1. Project Summary

'Urban-Rural Assembly (URA)' follows the hypothesis that strategic integrated, participative, place-based and environmentally sensitive urban-rural development represents a key lever to build resilient and sustainable urban futures. URA focuses on the case study region of Huangyan-Taizhou, Zhejiang province, located at the margin of China's highly dynamic eastern urbanisation corridor as a prototypical urban-rural learning context, where diverse and seemingly contradictory transformation processes take place redefining urban-hinterland relations. Huangyan-Taizhou demonstrates both - the interrelated social, economic and environmental risks and policy gaps that emerge, as well as multiple local innovations and experiments with potentials to inform new pathways toward sustainability. URA builds up a mutually beneficial learning partnership linking an interdisciplinary Sino-German research team of urban planners, landscape architects, environmental engineers, sociologists and economists to: (1) Address **critical knowledge gaps related to the complex transformation processes that shape the urban-rural interface** by studying how current urbanisation dynamics and land use changes impact on intricate water-settlement-patterns, cultural heritage, ecosystem services, food and energy flows and generate new socio-spatial coping practices; (2) Develop **strategic participatory transformation scenarios for three exemplary Urban-Rural Living Labs (URLL)** which will serve as transdisciplinary testing grounds for strengthening ecological-oriented urban-rural integration; (3) Develop **strategic tools and guiding principles** for integrated urban-rural planning and governance that can be adopted by other regions and address the necessity of transfer and 'scaling'; (4) Develop a **networking and dissemination strategy** to contribute to a global debate on how to strengthen urban-rural *interrelations* and *linkages* to achieve more effective transitioning-to-sustainability.

2. Problem Statement, Current Research & Development Gaps

Constituting only 18 % in 1978, China's urban population has rapidly grown up to over 60% by the end of 2019 (NBSC 2020), mainly due to rural-to-urban migration. Judging by an average annual growth rate (2011-2018) of urbanization at 1.19 %, one can foresee further expansion of urban population (ibid.). This unique state-led urbanization program was accompanied by a transition toward market-oriented economies based on growth models (Ren 2013), which has profoundly affected lifestyles, work patterns, incomes, family structures and personal aspirations of the Chinese society (NBSC 2019). While, initially, research and policies focussed primarily on rapidly growing (mega)cities and urbanisation corridors, more recently, the formerly rural hinterlands have come into focus, including demographic shrinking and ageing as a result of rural-to-urban migration, the difficulties to quality public service provision, the threat to cultural heritage and identity preservation, losses of farmland, and widespread poverty or environmental challenges. Indeed, uneven development (linked to socio-spatial polarisation and divergence in development) across China has increasingly been recognised as a major obstacle on the way toward a more socially, economically and environmentally sustainable and equitable transformation model. Here, Chinese policies have included the new-type urbanization agenda (2014-2020) (State Council 3/16/2014) promoting new real-estate development aiming to attract rural peasants to give up and leave their villages (Ren 2013; Webber 2012; Yeh et al. 2013). More recent initiatives, including e.g. the rural revitalization agenda (2018-2022) (State Council 9/26/2018) supporting the development of a 'beautiful and harmonious countryside' already begin to address the importance of stabilizing formerly rural regions. Mainly driven by an increasing domestic tourism sector targeting the rising Chinese middle class (Lu and Fan, 2010), enormous investments

have been made throughout the last couple of years in order to develop new infrastructure providing quick access for urban dwellers to nearby recreation areas. This also applies to the URA case study region Huangyan-Taizhou, comprising the urban district of Huangyan, Jiaojiang and Luquiao, part of the prefecture-level city of Taizhou in Zhejiang province. Throughout the last years, several small- and medium-sized rural revitalization projects (led by URA PI Prof. Dr. Yang Guiqing, Tongji) have been implemented aiming to enhance a more balanced and equitable development between urban and rural spaces, promote the "countryside" and strengthen regional urban-to-rural tourism.

However, so far, policy responses to address specific societal, economic and environmental transformation challenges at cities or rural areas were limited in impact. So far, the sporadic, 'top-down' experimental programs could have not stopped the rapid socio-spatial, economic and environmental decline of traditional rural villages across China (Ren 2013; Xu et al. 2010). Rehabilitation initiatives in villages are often "decorative", failing to be embedded in inclusive economic models that benefit the local population, or not taking the systemic environmental challenges into account. Ad hoc, non-sustainable measures contribute little to foster long-term resilience and fall short of offering clear, locally adaptive tool sets or policy directions to achieve sustainability. Parallel, fast track economic and urban growth continues to pose major threats to biodiversity, ecosystem services and environmental systems across China, caused unprecedented levels of land-use changes linked to urban expansion or air pollution, considerably disturbed the water system, and left formerly important cultural landscapes in crisis (William S. Saunders 2012; Wu & Zhou 2011;Liu 2018; Day and Schneider 2018; Scott et al. 2018), which can be identified in URA's case study region as well. Here, Initial studies and assessments of ecosystem services on regional level, carried out during Definition Phase by IOER Leibniz Institute and Tongji University (CEWPR) on the basis of LTM Landsat images and qualitative research methods, have stated intensive land use change throughout the last 10 years especially causing serious environmental impacts including e.g. soil erosion, water pollution, flood risks and the loss of green spaces and loss of biodiversity, along the water courses of Huangyan-Taizhou. Parallel, numerous other global urban-rural regions such as in Germany struggle with similar structural transformation challenges and, globally, scholars and policy makers have increasingly argued that adequate solutions for sustainability can only emerge through a change of perspective: Rather, than focussing on "urban" and "rural" challenges separately, both should be considered as interlinked and deeply dependent on each other (Tacoli 2006; Liu, 2018). Here, an urban-regional perspective on expanded urbanization (Soja 2011) could help to acknowledge the above mentioned gaps and the ecological environment across wider city-hinterland regions should, therefore, be understood as an extended metabolism or eco-system (Liu et al. 2013). Developing systemic solutions for utilizing and strengthening regional city-hinterland interrelations requires new approaches to research, policy and planning governance and it is to this emerging field "Urban Rural Assembly (URA)" aims to contribute. Here, several specific theoretical and practice-oriented concepts and approaches have gained currency in academic and policy discourses during the last few years, and were adopted as sensitizing concepts for the research and solution development agenda of URA:

(1) In debates on urban-rural governance the concept of "**Urban Rural Interface**" (Ros-Tonen et al. 2015) proposes a threefold perspective: a.) a geographic, and *place*-oriented perspective needed to frame specific contextual challenges; b.) the need to understand urban-rural constellation as "*spaces* produced by the activities and perceptions of the people who live, work, govern, commute and/ or recreate in these spaces" and, c) the need to address the horizontal/ territorial dimensions of *scale* to

understand linkages and develop governance approaches across institutional and jurisdictional scales. By taking into account “urban” and “rural” as an interlinked economic, environmental and socio-spatial continuum between urban core centres and rural village areas, the notion of “Urban-Rural Interface” goes beyond the concept of the “peri-urban” which tend to only address at transitional zones as immediate frontiers of urban expansion (Ros-Tonen et al. 2015). However, research and holistic conceptualization of transformative features and challenges including material and immaterial flows, ecosystem practices or socio-spatial perceptions at the *Urban-Rural Interface* are still relatively new to the Chinese research arena.

(2) In the search for adequate localization pathways to implement SDGs and New Urban Agenda, global platforms such as Un-Habitat have stressed the importance of **urban-rural linkages** (UN-Habitat 2017) to inform new governance approaches across urban and rural divides. This includes a need for seamless **territorial planning** that could provide integrated frameworks for multiple sectoral themes ranging from e.g. economic development, mobility, food systems, to disaster risk reduction. Currently, UN Habitat has strengthened this approach through publishing the “Urban-Rural Linkages Guiding Principles (URL-GP) and Framework for Action” (UN-Habitat 2020) that aim to inform pragmatic strategies and propose an action framework to build a global enabling environment for more inclusive and functional urban-rural linkages. Parallel, several global scholars have formulated the call for needed synergies between urban and rural policies to enhance resource sustainability, human wellbeing and climate change resilience at the the city level and that consequently need to stretch governance approaches across scales and beyond urban boundaries (Seitzinger et al. 2012). China’s recent policy reform initiatives including the Chinese National Territorial Spatial Planning (NTSP) (State Council 5/23/2019) and the National Urban and Rural Integration Development (NURID) (State Council 5/5/2019) agenda acknowledge theses global discussions and will be a key context for URA to position its implementation-oriented proposals.

