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Research Article

Synergy Sustainable Development through "Agricultural-Tourism Complexes": A Green Pathway for Rural China's Revitalisation

Lin Xiao[1], Noor Aisyah Mokhtar[2], Mohd Khairul Azhar Mat Sulaiman[3]

[1,2,3]Department of Architecture and Built Environment, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, UKM Bangi, Selangor, Malaysia
[1]Art College of Sichuan Technology and Business University, Xueyuan Street, Pidu District, Chengdu, China

INFO

Corresponding Author:
Noor Aisyah Mokhtar, Department of Architecture and Built Environment, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, UKM Bangi, Selangor, Malaysia
E-mail Id:
aisyahmokhtar@ukm.edu.my
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ABSTRACT

As the world community gradually shifts its global attention towards sustainable rural development under the United Nations' 2030 Agenda for Sustainable Development, integrated land use models are increasingly being viewed as a viable way of achieving ecological resilience and inclusive growth. Taking the Dongfang Agro-Tourism Complex in China as a case study, this study demonstrated a replicable model integrating ecological restoration, agricultural modernisation and low-carbon tourism, using spatial optimisation analysis, ecosystem service assessments and stakeholder-informed governance evaluation. Specifically, the study showed how multifunctional zoning, circular resource flows and green infrastructure could be combined to increase land productivity and biodiversity and diversify rural income. The article used a three-dimensional analytical framework incorporating spatial environmental assessment, industrial integration and social institutional participation to evaluate the environmental performance and economic feasibility of the complex. The findings showed that large-scale agritourism complexes could act as regional 'laboratories' for piloting green infrastructure and innovative circular economy solutions. The study concluded that location-based sustainable transformation would require participatory governance and adaptive policy implementation. Furthermore, this study could promote rural revitalisation in peri-urban and developing areas by integrating planning expertise, field research and ecological indicators, thereby enabling dialogue on nature-based solutions and green rural transformation.

Keywords: Agricultural-Tourism Complex; Rural Revitalization; Land-Use Multifunctionality; Eco-Economic Integration; Sustainable Development Strategy

Introduction

Global Concerns of Rural Sustainability and Green Transition

Over the past decade, rural sustainability has become a key concept in global development agendas as environmental sustainability, food security, and climate change have taken centre stage. The UN's Sustainable Development Goals (SDGs) highlight rural livelihoods (SDG 2), clean energy (SDG 7), decent work (SDG 8), sustainable communities (SDG 11), responsible production (SDG 12), climate action (SDG 13), life on land (SDG 15), and partnerships (SDG 17). These goals emphasise the interconnectedness of ecological, social, and economic objectives. In turn, green transitions in rural areas involve multifunctional agriculture, tourism, and renewable energy systems in an effort to align productivity with ecological stewardship. New research from the Journal of Cleaner Production reveals that a holistic, integrated rural systems approach combining agroecology with the principles of a sustainable tourism and a circular economy can lower greenhouse gas emissions while building soil fertility and diversifying household income sources.[1] Global case studies from Europe, Latin America, and Asia suggest that rural households can often achieve higher environmental performance and enhanced resilience in terms of economic returns when nature-based tourism is combined with clean energy solutions, such as biomass heating and solar irrigation.[2] However, challenges remain regarding broken land ownership, limited technical capacity, poor development support, and uneven policy support, which limit the wider expansion of these green models. Studies comparing sustainable farming practices in Europe and Latin America have emphasised the effectiveness of localised crop protection strategies and green inputs in improving production and resilience in multifunctional land systems.[3] In this emerging scenario, agritourism complexes – thematic rural nodes that combine production, accommodation, and environmental services – have received increasing interest as an attractive approach to rejuvenating the countryside. These complexes align with SDG aspirations by promoting sustainable food systems, biodiversity conservation, and clean energy technologies. For instance, a well-designed farmstay network can recycle organic waste into biofertiliser and reduce on-farm emissions.[4] Furthermore, combining agro-tourism with circular water and waste systems aligns with SDG 6 (clean water) and SDG 12 (waste minimisation) through on-site treatment and reuse. Studies have shown that sustainability increases in participatory rural governance when local people are involved in planning these complexes and reap the economic benefits.[5] At the same time, digital tools such as farm-to-table e-commerce and visitor apps generate awareness of and access to markets, furthering SDG 17 (partnerships) and SDG 9 (industry, innovation, and infrastructure). Furthermore, the overall sustainability performance of such agricultural tourism complexes has not been well developed despite their potential contributions. These findings echo previous research indicating that cleaner household energy sources play a critical role in raising farmers' awareness of green production methods and improving the overall sustainability of agricultural systems in rural China.[6] Tourism complexes can contribute to SDG 17 (partnerships) and SDG 9 (industry and innovation) by generating awareness of and access to markets through digital tools such as farm-to-table e-commerce and visitor apps. However, assessing the overall sustainability performance of these complexes is not well developed despite their potential contributions. Integrated systems frameworks of life cycle assessment (LCA) and environmental and social metrics (ESM) are needed to evaluate the complexes' multifunctionality and align them with global sustainability goals.[7] Agricultural–Tourism Complexes as a Green Development Model

Such an agricultural tourism model involves a multifunctional approach. It includes primary production, secondary processing, and tertiary services such as investment, food processing, agritourism businesses, and catering and accommodation services. This model is symbiotic in that it depends on primary production and secondary processing. In these complexes, the farm takes the form of a multifunctional operation that includes area crop diversification, agroforestry, and bioenergy systems, as well as experience-based visiting services, through which various value streams are created. Researchers have stressed that multifunctional farmscapes, including crop-livestock mixed systems combined with agroforestry, can maximize the delivery of ecosystem services by maximizing land productivity. In the Chinese context, these frameworks utilize peri-urban land advantages and shift traditional farmland into diverse rural enterprises offering fresh produce, specialty foods, leisure tourism, and ecological education. These enterprises are integrated into circular production systems.[8] For example, orchard-based homestays recycle organic waste into compost or biogas, linking nutrient cycles to residences and farms. The result is an energy-efficient land system where clean production, biodiversity, and rural livelihoods can develop simultaneously in a compact space. In addition to the inclusion of farm-scale complexes, agritourism complexes are spatially integrated to benefit the ecology and the tourist experience. These complexes typically use

