



# Rural decline or restructuring? Implications for sustainability transitions in rural China



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## ABSTRACT

With the increase in climate change and increasing social concerns about environmental deterioration, sustainability has become a hot topic in both natural and social research. Nowadays, sustainable cities are one of the focal points, while rural areas have been disregarded. In fact, rural areas have been suffering from environmental degradation for decades. Thus, sustainability transitions in both urban and rural areas should be given commensurate emphasis. In this paper, we provide an overview of rural evolution worldwide and attempt to explore alternative approaches for enhancing rural sustainability. As depicted in the literature, rural evolution is multifaceted. For a long time, depopulation and demographic aging have been like chronic diseases torturing rural areas. Although there were some bright spots of rural repopulation and economic restructuring, they were not mainstream of rural development. Based on the existing research, we established a conceptual framework and analyzed the rural evolution paradigm from a geographic perspective. We found that rural composition determined rural architecture, while rural architecture affected rural functioning. Changes in rural functioning formed the rural evolution trend. Since rural development was also influenced by external factors, both self-organization and governmental intervention were found to be alternative approaches to guiding rural transitions. We took the case study of Tengtou village to exemplify the sustainable pathways of a rural transition. The case study indicated that national policies were the fundamental impetus for rural transformation, while self-organization played a more important role. We hope that our study will shed new light on policy orientations and rural transitions.

## 1. Introduction

Over the past few decades, the global environment has experienced a series of overlapping issues—global warming, climate disasters, chemical pollution, overexploitation of resources, energy depletion, etc. Given the deteriorated environmental situation, strong calls for sustainability have proliferated in academia, the private sector, government and international organizations (Reid et al., 2010). So far, this century has seen explosive growth in sustainable projects and research, as well as environmental bureaucracy and policy efforts. All of these endeavors helped fill the knowledge gap in sustainability science and fostered the consensus that the transition to sustainability could only be achieved through deliberate transformation (O'Brien, 2012). Substantial literature has been published about the concepts, frameworks, and methodologies of sustainability in developed countries (Kates, 2011), but we still know little about the interpretations of sustainability

in developing countries.

As the largest developing country, China is one of the main emitters of greenhouse gases and suffers from heavy air pollution due to its rapid industrialization and urbanization (Quéré et al., 2016). Moreover, regional disparities have hampered the realization of harmony and equality across the whole country. Considering its severe natural and social challenges, there have been many voices in China calling for a transition to sustainability (Li et al., 2018). Due to the predominance of urban activities in human development, the design of sustainable cities has gained more attention than sustainable rural planning (Bai et al., 2014; Tan et al., 2016). However, rural issues are closely related to urban issues, especially in China, where nearly half of the population still lives in the countryside. As Liu and Li (2017) argued, rural decline has hampered the implementation of a comprehensive well-off society in China. Rural issues like arable land loss, rural ageing and out-migration, hollow villages, and water/soil pollution are intertwined

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with each other and increase the vulnerability of the countryside (Liu et al., 2010; Ongley et al., 2010; Peng, 2011).

In response to the rural decline, the Chinese government proposed “Rural Vitalization” as a new strategy to stimulate rural development. There are five core guidelines of the strategy: thriving business, a pleasant living environment, social etiquette and civility, effective governance, and property. It is easy to conclude that these five principles are closely related to the sustainable development goals (SDGs) of the UN. So, some practical considerations occurred to us regarding how to design the rural transformation pathways to realize the SDGs. Bearing this in mind, this paper aims to establish a theoretical framework for exploring alternative approaches to promote rural sustainability. Based on research from Western countries and China, we propose a theoretical framework to integrate rural transition with sustainability and use a case study to exemplify the potential pathways to promote rural sustainability in villages near metropolitan areas. We hope that this discussion will shed new light on rural sustainability research and inspire the Rural Vitalization Strategy in China.

The remainder of this paper is as follows: In the first part, we review the literature on rural evolution in Western countries and provide an overview of rural development worldwide. In the next part, we analyze rural development in China and summarize the main characteristics of rural transition. Then, we establish a theoretical framework for analyzing the rural evolution process and propose alternative approaches to promote rural sustainability. Next, based on the framework, we expound on a case study to exemplify the sustainable pathways of a rural transformation in suburb villages. Finally, we present the discussions and conclusions.

## 2. The multifaceted features of rural transitions around the world

### 2.1. Demographic desertification and rural decline

With the advance of urbanization and industrialization, populations have become concentrated in the main growth centers, especially in metropolitan areas. As reported by Rizzo (2016), rural-urban migration started from around the time of World War II. Population concentration has promoted urban prosperity but has also resulted in heavy demographic desertification in some rural areas. Nowadays, in large parts of rural America, depopulation is a common phenomenon. As Johnson and Lichter (2019) noted, 46 % of rural counties have suffered from depopulation—a larger proportion than in nonmetropolitan (24 %) and metropolitan counties (6%). In Western Europe, many rural areas have faced population losses: about a third of rural areas in Austria have experienced depopulation for more than 10 years (Dax and Fischer, 2018). As for Eastern Europe, the rural exodus has brought about a hollow village phenomenon. According to census data, the number of Russian villages with fewer than 10 residents increased from 34,000 to 36,200 from 2002 to 2010, and it was estimated that about 19,400 villages existed only on paper with no residents (Wegren, 2016).

Rural depopulation is a complicated process informed by both push factors from rural areas and pull factors from urban areas. The better job opportunities, higher salaries, and easier access to public services and consumer goods in urban regions are the main factors influencing rural migration decisions. On the other hand, in some rural areas in developing countries, economic transformations caused by technology, mechanization, and globalization reduced employment in the agricultural industry, so redundant laborers had to leave their hometowns to find new jobs in cities (Perz, 2000). In the Pampas region of Argentina, the process of “agriculturalization,” based on technological packages and large capital, made small and medium householders give up their lands and migrate to cities (Fernandez et al., 2013). As a result, more than half of villages in the Pampas region are at risk of disappearing and forms of infrastructure like railways have closed down. This means that rural depopulation may have a self-reinforcing effect. Once depopulation emerges in certain areas, the living environment

may worsen, including higher costs for care services and poorer equipment for facilities, bringing about more population loss (Elshof et al., 2014).

