandemic, face-to-face communication became even harder, especially for cross-regional exchanges, which gave SNPs an even more active role in everyday life. Similarly, challenges are also faced by scholars working in sociology and urban planning among other fields that work closely with people's everyday practices and spatial transformations. Creative and alternative approaches are needed to assist scientific research, especially for studies on socio-spatial practices which rely upon observing everyday practices in the field. This pilot study explores a possible way to connect with people and encourage exchange in a convenient and comfortable way, while at the same time providing an opportunity for researchers to gain an understanding of their roles in the research. The group also revealed how (social) concepts are perceived distinctively by individuals

due to their personal experiences and contexts. It reminds us that we can not always take those concepts for granted without embedding them in certain time-space contexts."

Kit Kat, researcher, Canadian in Germany: "In these collected photos and observations, we see how abstract coordinates on a map turn into our senses of place – a space with many individual and intimate experiences and histories attached. Places came to life in the WeChat group over time, through mundane encounters shared across borders and time zones – the flowers and lakes we admired, the meals that were special, the sunsets worth recording, the homes we passed as we headed to work, the observations that made us laugh. In their ubiquity, these digital traces become greater than the sum of their parts – an archive of what it means to move through space in a time of hyper-connectivity, surrounded by digital screens and at the same time bodies of flesh and blood; globally-minded while simultaneously rooted in our own families, communities, cultures and languages. As the WeChat group continues on its own journey of becoming, there will be further experiments with its form and function which take on board the insights and suggestions of participants, an example being the inclusion of words to accompany the photos so people can get to know each other better. This remains an ongoing challenge, however, when participants are unable to meet in person, and build the trust required to make deeper connections. Like the human lives represented in its photos, the WeChat project must continually evolve. As we reflect on the challenges of inviting new ways of seeing between strangers, we also gain a greater understanding of our own biases and assumptions."

Credits

The authors would like to offer their great thanks to all the participants of the WeChat group URA 照片分享群 whose photos are featured in the photo walk.

Land transition and socio-ecological restructuring at the urban-rural interface: the case of Huangyan-Taizhou

Dr. Huang Huang¹, Prof. Wolfgang Wende², Till Fügener², Alexander Maximilian Haase², Dr. Suili Xiao^{2*}

¹ Department of Urban Planning, Tongji University, Shanghai

² Leibniz Institute of Ecological Urban and Regional Development

* corresponding author

Introduction

Rural-urban transformation is a process associated with tension due to the conflicting aims of economic growth and natural productivity (Allen, 2014). Urban expansion is one of the most visible and rapid types of change in land use, and a key driver for many environmental and societal transformations across multiple scales (Gao et al., 2020). In order to successfully overcome global challenges to sustainability – such as food security, biodiversity loss and climate change – it is important to carefully manage land stocks and their usage (Winkler et al., 2021). Here, it is essential to quantify and comprehend land-use change and its spatio-temporal dynamics.

China has actively participated in exploring pathways to reach sustainable urban planning and spatial transformation, after previous urbanisation processes have drastically impacted the country's ecological systems (Xiao et al., 2022), as well as detrimentally affecting rural culture and social networks. These negative repercussions are intensely reflected at urban-rural interfaces (URIs), where the rural-to-urban land transition is primarily initiated and urban and rural fabrics become intertwined. In our article, we consider how social-ecological impacts of land transitions (i.e., on Blue and Green Space (BGS)¹) guided by development agendas affect – and are affected by – the everyday practices of local residents..

Methodology

Our case study is the region of Huangyan-Taizhou, which is undergoing a dramatic land transition at its URI. Mixed methods were applied to obtain an understanding of the interactions between macro-scale land transition (at the district level) guided by ecosystem restructuring processes, and micro-scale land use (at the level of small plots of land) initiated by the everyday practices of local residents (e.g., farming close to

their houses). The overall aim was to identify interconnections between the ecosystem restructuring process and changes in the use of BGS due to everyday socio-spatial practices.

To understand trends in land transition – with a focus on ecosystem restructuring – we analysed changes in land cover and land use (LCLU) from 2010 - 2020, using GIS methods. The space-based data employed in the study was multi-temporal satellite data recorded by Landsat satellites in the region of Huangyan-Taizhou. Five categories of land cover were considered: urban areas, forest areas, arable land, grassland, and barren land. The accuracy of the classified data was tested using an error matrix, which confirmed the reliability of the results. Next, we calculated the spatial and quantitative distribution of mapped land cover classes.

LCLU only gives information on the area of transformed land and not how these changes were shaped in space, or their impacts on the everyday lives of local residents. Thus, participant observation was conducted in the research region between October 2019 - August 2020, to understand the ways in which urban planning has intervened to reshape and restructure ecosystems – in terms of water bodies and green space within BGS – and if the land transition achieved the specified planning goals at a local scale. The observation of changes to BGS – specifically focusing on areas close to residential plots, as well as changes in residents' use of the land – aimed to identify the social meanings of these changes (i.e., how locals perceived these changes in their everyday lives, such as an increase in green space), and whether this differed from the planning perspective. To support this, we also conducted in-depth interviews with planning professionals, local authorities, and residents directly affected by the transitions, to determine how such changes were perceived in the study area.

¹ Water and land covered with green space (such as forest and grassland).

CASE STUDY OF HUANGYAN-TAIZHOU

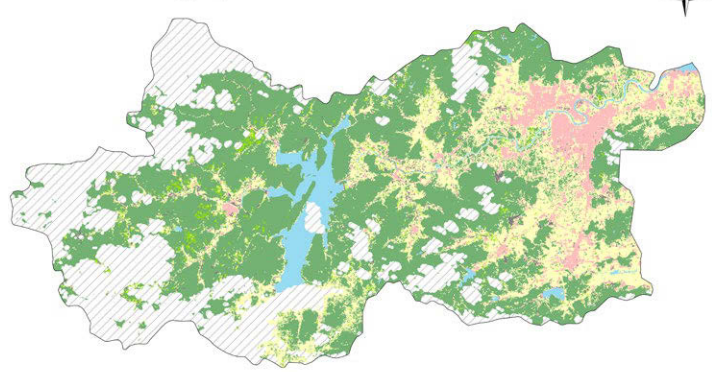
Land cover and land use change in Huangyan-Taizhou from 2010 to 2020

This study focused on the URI of Huangyan-Taizhou – in particular Xinqian Street Subdistrict – which features distinct spatial, social, economic, and ecological characteristics. During an era of rapid urbanisation in the study region, development was led by a binary conceptual ‘urban’ and ‘rural’ framework, resulting in extensive urban sprawl and rural-to-urban land transition (Huang, 2020). The URI in this context is a zone in which urban and rural spatial fabrics are highly mixed, featuring intensive interactions between diverse everyday practices, as well as various development agendas across two regional and local dimensions. Today, one of the most prominent aims within such development agendas is ecological protection, which has resulted in the restructuring of BGS and has led to land use transitions.

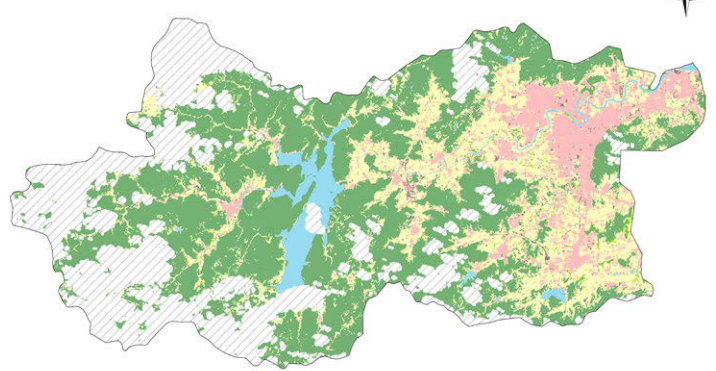
The land cover classification allowed for detailed mapping of trends in land use in the Huangyan-Taizhou region, between a ten-year period from 2010–2020 (Fig. 1). The results showed a clear trend of urbanisation, with urban land cover expanding by approximately 72%, specifically from 57 to 99 km² during this period (Fig. 2). All other types of land cover declined by varying degrees during the same period. The largest decrease was seen in grassland, which contracted by 60%. However, the analysis also showed that the area covered by grassland is subject to strong fluctuations, due in part to specific dates in the year when satellite images are taken which reflect growth cycles of agricultural land (Wende, 2020). Another theory to explain the large fluctuation detected in the extent of grassland and the development of barren land is that this changing pattern results from preparations for future built-up land. For example, former arable land is left fallow, creating grassland that is then developed into new settlement areas (ibid). This development suggests that urban expansion generally occurs on former arable areas, which surround the main urban area in Huangyan. In turn, grassland or forest land at other locations is then transformed into arable land to compensate for the loss of agricultural space, as envisaged by China’s policy of agricultural land protection (ibid.). This could also explain the shrinkage of the forest area of Huangyan by more than 5% since 2010 (Fig. 2).

The second largest detected decrease in land cover was barren land, which declined by 56% in the period 2010–2020 (Fig. 2). Some barren land was directly transformed into new urban areas, whilst other sites were cultivated to compensate for the loss of farmland elsewhere. Reflecting regulatory measures for land compensation, large areas of agricultural land were created through land consolidation, wasteland development, as well as forest, grassland and wetland reclamation. While the loss of forest area is not directly related to urban sprawl, there is no doubt that it is closely linked to the consumption of arable land.

Land cover Huangyan, 2010

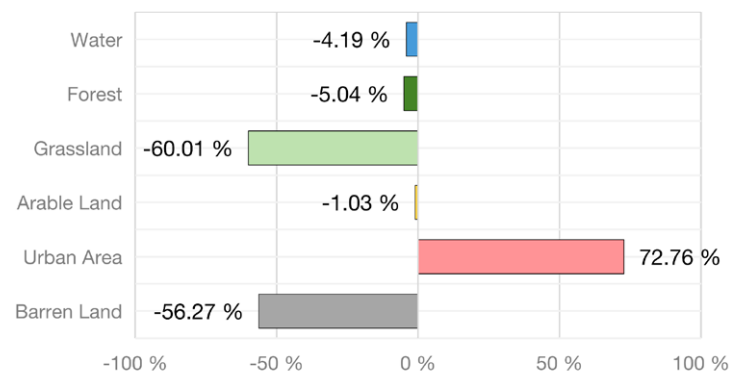


Land cover Huangyan, 2020



1 ↑ Changes in land cover and land use in Huangyan-Taizhou (2010–2020).
Source: Own calculations based on Landsat data

LULC changes in Huangyan, 2010 - 2020



2 ↑ Percentage change in land cover in Huangyan-Taizhou (2010–2020).
Source: Table generated with own calculations based on Landsat data

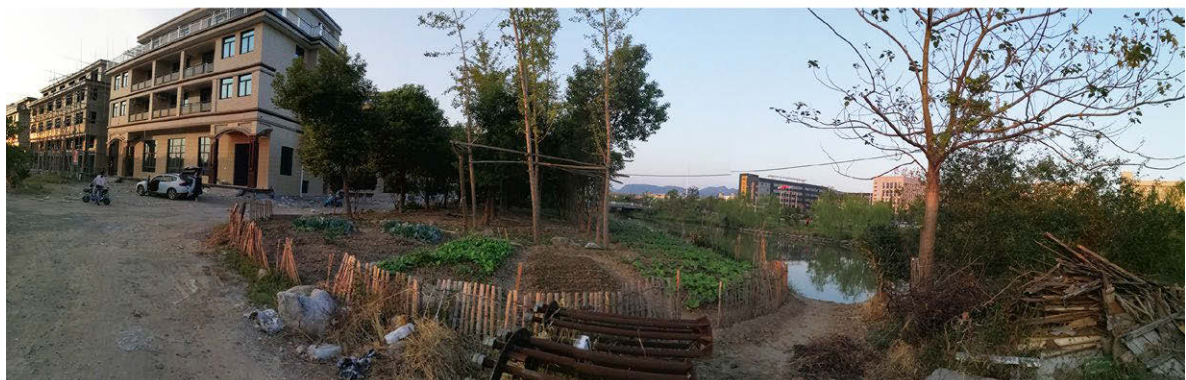
Socio-ecological restructuring

In light of this overall comprehensive land use change, it was necessary to zoom in and focus also on a distinctly local, neighbourhood level. Although our analysis of land cover revealed decreasing extents of water, forest, and grassland, this must be balanced against the careful and systematic development of a regional greenbelt, along with improvements to the built environment. In the field investigation, we gathered positive statements from local people regarding the ecosystem restructuring, for instance: “I don’t know if the ecosystem has improved, but I feel the green space has increased. I often take my granddaughter to play at the riverbank. A place for playing is much closer than before” (Interviewee 1, personal communication. 2019, October).