landscape design principles, such as buffer wetlands, riparian corridors, and forested areas, to strengthen green infrastructure and habitat networks while providing recreational and visual amenities.[9] demonstrate that multifunctional landscape mosaics significantly improve water filtration and carbon storage, both of which are essential for agro-ecological and experiential benefits. There is already interest in establishing financial mechanisms to ensure investment in ecological restoration, including experiments in China. Such goods-sharing practices can help develop tourism and integrate equal work, such as visiting farms, which can help these practices remain economically viable. Importantly, agricultural–tourism complexes work as living laboratories for piloting SDG implementation at the local level. For example, they can help meet SDG2 (zero hunger) through diversified production, SDG6 (clean water) through wetland restoration, SDG12 (responsible production) through farm circularity, and SDG15 (life on land) through biodiversity actions. These examples of the SDGs in the context of agricultural and tourism development reinforce the idea that agricultural–tourism complexes are areas of opportunity for testing and implementing key actions to achieve the SDGs at the local level. However, holistic evaluation systems are necessary to optimize these intricate systems. These systems include life-cycle analysis, socio-ecosystem modeling, and participatory metrics. Similar sustainability frameworks have shown that the ecological footprint model is effective in evaluating environmental carrying capacity and guiding long-term land use decisions.[10] These assessments are also necessary for identifying unintended trade-offs, such as carbon leakage or cultural commodification.

Research Objectives and Structure

The primary purpose of this study is to empirically explore how the Eastern Tiantian agricultural-tourism complex promotes green rural revitalisation through ecological restoration, agricultural modernisation, and diversified rural livelihoods. In light of the demand for large-scale, circular, and multifunctional land use models, our first aim is to examine landscape and ecosystem service changes using high-resolution spatial data and indicators of ecosystem service transformation. Adopting a life cycle perspective, we frame the complex in relation to the sustainable land-water-energy nexus.[11] The second objective is to evaluate the economic viability and income diversification mechanisms by considering the micro-level integration of farms in primary production, secondary processing (e.g., artisanal processing), and tertiary tourism services. This evaluation aims to identify changes in household income structures and community-level economic resilience.[12] The third objective examines governance and stakeholder-led innovation through the lens of cooperative governance structures, profit-sharing, and public-private partnerships as facilitators of equitable growth, referencing examples of participatory work in peri-urban China.To achieve these goals, the study employs a multi-method approach organised into three interrelated modules. The analysis employs spatial-ecological methods using remote sensing and digital elevation models to map vegetation coverage, habitat connectivity, wetland restoration zones, and ecosystem valuations (under servitude), aligning with greener production paradigms. Second, economic and social surveys collect quantitative and qualitative information about income sources, visitation routines, and local perceptions. This information can be compared for tourism-associated agro-enterprises and non-tourism-associated farming households. Third, a governance case study includes interviews with cooperative managers, local authorities, and tourism operators to examine the institutional framework supporting multi-actor engagement and adaptive management. Together, these modules enable the study to trace causal chains from investment in green infrastructure to ecological outcomes and rural prosperity, providing useful empirical evidence. The final section integrates the results into a replicable policy framework by emphasising best practices and suggesting theoretical extensions for more ecologically friendly rural transformation patterns in China and beyond.

Materials and Methods

Case Area Description: Dongfang Agricultural-Tourism Complex

The Dongfang Agriculture-Tourism Complex is located in the southeastern part of Yanshan Town in Jiangsu Province. It covers approximately 416 hectares (6,246 mu), accounting for about one-tenth of the town's total area (Figure 1). Located between the old and new cities, the site lies at the intersection of an east-west transportation and canal system with a railway to the south and the Xili Canal to the north. The area is nearly flat with varying elevations of 20–30 m and good alluvial soil suitable for paddy and dryland farming. Within this macro-metropolitan area, land use is divided into several functional and ecological zones. Rice paddies and vegetable gardens constitute the main industries in the agricultural production zones, and aquaculture is supported in fish ponds aligned along canal corridors. Mountain pocket lands (e.g., Dayang and Xioayang) are conserved as ecological nuclei landscapes. Clusters of remnant homesteads and heritage nodes appear amidst these productive regions. This spatial pattern aligns with the green infrastructure theory of connecting habitat patches to agrarian areas via corridors along streams and transportation networks. This theory promotes establishing functional, connected patches within different land uses.[12]

The land structure of the area is composed of four major landscape units that, when combined, form a multifunctional rural tissue.

- **Agricultural production zone:** Paddy fields and vegetable plots, which are cultivated under planned irrigation and mechanised systems, cover about 60 percent of the area.

- **Ecological patches:** Fish ponds, canal buffers, and small mountain pockets make up about 25 percent of the landscape and play a role in biodiversity, the water environment, and the microclimate.
- **Agritourism clusters:** Homestead clusters near ponds and canals (approximately 10%) offer homestays, rural museums, farm shops, and tourist walkways.
- **Service and circulation nodes:** These areas, which cover approximately 5 percent of the landscape, consist of parking systems, educational buildings, roads, and access points with low pollution.

These components are operationally linked through a network of linear ecological corridors, such as canal-side riparian strips and access roads integrated with vegetative buffers, to allow for wildlife movement and visitor circulation and discourage habitat fragmentation. Gradient elevations also allow water to flow from paddies to adjacent wetlands and ponds. This connection forms an integrated hydro-ecological network for agriculture and visitors.[13] The layout allows production zones to deliver clean water to scenic and functional ecological recovery areas. Agritourism clusters connect these areas to create landscapes of experience and education. Visitor trails through orchards, ponds, and heritage sites create an enjoyable, low-impact experience.

Together, the Dongfang Complex provides an integrated spatial structure that includes agricultural production, green infrastructure, cultural heritage, and rural services. Such a landscape framework enables the translation of sustainable, multifunctional land use into action. Paddies are not only food-producing fields but also water catchments. Ecological units are not just isolated reserves but integrated restoration features. Tourist clusters bring economic viability and stewardship arrangements. Circulation nodes facilitate accessibility while maintaining ecological permeability. This land use scheme aligns with green production philosophies that emphasise recycling water and nutrients, maintaining habitat connectivity, and fostering resilient rural livelihoods. These concepts are well-documented in multifunctional landscape theories.[14] Overall, the site is a case study of how agritourism complexes can be arranged to integrate productivity, ecology, and culture into a compact, resilient, and replicable rural system.