(3) Planning discourses addressing specific urban-rural transformation challenges in Europe, in particular **Integrated Raumbild development** (Langner 2016; BBSR 2017; Obkircher 2017;), which combines spatial planning and actor-oriented participatory approaches provide an additional learning context. Based on re-reading and revealing key transformation drivers that influence the so-called ‘*Raumgeschehen*’ (Seggern 2010) including their socio-spatial impacts across the urban-rural continuum (Sieverts 2008), the approach seeks to define new strategies and tools supporting transformation processes toward co-produced visions (Leitbilder and transformation scenarios for urban-rural sub-regions) involving local communities, governance bodies and external experts. Raumbild processes generate possibilities to actively involve change agents, also referred to in the German context as ‘*Raumunternehmer*’ (Buttenberg et al, 2014) or ‘*Raumpioniere*’ (Oswalt et al 2013) which are already active in the Chinese Huangyan-Taizhou context too: Here, a wide range of mostly young urbanites and entrepreneurs explore and acknowledge former rural hinterland areas and thus its very material and immaterial cultural leftovers as extended spaces of possibilities. Based on the increasing shift toward ecologically produced food, alternative small-scale organic farming projects have emerged in the Huangyan-Taizhou region (e.g. Beiyang Township) introducing small-scale innovations that show the potential of circular, community-driven urban-rural economies to act as catalysts in transformation-to-sustainability processes. Deriving from here, URA follows the hypothesis that similar strategic, implementation- oriented approaches could be an important complement to the legislative and regulatory frameworks defined by the above-mentioned policies in China. At the same,

through its context-specific further development and application in the Chinese context, such tools could be decisively improved in the framework of international comparable case studies setting up a new global horizontal knowledge exchange.

(4) Sociotechnical innovations and nature-based solutions: A third applied research and practice area gaining significance globally is the search for **ecosystem-based innovations** to analyse and manage sustainable urban-rural flows and extended metabolisms**.** During rapid urbanization processes and land-use changes, historically evolved ecosystems related to water-settlement patterns, waste management, resource flows, biodiversity, local food cycles or local climate adaptive building heritage are traditionally structured. The intricate urban-rural metabolisms are at risk. Hinterland areas have often been transformed not only into sites of extraction for fast growing urban centres but are also receiving wastes, effluents and pollutants from urban areas. The fragility of ecosystems has become a major risk for the resilience of urban-rural regions. The August 2019 hurricane “Lekima” affected the coastal urbanization corridor of Eastern China dramatically including our research area Taizhou bay. The damage through flooding was exacerbated due to dysfunctional ecosystem services. The EU has started to acknowledge the protection and re-stabilization of ecosystemic inter-linkages within urban-rural regions as a key lever within transformation to sustainability processes. Policy initiatives such as the “**Ecosystem-based adaptation**“ (EBA) promote the use of biodiversity and ecosystem services as part of an overall adaptation strategy against the adverse effects of climate change. Other policies include the protection and strengthening of “**Green Infrastructures**” (GI) to guarantee sustainable ecosystem services, or **Ecosystem-based Disaster Risk Reduction** (ecoDRR) in the context of climate change adaptation to contribute to the conservation, enhancement and restoration of biodiversity, ecosystems and ecosystems services while often providing significant co-benefits in terms of climate change mitigation or human health, safety and well-being. In this context, also **Nature-based Solutions** (NBS) offer a useful conceptual framework addressing multidimensional and multi-scalar contemporary challenges faced by both urban and rural areas, linking the concepts of climate change resilience, biodiversity preservation, and social equity. In China, the interest in above-mentioned concepts is growing steadily with increasing awareness of environmental risks such as pollution and climate change induced extreme weather. Recent reforms, e.g., the *Integrated Reform Plan for Promoting Ecological Progress* issued by the State Council (2015.09) has acknowledged the need for integrated environmental governance across rural and urban areas. The Definition Phase confirmed that ecosystem services are both risks and opportunities, in the Huangyan-Taizhou region. Transect studies along the main water courses related to the Yongning river, conducted by consortium partner IÖR, BUW, Tongji and Zhejiang University, reveals how erosion and pollution (groundwater, surface water, wastewater) present major threats to both, biodiversity and livelihoods in villages and urban centres. URA follows the hypothesis that the above-mentioned strategic, implementation-oriented approaches could be an important complement to the legislative and regulatory frameworks defined by the already implemented planning reforms in China. The **integration of circular and ecosystemic thinking with land-use planning, economic plans and future-oriented strategic scenario building** remain a critical policy gap and key lever to build more resilient urban-rural regions. URA will address further **gaps related to methodological questions linked to the analysis and monitoring of complex urban-rural metabolisms** through employing the GIS based integrated data modelling in the case of Huangyan-Taizhou. Expected benefits are multiple and interlinked, ranging from disaster risk reduction, heritage protection, the development of new sustainable circular economies in local

ecotourism to concrete improvement of living quality through access to green spaces. Particularly, for the impoverished villagers, the material benefits (beyond jobs and livelihoods) can unfold as the opportunities of re-utilizing the ecosystem service provision like natural treatment of wastewaters or recycled nutrients in the economic manner. New context-specific prototypical solutions in the nexus of economic and material/ecological flows will be developed for potential scaling. Here, circular economies could play a key role in building effective pathways toward SDG implementation as they build synergies and co-benefits between ecological gains (e.g. sustainable production patterns) as well as socio-economic benefits (e.g. sustainable economic growth, cultural heritage preservation, etc). Based on the preliminary findings of the definition phase, URA will co-chair a session (with UFZ Helmholtz Centre for Environmental Research) at the "Sustainable & Resilient Urban-Rural Partnerships" conference in Leipzig (Nov.2020) as part of BMBF program Stadt-Land-Plus, aiming to address above mentioned issues impacting in Huangyan-Taizhou region.

3. Preliminary Activities and Research Findings of Definition Phase (DP)

Key activities

• Kick-off workshop and conference participated by all consortium partners and local government representatives (Jun. 2019), followed by extensive field trip (Oct.-Nov.2019); monthly virtual Sino-German consortium meetings; 5 workshops at TUB with German consortium partners.

• WP specific quantitative data gathered based on an existing data demand existing scheme ; conceptualizing of an integrated GIS-based data platform; qualitative data gathered from 2 extensive field investigations (June, Oct. 2019); due to Covid-19 outbreak and travel bans, digital communication formats are used since Feb 2020.

• **Establishing solid cooperation framework with local governments (Huangyan and Taizhou) through signing LoIs** (see attached); discussing on-going/planned policy and investment priorities by local government and business actors plans (e.g. Taizhou SeeHer Farm Ltd. in Beyang; Green City Ltd. in Jian Wetland Park) to align forthcoming activities and shared goals.

• **Establishing close links to key actors in Chinese planning reform** related to Chinese National Territorial Spatial Planning (NTSP) (State Council 5/23/2019) and the National Urban and Rural Integration Development (NURID) (State Council 5/5/2019) as key policy reform horizon for URA.

• **Develop concept for "Integrative Urban-rural Demonstration Belt"** submitted to Huangyan District Government (embedding URLLs in sub-regional urban-rural development strategy)

• **Establishment of the Local Project Office "Sino-German Rural development Institute"** in Huangyan District (Shatan Village), supported by the Huangyan District Government and based on previous cooperation track between TUB and Tongji CAUP. It will serve as a workshop and conference location during the R&D phase and will be upgraded to a mutual "learning and exchange centre" bringing together local stakeholders incl. community, consortium partners and international experts.

• **Final consolidation of Sino-German Consortium (MoUs)** based on "tandem"-partnerships; new: Zhejiang University linked to TUB/ Circular Economy (CERT) and Bauhaus Universität Weimar.

• **Signing of additional cooperation partners (LoIs)** - see list of cooperation partners.

• **Implementing "risk mitigation strategies"** regarding, 1) difficulties with data access (key role of Chinese partners, request for supporting letter for BMBF); 2) COVID-19 related travel restrictions (online-meetings, exchange of letters between TUB-Tongji Vice Presidents to ensure local LoIs with municipal authorities, and 3) general trust building.

Preliminary research outcomes

(1) Building an interdisciplinary understanding of urban-rural interface dynamics

URA's integrated, contextual analysis has produced a better systematic understanding of the multi-dimensional dynamics, interrelated challenges/ risks and potentials that shape the urban-rural interface in Huangyan-Taizhou. In particular, outcomes include:

(a) Prel. findings from ecosystem/ landscape transformation perspective (WP4/5)

• Field work along exemplary transect following Yongning river in Huangyan, linking compact urban structures in Huangyan-Taizhou to the scarcely populated rural hilly region around Shatan village identified frictions (causes and resulting risks) related to hydrological systems (erosion/ flooding/ contamination) and biodiversity and loss of cultural heritage (water ponds, vernacular architecture, traditional landscape-settlement patterns, etc.); use of initial GIS data via open source access, e.g. on land use and land cover (LULC), DEM, soil, NDVI (etc.) as well as observations in the field.