In the field study, we also identified the different meanings that land transition holds for residents from diverse backgrounds, who may perceive changes in distinct ways. In particular, as the extent of agricultural land decreased, the remaining plots generally benefited larger farms rather than local residents. These local people customarily grow agricultural produce in plots close to their homes, for example, in vacant land between rural houses, unused construction land, and in their front yards (see Fig. 3). As one woman using an informal plot told us: “There used to be small plots of land close to my house; we planted the vegetables we needed every day there. We also sell any excess produce in the neighbourhoods. I don’t understand why grassland is everywhere now. It’s not useful and you cannot eat the grass” (Interviewee 2, personal communication. 2020, October)

As fewer agricultural plots were left available around residents’ houses, many of them took the initiative to maintain their farming activities in any possible way. We observed that this was primarily driven by daily habits rather than opportunities for income. For example, during the field study we encountered a man who was farming a plot on a piece of vacant land (Fig. 3). Originally from Hunan province, he came to the Huangyan-Taizhou region because of his son’s career, commenting: “I haven’t really gotten used to life here; but farming on this land is a perfect way to avoid that. It makes me feel much more connected to my previous life” (Interviewee 3, personal communication. 2020, August). Farming on vacant land provided him with an important social connection to his local area. This is consistent with findings from other researchers such as Joshi and Wende (2022).

Through our field investigations, we observed that some planned grassland and green space located close to residential areas along nearby roads, streets, and vacant land were informally used for growing vegetables (Fig. 4). However, green space of high ecological value, located in the greenbelt alongside the mountains, mostly remained untouched. The informally-used green land supported the local custom of growing vegetables, and simultaneously helped to build social connections between incoming populations from other rural regions. This suggests that the introduction of green space can improve the condition of ecosystems, whilst also underpinning important social connections. Thus, this example shows how ecological and social transformations can be closely connected and interact with one another.



3 ↑
Small informal plots used for planting crops
Source: Photos by Huang Huang



4 ↑
Land within the ecological green belt informally used for small-scale agriculture
Source: Photos by Huang Huang and Ava Lynam

Discussion and conclusion

About three-quarters of the Earth's land surface has been altered by human activity over the last millennium (Luyssaert et al. 2014, Arneth et al. 2019); changes in land use are both the cause and the consequence of socio-ecological change. Whilst physical changes occurring within rural-urban transformations do not necessarily entail simultaneous social changes (e.g., social behaviour or living customs), space is constantly being reshaped by local daily activities. To understand the dynamics of ecosystem and land use through rural-urban change, it is therefore essential to take social and cultural factors into account.

Land use development in China is evolving towards a more sustainable and integrated trajectory. Currently, the ecological use of land is a predominant concern in policy and planning. In practice, the protection and restoration of the ecological system has been directed by systematic planning policies, implemented in the form of nature reserves, scenic areas, parks, greenways, and so on. With such formally designed urban green space becoming increasingly promoted in development agendas, the informal use of land at the URI – such as for planting vegetables – presents new challenges for ecosystem services and urban planning. At the same time, as the development of settlements and the nature of work and production has been transformed by urbanisation, the essence of rural culture remains embedded in farming practices where the link between many rural residents and nature is still rooted in the land. In our case, the introduction of vegetable gardens or other informal agricultural practices – and their connection to local people's everyday lives – was not sufficiently considered in BGS system visions for spatial transformation.

We were able to observe that many areas of green space, as well as plots planned for formal green spaces, were informally used for small-scale agriculture through individual initiatives. Local residents and an inflowing population from rural areas still retain the custom of growing food and vegetables in neighbourhood plots. However, it is also important to acknowledge that some smaller plots randomly chosen by local residents for everyday farming could have a negative impact on ecosystems. For example, agricultural plots located on riverbanks risk contaminating water bodies through farming practices with the use of fertiliser.

Drawing from our analyses of land transition and long-term field investigations in the Huangyan-Taizhou region, this study demonstrates the ways in which urbanisation has a profound impact on land use and ecosystems, whilst also being closely related to local social activities. Thus, we suggest that as a particular form of green space which is rooted in local culture and characteristics, small-scale vegetable gardens or 'informal' agricultural practices should be integrated into sustainable urban-rural development planning alongside measures toward ecological protection. If BGS planning takes into account the social needs of local residents, a higher quality ecosystem can be co-constructed – from both top-down and bottom-up. This study thus contributes to the global debate surrounding sustainability by highlighting the importance of interventions that put emphasis on socio-cultural and socio-ecological perspectives within urbanisation processes, particularly at the URI.

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Ethnographic portraits: exploring drivers of in and out migration in Beiyang Town

Gaoli Xiao¹, Ava Lynam¹

¹ Centre for Cultural Studies on Science and Technology in China (CCST), TU Berlin

Migration studies in China have largely focused on rural to urban flows to first-tier cities that are attractive in terms of economic opportunities and lifestyle (see, e.g., Chan, 1994; Cheng et al., 2014; Ge et al., 2020; Hao & Tang, 2015; Li, 2006; Xu et al., 2020). Drivers of migration to small towns and rural areas, however, remain overlooked. With comparatively less developed infrastructure and institutional structures, critical challenges arise in the process of accommodating migrant groups in these regions.

Through multiple field investigations between 2019 and 2022 across small towns and villages around Beiyang Town in the west of Huangyan – a secondary city-district in the Yangtze River Delta economic belt – we observed that, despite the region's out-migration, its relatively strong economic condition has attracted rural migrants from poorer provinces to engage in modern agriculture and industrial production. Investigating the drivers behind such migratory patterns – and the challenges facing different migrant groups – cannot be achieved without centring human experiences in the process of departure and arrival.

Our contribution showcases two ethnographic portraits – elderly factory workers and migratory watermelon planters – to capture in- and out-migration patterns and perspectives encountered across the rural-urban hinterland of Beiyang Town. Through the combination of empirical material – extracts from informal conversations, semi-structured interviews, participatory observations documented in field notes, architectural spatial mapping – we reveal different forms of migration, and provide rich text and visual descriptions of the underlying social, institutional, and economic forces that influence population flows from an everyday perspective.

PORTRAIT 1: RURAL-TO-TOWN MIGRATION

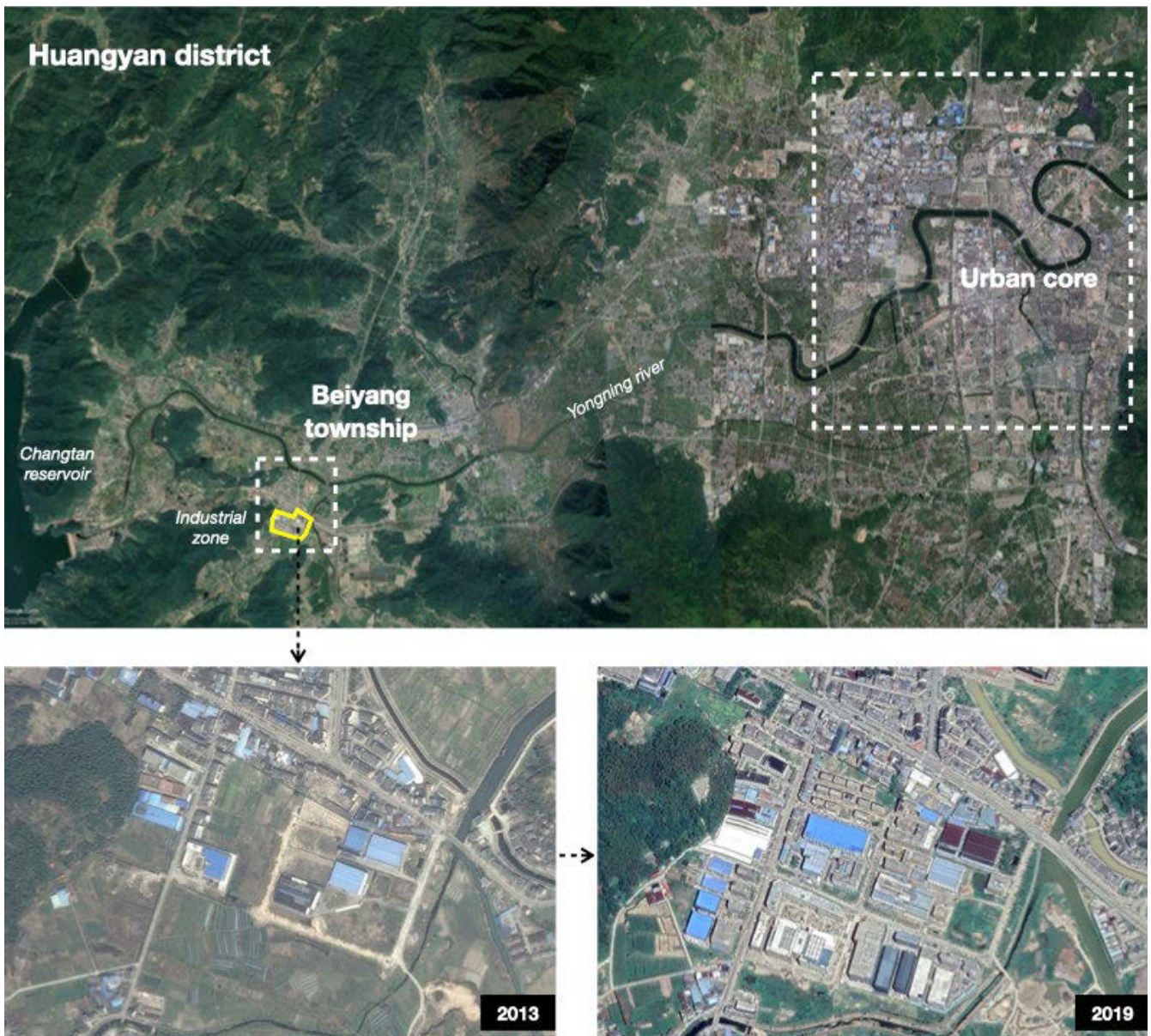
The experience of elderly seasonal workers in Beiyang Town's factories

Around 2015, Beiyang Town started to develop its southern zone – primarily occupied by farmland – into an industrial area. The relatively cheap land attracted successful moulding and plastic factories located in the urban area of Huangyan to expand their businesses there. Although supported by the government, factories in Beiyang Town's new industrial zone remain challenged by their peripheral geographic location.

During field work in March 2022, a plastic factory manufacturing products such as Christmas decorations was investigated. The factory was unable to employ enough local labourers as most young people have moved to the more developed urban area of Huangyan, as well as other major cities. Labour-intensive and low salaried jobs are not attractive to the remaining local population, which mainly consists of elderly people, women, and children. As a result, the factory employed around 140 migrant workers, accounting for more than half of the total work force.

People in the office working on computers looked very young, whilst people in the production workshops were mostly elderly. The women in the workshop were using small knives to cut off irregular edges of small, soft, pink plastic bins. They worked in a relaxed manner listening to audio-books and pop songs.

Field notes extract: 3pm on 23rd March 2022, at the plastic factory in Beiyang Town's industrial zone.



1 ↑ ↗
Beiyang Town and the spatial transformation of its industrial zone from 2013 to 2019. Source: Maps developed by Gaoli XIAO using Map Data ©2013 Google, Map Data ©2019 Google, Map Data ©2022 Google

Almost all these migrant workers, with an average age of over 60, came from the same village in Henan – a province famous for its labour output as a result of its poor economic status – through social networks or labour brokers. They are highly mobile seasonal workers who often remain engaged with agricultural practices in their hometown. Three migrant workers – Zhang, Yang, and Xue (alias) – were encountered inside the factory canteen and their dormitory room. The women held Henan Hukou¹, and were 56, 67, and 60 years old, respectively. Extracts from two interviews give an insight into their experiences of migration in this industrialising zone, in terms of living and work conditions, motivations for migration, and their visions for the future.

How are your working conditions?

Zhang: My salary is 10 ¥ (approx. €1.40) per hour. I usually work 8 hours per day, and when there is extra work, 12 hours.

Xue: We have injury insurance, but our health insurance is tied to our hometown. Our pension is 2000¥ (approx. €285) per year, but some only get 990¥ (approx. €140).

Where is your family?

Zhang: My two sons are also in Zhejiang province – Jiaxing and Hangzhou. I have two grandchildren. I can't take care of them anymore. They needed to go to school, so my daughter-in-law went back home and I came out to work.

Yang: My son and his wife work in Henan province, but the salary is too low to raise their kids. My granddaughter has to pay 16,000¥ (approx. €2,200) tuition every year.

Why don't you work in the same place as your family?

Zhang: My son works in Meide (a big company). They have higher requirements and I'm not qualified.

Yang: The factories where my son works don't take old people.

How many people are there in your dorm?

Zhang: Seven people. One person, one bunk bed.

How is your life here?

Zhang: It's okay. I'm not a picky person, as long as I have food and accommodation. The factory dorm is fine for me.

Xue: It's better to be occupied here than doing nothing at home. It's very lonely back home. Here at least we have seven people in the dorm.

What do you do after work?

Zhang: I go back to the dorm and relax. Sometimes I buy things on the street. I try not to go out too much as I will just spend money.

Why did you come to Beiyang Town?

Zhang: I used to work in restaurants and factories in my hometown, but the working hours were 12 hours per day. It was too much for me. Here the workload is less, although the salary was higher back home.

Xue: We don't have land anymore. Nowadays agriculture is mechanised back home.

¹ Hukou (户口) is a system of household registration in China previously tied to urban or rural status, with impacts on public service and social welfare access.

How long do you plan to stay here?

Zhang: If I like it here, I will stay for one year then go home. Otherwise I will leave anytime.

Xue: Depends if we still have the strength to work. If we can't handle it anymore, we will go home. We all are seasonal workers, and have to go back during the harvest season (to work in modernised farms managed by external owners).

When would you like to retire?

Yang: When I can't move anymore. But now factories are restricting the age of workers. Without skills we can only find work like this.