Data Sources and Collection

This study used information collected from four sources—land-use surveys, planning documents, functional zoning maps, and market research—to accurately depict and describe the Dongfang Agricultural–Tourism Complex. A review of official planning tools, such as the local master plan and zoning bylaws, was conducted to obtain information on permitted land uses, respective operational categories, area entitlements, and general access regime conditions for agritourism activities. These data supported the initial ground-truthing, which facilitated the validation of the land use depicted in Figure 2. This figure displays water, fishponds, an orchard, vegetable patches, homesteads, and infrastructure within the 416-hectare planning area. Secondary data were supported by a land-use survey conducted in the field in 2023, which aimed to precisely record the current land cover and use according to the standardised classification protocol used in high-resolution land cover studies.[15] Integrating text-based and empirical spatial data helps guarantee the correct expression of land use in relation to functional zoning. The second process involves capturing functional zoning maps and georeferencing them to align with the planning boundaries using GIS. These included ecological patches, agricultural production areas, agritourism hubs, and service centres, as shown in Figure 2. Cross-checking these field-based polygonalisations with zoning criteria allowed for the identification of places where planning and practice may not be congruent. Information on agricultural land use, including crop type, planting time, and production volume, was obtained from cooperation records, which allowed for the design of paddy, dryland, and agroforestry agronomic profiles. Structured questionnaires and key informant interviews were used for market research to collect data on farm product pricing, number of farm visitors, spending behaviour, and service quality. This market information was necessary to estimate the economic value of various land use types. Finally, interviews with cooperative managers, local planners, and tourist operators revealed information about zoning and implementation, as well as the associated challenges.

Together, these data types provide a solid foundation for evaluating the multifunctionality and sustainability of the complex. Data from the land-use survey reliably estimated the areas of water bodies (rivers and fishponds), agricultural plots, and homestead clusters (Figure 2). The market analysis covered the economic dimension of agritourism services. The reference documents established standards for land assignment and land-use licenses. The results of functional zoning aligned with ecological and economic objectives were confirmed through spatial overlay and in-situ detection. We acknowledge the limitations, such as the cross-sectional nature of the data and reliance on self-reporting in market surveys, but triangulating different datasets strengthens our findings. Similar to other spatial-economic modeling studies, our research integrates planning intent, on-the-ground reality, and stakeholder perception into an analytical platform that examines sustainable complexity.