• Multi-scalar initial assessments of ecosystem services (focus on biodiversity, water supply/ flood regulation, erosion control, and cultural ecosystem services with regard to eco-tourism potential); Mapping land-use over the last 15 years intensifying flood risks and soil loss.

• Analysis of longitude satellite and GIS data from the last 20 years combined with observations in the field to identify characteristic spatial-territorial typologies of urban-rural water-settlement-structures, and their distinct transformation dynamics/ qualities (challenges, potentials) on meso and micro level.

• Identification of multi-variant water-settlement entities as representative, culturally specific and multifunctional "types" (riverine, wetland, ditches, ponds) and their transformation potentials.

(b) Preliminary findings related to nutrients and wastes flows (WP3)

• WP3 developed qualitative material flow analysis (MFA) for food and energy flows - a data sourcing strategy for quantitative MFA studies based on iterative data acquisition, a map of involved stakeholders in food and energy flows, including innovations for sustainable agriculture pathways.

• Preliminary evaluation includes a general description of key material flows in Huangyan-Taizhou (plastic and metal flows; food and nutrient flows for conventional farming activities such as orange and wild rice shoots, and innovative organic-based horticulture production).

• Identification of untapped waste flows with potential for the implementation of circular intersectoral utilization concepts benefiting farmers and local population as well as improving environmental quality by circular solutions and emission reduction.

• Micro-level analysis of industrial, agricultural production revealed environmentally harmful management practices (e.g. burning of agricultural residues, causing air pollution; improper waste treatment causing diffusive methane emissions), furthermore, circular utilization concepts for agricultural residues offers considerable potentials to lower emissions, reduce the application of chemicals, and promote transition toward green and organic agriculture.

(c) Preliminary findings related to trans-local actor practices/ innovations and migration/ mobility flows and broader social impacts (WP2, 6)

• Analysis of the demographic and migration structure of the Huangyan-Taizhou region drawn on the national and regional census and open-source statistical yearbooks.

• The current dualistic institutional structures (e.g. the urban-rural Hukou, land-use, industrial-agricultural remittances) and normic social structures (e.g. gender, kinship, class) provide distinct opportunities and exclusion risks and mobility options for specific social communities.

• Qualitative research methods were applied in analyzing the social-spatial constitution of the Xinqian-

neighbourhood, where the urban-rural social groups (e.g. small-scale farmers, migrant informal settlers, trans-local industrialists, middle-class commuters, retired elderly) live and work in close proximity. Their access to housing, market, education and other services and resources has been shaped by their distinct positionalities leading to distinct social-spatial everyday life practices, i.e. commuting, livelihood opportunities, consumption and recreation strategies.

• Initial evaluation of the social and physical (im-)mobilities across the social-geographical spectrum has led to the identification of vulnerable communities and their immediate life-worlds (i.e. senior villagers left-behind in remote villages, migrant single-male workers in informal productive sectors).

(2) Refinement case study design through definition of Urban-Rural Living Labs, URLL

The selection of URLLs for further micro-level research took place according to the following criteria: (1) ***the representativeness*** of typical interrelated problems for constellations at the urban-rural interface, that can only be addressed through integrated, cross-disciplinary and participatory transformation strategies; (2) ***the complementarity*** of challenges, key actor-constellations and innovation potentials across the URLLs; (3) ***the commitment and engagement*** of local actors in a given case ; (4) ***the alignment between URA's question identification and local government's action-priority plan***; (4) ***data availability***; (5) ***the investment potential*** (public and private).

URLL #1	**Beiyang Township Area**		
R&D Focus	Urban-Rural integration through enhancing sustainable nutrient and waste cycles to support ecological food production and inclusive eco-tourism		
Short description (for more detailed description see URA website)	**Urban-rural transformation challenges:** • High urbanization pressure in terms of land-use change • Industrialized agriculture negatively impacts on ecosystem services (water, soil contamination, waste disposal). • Exclusion risks (local villagers). **Potentials:** • High political priority (selected as "Characteristic town" to promote natural beauty, cultural heritage elements, promote ecological agriculture and eco-tourism) • Innovation potential: entrepreneurs interested in upgrading the current agricultural approach to ecological one. • Interest in German technology to improve efficiency of agricultural production; willingness to invest private funds. • On-going research on crop production with Zhejiang University	**Key actors**	**Governmental:** • Taizhou Municipal Government • Huangyan District Government (Agricultural Bureau) • Beiyang Township Government **Non-governmental:** • SeeHer Farm: Taizhou Xihe Ecological Agriculture Discovery Co., Lvwochuan farm, Zhonde farm, etc. • Agricultural Technology Service Base • TZAAS Linhai
R&D Goals:	Participative integrated local transformation scenario to include: • An assessment of the performance of urban-rural flows in agriculture and food systems, sustainability dimensions, resource competition and environmental degradation • The identification of untapped food and waste flows with potential for the implementation of circular intersectoral utilization concepts benefiting farmers (business models) and local population as well as improving environmental quality by circular solutions and emission reduction (e.g. increase water- and nutrient-use efficiency; turning of waste into usable products like fertilizer, irrigation water, and/or fuel; efficient and vibrant circular food economies) • Concepts for eco-tourism, broad education, and specialist trainee opportunities • Concepts for social and economic co-benefits for neighbouring local villages		

URLL #2	**Xinqian Urban Neighbourhood (Smart Moulding Town area)**
R&D Focus	Urban-Rural integration through strengthening green and blue infrastructures and ecosystem services within urban-rural transition zones (nature-based solutions)

Short description (for more detailed description see URA website)	**Urban-rural transformation challenges:** • Pressure on local ecosystem services triggered by moulding industry (water/ soil contamination and air pollution) • Lack of waste disposal infrastructure • Land-use changes lead to shrinking water absorption capacity and increase flooding risk • Lack of green space infrastructure and recreational spaces • Risk of socio-economic exclusion of villagers (espec. elderly) and migrant workers as smaller informal village-based businesses will be phased-out **Potentials:** • Relatively good access to information on policies and planning frameworks (discourse analysis) - High foreseen investment (mainly private driven); corporate responsibility of global companies; work with URA - Historic and current key industry for Huangyan District (High visibility; recognition; necessity)	**Key actors**	**Governmental:** • Taizhou Municipal Government • Huangyan District Government (Agricultural Bureau) • Xinqian Neighbourhood Government **Non-governmental:** • Business park including global companies (e.g. JC Times) • Elderly home initiative • Village based SMEs employing migrant workers
R&D Goals:	Participative integrated local transformation scenario to include • Concepts for small-scale interventions improving green and blue infrastructure to combine environmental improvement measures with and needs for public space/ heritage protection • Support for small-scale urban agriculture along green infrastructure zones including the development of community-based management concepts • Opportunities to better link local business park with village based small businesses and SMEs through environmentally sustainable cyclical economies		

URLL #3	**Jianyang Village Area (Wetland Park Development)**		
R&D Focus	Urban rural integration through balancing responsible and equitable land-use changes, the protection of ecosystems, inclusive socio-economic development and (rural) cultural heritage		
Short description (for more detailed description see URA website)	**Urban-rural transformation challenges:** • High urbanization pressure in terms of land-use change due to residential expansion and threat to cultural heritage of surrounding villages (destruction, displacement) • High degree of water and soil contamination • Risk of environmentally sensitive characteristic wet-land ecology and unique biodiversity **Potentials:** • High political priority (Zhejiang Provincial level, Taizhou city) with high public and private investment in the medium term • Established working relation between local townships, investors and Taizhou Academy and interest to work with URA • Good access to relevant local data	**Key actors**	**Governmental:** • Zhejiang Provincial Government • Taizhou Municipal Government • Huangyan District Government • Yuanqiao Township Government **Non-governmental:** • Green City Ltd. • Taizhou Academy • Chinese Association of Circular Economy
R&D Goals:	Participative integrated local transformation scenario to include • Development of high profile “wetland park” as key element of Huangyan-Demonstration Belt to include innovative solutions for climate and water sensitive residential areas, rehabilitation of traditional villages, eco-tourism infrastructure (visitor centre, walking trails, educational programs), community-based park management, nature protection and rehabilitation		

(3) Policy gaps in planning and governing the urban-rural interface (WP7, all WPs)

• Analysis of key sectoral planning documents relevant for Huangyan-Taizhou (urban master plans, land-use plans, documentation and plans for ecological preservation, etc.)

• Analysis of effectiveness of ongoing policy initiatives including top-down urbanization agenda (2014-2020) (State Council 3/16/2014) and the rural revitalization agenda (2018-2022) (State Council 9/26/2018) implemented in Zhejiang province and Taizhou city aiming at addressing the unequal and disjunctive developments between the urban and rural jurisdictions.