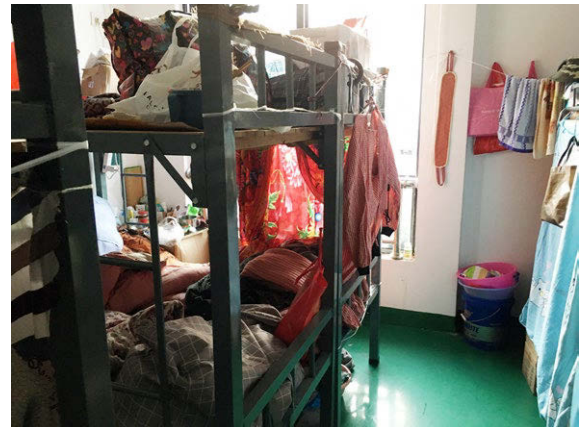
Xue: We want to work as long as we can. We don't want to burden our children.

Are there locals working in the factory?

Yang: Yes. They are also old. Young people don't want to work in the production line, they prefer offices. Some young people came and left because they didn't want to be surrounded by elderly people.

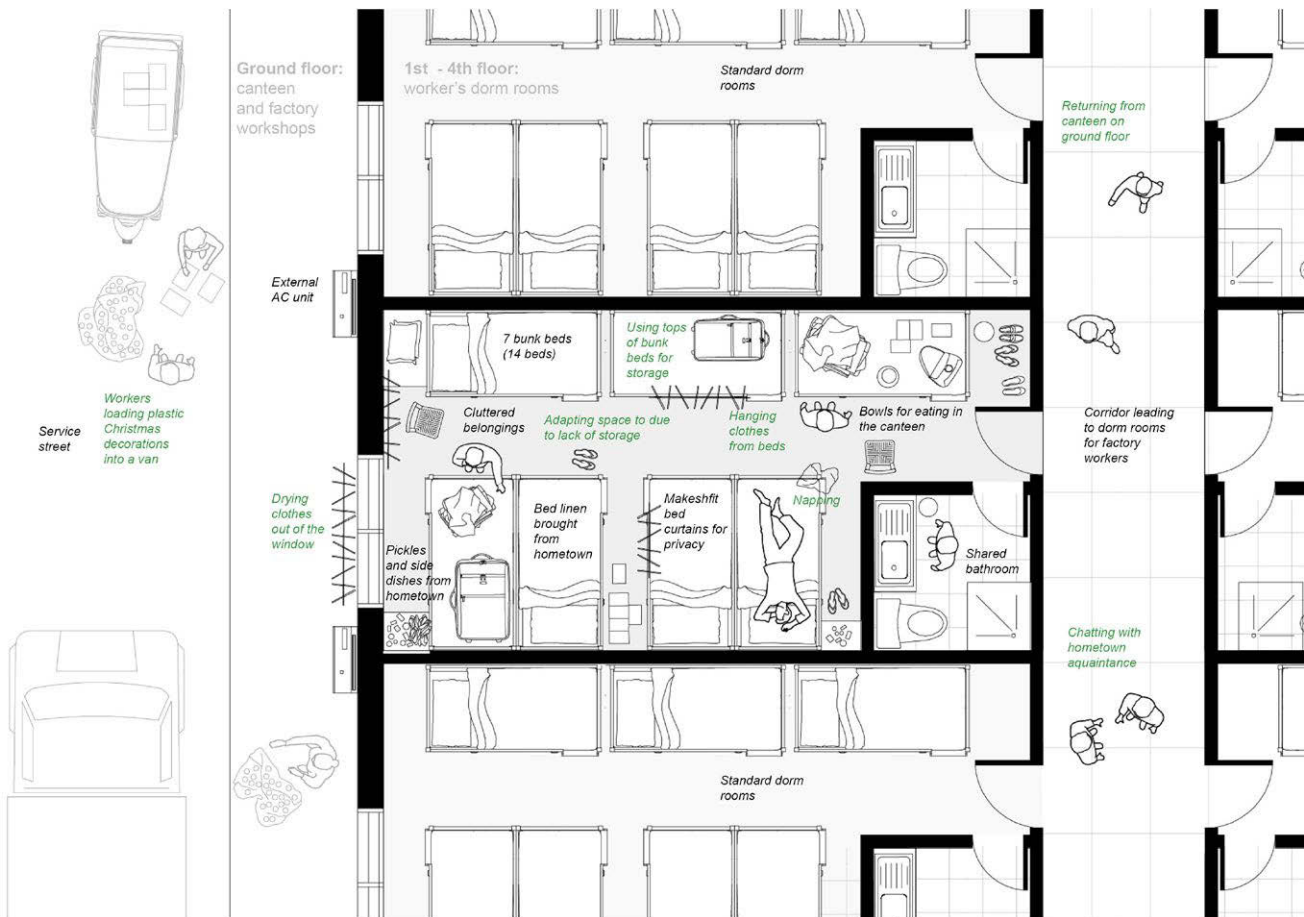
Having lost their livelihood from land exploitation and agricultural mechanisation, elderly farmers from Henan travelled to Huangyan to make ends meet with a spirit of resilience and adaptivity. Meanwhile, their efforts in trans-local production lines make them marginal yet active participants in the globalised economy; the products of their labour making their way from Beiyang Town into the European marketplace.

The migration of older people into small towns and rural areas, instead of big cities, creates specific challenges for the hosting region. Unlike labour-age migrants, the specific needs of elderly migrants – such as cultural and social belonging, and public services such as healthcare – require more targeted infrastructure and welfare provision. Our investigations in Beiyang Town reveal that factories generally only cover the migrant workers with injury insurance, while health insurance and pension are tied to their Hukou registration in their hometowns. With minimal social and institutional engagement with the local villages, elderly workers experience little place attachment – shaping their everyday routines as well as their future migration choices.



2 ↑ ↗

Left: Internal view of the canteen for the workers of the plastic factory.
Right: Dorm room in the plastic factory accommodating migrant workers.
Source: Photos by Gaoqi XIAO



3 ↑ Above: Socio-spatial mapping of a factory dorm room. Source: Drawing by Ava Lynam

PORTRAIT 2: RURAL-TO-RURAL MIGRATION

The experience of Huangyan’s mobile watermelon farmers going global

Watermelon planting by outgoing migrant farmers has been a tradition in the Huangyan region for many years. It has been estimated that by 2021 more than 43,000 people have ventured out from Huangyan to plant watermelons in 23 provinces across the country (Huangyan District Committee Office, 2021). In recent years, they have travelled as far as Nigeria, Laos, and Myanmar. The practice dates back to 1983, when five farmers set out from the rural area of Huangyan to Shanghai to escape extreme poverty (ibid.). Their successes soon attracted followers from their extended families, home villages, the surrounding villages and towns, and eventually the entire Huangyan region.

Outgoing watermelon planting has developed into a lucrative and mature business in Huangyan. According to the mayor of Beiyang Town, the annual revenue from watermelon planting has doubled the total agricultural output within the region (Mayor of Beiyang Town, personal communication, 2022). Fitting into the broader political vision of developing Beiyang Town into a ‘Characteristic Town’³ of modern agriculture, and with the high economic return increasing the average income of the rural population, the local government has established relevant policy incentives and plans to build supportive infrastructure. For example, an office building designated for outgoing

The street of Maoshe was wide, with many roadside shops all related to the watermelon production chain – selling seeds, farming machines, and plastic films. The boss of one of the shops showed me a map on the wall which traced the distribution of outgoing watermelon planters in China. He said proudly: “My son is the vice president of the World of Watermelon farmers”

Field notes extract: 11am on 9th March 2022, in the watermelon seed shop in Moashe Township.

² The ‘World of Watermelon Farmers’ is a digital platform (app) developed by the Development and Reform Office and Agriculture and Rural Affairs Bureau of Huangyan District. The platform provides site searches, agriculture finance, risk assessments, insurance, and many other watermelon planting related services using big data supported algorithms (The People’s Government of Zhejiang Province, 2021).

³ The ‘Characteristic Town’, or tese xiaozhen (特色小镇) is a ‘one town one characteristic industry’ development concept that has appeared in policy documents since 2015, with the aim of attracting investment to rural areas, cultivating emerging industries, and promoting rural revitalisation (Zhu et al 2018; Liao and Yi 2018).

watermelon farmers – as well as other modern agriculture entrepreneurs – is planned to be built on local land, stretching as large as 40 hectares (ibid.)

A substantial highly mobile and adaptive group has subsequently been established in the local area around the practice of watermelon planting. They return twice a year for 2-4 months, purchase everything they need, and set out again to farm in various regions. The conversations with villagers around Beiyang Town revealed that watermelon planting as a family business serves as a back-up plan for the younger generation who often fail to find better opportunities in cities. Many households have at least one family member engaged in the watermelon planting business. An extract from an interview with the Beiyang Town mayor illustrates the motivations and experiences of out-migrating watermelon farmers, as well as their attachment to their hometown.

How did people start going out to plant watermelons?

It started in Maoshe Township and Shangyang Village. People here are very capable of imitating. After seeing friends and relatives making money outside, many others went along with them. The original reason was poverty. Maoshe and Shangyang were both very small and poor, so people had no choice but to go out.

What is the situation today?

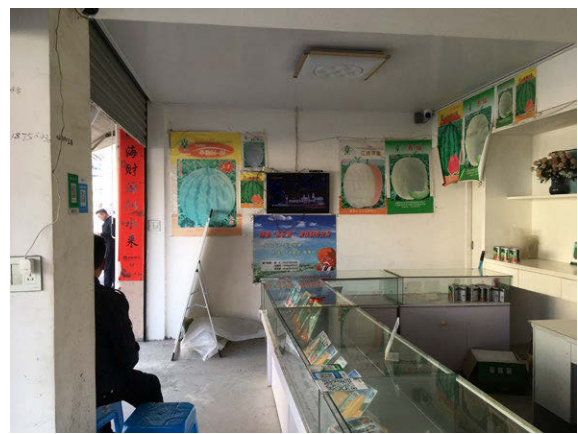
Nowadays it's different as watermelon planting has become a business chain. There are online agents through whom you can go anywhere in China with your suitcase and plant watermelons. They even reached Southeast Asia. The Huangyan District Government has developed policies to protect the rights of watermelon planters in other areas (through legislation, bank loans, and insurance). Their business operations went digital. Mobile watermelon planting is also viewed as part of our modern agriculture development strategy.

Why would people who made money planting watermelons choose to come back instead of settling somewhere else?

Everyone wants to return to their hometown when they are old. As an old Chinese saying goes: "Falling leaves return to roots (落叶归根)". This is our traditional culture. Another reason is that most out-going villagers still can't afford apartments in the urban area. Here it is cheaper, and they can build their houses themselves.

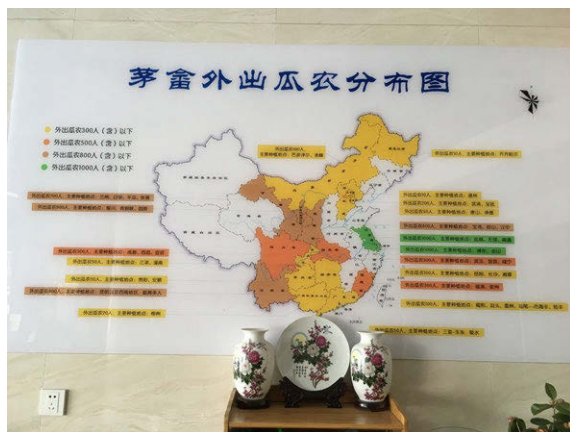
The watermelon planting business has turned seasonal agricultural production into an alternative income for local farmers. As the business expanded, many of the original outgoing farmers have become agricultural entrepreneurs who hire local or migrant farmers on their contracted planting sites (Huangyan District Committee Office, 2021). It is estimated that Huangyan’s watermelon farmers create more than 50,000 jobs in their planting sites every year (ibid.). Grassroots mutual support and a strong community network has played a marked role in this success. Without the help of the government in the initial phase, farmers found their own ways of surviving land loss and rural decline.

Although highly mobile, watermelon farmers are closely tied to their homeland socially, culturally, and financially. Watermelon planting is often a risky activity – heavily dependent on weather conditions. Villagers joke that those who made money and bought expensive cars this year have to sell them next year if the weather is bad. This financial risk is one of the ties binding outgoing farmers to their homeland, as the support from fellow planters and loans from local agricultural banks are vital to survive times of hardship. Meanwhile, strong place attachment to their hometowns and family values is a motivation to spend profits on renovating or building their village house.



4 ↑ ↗

Left: The main street of Maoshe Township, filled with shops supplying goods for watermelon planting. Right: Internal view of a watermelon seed shop. Source: Photos by Gaoli XIAO



5 ↑ ↗

Left: Map in a watermelon seed shop in Maoshe Township indicating the nationwide distribution of out-going farmers. Right: The organisational structure of the watermelon planter community, with the slogan, “Establish businesses on the foreign lands, serve fellow planters, reward homeland”. Source: Photos by Gaoli XIAO



6 ↑
Socio-spatial mapping of a watermelon seed shop.
Source: Drawing by Ava Lynam

Reflections

International migration studies show that migration from Global South to North is mainly driven by uneven development, rather than poverty (Castles, 2004). A similar phenomenon could be observed with China's internal migration. Regional imbalances have created fragmented social and economic realities, triggering diverse migratory patterns from underdeveloped to developed areas (He et al., 2019; Zhu et al., 2020). Our study finds that within Huangyan, unbalanced urban-rural development triggered out-migration from rural to urban. On a national scale, people from poor rural regions are moving into economically more prosperous Huangyan to find jobs that are not available in their hometowns.