Another problem bothering rural areas is demographic aging. As reported in the Shepherdstown Report on Rural Ageing, the percentage of the population over 60 will reach 25%–30% in many countries during the twenty-first century and the majority will live in rural areas (International Rural Ageing Project, 1999). In Australia, the proportion of rural population aged 65 or older reached approximately 36 % before 2009 (Davis and Bartlett, 2008); the percentage in America was over 15 % during 2005–2009 (Glasgow and Brown, 2012). There may be some gaps in the definition of rural areas that have amplified perceptions of the aged population problem, but the aging trend in rural areas has been universally recognized (Burholt and Dobbs, 2012; Glasgow and Brown, 2012). Rural aging is a consequence of low fertility rates in modern society and it is closely related to the exodus of young cohorts. Depopulation and demographic aging have constrained rural entrepreneurship and impaired economic vitality, since the remaining old people lack the energy and passion to bring about innovations and establish a self-organizing mechanism (Delfmann et al., 2014). In addition, some research has showed that the aging population and economic transformation from agrarian to industrial have brought about the abandonment of pasture and cultivated lands, creating favorable conditions for reforestation in some Latin American countries (Aide and Grau, 2004). Agricultural land abandonment has also raised worries about biodiversity homogenization at the local scale, because the previous mosaic landscape is likely to be replaced by the dominant land cover (e.g., forests) (Jacob et al., 2008).

### 2.2. Rural restructuring and rural repopulation

Although depopulation and economic slumps are like chronic diseases torturing rural areas, especially remote and isolated regions, some other rural villages have remained dynamic and even maintained constant growth. In recent years, due to the permeation of urbanization and industrialization, rural is not equal to “agricultural” anymore (Collantes et al., 2014). Non-agricultural activities and off-farm livelihoods have replaced the once-dominant agricultural production in some rural regions. The economic transformation has also triggered social changes and brought about a totally different rural morphology. Marsden (1998) described this kind of non-agricultural transformation as rural restructuring, but many successive studies used “rural restructuring” as a holistic view to describe the whole process of change in rural areas (Hoggart and Paniagua, 2001; Wood, 2005).

Rural restructuring is likely to burgeon in two types of regions. One is the countryside, with its positional advantages of being close to metropolitan cities or transportation lines, which make it easier to absorb urban consumers and industrial transfer. In the early development period of Japan, regional policies encouraged manufacturing plants to be set up in rural areas, so farmers obtained off-farm income and filled the labor vacancy of industrialization (McDonald, 1996). Nowadays, in some developing countries in Southeast Asia, advocacy of rural industrialization has created a glut of part-time farmers who live in farm households and work in factories (Rigg, 1998). “Depeasantization” has also occurred on other continents such as Africa and Latin America, where rural livelihoods are sustained more by nonfarm incomes than by agricultural production (Bryceson, 2002; De Janvry and Sadoulet, 2001). However, in some post-industrial countries, rural restructuring is no longer regarded as a transformation from agricultural to nonagricultural. Instead, it refers to employment fluctuations in the manufacturing and rural public sectors, as well as to the recent growth in urban service sector recruitment (Hedlund and Lundholm, 2015).

Besides industrialization, rural tourism and recreational activities are other ways to promote rural restructuring. These usually emerge in places with abundant natural endowments or unique characteristics.

The most significant feature of these areas has been the growth of service departments, which provide new job opportunities for redundant rural laborers and stimulate the economy. To some extent, the development of rural tourism depends on local environmental and cultural resources. Scenic landscapes, special terrain conditions, distinctive cultures and customs, and even local cuisine and brewing skills can be recast as “countryside capital” to create new value and make profits (Bessiere, 1998; Bruwer, 2003). Tourism has provided a new platform for rural development, and it has also acted as a useful tool for recovering abandoned villages (Lupi et al., 2017). For example, “albergo diffuso” tourism in Italy was established on reclaimed rural lands (De Montis et al., 2015).

Another phenomenon closely related to rural restructuring is the population reflux into the countryside. These rural immigrations can be divided into two groups and have different destinations (Nelson and Nelson, 2011). The low-income groups are usually international migrants from lagging regions who are seeking work opportunities in relatively developed rural areas. For example, the Hispanic migrants to the Great Plains of America and Eastern European migrants to Portugal (Barcus and Simmons, 2013; Fonseca, 2008). They form an important part of the local labor market and dampen rural depopulation to some degree.

Their counterparts are high-income groups that mainly consist of retirees and middle-class commuters. They chose to settle down in the countryside for its better environment and nice scenery. Commuters generally concentrate in the suburbs, while retirees tend to live in remote scenic rural areas. Rich outsiders stimulate local demands for housing, commercial goods, and public services, and help to establish social networks in some declining communities (Hedlund et al., 2017). This rural repopulation trend has been called “counter-urbanization” or “rural gentrification” (Phillips, 2010). Although much of the literature stresses the positive effects of rural immigrants, we have to note that there are still some potential conflicts between local residents and newcomers. Solana-Solana (2010) said that the high demands caused by rural immigrations have increased local housing prices and living costs, so young inhabitants who cannot afford the rising expenditures have had to leave their hometowns. We need a critical perspective to assess the impacts of rural immigration; both the heterogeneous characteristics of immigrants and the diverse contexts of destinations should be taken into consideration (Stockdale et al., 2000).

### 3. Characteristics of rural transitions in China

#### 3.1. Rural transformations and land use transitions

As is known, discussions around Western countryside areas have been based on the privatization system. However, the counterparts in China were based on a collective system, which induced distinguishable rural policies and a transition paradigm. Until the 1980s, rural development in China was dominated by an extreme planning system where farmers were restricted to their lands to work together and share economic gains equally. Along with the implementation of the “Open and Reform Policy,” the “Household Responsibility System” was established in rural China; thereby, farmers could dispose of their surplus on the premise of submitting quota agricultural taxes to the government. Since the emergence of the commodification market, the restrictions on rural areas have been loosened, and the countryside now presents completely different circumstances compared to the planned economy period (Andreas and Zhan, 2015).