• Qualification of factors fostering and hindering integrative, inter-scalar, intersectoral and cross-jurisdictional management and governance; gaps include 1) identifying the sites and intersections where the most prominent urban-rural integrative challenges manifest; 2) explore policy tools to replace the dualistic household registration, land tenure, the provision and allocation of public infrastructure service etc.; 3) compile the territorialized general urban-rural planning in line with the NTSP guidelines and in accordance with the upper-scale plans; 4) explore planning-governance tools to ensure integrative development at the urban district (country)-township-village-levels;

• Analysis of achievements and limits (sustainability risks) of previous revitalisation approaches implemented within Huangyan District.

4. Log-frame (Goals, Proposed Problem-Solving Strategies, Expected Impact, Indicators)

The following log-frame summarizes URAs research agenda for the R&D phase. Goals have been summarized as **four overarching research questions** shared by the entire research consortium, representing a combination of

• Interdisciplinary contextual baseline research on urban-rural interface dynamics (macro,meso,micro) related to the case study region (Research question 1);

• Experimental, transdisciplinary development of integrated, place-specific problem-solving strategies (based on participative transformation scenarios) for 3 URLLs (micro scale) as well as the sub-regional

"Demonstration Belt" (meso scale) of Huangyan District (Research question 2);
• Development of policy tools and guidelines to capacitate local governments (Huangyan and beyond) in integrated urban-rural resilience building (Research question 3); and
• Networking and learning through academic, policy and practice-oriented across different urban-rural regions in China, Germany and beyond (Research question 4).
Each WP has defined more **specific sub-questions**, which will be specified in the separate formal application by each consortium partner. The log-frame then provides a **summary of proposed key activities/ outputs**, the **expected impacts** and **indicators**.

Objective 1	**Research Question (RQ)1: What sustainability risks and transformation potentials emerge at the Urban-Rural Interface (place, space, scales) in the Huangyan-Taizhou region? How do these potentials and risks manifest themselves in the nexus between settlement patterns and built heritage, social inclusion/ exclusion, ecosystem services, and circulation pathways of nutritional and waste products**?
Scales	Micro/ Meso/ Macro
Activities/ Problem-solving strategies (WPs)	**WP 2: Urban-rural socio-spatial practices** • Building on initial mapping in the definition phase, continued investigation of multi-scalar, actor-based socio-spatial practices within URLLs. **WP 3: Urban-rural material cycles** • Development of innovative approaches to circular economy pathways of nutritional and waste products focussing on URLLs **WP 4: Urban-Rural Landscape Transformation: Decoding Spatial Typologies and Scenario Development**: • Mapping spatial constellations and their transformative dynamics (potentials and related risks) in the form of an atlas as a basis for interpreting URLL's materializing processes. **WP 5: Urban-rural ecosystems** • Identification/ Mapping transformation tendencies and risks of ecosystems, incl. biodiversity, water, etc. • Development of integrative GIS tool for all WPs **WP 6: Urban-rural mobilities and social inclusion** • Conduct quantitative and qualitative analysis of relevant social mobility patterns and exclusion risks focussing on URLLs and beyond. **WP 7: Integrated, Participative Transformation Scenarios and Integrated Implementation Strategies** • Provide entry point and focus areas for research activities within WPs 2-6. • Produce joint output (based on contributions of all above WPs): interdisciplinary conceptual tools describe the transformative features at the urban-rural interface and their mechanisms. • Investigate modus operandi of planning/ governmental approaches (policy mapping, discourse analysis, interviews) • Identify disjuncture of the collaborations, trade-offs, dilemmas or paradoxes at work. • Employ GIS-based spatial analysis and visualization tools, to trace, track, document and analyze the problematic processes with respect to particular entities and systems of flow (nutrients, water system, trans-local actors etc.) and their spatial manifestations.
Expected impacts	**Scientific impact:** • Substantive interdisciplinary case study contributes to a better, evidence-based general understanding (place, space, scales) of urban-rural linkages as well as of risks and potentials towards a sustainable future. • Methodological innovations through interdisciplinarity, combining qualitative and quantitative research methods and platforms to drive integrated spatial research. **Economic impact:** • Demonstration of innovations, economic opportunities and risks emerging in urban-rural regions. **Environmental impact:** • Evidence-based analysis of ecological risks and potentials at the urban-rural interface. • Development of scalable utilization concepts for agricultural residues to enhance material/ nutrient circulation. • Spatial concepts for developing and qualifying blue-green infrastructure to strengthen resilience. **Social-political impact:** • Demonstration of risks and opportunities related to social inclusion and exclusion at the urban-rural interface.
Indicators	• Specific WP-related indicators (milestones) have been achieved and documented in regular progress reports (see section 6 of this application). • A joint GIS-based spatial data analyzing, representation and integration platform for all research findings has been developed and is actively used by all consortium partners.

Objective 2	**Research Question 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?**
Scales	Micro
Activities/ Problem-solving strategies (WPs)	**WP 7: Integrated, Participative Transformation Scenarios and Integrated Implementation Strategies** • Facilitate establishing participative planning platforms for three URLL sites, grand open access to URA consortium, local actors (entrepreneurs, Township government, residents, etc.) and district government. • Utilize and adapt strategic scenario building tools based on "*Raumbild*"-planning approach to actively engage diverse key decision-makers and practitioners operating on different hierarchical levels into communication with expanded local stakeholders. • Develop locally specific integrative transformation scenarios for urban-rural transition zones negotiating social, environmental, economic and cultural aspects and proposing local innovations and guidelines for nature-based /multi-functional farming guidelines for scalable, feasible and environmentally sound agriculture practices, etc. (e.g. recycling process of agriculture residues, the biodiversity preservation, the range and accessibility of social service among diverse social groups, etc.) • Define pilot interventions for each URLL for URA's Implementation Phase (2024-26) in cooperation with German and Chinese SMEs • Support local government to conceptualize and implement a public exhibition about the regional development vision of Huangyan-district-wide "Demonstration belt." The belt shall integrate the three URLLs, already completed Tongji-initiated pilot interventions and other local innovations.
Expected impacts	**Scientific impact:** • Substantive, evidence-based conceptual framework for structuring inclusive transformation processes at the urban-rural interface across China (adaptation of Raumbild-approach). • Showcasing transdisciplinary, practice-oriented research approaches in Chinese partner universities. **Economic impact:** • Demonstration of broader economic potential of urban-rural circular economy practices and innovations associated with a nexus of built heritage, material flows, ecosystem services and social inclusion. • Chinese and German SMEs included in development of implementation plan of concrete pilot projects **Environmental impact:** • Revealing potential of integrative planning, circular economies, nature-based solutions to resolve the environmental-economic conflicts (e.g. water-settlement relation) effectively. **Social-political impact:** • Demonstration of added-value of strategic, participatory future-oriented planning as an effective policy tool. • Demonstration of benefits of active local community participation in development of new planning instruments.
Indicators	• The Raumbild-inspired planning sessions have been conducted for three URLLs based on integrated, participatory and future-oriented principles. • At least 50 local actors per URLL have actively participated in the planning processes. • At least 2 alternative future transformation scenarios are developed per URLL. • The planning processes have been conducted sustainably (the number of local URLL cooperation agreements being signed; the number of planning/policy frameworks referring to URA guidelines, etc.). • The number of implementation plans made along the proposed Huangyen's "Demonstration belt" referring to URA proposals and guidelines. • At least 5 proposals for German-Chinese KMUs have been drafted and proposed for potential realization in URA's Implementation phase (2024-2026).

Objective 3	**Research question 3: How can strategic, actor-oriented scenario and implementation planning at the urban-rural interface help to complement the on-going policy reforms (NTSP, NURID) recently rolled out in China and help to operationalize effective implementation approaches? What gaps and problems of coordination remain under-addressed?**
Scales	Meso/ Macro