The small-scale empirical study presented in this article reveals that small towns and rural areas in Huangyan are not attractive enough for local labourers to stay as regular dwellers, nor are they ideal destinations for labour in-migrants for the long term. For out-migrants with aspirations for increased income and who are capable of moving, neither farming nor local factory jobs are considered favourable. For in-migrants, the predominant driver of income generation ("Zhengqian", a Chinese term mentioned by many interviewees) contributes to weak place attachment during the initial phase of migration. Without sufficient incentives to settle down, migrant factory workers establish minimum interactions with their temporary places of arrival, and maintain their social networks, administrative status, and cultural activities in their homeland. In the long term, insufficient infrastructure provision, strong roots, and cultural identity – combined with institutional barriers, such as access to local health insurance and education – further reduce in-migrants' sense of belonging and contribute to their often highly mobile life trajectory.

Eco-agricultural practice and its impact on Agroecosystem Services: Beiyang Township Area

Dr. Yuting Xie¹, Keyi Zhang¹, Peiwen Huang¹, Yuxin Gong¹, Xiangjing Chen¹,

Dr. Maria Frölich-Kulik², Dr. Suili Xiao³

¹ Institute of Landscape Architecture, Zhejiang University

² Bauhaus Universität Weimar

³ Leibniz Institute of Ecological Urban and Regional Development

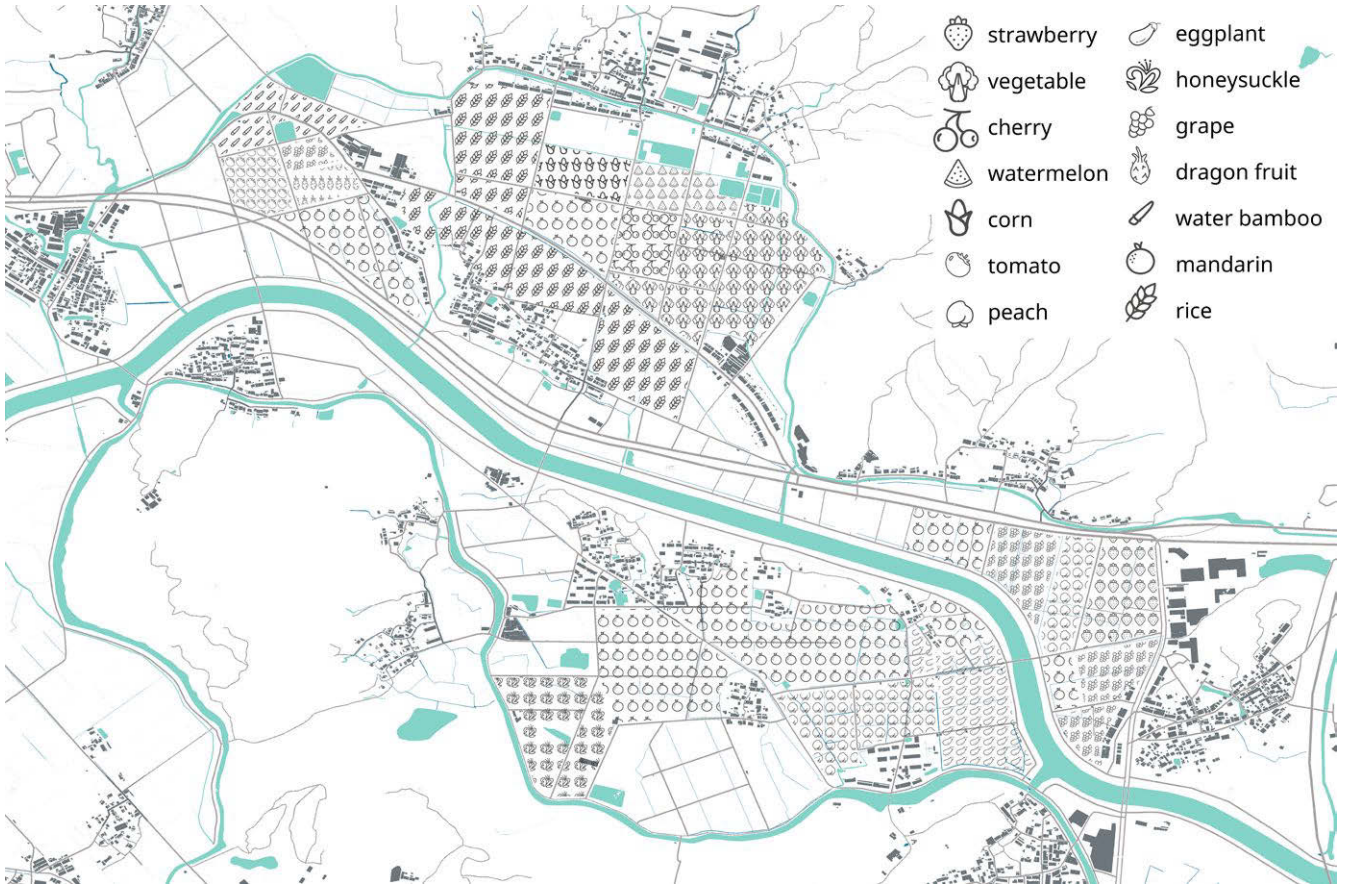
Introduction

As part of the Research & Development phase of the URA project, consortium partners are exploring possibilities of employing Urban-Rural Living Labs (URLL) in China. Coordinated by WP4 and in cooperation with others, particularly WP5, Urban-Rural Living Lab #1 'Beiyang Township Area' aims to strengthen ecological-oriented collaborations and support ecological food production and inclusive eco-tourism.

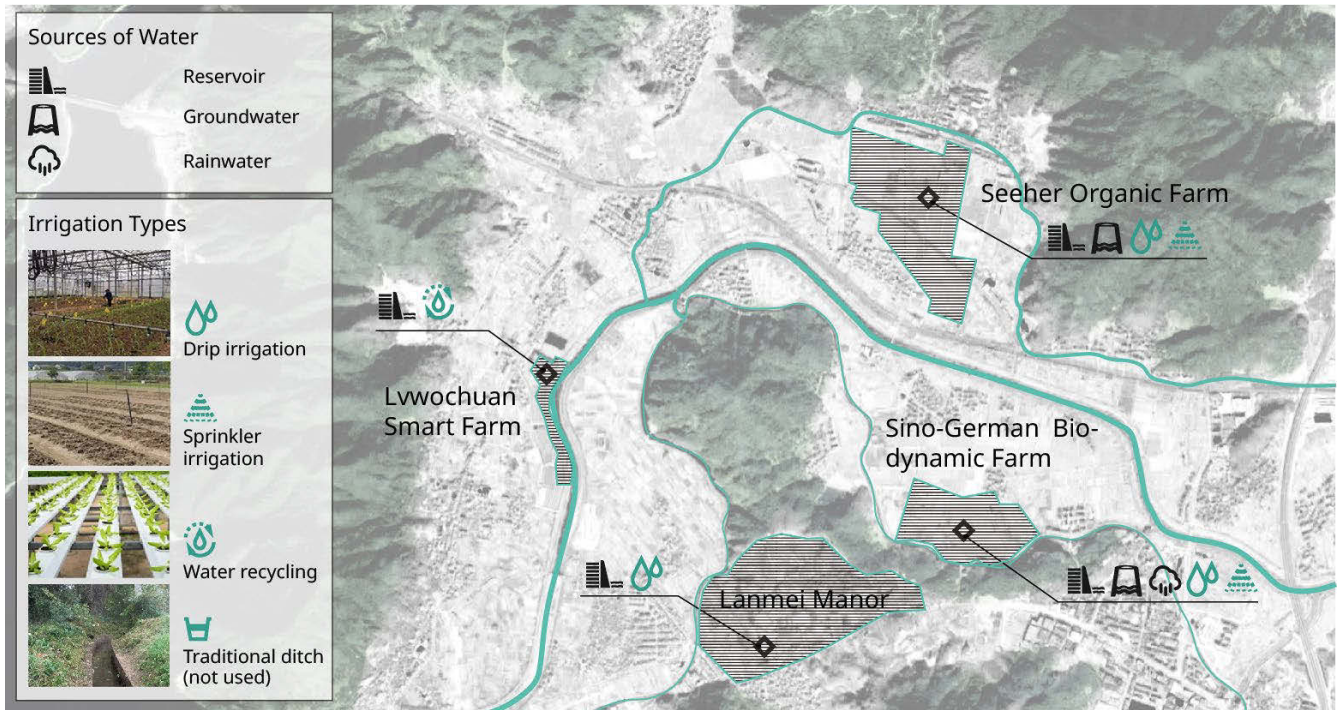
Beiyang Town is located in the upper reaches of the Yongning River in the Jiaojiang River Basin in the prefecture level city of Taizhou. Beiyang is an essential hub of water conservancy and irrigation; the primary water supplier for Taizhou city, the Changtan reservoir, is situated in its mountainous area. Because of its rich natural resources, Beiyang Town was nominated as a characteristic agricultural town in Zhejiang Province, and subsequently has promoted eco-agriculture practices as alternative models to local rice or orange-based agriculture (Fig. 1). These efforts at eco-agriculture practices have significantly improved local productivity and food security, and have encouraged the development of eco-tourism and nature education. However, as a crucial approach to eco-agriculture in Beiyang Town, agricultural intensification has led to environmental challenges such as risk of biodiversity loss, interrupted hydrological processes (Fig. 2), and soil degradation, for example in the case of the Seeher Organic Farm and Lwochuan Smart Farm. The Sino-German Biodynamic Farm model has struggled to make economic profits because of the necessity for large investment in biodynamic preparation, whilst mass-produced facility agriculture such as the Seeher Farm poses a severe environmental impact. Thus, conflicts between agricultural production and environmental risks have become the primary concern of local eco-agriculture practice.

Eco-agriculture is a sustainable agricultural development model that was developed in the late 20th century by China's ecologists and agronomists. The concept was intended to coordinate and promote the development of economic, ecological, and social benefits through combining various modern production technologies (Ye, 1988; Li et al., 2008). With rising awareness of the ecosystem services that could be provided through agriculture, in recent years, China has redefined its agricultural model, promoting active use of eco-friendly methods to put strong emphasis on the function of agroecosystem services (AES) (Luo, 2017). AES not only provides the provisioning ecosystem service of food production, but also regulating, supporting, and cultural ecosystem services, such as soil conservation, biodiversity, and leisure tourism. Strengthening these related AES could help mitigate conflicts between agricultural production and environmental issues (Dyer, 2014), and coordinate economic, ecological, and social benefits. However, there are few studies that have developed integrated models to evaluate multiple AES (Liu et al., 2022). Therefore, it is crucial to arrive at new understandings of the impact posed by eco-agriculture practices and approaches to accessing and improving multiple AES to achieve sustainable development goals in rural areas (ibid.).

In this study, we examine three typical farms practicing conventional and eco-agriculture in Beiyang Town to develop an integrated model for evaluating and comparing their AES. Based on the results, we have assessed the impact of agricultural transformation on AES, and have found that the strengthening of multiple AES corresponds with their improved application in agricultural landscape planning, governance, and eco-compensation policy making.