The significant changes in rural China have been encapsulated as a “rural transformation” or “urban-rural transformation” (Liu, 2010; Liu et al., 2014a). “Rural transformation” emphasizes changes that emerged in the countryside relating to the economic structure, land use pattern, social network, etc., while “urban-rural transformation” pays more attention to the gap between urban and rural development, including disparities in social welfare, municipal facilities, local income,

education and medical services, etc (Liu et al., 2013). It has been stated that the rural transformation advanced more quickly in eastern China than western China and the gap between urban and rural development was also smaller in the prosperous east than the poor west (Long et al., 2012a). This regional disparity has been ascribed to the different powers of rural transformation, including external forces and the endogenous impetus (Zhang and Liu, 2008). Industrialization and urbanization are considered as the essential powers that promote rural transformation, while natural endowment and human capital are determinants of the transformational direction (Liu et al., 2014a). According to the dominant driving factors, rural transformation in China was classified into two categories: bottom-up and top-down; they are impelled by endogenous imperatives and external forces, respectively (Zhang and Liu, 2008). The process of rural transformation can be mirrored in various aspects, both materially and ideologically, that are often reflected in land use transition, economic and employment revolutions, etc.

Long and Li (2012) claimed that cultivated land and rural housing land were two major sources of land use transition in China. Over the past few decades, cultivated lands decreased gradually, while rural housing lands increased steadily, changes that were driven by socio-economic and biophysical revolutions (Long et al., 2007). With more cultivated and ecological lands being invaded by urban sprawl, the ecological system suffered from severe disturbances (Long et al., 2014), exemplified by the increasing mean surface temperature (Zhou et al., 2004), degeneration of vegetation, and deterioration of soil diversity and sustainability (Zhang et al., 2007). Cultivated land losses were usually aggregated on the periphery of metropolitan areas, where land demands and prices were higher than in the rural hinterlands as a result of a population boom and economic growth (Yang et al., 2018). However, in the western mountain areas, large quantities of farmland were abandoned due to poor soil quality, the remote position, and a lack of agricultural labor (Zhang et al., 2014). Even on the plains, vast areas of cultivated land were marginalized because farmers were inclined to seek jobs in cities and devoted little time to agricultural production (Chen et al., 2009).

#### 3.2. Hollow villages and regional disparities

As mentioned above, rural migration has been a trend since the 1990s and has invoked a series of social and economic issues in rural China. Ye and Pan (2011) pointed out that some old people, women, and children left behind in villages were still striving for subsistence, and a few aged people even chose suicide because of depression. He (2018) declared that old farmers had assumed the main assignment of agricultural production in China, since young farmers migrated to cities. Thus, it was hard to foster machinery and large-scale agriculture because old farmers lacked capital and dependent on self-sufficient agriculture. Another issue that has resulted from rural migration is “hollow villages,” a term proposed by Liu (2009) to indicate the paradox of extended rural settlement lands but idle rural houses. Liu et al. (2010) expounded that residents prefer to build new houses on the fringes of existing rural settlements and leave their old houses idle in the center of the rural village, so these rural areas are defined as “spatial hollow villages.” Furthermore, Liu enriched the concept and developed the notion of “territorial hollow villages,” which refers to the declining rural areas where young farmers left to work in cities and villages lost their vitality (Liu, 2009). Faced with low land use efficiency and hollow villages, Long (2014) advocated land consolidation as an indispensable pathway to improve land use efficiency and restructure rural space. He divided rural space into production space, living space, and ecological space and elaborated the necessity of optimizing rural space patterns to improve rural functioning (Long and Liu, 2016). Liu emphasized that land consolidation was only a prelude to curing hollow village syndrome; the establishment of viable rural economic sectors and reorganization of the rural governance mode were also prerequisites for

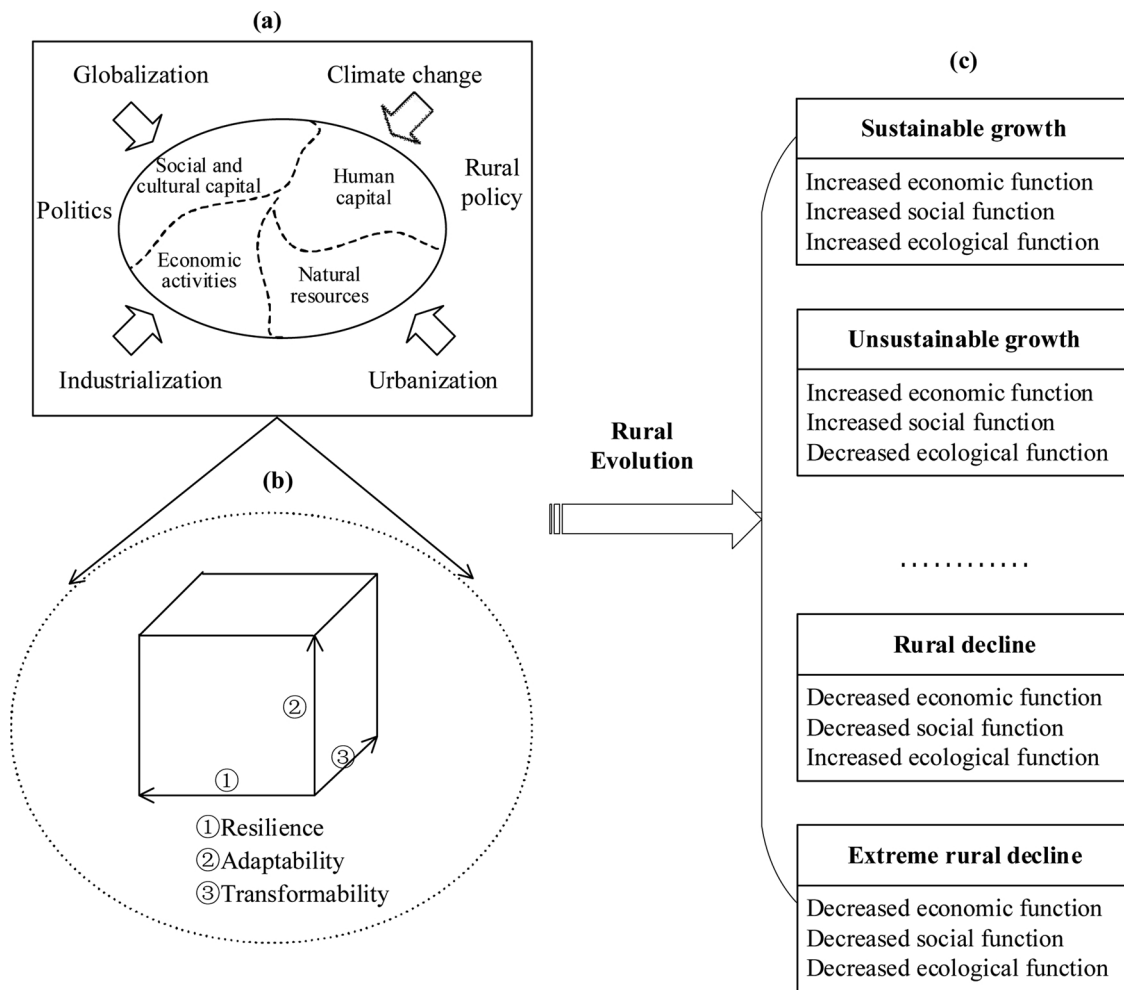


Fig. 1. Framework of the rural evolution process.

rural development (Liu et al., 2010).