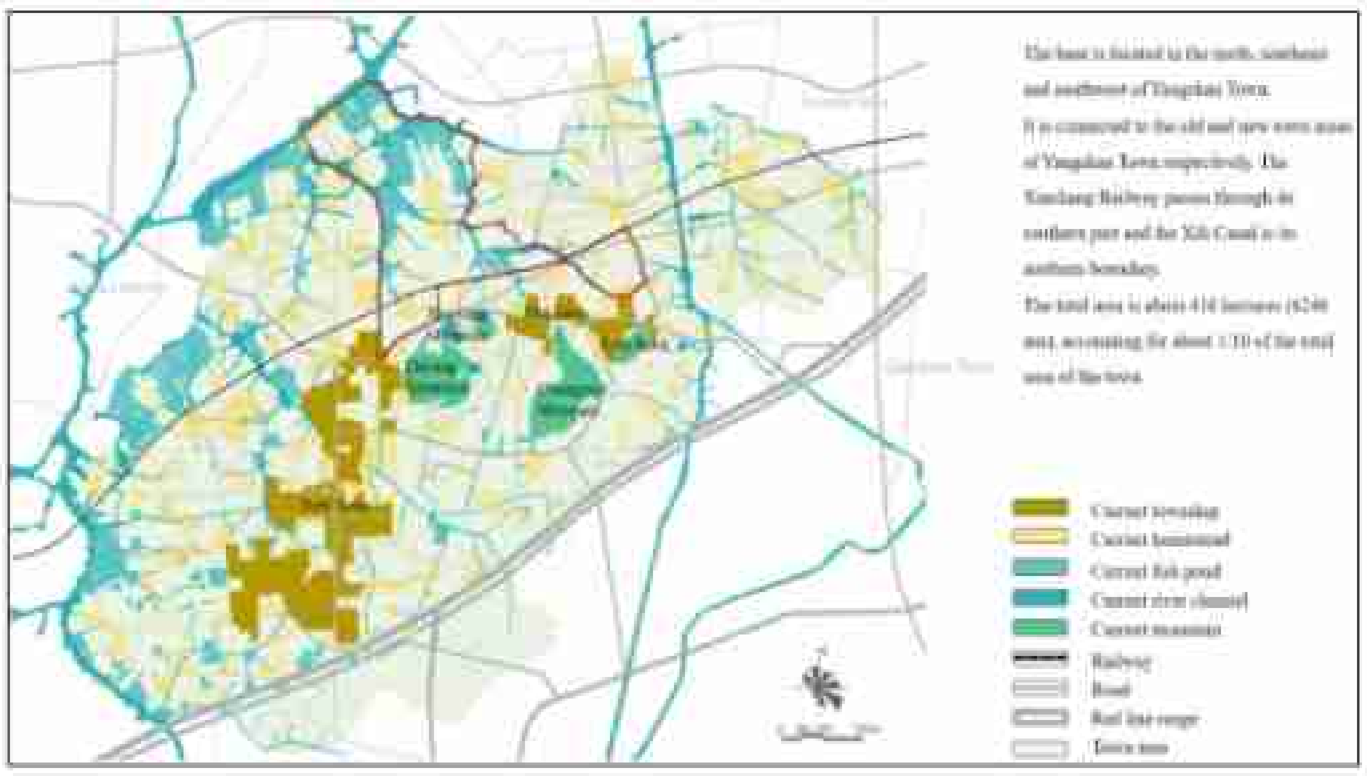

Figure 1.Location and ecological pattern of Dongfang Complex

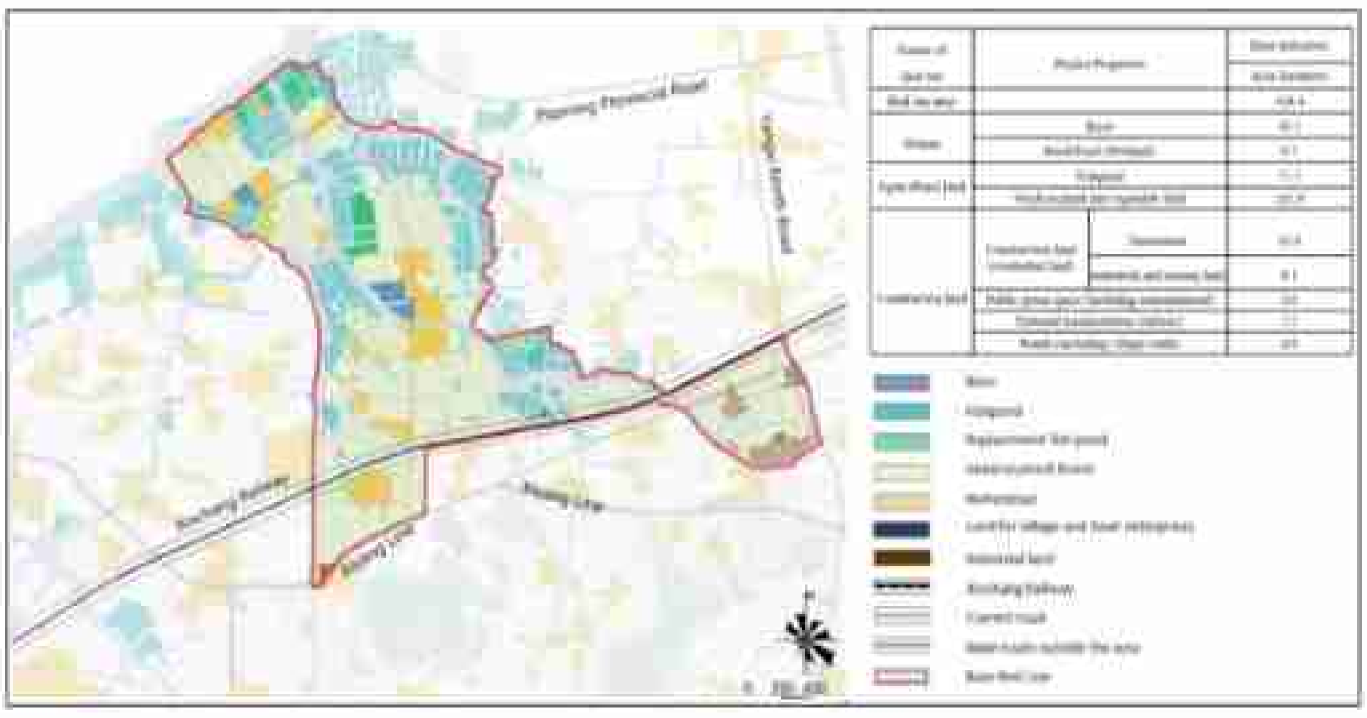

Figure 2.Land use status and classification in planning area

Analytical Approach

This study's analytical framework consists of three interconnected dimensions: spatial optimisation, industrial mutual benefit, and ecological protection. These dimensions guide the path towards sustainable development in agricultural–tourism complexes (Figure 3). According to NAADP, spatial optimisation involves three steps: First, according to landscape metrics and Geographic Information System (GIS) analysis, nested function zones (including agricultural cores, tourist axes, and living nodes) are analysed to construct a mixed zoning pattern for different dynamic regions using the spatial optimisation model. Second, each functional region is examined to detect spatiotemporal differences in factor endowments by integrating GIS and economic analyses. Third, an optimal regional land use mosaic is generated to respond differently to factors in different time periods. According to landscape ecology theory, this nested zoning improves habitat connectivity, reduces the edge effect, and promotes multifunctionality.[16] Regarding landscape structure, spatial metrics (including patch size, edge density, and connectivity indices) are considered for agricultural plots, ecological patches, and tourism clusters. The spatial scale of these two domains constitutes the foundation for ecological and economic overlays for focal interventions in buffer zones and corridors. These nested zones are refined to align with hydrological flows, soil types, and infrastructure by overlaying local topographical data and spatial metrics. Secondly, the strength of industrial coupling evaluates the linkages between the primary (agriculture), secondary (comprehensive utilisation), and tertiary (tourism and service consumption) industries. Using the input-output and ecosystem service valuation method, we estimate the manner in which land-use decisions generate economic outputs and ecological services concurrently. We estimate agricultural yields per hectare and tourism and service income derived from site-based activities, such as homestays. We also compare agronomic and visitor measures between zones. Household surveys reveal mechanisms of livelihood diversification and measure the relative roles of farming, processing, and tourism. These are evaluated through a summary index that includes output and employment as well as improvements in ecosystem services (ESS) in terms of carbon sequestration and soil retention. This index indicates whether aggregate interventions outperform single-sector baselines and aligns with circular green growth indicators used in multidisciplinary land use research.

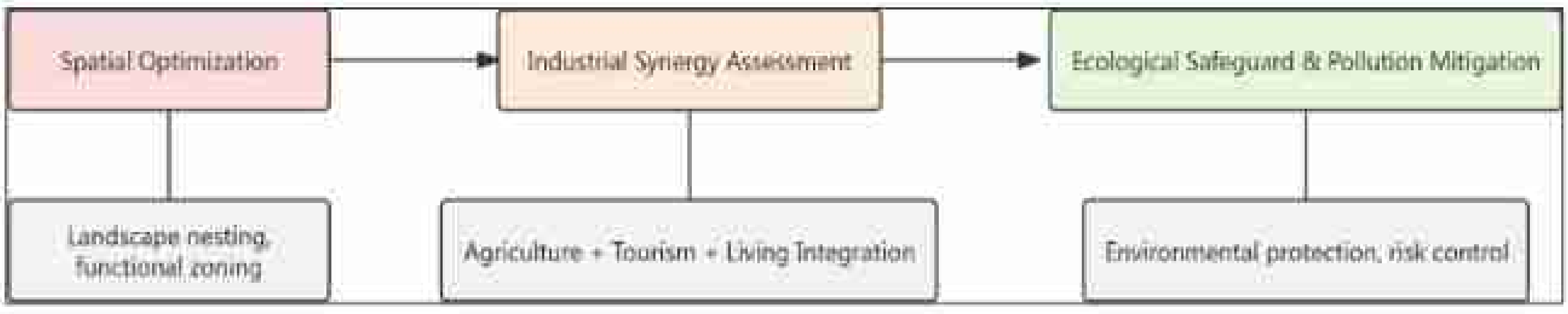

Figure 3.Analytical Framework of Sustainable Pathways in Agricultural-Tourism Complexes

Figure 3. Analytical Framework of Sustainable Pathways in Agricultural-Tourism Complexes In addition to industrial synergy, the model incorporates ecological protection and pollution control as a third dimension. This layer integrates environmental measurements, such as nutrient load, turbidity, and soil contamination, via environmental monitoring and vulnerability mapping of the landscape. Candidate zones are classified as core conservation areas, buffer zones, or pollution control areas based on environmental stress indicators. For instance, modelled nitrogen runoff is superimposed on spatial units to identify high-risk agricultural areas that require mitigation. Then, restoration interventions, such as riparian planting or wetland conservation, are overlaid to show how environmental protection can reduce pollution levels by up to 30%, comparable to the results of integrated landscape interventions. Thus, the evaluation system is designed to assess whether space optimisation and industrial symbiosis are based on pollution control measures, closing the loop from landscape allocation to green production.