1 ↑
 Biodiversity of crops, vegetables and fruits in Beiyang Town.
 Source: Credit to Yating Zhu and Yuxin Gong



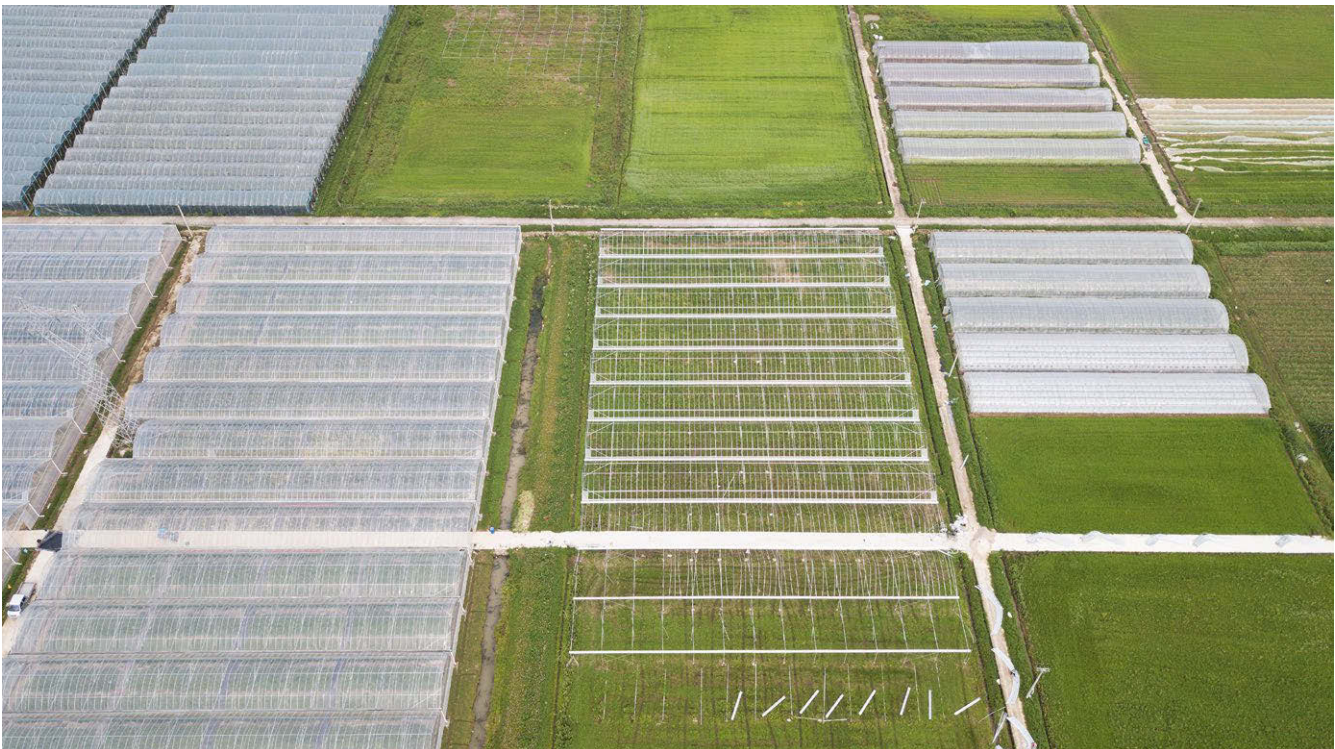
2 ↑
 Comparison of irrigation types and related hydrological processes of four eco-farms in Beiyang Town. Source: Credit to Hongqing Li, Xiaohui Le, Xiangjing Chen

Study area

For our study in Beiyang Town, we have selected a conventional paddy farm and two typical eco-farms of local eco-agriculture as case studies. These eco-farms represent two typical agroecosystems certified by Chinese and international organic farming in this region. The conventional paddy farm (33.3 hm²) is managed by local farmers; we use this case as a control group of conventional agriculture to compare AES with eco-agriculture. The Sino-German Biodynamic Farm (20 hm²) mainly produces organic rice through biodynamic preparations of restoring and regenerating soil and setting buffer zones for encouraging biodiversity. This farm received the DEMETER Certification for its fulfillment of the strictest standard for organic agriculture worldwide. The Seeher Organic Farm (5.1 hm², Fig. 3) is an example of typical facility agriculture operated utilising closed greenhouses with rotation farming of more than 100 types of vegetables and fruits. The farm received a Chinese certification of organic products (中国有机产品) for high standards of food safety, biological control, and integrated pest management.

Methods: quantifying AES

To develop an integrated model for AES evaluation, we applied several methods – market price, shadow pricing, and replacement costs – to calculate and compare the provisioning, regulating, supporting, and cultural ecosystem service value of each agroecosystem (Alcamo et al., 2003). We identified nine indices to respond to the research goals and questions. The significance and evaluation methods for the indices were reviewed, and appropriate quantitative models were established for each (Sun, 2007; He, 2016; Song, 2018; Lu, 2011; Liu et al., 2020; Slater et al., 2021; Kutzbach et al., 2007; Ren, 2018; Li et al., 2016; Li et al., 2015; Ma et al., 2015; Tang et al., 2008; Xie, 2015). Furthermore, we measured the biodiversity of each eco-farm through field studies and interviewed farm owners to obtain economic data.



3 ↑
Seeher Organic Farm facility agriculture operated utilising closed greenhouses.
Source: Credit to Jiaxin Ying

Results and discussion

Our findings are detailed in Table 1 below. It should be noted that the size of each farm varies: to accurately compare the results of the three farms, we measured all AES values in Chinese Yuan (CNY), per hectare (hm²) and per year (yr).

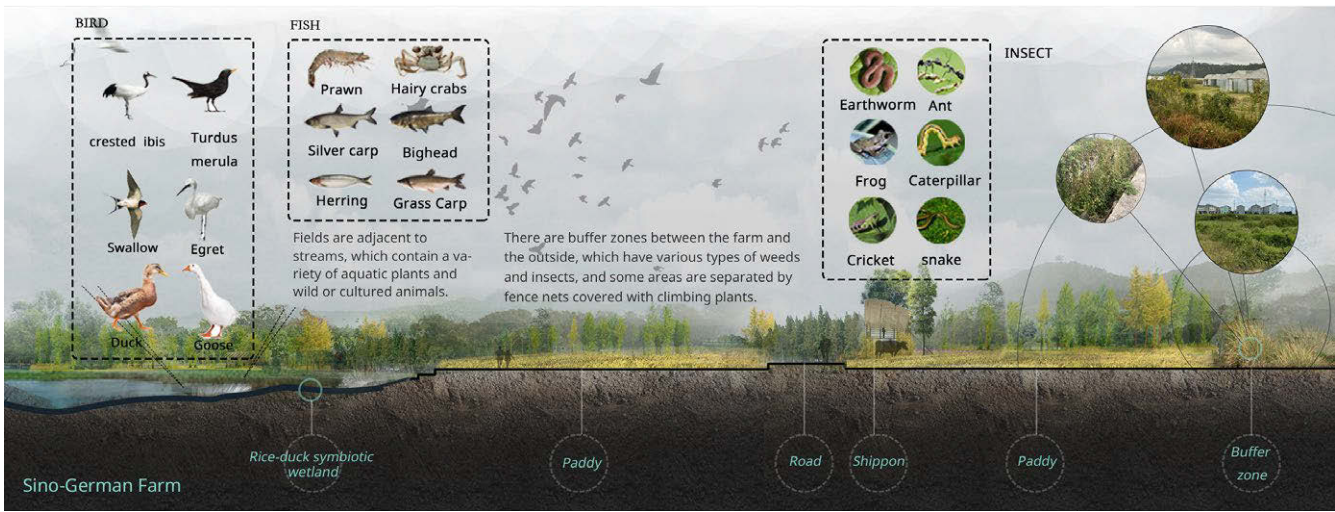
TABLE 1 ↓
Nine AES values of the three farms

Service Indices		AES value (CNY/hm ² · yr)		
		Conventional paddy farm	Sino-German Biodynamic Farm	Seeher Organic Farm
Provisioning	Food production	47,250	136,005	338,955
Regulating	Carbon fixation	3,520	3,105	4,680
	O ₂ release	22,200	21,615	29,595
	Greenhouse gas emission	-450	-614	-150
	Soil conservation	2,175	3,030	2,790
	Water conservation	9,615	9,615	3,825
	Air purification	210	210	75
Supporting	Biodiversity	570	570	345
Cultural service	Leisure tourism	0	0	300,000
Total		85,080	173,535	680,115

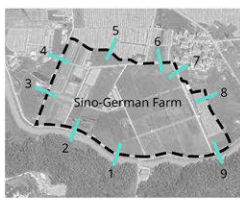
The conventional paddy farm had the lowest total AES value of 85,080 CNY/hm² · yr, only 12.5% of the Seeher Farm. It also had the lowest provisioning value of food production at 47,250 CNY/hm² · yr; the cost of labour and machines can barely be covered by any direct economic benefit. Conventional rice farming still dominates in Beiyang Town, largely due to the strict protection of paddy farms by land use law, as permanent farmland for food security. Thus, the operation of local rice farming relies on state subsidies. As well as provisioning ecosystem services, regulating and supporting ecosystem service value is 37,830 CNY/hm² · yr, accounting for 44.5% of the total value. The conventional paddy farm had the lowest soil conservation value due to its vulnerability to soil erosion, whilst the use of inorganic fertiliser detrimentally affects soil fertility. However, this paddy farm was found to have high water conservation and air purification value because the rice was grown under flooded conditions.

The Sino-German Farm had a relatively high food production value of 136,005 CNY/hm² · yr. – organic rice sells three times (21 CNY/kg) higher than ordinary rice (7 CNY/kg). It is worth noting that provisioning value comes both from rice (560 CNY/hm² · yr) and its by-products such as rice wine (604.5 CNY/hm² · yr).

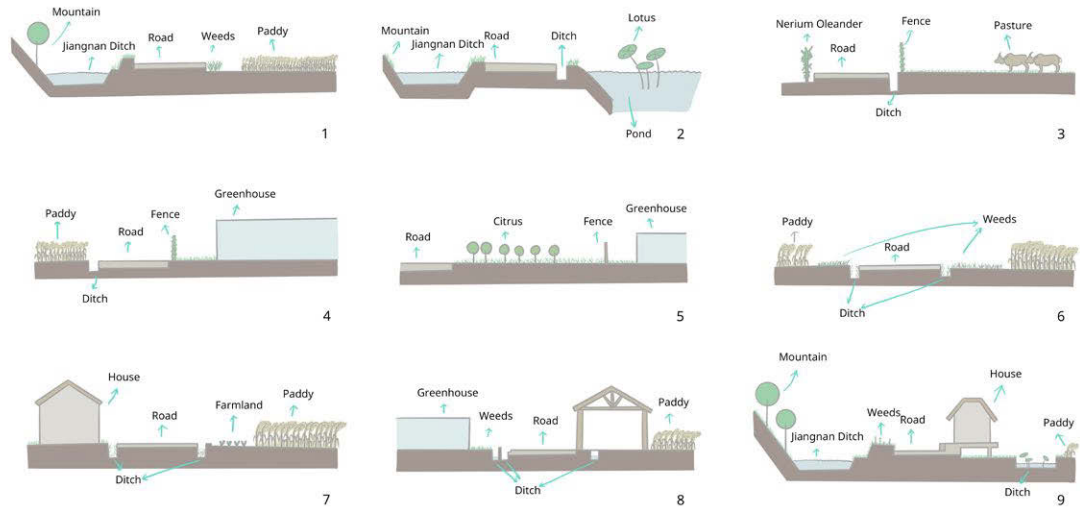
However, the provisioning value of organic rice only reaches 40% of the cash crops of the Seeher Farm, though the high cost for biodynamic preparation has not been subtracted in the calculation. Regarding regulating ecosystem services, water conservation, soil conservation, and air purification values were found to be higher, due to improved soil and water quality relating to organic farming. However, these methods produce the highest greenhouse gas emissions, primarily because of the integrated rice-duck farming system, and exacerbated by the manure used. However, this negative effect is as little as 615 CNY/hm² · yr, suggesting that breeding animals as part of biodynamic farming is less detrimental than some other farming practices. In terms of supporting ecosystem services, the Sino-German Farm boundaries have higher biodiversity (Fig. 4) than the Seeher Farm. This can be attributed to the high standard required for the certificate of DEMETER biodynamic farming, such as buffer zones along farm boundaries (Fig. 5). Relating to cultural ecosystem services, the Sino-German Farm has hosted biodynamic farming training courses for domestic farmers, however we were unable to obtain income data from the farm owner.



4 ↑ Biodiversity of the Sino-German Biodynamic Farm. Source: Credit to Keyi Zhang and Peiwen Huang



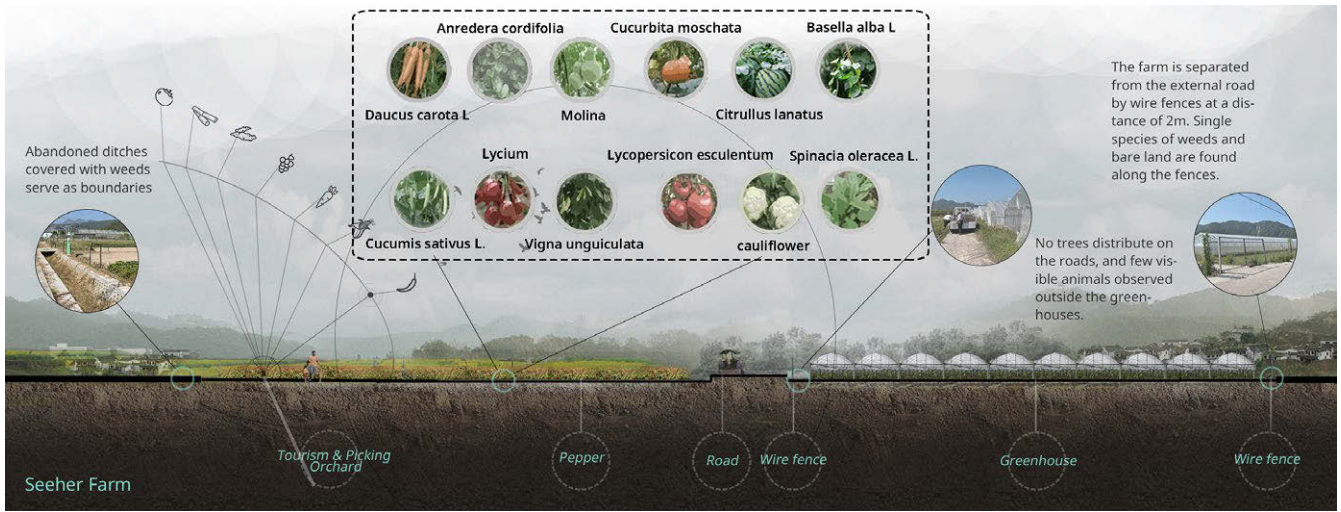
5 → The boundaries of the Sino-German Farm. Source: Credit to Peiwen Huang and Yuting Xie



For ecosystem service value overall, despite being operated using eco-friendly principles, the Sino-German Biodynamic Farm ranks as highest in the results. This can be attributed to the following reasons: 1) the food production value of growing rice is 1.5 times lower than the Seeher Organic Farm; 2) the Sino-German Biodynamic Farm does not take full advantage of the surrounding natural environment to develop eco-tourism or nature education, whereas the Seeher Farm gains 300,000 CNY/hm² per year in profits from cultural services such as these.