Although the rural decline has been one of the major social concerns, we cannot deny the positive effects of the rural transformation in China. Since the government abolished the people’s commune system and encouraged the development of rural enterprises, many villages have seized this opportunity and developed a flourishing collective economy, especially in South China. These villages have made appreciable profits from non-agricultural activities such as rural tourism, the manufacture and merchandise trade, providing public services, social welfare, and dividends for their collective members. Villagers living in these prosperous areas are pretty affluent and enjoy even higher welfare than urban residents. However, it is worth noting that there are significant regional disparities in China. In recent years, rural areas in east coastal China have developed quite quickly due to the penetration of urbanization and industrialization (Liu et al., 2016a), while villages in central and western China have lagged far behind their eastern counterparts and become the main arena for poverty alleviation (Liu et al., 2016b). The urban-rural gap resulting from the dualistic system still exists and has hindered the spread of well-being in society. Urban and rural areas are closely related to each other and the rural transformation has been considerably informed by urbanization. In order to analyze the rural transformation from a comprehensive perspective, Liu (2018) proposed that urban and rural areas should be regarded as “a territorially integrated system.” The infrastructures including transportation and communication facilities are a tangible network that connects urban and rural areas. Exchanges of materials and capital have formed an intangible network that promotes the circulation of elements between urban and rural areas. Only if the network is fluent and

bidirectional can urban and rural areas benefit each other and develop harmoniously. Once the network is interrupted or becomes a one-way track to urban areas, rural areas will be vulnerable to decline. Small towns or cities play an important role in the network as nodes that link metropolitan areas with vast rural ones (Liu et al., 2014b). Rural China is experiencing a conversion from an enclosed and plan-oriented system to an open and market-oriented one, and the transition process is quite complicated and difficult to clearly delineate in a few words.

#### 4. Rural evolution and sustainability transitions

##### 4.1. Theoretical framework of rural evolution

###### 4.1.1. Retrospective on existing theoretical frameworks

Rural evolution is a dynamic process and we need a systematic framework to explain its complicated course. Many studies have established a framework to analyze the evolution of social-ecological systems. Focusing on hierarchies and adaptive cycles, Holling (2001) developed the framework of “panarchy” to describe the continuous transformation of a system. According to the panarchy framework, the adaptive cycle of a system is divided into four stages: growth, conservation, release, and reorganization. Also, the future of the system is shaped by three properties: potential, connectedness, and adaptive ability. Panarchy is a general framework that can be used “whether at the scale of the cell or the biosphere, the individual or the culture.” However, it disregards the interactions between humans and the environment. Aimed at analyzing the coupled social-ecological system, Ostrom (2009) proposed a framework to explain the relationship



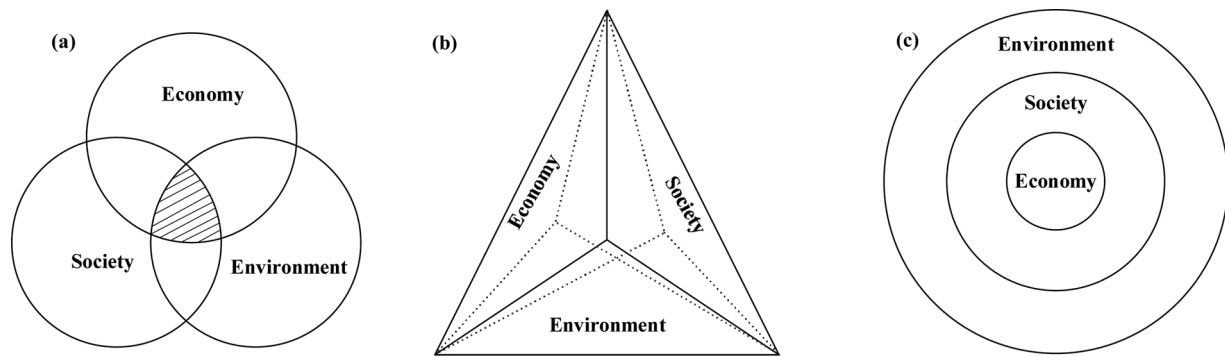


Fig. 2. Connotations of sustainability. (cited from Wu, 2013).

between sustainability and resource use. Based on Ostrom's framework, the social-ecological system consists of four sub-systems: resource system, resource unit, resource users, and governance systems. On the second level, 10 sub-system variables are identified to explain the possibility of self-organization contributing to sustainability. This framework, fostered by political economy, pays full attention to the interaction of human activities and environmental changes but neglects external stresses. To understand the social-ecological changes completely, Turner et al. (2003) developed a vulnerability framework to assess the coupled human-environment system. The architecture of the vulnerability framework is composed of three parts: the coupled human-environment system where vulnerability is embedded, external disturbances from broader scales (i.e., climatic changes, political transitions, and macro-economic trends), and linkages between the specific system and external conditions. The framework operates at various scales and emphasizes place-based analysis, thus forming a holistic viewpoint to explain the dynamic social-ecological system. These seminal frameworks in sustainability science provided the essential inspiration for us to establish a conceptual framework of the rural evolution process.