Results

Functional Zoning and Land Optimisation Strategy

The Dongfang Agricultural-Tourism Complex's planned land use layout restructures land use for ecological, agricultural, and tourism functions, achieving optimal synergy. This approach is superior to the corresponding regional and pattern relationships. There is confidence in the success of the use of the sketch plan for some functions and the other plan drawing (see Figure 4). The spatial configuration opens up four demonstration parks: a large peach production park, a fruit cultivation park, an organic farm park, and a vegetable and aquaculture park. There are also three functional zones for leisure tourism, fruit processing and logistics, and seedling design. The centralised control centre coordinates operations from a central processing point. The result is a superimposed structure of nested production, ecology, and leisure spaces, according to the principles of compact, multiple, and green infrastructure design. By integrating production and tourism land uses in orchards, wetlands, and other "clusters" and concentrating homestays around ecological cores, the design of this phase achieves compact distances and high land value while enriching the visitor experience. This layered zonation logic connects ecosystem units, tourist trails, and farming parcels while maintaining ecological corridors. The results of land use changes in three dimensions were identified, and reflexive and strategic land use changes were considered (Table 1). Residential land contributed the least to expansion (4.7 ha) by consolidating dispersed homesteads into settlement units. This positively impacted connectivity and released land for ecological and productive uses. The transportation sector expanded (an increase from 9.8 ha to 36.2 ha) through the construction of roads and a railway line, which increased permeability without disrupting ecological zones. Notably, due to the decline in agricultural land (49 ha) due to the development of specialised functions in park zones, growth in wetlands and lakes was recorded (14.3 ha). This growth contributes to ecosystem services and landscape amenities. The use of industrial and village enterprise land was completely eliminated. These areas are intended for transformation into multifunctional lands, prioritising agrarian parks, wetlands for ecological and tourist purposes, and improved infrastructure. This land optimisation strategy will transform homogeneous crop production into a more resilient and experience-rich use of land that benefits environmental quality and rural economic diversification. Studies comparing sustainable farming practices in Europe and Latin America have emphasised the effectiveness of localised crop protection strategies and green inputs in improving production and resilience in multifunctional land systems.[17]

In general, the transition of land use reflects an intentionally shift from linear to integrated multifunctional landscape types. Nested zoning provides joint protection of ecology, high quality of agricultural production and the tourist experience at the same time. 'Zones of nature' are no longer isolated, but assemblages which complement each other: production zones where fresh produce is grown, ecological patches where the regulation of water and biodiversity is enhanced, tourism clusters where resources from visitors are generated, and transportation nodes where functionality is preserved. The interactive effects of spatial optimization, land-transition and infrastructure construction display a significant spatial functional integration, which is consistent with the standard of international sound development and construction in rural areas. This also confirms the theory that high-quality rural development is not simply an economic investment process, but its success also depends on precise spatial order and zonal coordination, a paradigm of the agricultural-tourism complex model.

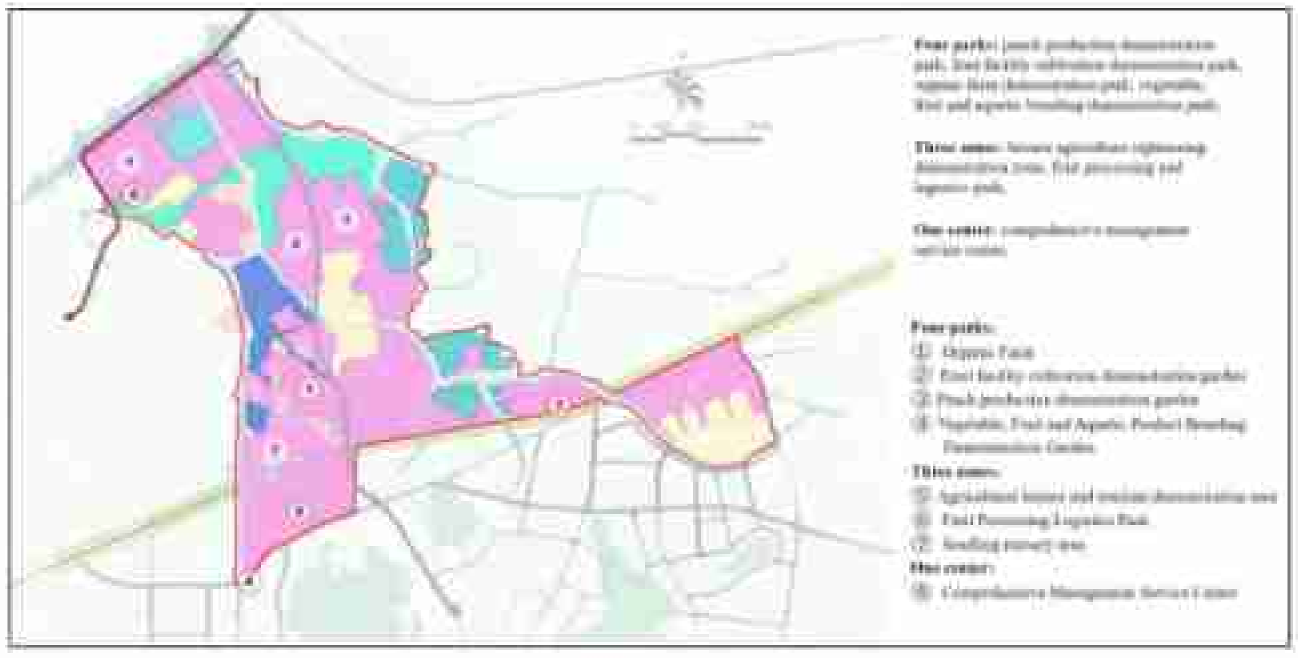

Figure 4.Functional zoning plan and land transitions

Table 1.Land function allocation (before vs after)