Activities/ Problem-solving strategies (WPs)	**WP 8: Alignment with Urban-Rural Planning Policies in China** • Map and interpret the transformative trajectory and rationale in relevant policy areas (i.e. rural-urban Integration, urban biodiversity preservation, etc.), in both the national, provincial and municipal frameworks. • Conduct science-policy dialogues in various formats with key stakeholders from municipality, academic consortium and local communities, including business community. • Include observer cities sharing similar social-economic-biological contextual factors, who have been piloted with NURID guidelines. **WP 9: Tools and guiding principles for strategic urban-rural planning governance** • Development of technical urban-rural planning governance Toolkit/ Manual for Chinese local governments (districts/ counties/ municipalities) based on outcomes of URLLs, Demonstration Belt, Science-policy dialogues. • Development of guiding principles for strategic planning at the urban-rural interface in China. • Conduct capacity building workshops with local government officials from Huangyan and other districts • Development of guidelines for integrative, strategic planning at urban
Expected impacts	**Scientific impact:** • Raising awareness in the Chinese and international planning and environmental research community of need for practice- and implementation –orientation and close cooperation with local actors. • Contribution to emerging discourse on strategic, inter- and transdisciplinary and spatially integrated planning in Chinese urban-rural regions as complementary to NTSP and NURID regulatory frameworks. **Economic impact:** • Local and regional Chinese businesses are aware of the innovation potentials at the urban-rural interface. **Environmental impact:** • Demonstration of value of Integration of ecosystem services (water, waste, biodiversity) in all planning stages. • Improvement of planning and implementation of NTSP on the local scale and National Ecological Redline Initiative from the national level to regional/local levels. **Social-political impact:** • Dissemination and mainstreaming of research outputs and learnings in China to empower local government's capacity to steer integrated, sustainable and inclusive transformation processes at the urban-rural interface. • Demonstration of added-value of local actor participation (including marginal communities) in transformation planning as complementary to Chinese planning frameworks (NTSP).
Indicators	• At least 30 decision-makers at local and provincial government levels have been actively included in URA activities and rate their participation as relevant (attendance lists, feedback templates). • 2 Chinese observer cities have participated in key activities and defined specific learning and take-aways. • At least 30 local entrepreneurs included in URA activities (attendance lists, feedback templates). • 5 key institutions at the Chinese national level (including sectoral associations, scientific think tanks academies, etc.) have participated in URA activities. • A Toolkit/ Manual containing descriptions and guidelines for at least 15 specific planning instruments (to steer inclusive future-oriented planning processes, interdisciplinary planning etc.) has been published digitally on the URA website (in English and Chinese). • Policy guidelines on integrated and inclusive planning at the urban-rural interface have been developed with UN-Habitat, published on URA and UN-Habitat websites and widely disseminated.

Objective 4	**Research question 4: What lessons can be drawn from the Huangyan-Taizhou case towards national and global debates on SDG-oriented urban-rural territorial planning? How can Huangyan-Taizhou benefit from global experiences developing sustainable transformation pathways through strengthening urban-rural linkages?**
Scales	Meso/ Macro
Activities/ Problem-solving strategies (WPs)	**WP 10: Sustainability of Scientific Outcomes, Partnerships and Knowledge Dissemination:** • Expand and utilize the URA website sections and newsletter to disseminate research progress. • Facilitation of 4 international URA conferences in Germany and China addressing academic, policy and practice communities. • Facilitation of a URA travelling exhibition or Germany and China, showcasing research and best practices. • Develop publications from the joint conference contributions, joint academic papers and final research outcomes in book format. • Development of tools to integrate research activities within the teaching structures of the participating academic institutions. • Promote talented future scientific staff (Masters students and PhDs) in the respective institutions and develop networking platforms across the German-Chinese consortium.

Expected impacts	**Scientific impact:** • Strengthening German-Chinese research partnerships and joint research publications. • Strengthening academic learning partnership on structural transformations of urban-rural regions, benefitting both research communities in Germany and China. • Contribution to didactic innovations in teaching and young academic staff support through interdisciplinary and practice-oriented approaches and global learning partnerships. **Economic impact:** • Relevant German and Chinese SMEs are aware of the potentials for joint business opportunities. **Environmental impact:** • Demonstration of the need for integrated, strategic planning approaches to steer environmentally sustainable transformation processes. **Social-political impact:** • Identification of common challenges and solutions among Sino-German political and non-governmental actors and strengthens cooperation networks.
Indicators	• 3 PhD dissertations by research staff employed under the project have been completed and published. • At least two joint Chinese-German Studios and summer schools (architecture/urban design/landscape architecture etc.) have been conducted and 15 Masters theses completed. • At least ten articles have been published based on the research findings in internationally renowned journals (5 of these are German-Chinese co-authored) • Four international URA conferences have been organized and proceedings published on URA Website (expected number of participants in each: min.150) • URA's travelling exhibition has been viewed by 1000 German + 1000 Chinese visitors. • URA book contribution has been published with internationally renowned publisher (print run of 1000) • All consortium partners contribute findings to at least 2 international conferences each (e.g. WUF XI and XII) • At least two German-Chinese research proposals have been submitted building on URA research findings.

5. Relevance to the Funding Goals

(1) Thematic relevance: URA will contribute to building "*resilience of cities and their surroundings as well as urban regions*" by addressing research and policy gaps that prevent a more effective management of urban-rural linkages and **urban-hinterland relations**. China has already recognized the urgent need to new territorial planning across jurisdictions to more effectively manage land use transitions, address urgent environmental problems and risks and integrate economic development plans. Recent climate change related extreme weather such as the damaging 2019 Taizhou taifun has demonstrated the critical vulnerability of urban-rural regions and the urgent need for action. URA will support this on-going reform process by adding still missing concepts and tools for **integrated, cross-sectoral and participatory action-oriented transformation-to-sustainability management and implementation** based on experimental solution-development in URLLs and policy dialogues. URA will reinforce and bridge the urban-rural integration reform on the institutional and policy level and the integrative spatial planning reform on the technical and territorial level, which is missing in the local context. This responds not only to a specific Chinese challenge but contributes to the global discussion localizing Agenda 2030, Paris Outcomes, the New Urban Agenda, or the "Urban-Rural Linkages Guiding Principles (URL-GP) and Framework for Action" (UN-Habitat 2020).

(2) International cooperation and knowledge exchange: During the definition phase URA has consolidated a Sino-German consortium of leading academic partners and local practice partners that have been involved as **equal partners** in the research and planning process. URA built on a long-standing and trusted cooperation relationship between TUB/ Bauhaus University and Tongji University and initiated new partnerships with Shanghai and Zhejiang University, as well as the local Taizhou Academy. On both sides, international cooperation is seen as key to **increase problem-solving expertise**. The project aims to aggregate local learning into concepts, instruments and policy briefs, which can be transferred to other regions. National planning and design institutions such as CAUDP will support **knowledge transfer** across China. ICLEI e.V. will also utilize its growing network of

Chinese cities to facilitate horizontal learning (observer cities). **Eye-level cooperation** between partners is strengthened by the fact that both China and Germany are facing analogous sustainability challenges related to urban-rural linkages and city-hinterland relations and can benefit from close research cooperation. Through the inclusion of IBA Thüringen GmbH or the Chinese Association of Circular Economy (CACE) **horizontal learning across regions in Germany and China** including network building between SMEs is supported. The inclusion of UN-Habitat supports an additional global dimension of the learning and dissemination network. The Aedes Architectural Forum will engage as a renown platform for knowledge dissemination, exhibition and conference organisation.

6. Research Design, Methodology, Work Plan and Milestones R&D Phase

6.1 Research Design and Methodology

URA's research design is based on the call for more participatory action- and intervention-oriented, trans-disciplinary R&D approaches orientating and aligning with sustainable transformation concepts such as "planetary boundaries" (Rockström et al. 2011; Steffen et al. 2015; WBGU 2016; WBGU 2014) "planetary guarding rails" (WBGU 2016), and more policy informing approaches like the localization of the Sustainable Development Goals (SDGs) and the New Urban Agenda (NUA). Building on transformation science and "transformation thinking" (ecological, institutional, technological, and socio-cultural) (Schneidewind and Singer-Brodowski 2014), URA follows a systemic, multi-scalar approach to build an inter- and transdisciplinary transformation knowledge **(systemic knowledge; target knowledge; transformation knowledge)** that can guide future integrated urban-rural transformation in Huangyan-Taizhou region and beyond. The following 3 dimensions shape the methodological framework for URA's R&D activities:

(1) Interdisciplinary contextual research methods on urban-rural linkages (system knowledge) - micro, meso, macro / WP 2-6:

On the base of preliminarily identified local transformation challenges (see section 3), URA arranges its R&D activities in a cross-sectoral approach, bringing five discipline specific and complementary entry points together into studying urban-rural linkages in Huangyan-Taizhou: WP2: Urban-Rural Spatial Practices; WP3: Urban-Rural Material Cycles; WP4: Urban-Rural Landscapes and Spatial Typologies; WP5: Urban-Rural Ecosystem; WP 6: Urban-Rural Mobilities and Social Inclusion. URA applies these themes/ entry points as part of an **"embedded multiple case design"**. The three local units defined for further analysis and implementation **(Urban-Rural Living Labs, URLL) serve as cases (Micro-**

Scale). Throughout the project, the interdisciplinary R&D activities within these specific cases will be continuously linked with contextual research across the **districts Huangyan, Luqiao, Jaojiang (Meso-Scale),** as well as the broader Chinese eastern urbanization corridor linking **Shanghai-Jiangsu-Anhui-Zhejiang Provinces (Macro-Scale).** Especially, aligned with current territorial planning reforms in China (NTSP 2019), the project will attend to the cross-jurisdictional and cross-sectoral structures and relations that drive the social, environmental and economic transformation processes at the Huangyan-Taozhou's urban-rural interface, developing territorially coherent planning and development strategies. Macro, meso and micro dynamics will be considered in the contextual research to identify multi-layered urban-hinterland interrelations (material and non-material) as well as key actors including relevant governmental and non-governmental actors. The resultant interdisciplinary findings will contribute to the transdisciplinary development of URLL specific transformation scenarios and implementation strategies, which serve as catalysts for integrated territorial development (WP 7).