#### 4.1.2. Theoretical framework of rural evolution

Taking a geographical perspective, we conceptualized rural areas as a "territorial rural system" (Liu, 2018). This concept kept the core connotation of the social-ecological system and emphasized the place-based features of rural areas. The territorial rural system was divided into natural, economic, and social components (Zasada et al., 2015). These components were local and distinctive from broader scales (Fig. 1a). The natural components were the natural resources and environmental conditions. The economic components included economic activities and human capital. The social components consisted of social and cultural capital. The configuration and interaction of various components formed the architecture of the rural system. For example, rural depopulation and rural gentrification changed the social structure, which also influenced the economic structure. Hollow villages caused by population loss brought about land use change and even had an impact on local biodiversity, which was an essential part of the ecological structure. There were three indicators to elucidate the properties of rural architecture (Fig. 1b): resilience, adaptability, and transformability (Walker et al., 2004). Resilience is the capability of a system to absorb external disturbances before making fundamental changes. Adaptability is the capability of components in the system to affect resilience. Transformability is the capability to transform into a totally new system when the architecture cannot maintain the existing system. If a rural system has absurdly weak resilience, adaptability, and transformability, the rural architecture will be vulnerable to collapse when encountering severe external perturbations and rural functions will tend to decline (Li et al., 2019). Conversely, strong resilience, adaptability, and transformability are conducive to creating a new

system and enhancing rural functions. External stresses or disturbances from broader scales influence specific rural systems; they may be global trends or national politics, such as globalization, industrialization, urbanization, climate change, or rural policies (Fig. 1a). These exogenous forces exert considerable influences on the composition and architecture of the rural system. Changes in the rural structure then accelerate the functional transition, and the ultimate destinations of the rural transition are varied (Fig. 1c). Some rural systems will evolve into sustainable growth systems, with increased social, economic, and ecological functions. Other rural systems may experience unsustainable growth and increasing social and economic functions at the cost of ecological deterioration. There are also some tragic rural villages that demonstrate extreme unsustainability, showing totally decreased functions. Therefore, we believe that sustainability transitions should be proposed to ameliorate the unsustainable situation of some rural areas.

#### 4.2. Alternative approaches to sustainability transitions

##### 4.2.1. The connotations of sustainability

Before designing the pathways for the sustainability transition, we needed to figure out the connotations of sustainability. The concept of sustainability was first mentioned in the World Conservation Strategy (UCN, UNEP, WWF, 1980). Successively, the Brundtland Report (WCED, 1987), Rio Declaration (UNCED, 1992), and 21 Agenda (UN, 1992) then extended the concept. The initial definition of sustainability was mainly about the environment and economy. Then, the World Summit on Social Development in Copenhagen (UN, 1995) added social development as a third pillar. After that, with subsequent discussions and statements, the World Summit on Sustainable Development in Johannesburg confirmed the three pillars (UN, 2002).

To understand sustainability, it is necessary to scrutinize the relationships between the three pillars. As delineated by the UN, society, economy, and the environment form the three bottom lines of sustainability. This is often depicted as three interconnected rings of the same size in a symmetrical position (Fig. 2a). The shaded part, which covers the overlap of the three rings, is regarded as the fulfilment of sustainability. Then, debating the interaction between natural and human-made capital, researchers interpreted sustainability from two different perspectives: "strong sustainability" and "weak sustainability." Weak sustainability is based on neoclassical economics and assumes that a system is sustainable as long as the total capital stays stable or increases (Rennings and Wiggering, 1997). This means that artificial capital can be a substitute for natural capital (Fig. 2b). Meanwhile, the strong sustainability perspective claims that human-made and natural capital are complements (Wu, 2013). It assumes that a system is sustainable only if the synergy between society, economy, and ecology is realized. Griggs et al. (2013) claimed that strong sustainability should be defined as a nested concept (Fig. 2c). The external,

middle, and core layers represent the environmental, social, and economic sectors, respectively. The central position of the economic system does not signify its status as an important hub, but rather indicates that economic activities could not continue without social and environmental support (Giddings et al., 2002). We feel that strong sustainability presents the ideal vision of the rural sustainability transition.

#### 4.2.2. Pathways to promote rural sustainability

Sustainable development in rural areas is a deliberate process guided by governmental intervention or boosted by self-organization. Governments have played an important role in promoting rural sustainability. The Common Agriculture Policy (CAP) reform and Liaison entre actions de développement de l'économie rurale (LEADER) program in Europe exemplify the positive effects of government policies. Since the 1990s, the second pillar of the CAP started to advocate agro-environmental schemes in rural Europe, which improved the cost-effectiveness of agricultural production and inspired the formulation of rural environment protection schemes in some countries (Emerson and Gillmor, 1999; Matzdorf and Lorenz, 2010). The transition from “sectoral” approaches to “territorial” policies in the CAP reform also promoted rural development (Watts et al., 2009). At the same time, the EU initiated the LEADER program, which encouraged endogenous development by sponsoring the establishment of local networks (Ray, 2000). Although LEADER had some deficiencies, to some degree, it activated social inclusion, entrepreneurship, and innovation in rural areas (Marquardt et al., 2012). Furthermore, the regional policies that featured bottom-up, endogenous, and participation-oriented characteristics achieved great success in revitalizing small towns and villages, such as the “One Village, One Product Movement and Village Revitalization Action” in Japan (Wirth et al., 2016).

Self-organization was another approach to motivating sustainability transitions in rural areas. Some case studies have shown the positive effects of self-organization, such as the management of benthic small-scale fisheries in Mexico and Chile and the protection of urban lake commons in Bangalore, India (Basurto et al., 2013, Nagendra and Ostrom, 2014). The success of self-organization in promoting sustainability was determined by a series of variables, including the size of resource systems, the number of users, leadership, the importance of resources to users, etc. (Ostrom, 2009). However, self-organization is not a common phenomenon in rural areas and sometimes it has been fragile. To some extent, rural gentrification has been beneficial for fostering self-organization, because older retirees have spare time to devote to public affairs and are enthusiastic about volunteering. There are various opportunities to foster self-organization in rural areas and it may create the potential to realize rural sustainability transitions.

Although governmental intervention has positive effects on rural development in some regions, it is not a panacea for rural decline. CAP and LEADER action in Europe provide new chances for rural development, but they are not competent to stem population outmigration and economic depression in rural areas. Some governmental policies even resulted in unsustainability tragedy in rural areas. For example, the pasture degradation of northern Tanzania in 1980s was triggered by the Canadian-aided wheat-growing scheme, which was launched by the government to replace the traditional seminomadic pastoralism (Lane, 1992). Considering the governmental intervention sometimes fails to conform to the real demands of local farmers, it is necessary to integrate self-organization with governmental intervention to promote rural sustainable development (Fig. 3). Poverty alleviation, diversity of livelihood, and market orientation will bring about economic advances. Local participation, social entrepreneurship, and spirits of collaboration and reciprocity will enlarge the social and cultural capital. A mental transformation to sustainability and the adoption of environment-friendly technologies will help to maintain ecological capital. All of these changes will result in the adjustment of rural architecture and will facilitate rural restructuring. Finally, the evolution of rural functioning may be guided into the designed trajectory as hoped—that is, toward a

sustainability transition.