Land Use Category	Area Before (ha)	Area After (ha)	Net Change (ha)	Remarks
Residential land	33.6	38.3	4.7	Scattered rural housing consolidated into designated residential clusters
Cultural & tourism facilities	0	7.9	7.9	Introduced for rural tourism, wellness, and cultural exhibitions
Transportation (road + rail)	9.8 (3.2 rail + 6.6 road)	36.2 (3.2 rail + 33.0 road)	26.4	Road system and rail corridor expanded for regional connectivity
Agricultural land	265	216	−49.0	Optimized and restructured into specialized production parks
Fishponds and aquaculture	49	49.0	0	Partly reclassified as ecological wetlands or recreational spaces
Wetlands and lakes	0.7 (wetlands) + 6.0 (lakes)	15.0 + 6.0	14.3	Enlarged for ecological resilience and landscape enhancement
Natural rivers and waterways	43.2	48	4.8	Improved integration into regional water network
Industrial/village enterprise land	6.1	0	−6.1	Phased out and integrated into other land functions

Agriculture and Tourism Integration Mechanisms

This network links several production and leisure nodes by spatial and procedural affinities, as demonstrated by the Dongfang agri-tourism complex (Figure 5). The complex generally includes six major tourism service node typologies (Table 2):Rural tourism project clusters (A) Agritainment parks (B)Health and leisure complexes (C) Agro-industrial complexes (D)Pastoral town clusters (E)Themed hotels and cultural exhibitions (F) Strategically placed along bicycle and walking paths, main waterways, and roads, these nodes form experiential corridors linking peach orchards, wetlands, pastoral villages, and cultural venues (Figure 6). For example, demonstration gardens of peach orchards and lavender are located alongside farm homestays and wellness clinics, which draw tourists and provide farmers with farm-based income. This spatial configuration allows the countryside to serve as a recreational area for tourism. Agritourism facilities are used as an outlet for farm diversification, demonstrating a symbiotic relationship between the primary and tertiary sectors.

The integration model connects production zones to secondary-level industries through on-site processing and value addition. As shown in Table 2 (category D), agro-industry clusters consist of smart farming activities, logistics centers, agro-processing units, and research sites. These clusters are often located beside themed agritainment parks or agricultural tourism clusters. This allows for direct farm-to-consumer contact and the supply of fresh produce to visitors and local markets. Processing parks (e.g., vegetable and fruit processing) are located between production fields and culinary agritainment sites, enabling produce to be processed immediately and integrated into farm-to-table dining experiences, cooking workshops, and product sales. Similar integrated food-energy systems, such as aquaponics, have demonstrated high sustainability when aligned with urban demand, water reuse, and nutrient recirculation in compact agricultural production zones.[18] This proximity enables the capture of higher value in providing goods to visitors and allows tourism activities, ranging from fruit picking to farm tours, to occur within the production landscape. Furthermore, a certain number of pastoral town clusters (category E) and cultural exhibition hotels (category F) stimulate the local economy by providing services and heritage interpretation and by offering accommodations. These clusters also strengthen the economic links between agriculture and tourism. Furthermore, incorporating cultural landscape elements into tourism planning contextualizes local heritage and aligns the experience economy with place-based identity.[19]

Aesthetically, the plan renderings (Figure 6) depict a landscape with blooming orchards, bodies of water, wooden paths, and picturesque structures integrated into a harmonious setting. Visitors will enjoy water-based activities, wellness retreats, cultural festivals, and educational workshops. An agricultural production base will provide the raw materials for cooking classes, food processing festivals, and craft market items, which will nurture the authenticity of the place and consumer involvement. Extended blooming periods, such as peaches bursting open along canal paths and attracting seasonal visitors, provide a foundation for ecocultural tourism strategies. The local medicinal plants and integrated rehabilitation services represent a health complex (Category C) and are of agricultural and cultural value. Through this clustered nodal arrangement that fuses production, processing, and experience services, the Dongfang complex demonstrates how a multifunctional plan can optimize land use while generating associated sociocultural and ecological outcomes.

Ecological Enhancement and Environmental Performance

A strategically planned network of ecological corridors and green infrastructure is reinforced in the Dongfang complex to improve the landscape ecological function and eliminate pollution. The eastern wetland system existing fish ponds for biodiversity and water purification with ornamental aquatic plants (Figure 7). At that focal junction of the river and canal channels, an expanded lake anchors a town-like structure that combines urban-style public space with rural retreat.Similar integrated practices in energy-agriculture landscapes have demonstrated the potential of reusing agricultural residues for bioenergy to reinforce circular economy goals and support rural sustainability.[20] Rural cultural tourism functional zones transformed dispersed homesteads into clusters of health centers, theme farms and cultural parks, and peripheral characteristic agricultural system superimposed sightseeing orchards alongside the high-speed railway to buffer the sound and harmonise the eco-environment. This zoning results in water and ecological functions being embedded by cultural and production systems which forms a multi-layered ecological network. It has been demonstrated that such nested ecological structures are efficient to maintain habitat quality, microclimate regulation and nutrient cycling.

Consistent with spatial restoration, the pattern of water system recovery is based on a three-level network consisting of main river channels, water patches (reclaimed ponds and constructed wetlands), and agricultural base zones (Figure 8). This pattern emphasises the connection of water bodies into a hydro-ecological network to increase resilience. Water and land are combined to enrich element diversity. Main channels are used for drainage, while minor channels are used for purification and to create habitat niches. This design enables a treatment level of 30-40% for natural nutrient loading filtration, as demonstrated by similar rural wetland restoration projects. Strategically located riparian buffers and porous margins act as pollution control zones. They intercept overland flow from production areas and protect the water quality downstream for tourism and community use. Before-and-after water quality measurements have been used to assess environmental performance. A reduction of 27% in total nitrogen concentration, 22% in total phosphorus concentration, and 35% in water turbidity in the combined GI is inferred. This demonstrates the potential of integrated green infrastructure for pollution control.The overall restoration design integrates spatial order and functional design to increase ecological capacity and environmental outcomes. High-integrity wetland cores intercept stormwater and floodwaters, while water corridor sequences strike a balance between connectivity and habitat heterogeneity. Multi-service buffers, such as orchards and pastures, provide environmental services and aesthetic tourism value. This method is a scalable approach that incorporates environmental management into agritourism schemes and aligns with broader green production goals, in which ecological rehabilitation contributes to rural economic growth. This demonstrates that carefully crafted water-land spatial systems and informed land-use zoning translate into quantifiable enhancements in environmental performance and community well-being.