The Seeher Organic Farm, using typical facility agriculture, has significantly higher provisioning value due to the higher price of cash crops than rice, as well as other organic products. The lowest gas emission value at the Seeher Farm of -614 CNY/hm² · yr is due to an

abundant net biomass of crops; however, biodiversity value is only 0.6 of the other case studies. According to our observations, the large area of greenhouses and rigid boundaries have a detrimental effect on biodiversity (Fig. 6); poor water conservation and environmental purification values are due to the dry soil for cultivating cash crops (compared with moist paddy soil) and broad coverage of greenhouses that interrupt ecological processes. The value of 300,000 CNY/hm² · yr attributed to cultural ecosystem services mainly comes from leisure tourism, including fruit and vegetable picking, sightseeing, outdoor training, and modern farming experiences for local people. The farm also intends to carry out natural science education and craft workshops in the future, indicating that there is further potential for future development of cultural ecosystem services.



6 ↑ Crop diversity and the boundaries of the Seeher Organic Farm. Source: Credit to Keyi Zhang and Peiwen Huang

Conclusion

In China's policy context, food security is a national priority, followed closely by environmental sustainability. The former has encouraged industrial-scale agriculture to become the dominant model in eco-agriculture practices. Despite this, there is potential for different models of eco-agriculture to be made more sustainable and subsequently promoted through agricultural landscape planning, governance, and eco-compensation policy-making. This could mitigate conflicts that arise between agricultural production and environmental risks. Lastly, our study at Beiyang Town offers innovative insights and potential new measures for more ecological-oriented agriculture practices in terms of AES value, with the aim of transforming agricultural regions in China. These include:

1) Excluding value calculated at a macro scale, buffer zones and marginal fields between different agroecosystems have the highest biodiversity (Fig. 7), according to our site observations. Therefore, for land consolidation, we suggest that circulated farmlands from individual farmers for large-scale facility agriculture should be centrally positioned, whilst buffer zones and marginal fields for individual farmer's vegetable and fruit production should be conserved as biodiverse hotspots.

2) Permanent farmlands protected by land use laws mainly consist of conventional paddy fields that cannot be modified to any other agricultural land use. For these permanent farmlands, AES could be significantly improved through the crop rotation of rice and other cash crops, as well as by developing leisure agriculture and eco-tourism. Finally, current state subsidies and eco-compensation should be offered to farmers to support a transition from conventional paddy fields to eco-farms.



7 ← Marginal fields in between different agroecosystems. Source: Credit to Yuting Xie

Characteristics of (im)mobility at the urban-rural interface: a comparative case study of the floating population in Huangyan-Taizhou

Liyuan Fei¹, Ava Lynam², Fengqing Li¹, Dr. Huang Huang³

¹ Architecture Department, Shanghai University

² Centre for Cultural Studies on Science and Technology in China (CCST), TU Berlin

³ Department of Urban Planning, Tongji University Shanghai

Introduction

The urban-rural interface (URI) in the Chinese context is characterised by mixed and complex regional landscapes, productive activities, cultural norms, and everyday practices (Adu-Gyamfi et al., 2022; Huang et al., 2020). This rapidly transitional zone typically offers lower rents and a large diversity of jobs which require less training or education, thus providing opportunities to accommodate a substantial floating population¹ – or migrant workforce (van Oostrum, 2020; Shelton et al., 2015). Nevertheless, the floating population may still face various difficulties in terms of local inclusion in their host environments, such as poor living environments and varying access resources, public spaces, as well as public services in relation to their household registration (also known as hukou 户口) (Liu et al., 2017; Qi et al., 2019). In order to understand such differences among the floating population and local residents, this article focuses on a comparative study of physical mobility as a means of reflecting social inclusion. To do so, we investigate movement and travel patterns resulting from the commutes and public activities of local residents and the floating population at an URI, in order to reveal key factors affecting their inclusion and exclusion. The study aims to support the development of more inclusive planning interventions at the URI by providing evidence of challenges to physical mobility and their drivers.

This research focuses on the region of Huangyan-Taizhou in China, which has a comparatively clear and identifiable URI connecting a western area of agriculture development and a more urbanised eastern zone. In addition, the moulding industry has established itself in Huangyan District since the 1980s, attracting an increasingly large number of floating workers to temporarily settle there. As the industry continued its growth over the years, the floating population has increased to over 250,000 people by 2022, accounting for 1/3 of the long-term resident population totalling approximately 700,000 (Interview 1, personal communication, 2022, February). These conditions provided an ideal sample for this study. In order to analyse physical mobility, Location Based Services (LBS) analysis has been applied as a method to reveal differentiated travel tracks of various social groups, whilst a field investigation including interviews and participatory observation supplements the findings by verifying them and revealing complex interpretations, drivers, and meanings.

¹ The term 'floating population' in this article refers to people with places of residence that differ from the location of their household registration (hukou 户口)(Wu,1997)

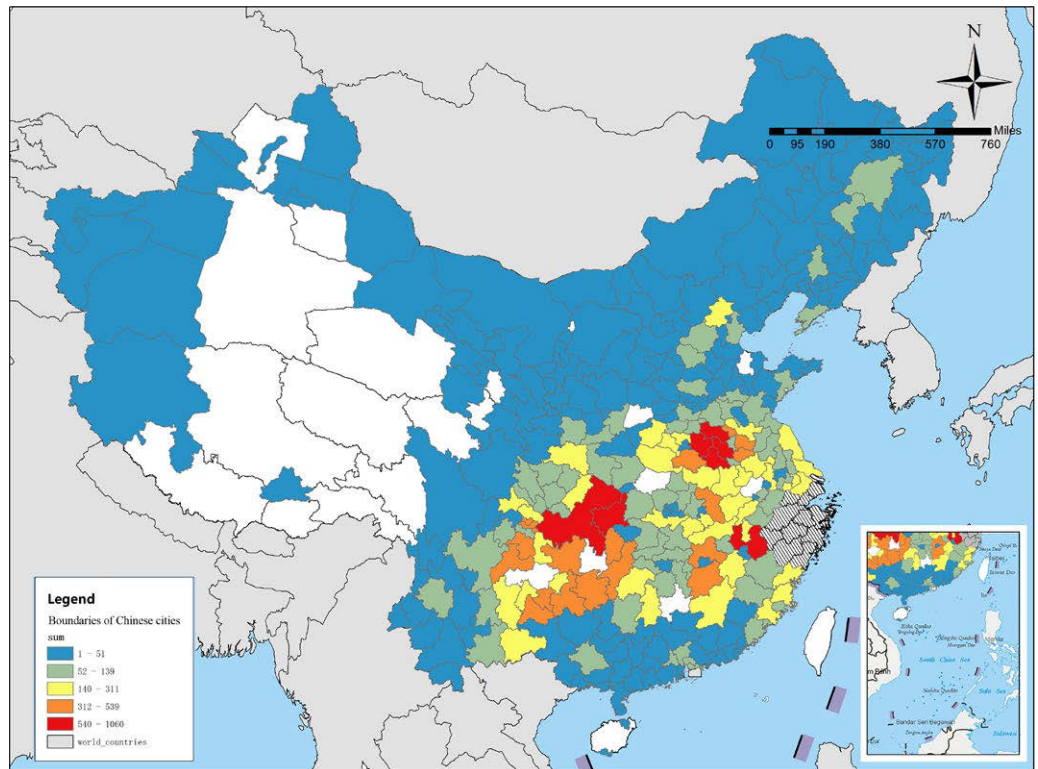
Methods and case selection

LBS data is a type of geographic location data obtained anonymously from mobile phones that visualises physical movement traces and patterns of different social groups based on appended social information (e.g., age, income, gender, hometown). For our study, it has been employed to help us identify the floating population's physical mobility patterns within our research region, with data collected in Huangyan-Taizhou between October 1st and 30th 2021. For the purpose of our LBS analysis, the floating population were identified in the data as people who have temporarily settled in Huangyan from other provinces. The LBS analysis was supported by a field investigation, mainly conducted in the form of participatory observation and semi-structured interviews from October 1st to October 6th 2021, and from February 21st and February 25th, 2022. The aim was to gain a deeper understanding into the experiences behind physical mobility patterns identified in the LBS analysis, giving us a more nuanced insight into the key factors affecting the level of inclusion of the floating population. 27 interviews in total were conducted in Xifan Village and the Smart Moulding Town industrial zone in Xinqian Street subdistrict, the

recruitment market in Beicheng Street subdistrict, and Chaoji Village in Beiyang Town. The interviewees were primarily local permanent residents and members of the floating population of different ages and genders, and were classified by occupation (including those who work in moulding factories, those engaged in the service industry, and those who came to join their families without employment). The questions focused on their daily habits, what transportation they use to commute, if they were willing to settle in the region in the long-term, and if their children could access educational resources and facilities.

Two cases were selected at the URI of Huangyan-Taizhou for comparison – two 'Characteristic Towns'² with different provincial development orientations. These are Beiyang Town, focusing on agricultural development, and Xinqian Street – or more specifically, the Smart Moulding Town (SMT) – focusing on industrial development. The field investigation focused on two villages most impacted by these developments: Chaoji Village and Xifan Village, belonging to Beiyang Town and Xinqian Street, respectively.

→ 1
Origins of the floating population
in Huangyan District.
Source: Map produced by the
author based on LBS data



² 'Characteristic Towns' represent a policy and mode of development in China usually cultivated by the government with different functional orientations, such as leisure tourism, trade logistics, modern manufacturing, education, technology, and traditional culture with the aim of driving the development and construction of small towns across the country (Ministry of Housing and Urban-Rural Development of the People's Republic of China, 2016).

COMPARING PHYSICAL MOBILITIES AMONG LOCAL RESIDENTS AND FLOATING POPULATION

Regional mobility patterns: origins of the floating population

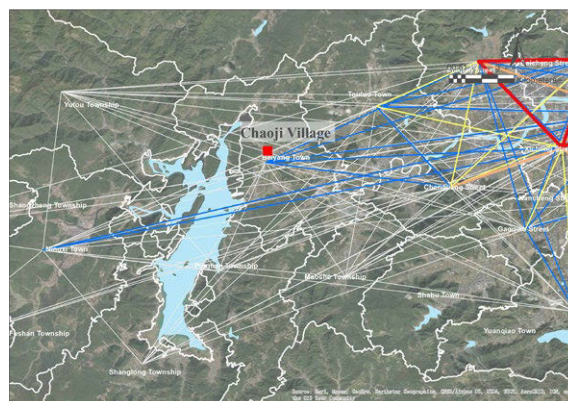
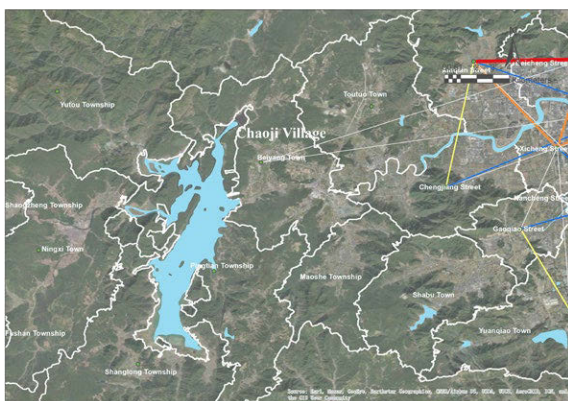
At a regional scale, the LBS analysis showed that most of the floating population in Huangyan District had migrated from central and western regions of China (Fig. 1), including cities such as Chongqing, Enshi, Tujia and Miao Autonomous Prefecture of Hubei Province, Fuyang City of Anhui Province, and Shangqiu City of Henan Province. These are comparatively less-developed regions which see a large outflowing population seeking employment opportunities elsewhere. This indicates that Huangyan-Taizhou was not an attractive destination within its own regional agglomeration – the Yangtze River Delta – but rather for less developed regions further afield.