## 5. Case study of Tengtou village in South China

In the previous parts of our research, we discussed the multifaceted features of rural transitions around the world, established a theoretical framework of rural revolution, and proposed alternative approaches to rural sustainability transitions. Next, we come to the following question: how did these approaches take effect in practice? Bearing this question in mind, we selected a case study in southeastern China to exemplify the prospects and possibilities of sustainability transition in a rural village. There were two reasons why we chose Tengtou village as the research setting. Firstly, it is located in South China, where villages have been experiencing more significant changes than in the central and western areas because of its prior implementation of the “Open and Reform Strategy.” Secondly, Tengtou village has achieved great success in economic development, social harmony, and environmental protection. We think that it is approaching sustainability. In the following, we will demonstrate the pathways and approaches that guided Tengtou's rural transition.

### 5.1. Responses to rural policy reform and economic restructuring

Tengtou is located in Zhejiang province in South China, with 333 households and 869 residents as of 2016. It is a small village that only covers 494 acres. Up to the 1960s, the village was so poor that farmers could not obtain enough food to sustain themselves. Due to the rough terrain and scattered land parcels, the rice yield in Tengtou was often lower than 607 kg per acre, so some villagers had to turn to begging when they faced natural disasters. In 1964, the central government of China initiated a rural movement with the slogan “Learn from Dazhai in agriculture” (Dazhai village was famous for its successful land consolidation). Following this national trend, Tengtou village started land consolidation to improve its agricultural production and fight poverty. At that time, the village was extremely starved of financial capital, so villagers volunteered to finish all of the works by themselves without any reward. Under the leadership of the village committee, they levelled the uneven lands, constructed drainage and irrigation systems, covered barren lands with fertile soil, and combined scattered parcels into unified farmland. Thanks to the improved land conditions, the agricultural yield was doubled in the 1970s.

During the early part of the 1980s, the “Open and Reform Strategy” was promoted across the whole country, the “People's Commune System” was abolished, and the “Household Responsibility System” was adopted in rural areas. Conforming to this social reform, Tengtou village allocated the collective farmland to each villager with an equal quota. Along with the policy revolution, a mental transformation also emerged in rural areas. The Tengtou villagers began to realize that smallholder agriculture could only meet subsistence demands and would not lead to prosperity. Given the market opportunities and physical conditions, they decided to develop clothing manufacturing in their village. The first clothing factory was established in 1979 with less than 20 machines; it was located on a renovated poultry farm. After that, Tengtou set up another firm to cultivate nursery stocks and sell them to cities. With more and more villagers working in the factory, the farmlands were facing abandonment, so the village committee withdrew all farmlands and leased them to a few skilled villagers. Nowadays, the main agricultural production in Tengtou village is fruit and economic crops rather than rice. The villagers have also begun to develop rural tourism to bring in more income.

Thanks to the efforts of a few generations, Tengtou has eliminated poverty and established a vibrant economic sector. They set up the Tengtou Group in 1982 and extended their business into finance, real estate, hotels, engineering construction, etc. The Tengtou Group owns more than 80 branch companies and it contributed approximately 1 billion RMB in tax revenue in 2016. The annual average income of the

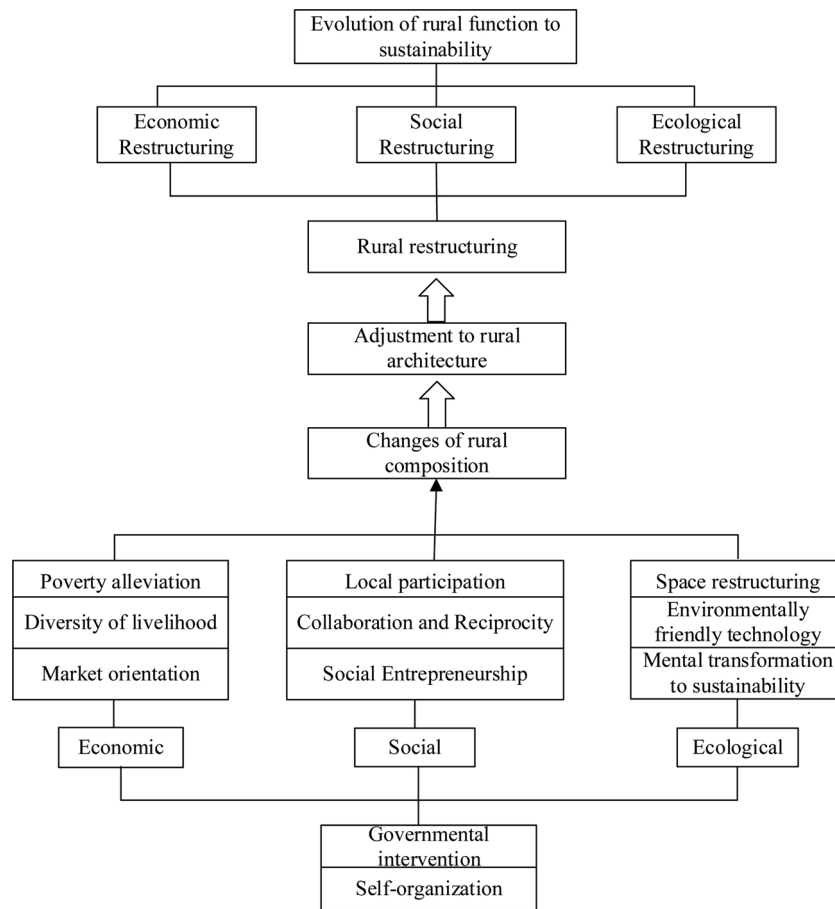


Fig. 3. Pathways to achieving rural sustainability.