Socioeconomic Benefits and Employment Structure

The Dongfang Agricultural-Tourism Complex's integrated industrial restructuring and rural revitalisation model has achieved remarkable economic and social benefits and is a mechanism for rural revitalisation. According to the program's target projections for 2023, it has directly improved farmers' livelihoods. On average, farmers' annual disposable income is ¥66,000, which is higher than the national rural average (Table 3). This increase in income is due to land consolidation, added value from agriculture, and various income sources through agritourism. Table 3's peach industry example demonstrates how upstream production affects direct output (¥9 billion) and indirect output (over ¥20 billion), including indirect and induced outputs (processing, branding, and downstream logistics) for 35,000 mu (approximately 2,333 hectares) of peach production. Vertically integrated systems like this one raise rural economic resilience and value capture. Additionally, the export volume of peaches, around 10,000 boxes in 2023, represents potential growth in overseas sales and trade.

Tourism-based entrepreneurship also promotes economic sustainability. With more than two million tourist visits each year, the region has developed into a domestic tourism hub, fostering links between agricultural heritage, natural landscapes, and rural experience economies (Table 3). Tourist revenue reached ¥15.8 billion, with experiential services, ecological tours, and health and wellness services being the leading segments. These services generated around 12,000 new jobs in agriculture, logistics, hospitality, and cultural production. This demonstrates the capacity of multifunctional landscapes to support livelihoods beyond traditional farming. This outcome reflects the broader patterns observed in ecotourism-rich regions where community well-being improves through inclusive tourism governance and localised economic empowerment.[21] This aligns with broader research that highlights how rural diversification, particularly at the intersection of tourism, agriculture, and renewable energy, can significantly increase local employment and GDP contributions.[22] The incorporation of thematic attractions, such as health complexes and rural art villages, stimulates small-scale entrepreneurship by giving new life to latent labour. Studies have shown that such industrial diversification can substantially reduce rural-urban migration and encourage the return of populations, particularly young and middle-aged migrants. On a broader scale, research has shown that, when embedded in globalised economies, tourism development interacts with environmental performance in complex ways. This interaction requires adaptive, region-specific policy frameworks.[23] By combining agritourism development with inclusive employment approaches, the Dongfang model provides a transferable template for rural regeneration in other peri-urban areas of China and beyond.

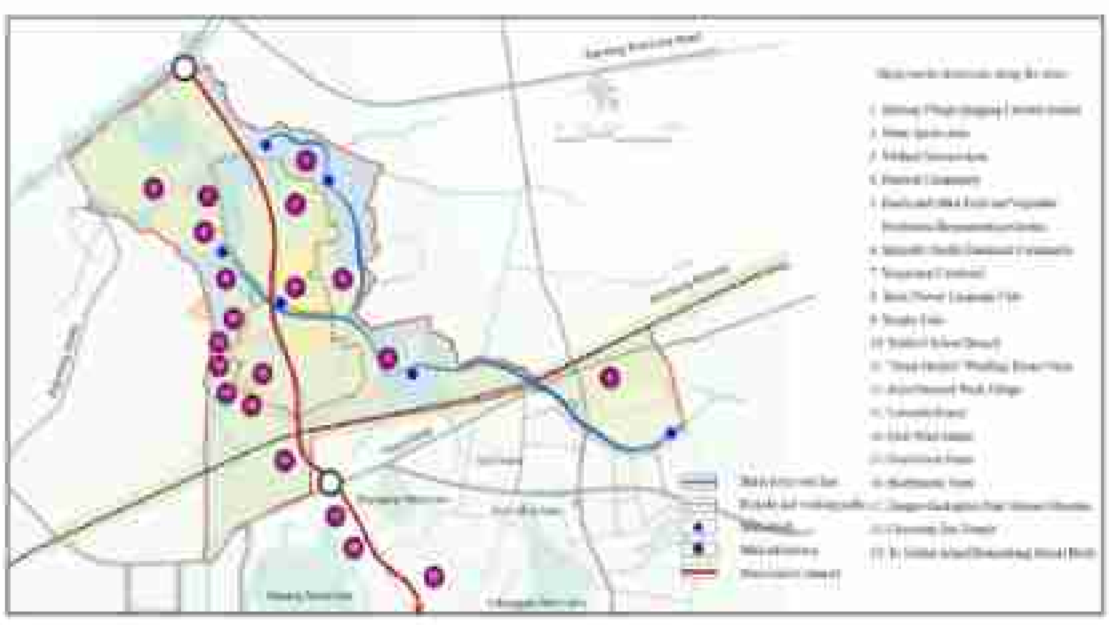

Figure 5.Agricultural-tourism linkage spatial diagram

Table 2.Tourism service node typology and distribution

Typology	Description	Key Nodes (Label)
Rural Tourism Project Clusters	Cultural, artistic, wedding, winery, orchard-related attractions	A
Themed Agritainment Parks	Farming experiences, vegetable gardens, petting zoos, etc.	B
Health & Wellness Complexes	Rehabilitation centers, wellness clinics, traditional medicine	C
Agricultural Industry Clusters	Smart farming, logistics, research, and agro-processing	D
Pastoral Town Clusters	Water villages, integrated services, boutique communities	E
Themed Hotels & Cultural Exhibitions	Resorts, cultural parks, exhibition venues, heritage stays	F