Daily commute patterns between work and home

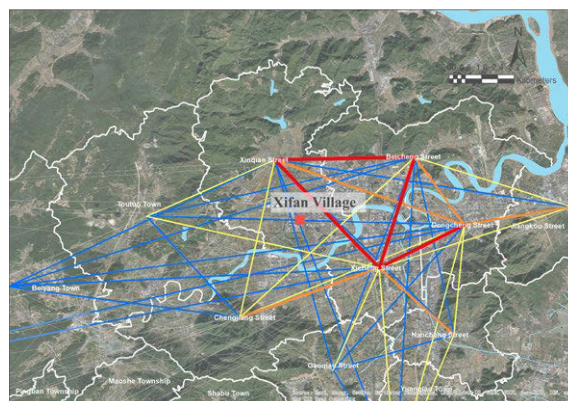
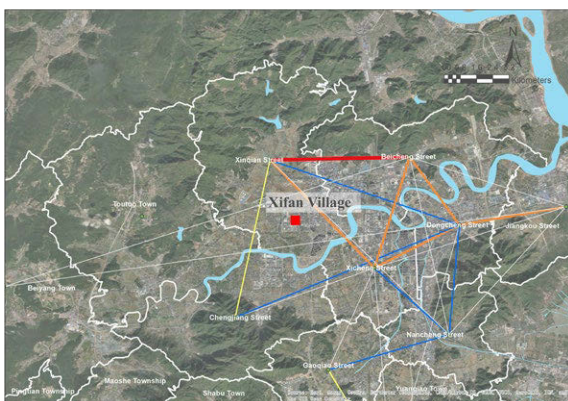
The LBS data analysis identified a floating population of 1,320 (enlarged sample in proportion³) in Beiyang Town, whilst the officially registered floating population numbers around 1,600 to 1,800 (Interview 1, personal communication. 2022, February) – this helps to verify the LBS data. Amongst them, 93% of the floating population worked and lived in Beiyang Town, whilst only 6% also have daily commutes with Beicheng Street and Jiangkou Street. On the other hand, local residents in Beiyang Town showed a more frequent and

varied commute connection with other subdistricts. The LBS analysis collected 6,061 samples of local residents, among which 69% were employed and worked in Beiyang Town, with nearly 30% working outside and presenting a regular commute pattern with destinations such as Xicheng Subdistrict, Xinqian Subdistrict, Beicheng Subdistrict and Toutuo Town (Fig. 2). This indicated a difference of physical mobility between the floating population and the local residents in that the local residents may enjoy much higher flexibility in their daily commute.

Fig. 3 presents the daily commute patterns of Xinqian Subdistrict, which revealed a similar trend. The LBS analysis identified a floating population of 6,756 (enlarged sample in proportion), of which 82% lived and worked in Xinqian Subdistrict, and 19% worked in other subdistricts. There were 18,060 local residents in Xinqian Subdistrict, of which 66% live and work in the area, whilst 44% worked elsewhere in the city. The analysis therefore indicates that, in the local region, long-term residents showed a much stronger connection to other areas in the city in terms of their daily commute patterns, when compared with the floating population. Whilst this directly reflects an increased physical mobility, it also suggests potential for a weaker social mobility – in terms of access to transportation or distribution of workplaces, for instance – which needed to be verified in the field investigation.



2 ↑ Daily commute patterns of the floating population (left) and local residents (right) in Beiyang Town. Source: Produced by the author using LBS data



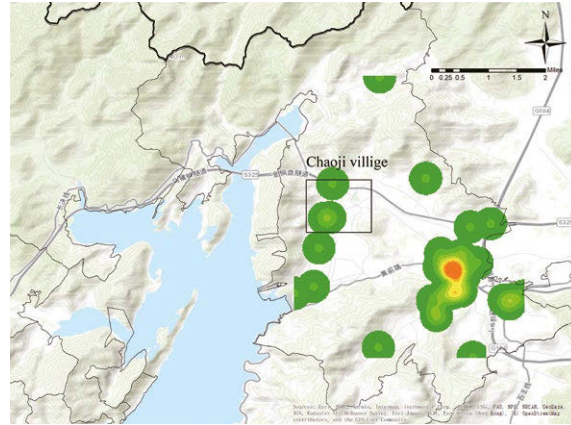
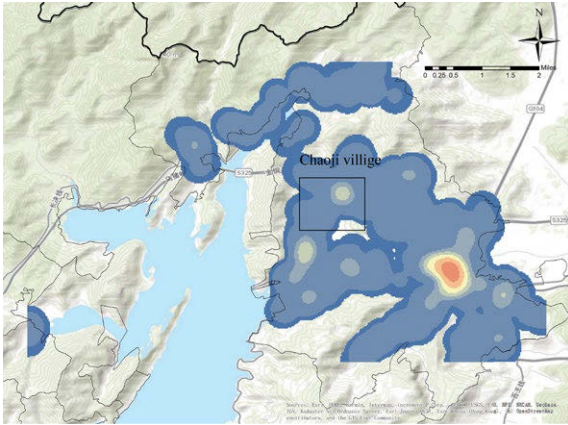
3 ↑ Daily commute patterns of the floating population (left) and the local residents (right) in Xinqian Subdistrict. Source: Produced by the author using LBS data

³ The LBS sample is enlarged in proportion to verify the accuracy of the obtained data – this is because LBS only picks up those of the population using mobile phones, whose signals were detected by the software.

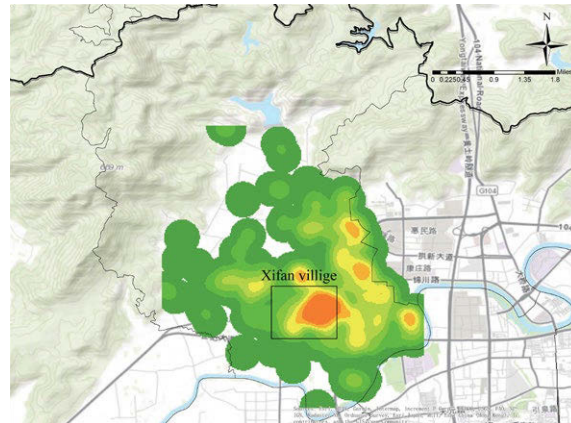
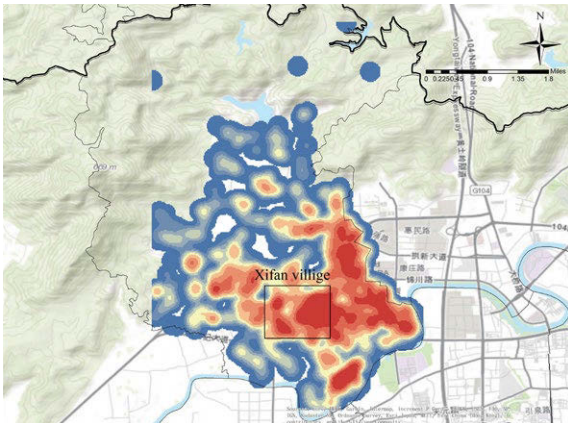
Daily activities beyond place of work

The LBS analysis of activity tracks beyond work commute trips revealed a high concentration of movement at the southeast of Beiyang Town, where an industrial park is located (Fig. 4). Local residents again seemed to have access to a significantly wider range of areas in which they live and carry out their daily activities around Beiyang Town – in comparison with the floating population, who appear to be clustered in work and living spaces in specific locations including farms located on the south of Chaoji and the centre of Beiyang. The mobility patterns also suggest that the floating popula-

tion tends to cluster together in their own small groups. In the LBS analysis of Xinqian Subdistrict (Fig. 5) – a relatively urbanised area – the intensity of daily activities was higher overall, among both local residents and the floating population, who had access to many more amenities and possibilities for leisure activities. However, similar to Beiyang Town, local residents nevertheless showed a higher intensity of physical mobility in a wider range of locations than the floating population, which may suggest a higher degree of social mobility in terms of leisure time and disposable income – also requiring further verification through the field investigation.



4 ↑
Activity tracks of the local resident population (left) and the floating population (right) in Beiyang Town. Source: Produced by the author using LBS data



5 ↑
Activity tracks of the local resident population (left) and the floating population (right) in Xinqian Subdistrict. Source: Produced by the author using LBS data

Legend

1, 890, 222549 - 46, 469, 83671	136, 229, 0651 - 181, 108, 6792	270, 867, 9076 - 5, 760, 898
46, 469, 83672 - 91, 349, 45087	181, 108, 6793 - 225, 988, 2934	5, 760, 898, 001 - 12, 440, 447
91, 349, 45088 - 136, 229, 065	225, 988, 2935 - 270, 867, 9075	12, 440, 447, 01 - 44, 680, 480

FIELD INVESTIGATION

The following section presents the results from our field investigation conducted in Chaoji Village (Fig. 6) and Xifan Village (Fig. 7), which helped us to interpret the reasons behind the differentiated physical mobility and immobility patterns identified in the LBS analysis.

Chaoji Village: an agriculture-led village

Chaoji Village is located to the east of Beiyang Town, in a rural region of the district surrounded by mountains, and has a current population of 1,126 (The People's Government of Zhejiang Province, n.d.). Located next to several large-scale farms in Beiyang Town, Chaoji Village has been largely affected by the development of modern agricultural approaches that have emerged in the area, but have only provided limited job opportunities for both local residents and the floating population. For example, Lvwochuan farm, one of the largest farms in Beiyang Town, is primarily engaged in the

soilless cultivation of ecological strawberries – as well as agricultural tourism – and only employs 30–40 people (Interview 7, personal communication. 2022, February). On the other hand, while some of the floating population in Chaoji have participated in agricultural projects and local services (such as food sales or work in grocery stores) (Interview 9, personal communication. 2022, February), a much higher proportion have found employment in the growing industrial zone to the south of Beiyang Town. Here, high-end moulding and plastic factories have provided more plentiful job opportunities. The average wage of the floating population in Chaoji Village ranges from 3000–5000 CNY (436.5–727.5 Euro) (Interview 4, personal communication. 2022, February; Interview 5, personal communication. 2022, February), whilst the average income of villagers in Beiyang Town is 6,467 CNY (924 Euro) (The People's Government of Zhejiang Province, n.d.).



6 ↑
Chaoji Village. Source: Photos taken by the author

Xifan Village: an industry-led village

Xifan Village has a registered population of 2,236, and a floating population of 4,300 (The People's Government of Zhejiang Province, n.d.). Transportation links in the area are well developed; Xifan Village is located adjacent to a provincial highway which provides strong connections to cross-provincial regions. Due to the ongoing upgrading of the local moulding industry in Xinqian Subdistrict, rural land collectively owned by Xifan villagers has been gradually transformed into urban land to make room for advanced moulding enterprises. This transformation has generated a high number of employment opportunities, and has thus attracted a considerable number of floating workers to the area – primarily employed as highly skilled workers or apprentices in moulding enterprises. According to our interviews, the moulding workers reported harsh conditions; it took at least 2–3 years for an apprentice to become a mature technician, whilst many workers' shifts extend to 12 hours. Wages can vary widely, from 4,000–20,000 CNY per month (582–2,910 Euro) (Interview 2, personal communication. 2022, February; Interview 3, personal communication. 2022, February), depending on skill level. The floating population also took service jobs, such as in fruit shops, as road sweepers, or as delivery drivers.

With relatively low rent in comparison with that of more urbanised areas of Huangyan, accommodation options within Xifan Village are popular among these migrant workers. According to our interviews (Interview 3, personal communication. 2022, February; Interview 6, personal communication. 2022, February), the rent is usually between 300 CNY (about 43 Euro) and 1200 CNY (about 143 Euro) per month, depending on the size, location and quality of the rental houses and rooms.

In both cases, the field investigation suggested that those within the floating population who had more advanced skills in the moulding industry often displayed a stronger sense of attachment to the host neighbourhoods. Generally, these workers were over the age of 35, and had more stable jobs with higher salaries and better access to pensions and insurance (Interview 8, personal communication. 2022, February; Interview 10, personal communication. 2022, February). Some skilled floating workers also act as superiors and have their own businesses. Moreover, they more often brought their families to live with them in Huangyan. The interviews also suggested that these higher skilled floating workers were more able to 'blend in' with the local residents, enjoying meals and leisure time after work together with no apparent sense of exclusion. On the other hand, the floating population engaged in temporary service jobs tended to be under the age of 35, with some clearly expressing that they do not feel they can – or have the desire to – adapt to the local environment, and instead plan to return to their hometown after saving enough money (Interview 6, personal communication. 2022, February).



7 ↑
Xifan Village.
Source: Photos taken by the author



Discussion and conclusion

Drawing on the LBS analysis and field research at the URI of Huangyan, inequalities in both physical and social mobility were observed between the floating population and local residents. In both Chaoji and Xifan Village, local residents had a much broader range in their daily commutes and activities, enjoying increased access to a wider variety of surrounding areas, amenities, and distances. Meanwhile, the physical movement of the floating population was concentrated in specific areas typically surrounding industrial zones, and was much more limited in variety and scope.

Our findings suggest that the floating population were less mobile than local residents primarily due to three aspects. Firstly, many of the floating population were only qualified for low-skilled work that was less stable with lower incomes. Thus, these workers were less able to spend money on leisure activities – such as visiting shopping malls or taking trips to other places in the region. Furthermore, having less disposable income also meant that they could not afford to purchase a car in order to travel further afield for job opportunities, instead often travelling by bus or on foot. Secondly, the floating population who were engaged

in manufacturing typically have harsh and unsociable work-rest schedules with long hours and night shifts, and thus had less time and ability to enjoy public spaces for leisure, or build up a local social network. Thirdly, for many of the floating workers, their primary aim was to send money back to their families or to save for a future family business in their hometown. Therefore, they were less able and willing to spend money in their spare time if it was not deemed essential (i.e., not work related).

To conclude, the floating population showed weak physical mobility in daily commute and activities beyond work trips, which appears to have partially resulted from their lower social mobility – including factors such as their daily working schedule, ability to access different forms of transport, income distribution within families, and their plans for their future development. These findings suggest that social mobility exerted a strong influence on physical mobility among the floating population. Our study thus highlights the importance of studying the interactions between physical mobility and social mobility together, in order to understand the interlocking drivers between different forms of inclusion and exclusion.