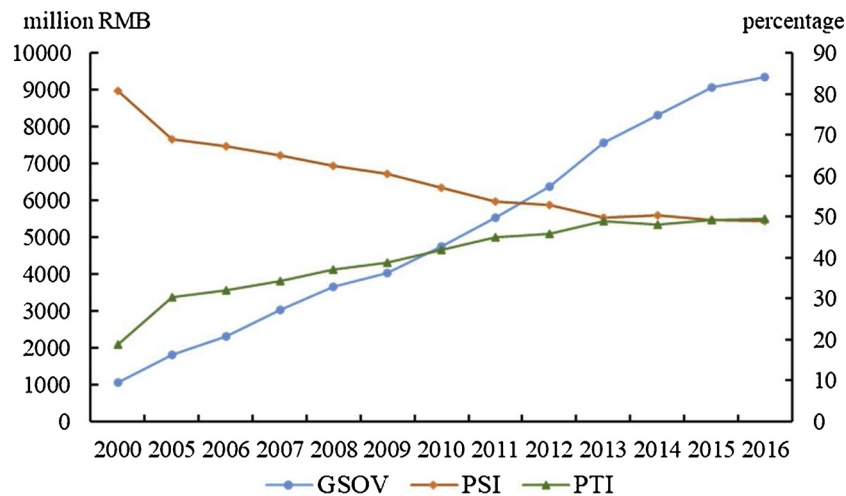


Fig. 4. The value of the gross social output and its composition in Tengtou village.

(GSOV = gross social output value, PSI = proportion of secondary industry, PTI = proportion of tertiary industry. The data were collected from the Tengtou village committee by the authors in 2017).

villagers also increased from 1,712 RMB per person in 1991 to 63,000 RMB per person in 2016. During 2000–2016, the gross social output value of Tengtou village increased from 1061.5 million RMB to 9346.75 million RMB, in which the proportion of tertiary industry has been growing steadily while the proportion of secondary industry has decreased Fig. 4).

5.2. Self-organization, environmental protection, and social welfare

Tengtou used to be an ordinary village in rural China with no superior natural endowments. Many villages possessed more abundant resources than Tengtou, but they lagged behind this small village. The essential prerequisite that determined Tengtou’s success was its strong capability for self-organization. The leadership of the village committee played a crucial role in consolidating Tengtou’s self-organization.

Village committees are autonomous governance organizations in rural China, authorized by the Constitution of the People's Republic of China in 1982. Since village committees are not affiliated with an administrative hierarchy, the members are part-time and only receive a small allowance from the local government. Therefore, many village committees only exist on paper and not an operational machine. However, in Tengtou, the village committee functioned well and exerted positive effects on the village's development. Based on demographic principles, the village committee was elected and supervised by the villagers' representative assembly. Each adult from Tengtou village had the right to participate in the villagers' representative assembly and vote on important decisions.

In Tengtou, the village committee is in charge of all public affairs. It is notable that the village committee started to foster ecological concepts in the initial planning stage. In 1979, Tengtou formulated its first village construction plan. The limited land resources were divided into three types of land use: construction, agriculture, and ecology. Agricultural production, industrial development, and settlement construction were restricted to specific areas and forbidden from expanding randomly. Due to the rigorous regulations, land development was well organized (Fig. 5) and the living environment was improved. In addition, Tengtou initiated the first village-level environment protection committee to scrutinize external investment and monitor internal economic activities. They refused any contaminating industry even if it would be more profitable. The village committee also enacted village regulations to encourage environmental preservation and penalize polluting. In return for their persistent ecological protection efforts, Tengtou was added to the "Globe 500 Roll of Honor for Environmental



Fig. 6. Tengtou's slogan ("Fight to the end, innovate to the end"). (Picture taken by the authors in 2017).

Achievement" and entered into the "First Batch of National Demonstration Areas for Ecological Tourism" and "National Model Gardens of Standardized Agriculture."

In addition to advocating environmental protection, the village committee also assumed the mission of allocating social welfare to villagers. With support from the collective enterprise, Tengtou villagers enjoy abundant subsidies. Each resident who was born in and registered at Tengtou village is provided with a 1500 RMB welfare payment per year. Villagers who are older than 65 can enjoy a pension of more than 2000 RMB per month. Up to 60 % of medical insurance expenses are assumed by the collective economy. Young villagers who get a bachelor's, master's, or doctoral degree are awarded a scholarship of 10,000, 30,000, or 50,000 RMB, respectively. Furthermore, the village committee encourages entrepreneurship among the villagers. They adopted the village slogan of "Fight to the end, innovate to the end," and it spread throughout the village (Fig. 6). Aimed at fostering better rural