(2) Participatory action-oriented R&D methods toward integrated urban-rural implementation strategies (target knowledge) - micro, meso / WP 7 & 8: The project builds on the concept of real-world living labs **(Urban-Rural Living Labs URLLs, WP7)** to bring together '*multiple knowledge forms'* (academic, technical, procedural, locally embedded/ contextual) and '*action*'. During the definition phase the Sino-German Consortium has defined the following three labs: **URLL#1 Beiyang Township Area** with a R&D focus on urban-rural integration through enhancing sustainable nutrient and waste cycles to support ecological food production and inclusive eco-tourism; **URLL#2 Xinqian Urban Neighbourhood** with a R&D focus on urban-rural integration through strengthening green and blue infrastructures and ecosystem services (nature-based solutions)**;** and **URLL#3 Jianyang Village Area** with R&D focus on urban-rural integration through balancing responsible and equitable land-use changes, the protection of ecosystems, inclusive socio-economic development and (rural) cultural heritage (see Chap.3). The selected labs are embedded within a sub-regional "**Demonstration Belt"** to showcase innovative urban-rural practices in Huangyan District (meso scale), which has emerged as a concept after discussions between the Sino-German Consortium, local stakeholders within the URLLs and the Huangyan District Government during the Definition Phase. URLLs will be test beds for URA's transdisciplinary tools and guideline development, aligned with and complimentary to China's current urban-rural policy reforms. Both, URLLs and the sub-regional Demonstration Belt will serve as sites for contextual research (WP2-6) and participatory action-oriented planning allowing URA to engage with key stakeholders in a process of 'co-production of knowledge' and 'co-design' of solutions (WBGU 2016). Hereby URA will build on the **Integrated *Raumbild* Strategy**, which is capable to steer and guide the inter- and trans-disciplinary strategic planning sessions joined by a multitude of stakeholders, co-producing shared future visions (*Leitbilder*) and implementation strategies for urban-rural sub-regions. Here, preliminary research outcomes will be discussed and verified through **Multiple-Actor Workshops** targeting village communities and local government as well as **Focus Group Meetings** targeting entrepreneurial SMEs and local government with help of subcontractor CACE. Frequent engagement with local actors will prepare the ground for local capacity building and participatory, action-oriented, co-development of URLLs transformation scenarios and implementation strategies. Specific tools and approaches to structure URLL processes will be jointly developed with subcontractor Urban Catalyst GmbH, one of the leading companies engaged in developing *Raumbild* methodologies in Germany and specialist in interactive workshop moderation including visual-haptic tools. For regular active engagement of stakeholders beyond URLLs **Science-Policy Dialogues (WP8)** ranging from on-

site workshops using URA's local project office, to web-based dialogues and sessions as part of URA International Conferences will support horizontal and vertical knowledge flow and learning. This will also help to improve the coordination between URA's research and policy processes at local, provincial and national levels to find sui-generis solutions. R&D goals have already been discussed and communicated with local authorities to ensure alignment with local policies and land use plans. URA will also involve 2 **Chinese observer cities** to ensure the URA team and Huangyan-Taizhou Government to have a practical angle on urban-rural integration in Chinese political context and helping to mainstream outcomes across other Chinese regions.

(3) Development of tools and guiding principles for integrated urban-rural planning governance (transformation knowledge) - meso, macro / WP 9: Based on URLL outcomes (WP7) and policy dialogues (WP8) URA will critically evaluate successes and failures of local experimentation to develop a tool box and guiding principles for integrated and participative urban-rural planning to be published on the URA website. Tools will be developed in an iterative process and tested in capacity building workshops with local actors (municipal officials from Huangyan-Taizhou and observer cities). Further validation and refinement will involve URA's international partner network and planned international conferences and workshops (e.g. four annual URA conferences or planned WUF Sessions 2022/24). Here, URA's subcontractors ICLEI and UN-Habitat will be key facilitators and multipliers helping to align URA's tools and guidelines with global processes. This includes the "Urban-Rural Linkages Guiding Principles (URL-GP) and Framework for Action" (UN-Habitat 2020) which derives from UN-Habitat's engagement with several international case study regions (e.g. Tanzania, Colombia, Italy) proposing an action framework to build a global enabling environment for more inclusive and functional urban-rural linkages. URA's R&D feed into this on-going process resulting in a final joint publication with UN-Habitat. Another learning and reflection context in Germany is the agreed partnership with the on-going International Building Exhibition (IBA) Thuringia. The IBA has stated its sincere interest in partnering with URA to internationalize local activities and also apply lessons learnt from *Raumbild*-approaches applied in China into their local action agenda. URA has therefore planned a set of joint conferences (2022/23), session contributions (e.g. WUF) and publications with both UN-Habitat and IBA-Thüringen - a trilateral collaboration already kick-started this year (Int. Conference 09/2020).

6.2 Work Plan and Milestones R&D Phase

WP 1 - Project management, overall coordination, quality assurance: The lead applicant, TUB's Habitat Unit, will assume the responsibility and the overall project management, planning, budget control and documentation including reporting to DLR/ BMBF, Midterm Evaluation (ME) and coordination of the application for the Implementation Phase (IP). WP also includes constant monitoring and quality control of the progress in the individual WPs. Tongji Univ./ CAUP will support TUB in communication with Chinese government actors. Habitat Unit/ CAUP will lead bi-monthly digital jour fixes, coordinate the organisation of German Consortium Meetings in Berlin (A), Sino-German consortium meetings in China (C), and Sino-German consortium meetings in Berlin (B), as well as joint field trips and international conferences (IC). Together with Shanghai University (partner of WP6), the Habitat Unit will also coordinate the maintenance of a GIS-based data integration platform to be established as a joint working tool for all WPs. Habitat Unit/ CAUP will coordinate regular local activities in the URA office in Huangyan, and facilitate the revision/ new MoUs for local URLL stakeholders.

WP2 - Urban-Rural Socio-Spatial Practices*:* WP 2 will build knowledge about the roles and impact of actor-driven socio-spatial practices within urban-rural transformation processes in order to catalyse their skills, techniques, resources and/or needs to support socio-ecologically integrated development within local URLLs and at the regional level of Huangyan-Taizhou. This includes 'project and/or investment-driven approaches' and 'everyday practices' and how they creatively transform traditional 'urban' and 'rural' lifestyles and livelihoods into hybrid, trans-local forms of living and/ or working at the urban-rural interface. WP2 will (1) conduct an actor-network analysis to identify, map and analyse specific local/ regional small-scale **entrepreneurial practices** (resources, networks, knowledge) that use and steer urban-rural linkages to achieve measurable benefits; (2) develop ***urban-rural spatial ethnographies*** of individual and family based everyday coping practices. Here, WP will focus on one key actor group in each (URRL#1- Beiyang: transforming agricultural practices; URLL#2 - Xinqian: migrant worker practices; URLL#3 - Jianyang: villagers of all age groups) to analyse motivations/ incentives, socio-technical and cultural tools, economic strategies, translocal networks of practices and their spatial impact. Finally, the WP will identify actor-specific challenges, needs, and opportunities to strengthen their inclusion and benefits from local transformation processes.

WP 3 - Urban-Rural Material Cycles: Interactions between rural and urban material flows are little understood and can be characterised as disrupted. At the same time, a transition toward a Circular Economy (CE) requires a holistic view on production and consumption systems along the value chain and lifecycle of products at the local scale. The working package 'Urban-Rural Material Cycles' (WP3) aims at understanding and supporting the management of material flows in the context of spatial human-environmental interactions, agricultural production, and urban-rural linkages. For URLL#1 WP3 will focus on **circular agriculture innovations as a motor for green urban-rural integration**. Based on I) three material and nutrient flow analyses, II) field and lab tests, and III) sketched an evaluated (indicator-based) regional symbiosis concepts an impact assessment of at least one circular agriculture pathway for Beiyang town will be conducted. For URLL#2 **circular approaches of urban agriculture for new models of "town-making"** at the urban-rural interface will be investigated. Based on I) a GIS-mapping and stakeholder interviews for the localization of (sub)urban agricultural activities and green sites as well as on II), the investigation of urban metabolism through the identification and quantification of intersectoral material flows, at least two concepts of innovative circular approaches for (sub)urban agriculture and parks will be developed. For URLL#3 the role of **circular economy concepts for land rehabilitation and sustainable green development** will be clarified. Based on I) the localization, mapping, and tracing of wetland pollutions and pollution sources and II) the development of at least two circular economy concepts for local and upstream agriculture, housing, or industry, circular infrastructure models will be conceptualized.