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Authors' Bios

Dr. Sigrun Abels

Principal investigator in URA and director of the China Centre (CCST), TU Berlin. Sigrun is also the managing director of the CDHK Berlin office (Tongji University Chinese-German University College, Shanghai) at the Faculty of Business & Management of TUB. As a Sinologist (RUB & Nanjing University), she studied China's media in the Chinese transformation process and worked as a radio journalist and lecturer at Deutsche Welle in Germany and abroad. Her teaching assignments and international conference papers cover the content of media development in China and Sino-German (higher) education cooperation.

Dr. Kit Braybrooke

Posthuman anthropologist and artist-designer whose work explores regenerative futures at the intersection of digital, material and ecological spaces. Kit is Senior Researcher with Urban-Rural Assembly at Habitat Unit, Technische Universität Berlin, and Director of Studio We & Us, a creative lab which brings artists and communities together across Europe, Canada and Asia to explore critical dynamics of the Anthropocene, and celebrate its more-than-human possibilities for systems change. Web: drkitkat.com

Xiangjing Chen

Undergraduate student at the College of Agriculture and Biotechnology of Zhejiang University and research assistant in URA Working Package. With a major in Landscape Architecture, he has worked on the Student Research Training Program of agroecosystem services and planning strategies research in Beiyang Town, where he is responsible for evaluating the ecosystem services of farmland and water systems.

Beatrice Chng

Program Manager at ICLEI East Asia Secretariat, responsible for low-emission, circular and integrated urban development. With more than 8 years of professional experience, she has worked at ICLEI World Secretariat and Ramboll Malaysia, supporting subnational governments and multinationals in their climate and sustainability efforts. Beatrice has an interdisciplinary background with a Masters in Environmental Science, Policy, and Management.

Dr. Li Fan

Senior researcher at Technische Universität Berlin. Dr. Fan has worked both as a practitioner and a researcher in China and in Germany. She served as a heritage consultant for conservation and regeneration projects funded by national and international institutions, including UNDP and ADB. She is a German Chancellor Fellow, a DAAD fellow and the board member of International Association of World Heritage Professionals. Her ongoing research interests are urban regeneration and urban heritage conservation in China and in Germany.

Alexander Maximilian Haase

Research assistant in URA and master student at the Technical University of Dresden. He completed his Bachelor degree in Geography and continues to study geoinformation technologies, specialising in remote sensing applications. In 2019 he did an internship at the UFZ – Helmholtz Centre for Environmental Research in Leipzig and started working as a student assistant in Dresden at the IÖR – Leibniz Institute of Ecological Urban and Regional Development in 2021. His work focuses on ecological research, primarily studying biodiversity and land use changes with satellite data.

Liyuan Fei

Postgraduate student at the Architecture Department of Shanghai University. She is currently engaged in the Working Package 6 team focusing on migration and mobility, within which she has participated in several practical projects since 2021 with a focus on industrial sustainability at the urban-rural interface of Taizhou. Her primary research interests are oriented around new data assisted analysis of urban-rural interactions. Prior to this, she received her Bachelor's degree from the Department of Urban and Rural Planning at Shanghai University.

Till Fügener

Researcher at the Leibniz Institute of Ecological Urban and Regional Development (IOER) in Dresden. In 2021 he finished his studies in Geography at TU-Dresden with a Masters degree (M.Sc.). He has worked within the URA project since early 2020 as a student assistant. After finishing his studies, Till became a member at the IOER as a Scientific Assistant. His research interests include remote sensing, ecosystem services, and landscape planning.

Dr. Maria Frölich-Kulik

Senior Researcher in URA, as part of the Bauhaus-University Weimar research team. Maria is an architect and studied at the Bauhaus-Universität Weimar, the Escuela Técnica Superior de Arquitectura de Madrid and the Tongji-University Shanghai. She completed her Ph.D. dissertation at the chair of landscape architecture and planning at Bauhaus-University Weimar in 2020. Her research focuses on the interweaving of urban and rural lifestyles as well as on the social and geographical relationships between buildings and landscapes.

Yuxin Gong

Advanced undergraduate student currently studying landscape architecture at Zhejiang University, following tutor Yuting Xie for scientific research training. Yuxin is a member of the Huangyan Workshop of the URA project, and has taken part in a field research group focused on the social inclusivity of modern agriculture. She has produced a short essay based on research results from the Huangyan Workshop, and is particularly interested in human-centered design and human-space interactions in urbanisation.

Prof. Anke Hagemann

Interim lead Principal Investigator of URA and co-chair of Habitat Unit at Technische Universität Berlin. Anke graduated in Architecture and was a research associate in the exhibition project Shrinking Cities, Berlin. She taught at the ETH Zurich and HafenCity University Hamburg before joining Habitat Unit in 2013 as a lecturer and researcher. In 2020-21 she was interim professor for Urban Planning at BTU Cottbus-Senftenberg. Her research topics include global commodity circulation and urban spaces, holiday architectures, urban mega-events and the spatial regulation of access and mobility.

Dr. Huang Huang

Assistant Professor of Urban Planning Department, College of Architecture and Urban Planning (CAUP), Tongji University. She received her PhD from Technische Universität Berlin (TUB), in the Planning Building Environment (Planen Bauen Umwelt) department. Her research focuses are oriented around urban sociology and critical urban theory. Huang has been engaged in work focusing on social-spatial practices within urban planning for 18 years. Currently she specifically focuses on practices related to urban and rural community renewal, sustainable development of urban-rural interface regions, urban-rural integration and sustainability.

Peiwen Huang

Research assistant at URA Working Package 4 and undergraduate student at Zhejiang University, majoring in Landscape Architecture. She has worked within the Student Research Training Program (SRTP) of agroecosystem services and planning strategies research in Beiyang Town under the guidance of tutor Yuting Xie, where she is primarily responsible for exploring sustainable development models for modern agriculture.

Prof. Dr. Fengqing Li

Associate Professor of the Architecture Department at Shanghai University. Fengqing obtained his Bachelor, M.E. and PhD degrees in urbanism and planning at Tongji University. He is primarily engaged in research on urban-rural mobility and social-spatial processes. Fengqing also hosts a series of national and municipal research funding such as the National Natural Science Foundation of China (NSFC) and the Shanghai Pujiang talent program.

Hongqing Li

PhD candidate of the Chair of Circular Economy and Recycling Technologies (CERT) at Technische Universität Berlin. Her research interests are resource metabolisms and material recycling in rural areas, mainly focusing on the region of Huangyan-Taizhou. She intends to develop a hybrid biomass potentials assessment approach and explore the coupling nexus among resources flows and metabolisms, develop a more precise circular economy model that achieves multi-objective trade-offs and synergies in rural China.

Ava Lynam

Researcher at the China Center (CCST) and PhD candidate at Habitat Unit, TU Berlin. Ava coordinates the URA team focusing on migration, mobility and social inclusion at Chinese urban-rural interfaces. Her research focuses on urban sociology, socio-spatial inequality, and land dynamics within rural-urban transformation. She also has a particular interest in the influence of Chinese infrastructural and industrial projects in rural Southeast Asia. Ava is also a freelance editor and writer and currently 'researcher in residence' at urban design and architecture practice Metropolitan Workshop. She previously worked between London and Dublin as an urban designer on urban strategy, housing, and community engagement projects.

Prof. Dr. Jian Liu

Advisory Board member of the URA project, registered City Planner in China, Associate Dean and tenured full professor of Urban Planning & Design at Tsinghua University School of Architecture. Jian Liu is the Managing Chief-Editor of China City Planning Review, and editorial board member of Urban Planning International, Urban Design and L'architettura delle città - The Journal of the Scientific Society Ludovico Quaroni. She was the Executive Member, Vice President, President of Asian Planning Schools Association, Council Member and Vice President of World Society for Ekistics.

Junseong Park

Young Professional supported by the Korea International Cooperation Agency in ICLEI East Asia Secretariat. He has worked at AIESEC where he focused on creating sustainable cities by revitalising traditional markets. He has also researched inequalities between urban and rural areas in Hong Kong.

Prof. Dr. Vera Susanne Rotter

Professor at the Technische Universität Berlin and head of the Chair 'Circular Economy and Recycling Technologies'. Her main research areas are innovative separation technologies, product-oriented recycling strategies, and integration of secondary raw materials in value chains. With her team she works in national and international project consortia addressing technologies and information management to support the recovery of raw materials. Further projects address the sustainable management of residual biomass.

Liyao Wang

PhD. Candidate of Urban Planning Department, College of Architecture and Urban Planning (CAUP), Tongji University. She graduated from Harbin Institute of Technology and received her master degree in University College London. Her research focuses on the influencing factors of Chinese urbanisation and their interactions, as well as employment distribution and its spatial impact at the county level in the Chinese context. She has participated in several practical projects in Taizhou since 2018, concentrating on rural vitalisation and the protection and regeneration of historical villages.

Prof. Dr. Wolfgang Wende

Landscape planner who studied at the Technical University Berlin (TUB), where he was later visiting professor between 2006–2008. Wolfgang's research strongly focused on German and international Mitigation Regulation Systems (IMR), biodiversity offsets and habitat banking. Between 2008–2009 he changed his position to the Federal Environment Agency Germany. Since 2010 he is professor for urban development at the Technical University of Dresden and head of a Research Area at the Leibniz Institute of Ecological Urban and Regional Development. He also has broad European and international experience, for instance as visiting professor at the National University of Singapore for landscape policies.

Gaoli Xiao

Research assistant at the China Centre (CCST), TU Berlin. Gaoli holds a double M.Sc. degree in Urban Development and Urban Planning. She is interested in themes such as migration, land politics, and socio-spatial inequalities. Her current research explores the drivers of labour migration to small towns and rural areas in the Yangtze River Delta.

Dr. Yuting Xie

Principal investigator in URA and a lecturer at the Institute of Landscape Architecture, Zhejiang University since 2018. Xie received her doctoral degree in landscape architecture from the Technical University of Munich in 2017. She is currently the director of China Urban Landscape Lab at TU Munich, managing landscape changes and developing historical landscape structures as a qualitative framework for China's rapidly transforming urban environment. In 2019, she co-founded a collaborative research platform, Jiangnan Lab, using regional design as a tool for bringing cross-sector spatial planning, landscape architecture and urban design, and multi-level governance together in the Yangtze River Delta megacity region in China.

Dr. Suili Xiao

Researcher at the Leibniz Institut für ökologische Raumentwicklung, Dresden. Suili was recipient of a German Chancellor fellowship from the Alexander von Humboldt Foundation. She holds a PhD in urban forestry from the Beijing Forestry University. In addition to her postdoctoral research on ecosystem services and biodiversity, she has also undertaken a range of environmental consultancy work for ecological protection and regional sustainable development in both Chinese and German cities.

Ji Xu

Program coordinator at ICLEI East Asia Secretariat. He has a strong focus on GEF funded project management and interests in circular economy, urban sustainable development, and low emissions. He has work experience with United Nations Agencies (including UNOPS, UNESCO and UNDP) and the Ministry of Ecology and Environment, China.

Dr. Bing Xue

Research scientist at the Chair of Circular Economy and Recycling Technologies (CERT) at Technische Universität Berlin. His main research areas include circular economy, industrial ecology, and regional sustainability, focusing on interaction analysis of human-environmental systems. In 2009, he received his Ph.D. degree in Human Geography from the Lanzhou University of China.

Prof. Dr. Guiqing Yang

Principal Investigator in URA project and vice director of Academic committee in College of Architecture and Urban Planning in Tongji University, as well as the vice-chairman of the Academic Committee of Mountainous Urban and Rural Planning in UPSC. His current research concentrates on Chinese rural vitalisation, with an interdisciplinary perspective of sociology and urban planning. He established the "Tongji-Huangyan Rural Vitalisation College" in 2018 after 8 years of planning practice in Huangyan District, Taizhou, and worked as the executive president. He received his BUP and MUP in Tongji University, MDes in GSD at Harvard University, and PhD in Tongji University

Zheng Yang

PhD candidate at the Chair of Circular Economy and Recycling Technologies (CERT) at Technische Universität Berlin. His research interests mainly lie in the integrated utilisation of agricultural residues with research methods including mathematical models and material flow analysis.

Keyi Zhang

Master student currently enrolled in Information Experience Design program at Pratt Institute. Previously, she gained her Bachelor's degree in Landscape Architecture at Zhejiang University. She participated in the Urban-Rural Living Lab #1 "Beiyang Township Area" of collaborative research in October 2021. Her Bachelor thesis, entitled "The Comparison of Traditional and Modern Agriculture on Agroecosystem Service Value: A Case Study in Beiyang Town, Taizhou," focused on agroecosystems in Beiyang Town.

Yulin Zhang

Researcher in URA and Ph.D. candidate at Chair of Landscape Architecture and Planning at Bauhaus-University Weimar. Her research interests focus on landscapes as expressions of conflicts and interrelations between traditional culture, religious practice, and modern values under the rapid transformation of rural China.

Prof. Min Zhao

Advisory Board member of the URA project. Former Chair of the Department of Urban Planning at Tongji University, and one of the most influential professors in China's planning and urbanism fields, having published numerous prestigious monographs.

Yanzi Zhou

Master student at the Chair of Circular Economy and Recycling Technologies (CERT) at Technische Universität Berlin. Her research interests are mainly focused on carbon neutrality, soil-based carbon sequestration, and sustainable management of biomass residues.

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