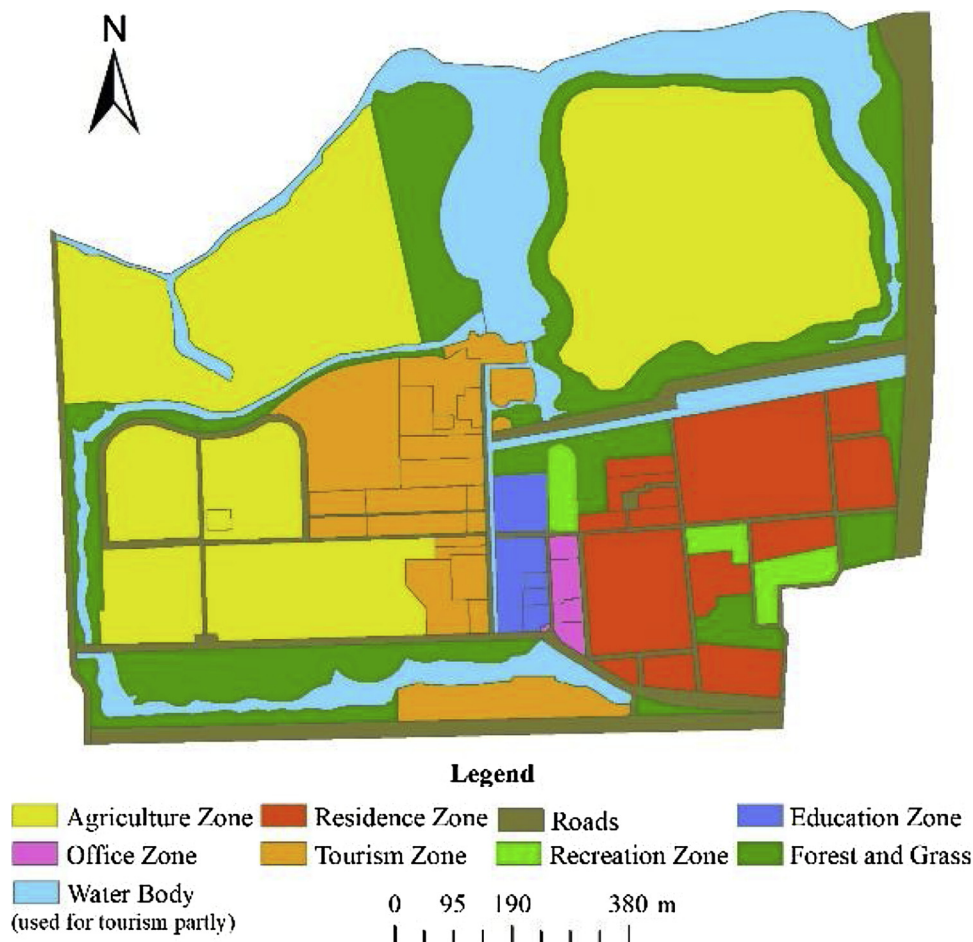


Fig. 5. Land zoning in Tengtou village in 2017. (The data was interpreted by the authors using remote sensing images collected from GS cloud and the interpretation was corrected via a field survey in 2017).



morality, the village committee promulgated several village regulations relating to neighborhood relationships, weddings and funerals, the prohibition of immoral practices (such as gambling and stealing), the encouragement of higher education, etc. Through the leadership of the village committee, a good social network was established in Tengtou village, which fostered responsibility, reciprocity, and trust. The village was also selected as one of the “Top 10 Harmonious Villages around the World” by the UN for its prominent work on social wellbeing.

## 6. Discussion

As shown by Tengtou village, rural sustainability should be a synergy of economic growth, environmental protection, and social wellbeing. Self-organization played an important role in promoting the sustainability transition in Tengtou village, while governmental intervention was also a fundamental impetus. In Western countries, there have been some policy transformations aiming to promote sustainable rural development. For example, the CAP reform proposed the Rural Development Program (RDP) in its 2000 Agenda to integrate rural development with agricultural support (Lowe et al., 2002). Although the RDP did not come into effect until 2007 due to budgetary limitations, it did exert a positive influence on rural sustainability transitions. The contributions of the RDP to rural sustainability were along three axes: “(i) improving the competitiveness of the agricultural and forestry sector; (ii) improving the environment and the countryside; (iii) improving the quality of life in rural areas and encouraging the diversification of the rural economy” (EC, 2006). Furthermore, the LEADER program also fostered participation, innovation, and reciprocity in rural areas (Ray, 2000).

Similar to Western governments, the Chinese government also played an important role in promoting rural transformations. In 2005, China’s central government initiated the “New Countryside Construction Program.” It aimed to renovate rural areas with the guidelines “Production is developed, life is rich, village style is civilized, village appearance is neat, management is democratic.” A dozen years later, a new strategy named “Rural vitalization and integrated urban-rural development” was proposed to ameliorate rural degradation and promote rural sustainability. Correspondingly, the guidelines were updated to “Thriving business, pleasant living environment, social etiquette and civility, effective governance and property.” Compared with the previous strategy, we found that living conditions improved and environmental protection was given more emphasis under the new version. Also, we noted that these guiding principles relied on related policies to be effective, among which the land use policy was indispensable.

For a long time, rural development was trapped by the outdated land system in China. In the 1980s, farmers got the contracts and usage rights to arable lands after the implementation of the “Household Responsibility System.” However, they did not obtain the ownership of their lands and land leasing was limited to the village level. So, there was no open land market in rural areas; rural areas stayed stable but also slightly backward (Liu et al., 2014c). In recent years, there have been some land policy revolutions within the rural scope. Firstly, land leasing was permitted to operate on broader scales, which provided chances for specialized production for professional enterprises and skilled farmers. Subsequently, multifunctional agriculture and rural tourism burgeoned in rural areas, which stimulated their economic vitality to some extent. Secondly, the “increasing vs. decreasing balance” (IDB) land use policy provided opportunities for rural space restructuring (Long et al., 2012b). The IDB land use policy allowed urban construction land increase on condition that rural construction land decreased. This policy stimulated the reclamation of waste construction lands in rural areas and improved the living conditions of local farmers. Although the current land use policies have exerted positive effects on rural development, there is also the possibility of deepening the land use system’s reform to adapt the new evolution trend for rural areas

(Ding, 2003). An open, transparent, and urban-rural integrated land market should be established, and farmers’ land property should be clarified and guaranteed (Liu et al., 2018). Only with an intact market system and definite property rights can rural resources and capital be utilized efficiently and China’s rural decline perhaps be slowed down (Long et al., 2016).

## 7. Conclusion

Aiming to understand rural evolutionary trends in the world, we conducted an overview of rural research in Western countries and China. The literature showed that rural decline and rural restructuring go hand in hand around the world. Rural decline, symbolized by depopulation and demographic aging, dampens economic vitality, while rural restructuring benefits from counter-urbanization, rural industry, and tourism, bringing a spark of revitalization to the countryside. Based on the previous research and existing theories, we established a conceptual framework of rural evolution. This framework analyzed rural evolution from the triple perspective of “composition-architecture-function” (Tu and Long, 2017). Subsequently, we proposed alternative approaches for promoting rural sustainability. We think that both governmental intervention and self-organization are essential forces that guide rural transitions. Then, we presented the case study of Tengtou village in South China to exemplify the sustainable pathways of rural transition.

Tengtou’s success presents a sustainable version of rural development, but it does not indicate that rural sustainability is achievable all over the world. As Li et al. (2019) claimed that there is spatial heterogeneity in rural development, villages with convenient access to markets are prone to prosperity, while villages in remote areas are vulnerable to decline even vanish. Tengtou is situated in Zhejiang province, where local residents are good at business and form a bounding social network with entrepreneurship, so it gets more favorable conditions to flourish. Remote rural areas are not liable to get involved in the urban markets and less attractive to young labors, decline seems an evitable destiny to them. It is worth noting that sustainable transition is not feasible for all rural villages. When referring to rural sustainability, we have to bear the importance of spatial heterogeneity in mind.

## Declaration of Competing Interest

The authors declare no conflict of interest.

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