WP 4 - Urban-Rural Landscape Transformation: Decoding Spatial Typologies and Scenario Development: The aim of WP 4 is to map, decode and interpret the transforming spatial-ecological relationships between water, settlement patterns and management structures in URLLs (micro scales) and validated through contextualisation in meso and macro scales. Morphological and natural spatial specificities and socio-ecological relationships form a series of landscape portraits of prototypical space-use-structures (agriculture, industry, nature reserve / wetland, cultural/natural heritage) facing specific transformation risks and offering specific potentials. Based on this analysis, the WP will develop possible sustainable development pathways for water-sensitive settlement and use structures to support URLL planning processes. The WP will identify typology-specific scenarios and support integrated scenario development in URLLs, exploring possible development paths for the sustainable use of water under extreme urbanization dynamics, water-settlement structures, socio-spatial use dynamics and programming options across diverse scales.

WP 5 - Urban-Rural Ecosystems: Ecosystem services at rural-urban interface play a pivotal role for the sustainable urbanization and rural vitalization. Huangyan-Taizhou addresses many specific ecological and environmental challenges such as flood risk, water issues and biodiversity loss. Based on the transect recording of ecosystem dynamics as well as land use change mapping (15 years) in the urban-rural continuum WP5 will investigate impacts on biodiversity, water (flood management) and landscape cultural elements with their most relevant ecosystem services in more detail. High-resolution geo-data beyond the transect (regional level and in the ‘Reallabore’) will be generated. Relevant GIS tools and regional ecosystem services assessment maps (biodiversity, water and cultural elements) will be created. To calibrate the maps, socio-ecological field survey data will be collected in cooperation with Chinese partners considering ecosystem services supply-demand structures. Results will be used to develop strategy suggestions and measures for the optimization of these ecosystem services, which in turn will be fed into planning processes at URLL and subregional Demonstration Belt. Methods and outcomes will lead to guidelines for better ecosystem service management at the urban-rural interface, complementing on-going national policy reforms, or plans such as the Ecological Red Line plan, National biodiversity strategy and action plan as well as the National Territorial Spatial Plan (etc.).

WP 6 - Urban-Rural Mobilities and Social Inclusion: WP6 will proceed with a quantitative analysis of mobilities of different social groups combining (1) the updated census data and big data (location-based data), and (2) spatial syntax analysis for space accessibility and 'social distribution' will at the prefectural city level of Taizhou. (3) At micro-level of URLLs the WP will identify different social groups, especially elderly and 'migrants /floating population' considered particularly vulnerable to exclusion dynamics. This will include qualitative maps of everyday mobility patterns including "commutes" of different social groups to analyse spatial logics and impact of institutional settings. Based on these findings, the WP will develop guidelines for improvement strategies (spatial and institutional, policy-oriented) to enhance opportunities for social mobility and inclusion. Efforts will also be made to scale-up positive and reflect on negative dynamics in URLLs. All collected data, which can be digitized, will be fed into the shared database throughout the research process.

WP7 - Integrated, Participative Transformation Scenarios and Implementation Strategies:
Following a transdisciplinary, action-research-oriented methodology outlined in section 6.1 and drawing specifically on strategic, participative and integrated visioning (Raumbild) processes developed in European contexts, WP 7 provide a framework for experimentation central for solution-development within URA. This experimentation is framed by the specific spatial and actor contexts of the three Urban-Rural Living Labs (URLLs). Site- and actor-specific transformation challenges and potentials will form the starting point for the development of new pathways toward inclusive, environmentally-sensitive and future-oriented transformation design. Here, URA consortium members will act as facilitators/ process moderators, embedded researchers and technical experts at the same time, engaged in a transdisciplinary partnership with local stakeholders (governmental and non-governmental). Visual-haptic scenario development will be a key tool to structure stakeholder workshops and define pathways toward sustainable actor-oriented development. Here, experienced subcontractors CACE and Urban Catalyst will provide crucial inputs. WP7 will also be key to define pilot interventions for the Implementation Phase with the involvement of German and Chinese practice partners (SMEs). To help contextualisation, broader reflection and scaling, WP7 will essentially contribute to the detailing of the subregional “Demonstration Belt” which will converge innovations across the region and URLL outcomes to form a public outdoor “exhibition parcour” and learning context, inspired by IBA Thuringia.

WP8 - Alignment with Urban-Rural Planning Policies in China: The purpose of the WP is to facilitate a productive science-policy interface for the conceptualization, testing and validating of effective and culturally specific actor- and process-oriented transformation planning in urban-rural regions across China (tool box and guidelines of WP9). The work is mainly divided into three parts: **(1) Conducting interdisciplinary and multi-scalar research on policy analysis and gap finding.** Based on the definition phase, the research will further focus on policy mapping and explore policy gaps, in collaboration with WP2-WP6, at an implementation level with interdisciplinary perspective, aiming to align different approaches toward a comprehensive understanding and setting of policies applying to Huangyan-Taizhou region. **(2) Contributing with the design and implementation of a set of Science-Policy Dialogues (SPDs)** targeting multilevel stakeholders aiming to disseminate and reflect ongoing results from both interdisciplinary contextual research and the participatory engagement within URLLs. Through the combination of international conferences, annually SPD and various activities are going to be hosted online & offline, domestically & abroad to foster equal dialogues among different stakeholders and enable mutual understandings between governments with different hierarchy, government officials and research scholar as well as local villagers who are considered as the most affected group. **(3) Involving two observer cities aiming to reinforce supplementary exchange knowledge and experience in the area of urban-rural interface development and transfer across China.** Selected observing cities with relevant experience will be encouraged to participate in all SPDs and other international activities and they are expected to review the outcomes in order to provide recommendations for improving the tools that can adapt to local context and enable the practice conducted in Huangyan district will be transferred to other municipalities/ regions.

WP 9 - Tools & Guiding Principles for Strategic Integrated Urban-Rural Planning Governance: WP9 feed the outcomes of interdisciplinary research (WP2-6), URLLs (WP7) and Science-policy dialogues (WP9) into a transferrable and scalable toolset capacitating local governments to steer transformation-to-sustainability processes at the urban-rural interface. A first WP outcome (9.1) is the development of a Toolkit in form of a Manual (Chinese/ English) consisting of tool profiles, fact sheets, feedback and narrations from URLL processes combined with technical advisory and tools (e.g. GIS-based integrated data management tool) from the research process. This practice oriented Toolkit/ Manual will evolve in an iterative way, accompanying the evolving URLL processes and will finally be published in printed form and on the URA Website. The Toolkit/ Manual content will be undergoing testings (capacity building workshops) and validations through science-policy dialogues (WP8) and global networking activities (WP10) before finalisation. A second WP outcome (9.2) is the development and publication of a more general set of guidelines for urban-rural governance in partnership with UN-Habitat, integrated in UN-Habitat's on-going global discourse on "Urban-Rural Linkages - Guiding Principles (URL-GP)". This final publication will take the form of a globally-oriented open-access policy paper, will be centred around URA outcomes but will also include contributions from other sources.

WP 10 - Sustainability of Scientific Outcomes, Partnerships and Knowledge Dissemination:
WP 10 will ensure that research and scientific outcomes will produce a lasting impact on the scientific community and beyond. This includes: (1) the organisation of several international URA conferences; (2) the organisation of a travelling to be seen in Germany, China (and in extracts online) exhibition showcasing research outcomes and a broad range of best practices; (3) A publication strategy involving co-authored articles in peer-reviewed international journals as well as relevant publication media in Germany and China; (4) a final book publication (Chinese, English) with an international publisher based on URA results and including additional voices relevant for the global debate on urban-rural linkages. URA will also seek to turn the Sino-German research consortium into a sustainable network (5) able to attract follow up funding. This also includes an integration of activities and learnings into Masters programmes in the respective institutions, including the existing Sino-German Dual Degree Urban Design (Tongji-TUB). This will involve joint studios/ summer schools in China and Germany and jointly supervised Masters Thesis and alumni activities. URA will also support early-career-scientists including at least 3 young researchers active in the consortium who will complete their PhDs on URA-relevant topics during the F&D phase and will be involved in publication strategies. All academic consortium members will seek to explore additional funding sources, including also co-funding possibilities for the Chinese consortium partners. TUB's China Centre will place a crucial role in this and can offer **synergies** with ongoing BMBF-funded activities such as **URBANIXX - Alumni Network, TUWITECH or SPURT.** Throughout the duration of URA its Chinese-German website (6) set up during the Definition Phase is a key dissemination medium to publish interim results (articles, images and visualisations, short films, audio recordings and advertise ongoing activities. In all activities URA will promote equal gender balance.

7. Inter- and transdisciplinary International Cooperation and Work Distribution

7.1 Trans- and Interdisciplinary Cooperation and Project Management

• The key project partners and their specific cooperation roles are described in the following drawing:

• Lead PI TUB Habitat Unit will assume **project management** responsibility and facilitate interdisciplinary research data integration (GIS tool); for detailed descriptions see Section 6.2/ WP1.

• The research activities of the R&D Phase are structured in **10 Work Packages** (WPs) led by different consortium members (Sino-German tandems), representing a broad mix of disciplinary perspectives and research methods. Each WP has defined sub-research questions and individual milestones.

• **Non-academic partners** play a crucial role in URA via actively participating in trans-disciplinary research formats, and acting as recipients/ beneficiaries and multipliers. This includes Chinese local governments, academies and institutes. NGOs and non-profit companies include ICLEI and UN-Habitat as well as other subcontractors.

• An interdisciplinary Sino-German **Advisory Board** including representatives from relevant high level institutions such as the German Federal Agency for Nature Conservation (BfN), the International Building Exhibition IBA Thüringen, and the Chinese Academy of Urban Planning and Design (CAUPD). The AB will meet annually in the context of URA activities to provide strategic advice.

7.2 Contributions by International Cooperation Partners

• Very important to our approach is to cooperate with Chinese consortium members and partner institutions at **eye-level** to ensure close cooperation and maximal internal knowledge flows.

• All WPs are led through the principle of Sino-German tandems to ensure involvement and ownership on both sides (see above partner diagramme).

• All Chinese academic partners (Tongji University, Shanghai University and Zhejiang University) have signed MoUs during the definition phase in which they have committed to active participation despite current lack of direct co-funding. Their commitment to the R&D Phase was renewed through LoIs. The attached budget quantifies Chinese partner contributions (attribution of staff time to join activities incl. field work, local travel, maintenance of local project office in Shatan Village.
• In the political realm, we have gained endorsements from the relevant functional departments of Taizhou Bureau of Natural Resource and Planning (BNRP) and it's subdivision in Huangyan Districts, which include the Department of Reform and Development (DRD), the Department of Urban-Rural Planning and Management (DURPM), the Department of National Territorial Spatial Planning (DNTSP) and the Department of Territorial Space-Ecological Restoration (DTSER). The local urban-rural administrative organs in Huangyan, from the Xinqian urban neighbourhood, Beiyang Township, Toutuo Township, Yutou county, Yuanqiao township have also endorsed their collaboration. In addition, our professional network of URA has extended to the planning professionals from the Chinese Academy of Urban Planning and Design (CAUDP), Zhejiang Academy of Urban-Rural Planning (ZAURP).
• Huangyan local municipality is willing to offset some local project costs including funding local travel during int. conferences in Huangyan incl. for international academic partners, hospitality costs, communication/ publicizing of activities, etc. This commitment was shown during the Kick-Off conference in June 2019 and will continue during the R&D phase.
• Other non-academic partners include local enterprises like Seeher agriculture ltd., Greencity ltd., as well as NGOs like ICLEI East Asia Secretariat, China Association of Circular Economy (CACE), Urban Catalyst GmbH as well as IBA Thuringia and UN-Habitat.

7.3 Risk Mitigation and Preventive Strategies for Conflict Management

(1) Data access: It can be sensitive for Chinese municipalities and universities to share quantitative data sets with international researchers. Mitigation strategies include a.) relying as much as possible on open-source data (e.g. census data, remote sensing images) or offerings on the free market or self-generated data; b.) conduct field investigations in close cooperation with Chinese partners; c.) build trust through formalised partnerships endorsed by high-level political authorities (Tongji University Vice President, Chinese Academy of Urban Planning and Design); d.) ideally BMBF-funded projects will receive official Sino-German endorsement letters; e.) Shanghai University as host for GIS data tool.
(2) Local field access: conduct all field visits and interviews in close cooperation with Chinese partners; contact local municipality representatives through Chinese partners;
(3) Travel restrictions rel. to current COVID-19: Continuation of close coordination of project progress with Chinese partners using digital communication platforms (e.g. ZOOM, WeChat video, etc.)
(4) Failure to achieve policy impact: Risk that URLL scenarios or Toolkit/ Manual fail to achieve impact due to the rapidly evolving local needs. To ensure effective knowledge-to-practice transfer of URA's contributions, we would continue to strengthen our local project office throughout the R&D phase to maintain maximum contact with local stakeholders.

8. Expected Results and Utilization

The overall table summarizes key results, prospects of success and potential scientific and economic applicability. Detailed lists per WP are included in the formal application.

Expected Research and Development Results	**Urban-rural transformative features and mechanisms** -Utilization concepts of agricultural residues, urban agriculture and wetland adapted organic farming. - Atlas characterizing the local and regional landscape and settlement structures and transformation dynamics - Analysis and assessment of the potential of ecosystem services and green Infrastructure (flood, biodiversity loss) in URLLs and broader research regions. -Analytical concepts and assessment of key factors/ actors affecting urban-rural mobility/ social inclusion. - Analysis, assessment and representation of the distribution of social-economic-ecological opportunities and risks across various social at local and regional scales. **Sustainable, circular, inclusive implementations plans** - Spatial concepts for developing big scale blue-green Infrastructures (addressing water security, water pollution and flood risk). - Nature-based strategic development plans for URLLs, including, implementation plan for utilization concepts of agricultural residues, wetland adapted organic farming plan and recommendations for upstream agriculture and industry, transition pathway for urban agricultural production towards the circular economy. - Guidelines for inclusive public service provision (housing, education, recreation etc.) and detailed territorial plans along the demonstrative belt. - Policy suggestions for integrated urban-rural management, (water, waste, biodiversity, land-use, etc.) and the development of corresponding participatory platforms for public involvement. - Integrated strategic development plans (Raumbilder) for the 3 URLLs and demonstrative belt.
Scientific Prospects of Success	**Research and development** - Concepts, plans, pathways and guidelines as the research base for other urban-rural transition zones with similar boundary conditions. - Methods, indicators and measures developed, i.e. transect for the conservation of biodiversity, water, cultural and natural heritages as well as sustainable use of natural resources; statistical analysis based on data analysis, space syntax analysis for studying socio-spatial distribution etc. can be applied for other transformation focused research. - Contribution to the dissemination and harmonization of circular economy approaches in urban-rural contexts. -Encouraging and facilitating dialogue and consultation between governments from different hierarchies and drawing different interests among stakeholders into mutual engagement. **Talent and capacity building** - Promotion of junior scientists due to Ph.D., Master, and Bachelor theses. - Strengthening of scientific university education with practical orientation in the URA subjects, e.g., material flow analyses, utilization of agricultural residues, GIS-mapping, scientific interviews, etc. - Incorporation of URA project topics in the teaching curricula of the project partners.
Economic Prospects of Success	**Consultancy in extended contexts** - Consultancy opportunities in the area of, i.e., constructing and implementing the Convention of Biological Diversity (CBD), National biodiversity strategy and action plan; National Territorial Spatial Plan (NTSP); regional development for comparable regions and / or municipalities, political actors etc. - Opportunity for capacity building and training program activities in the area of urban-rural interface development for observer cities. **Stimulating public and private investments** - Integration of German and Chinese SME during the implementation phase based on elaborated implementation concepts (nature-based approaches/ blue-green infrastructures etc.). - Increased chances in fundraising in the context of accompanying and follow-up research due to the increased employment of scientific staff and the increased publication rate.
Scientific and Economic Applicability	- Monitoring and assessment of implemented circular approaches for (sub)urban agriculture and green sites as well as circular infrastructure models - Connectivity to existing scientific approaches to planetary urbanization processes focusing on the consequences and effects of urbanization processes on rural and peripheral regions - The outcomes could support consultancy to various national policies and plans such as the Ecological Red Line plan, Eco-civilization and Eco-Cities. - The interdisciplinary (i.e. Social-ecological approach) research methods and “Raumbuild” urban-rural planning will expand the horizon for innovative research in other fields. - The dissemination of pilot study could strengthen knowledge sharing, technology transfer and policy improvement on green development locally, nationally and globally. - Reinforce horizontal exchange on policy formulation in terms of urban-rural interface development among Chinese cities and disseminate the policy tool across China through derived events from URA project. **Follow-up research and adaptations** - Follow-up research in subsequent projects in the contexts of urban-rural transition regions with different boundary conditions (climate, geography, economy, culture, etc.) in the fields of: utilization of agricultural, industrial, and human residues; adaptation of circular approaches for (sub)urban agriculture and green sites for other urban-rural regions; adaptation of circular infrastructure models for alternative real-estate concepts.