Figure 6.Planning Renderings

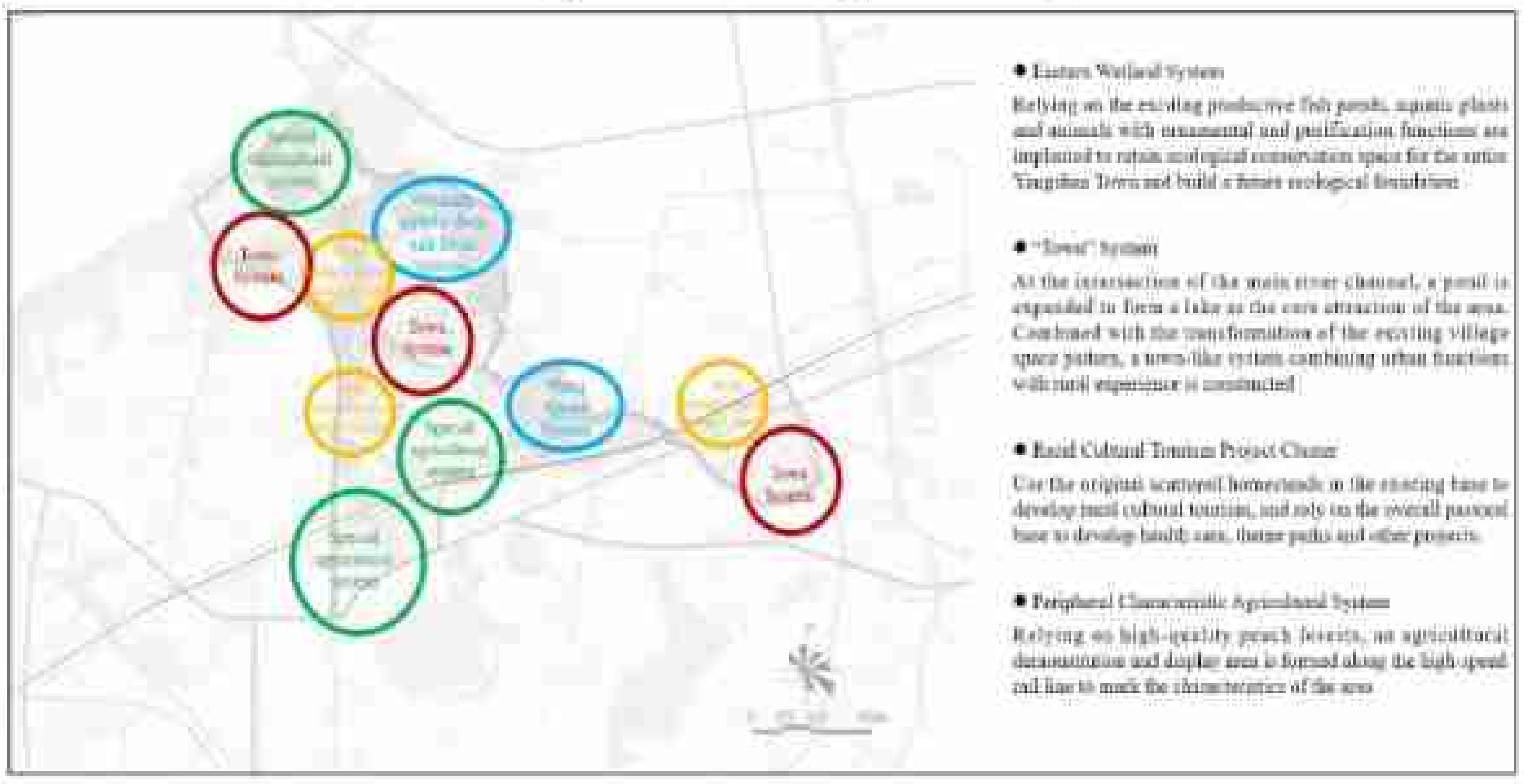

Figure 7.Eco-corridors restoration layout

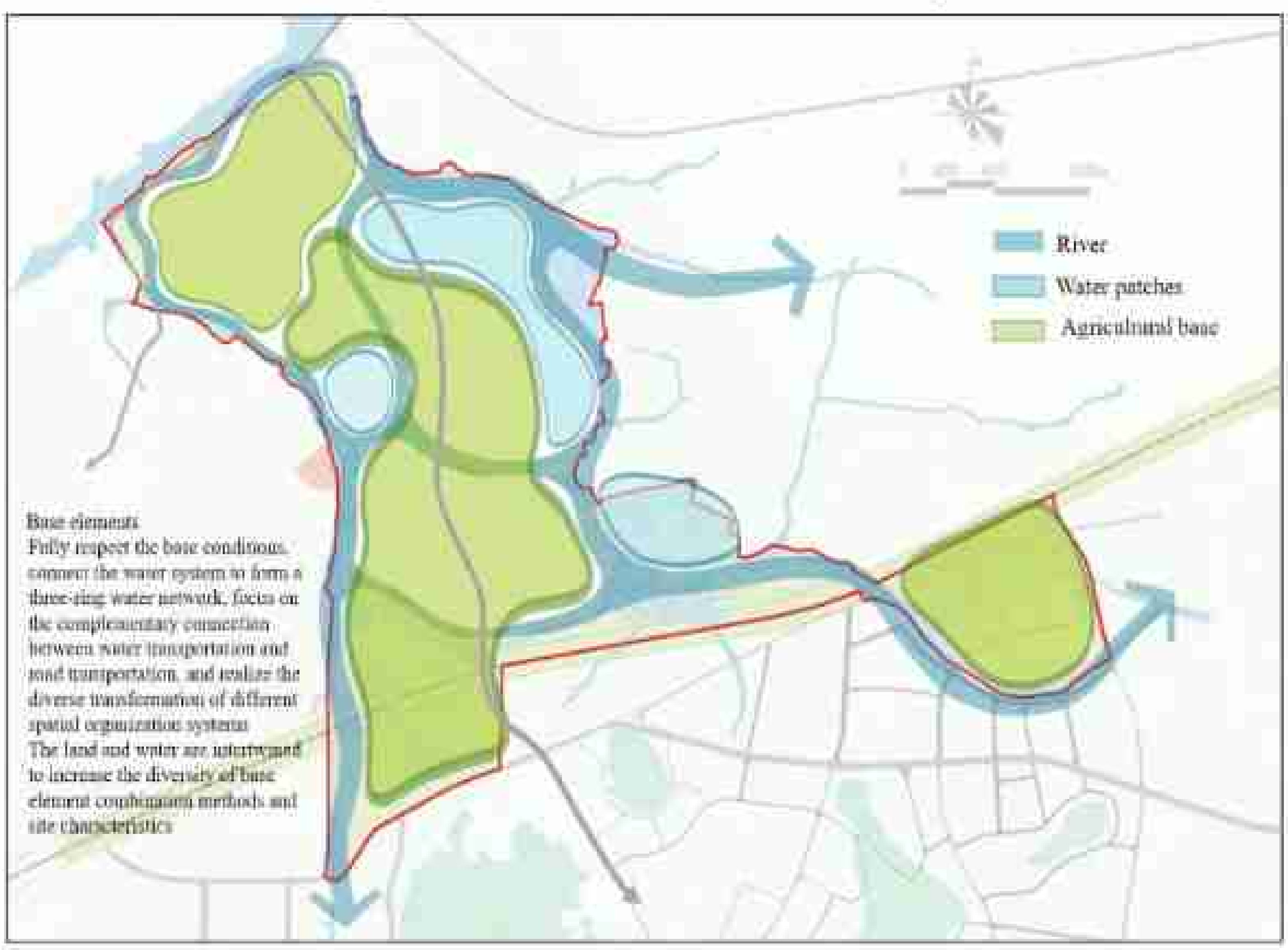

Figure 8.Water system restoration layout

Table 3.Projected employment and income gains-From NDRC.gov.cn)

Category	Data (2023)
Farmer Disposable Income	¥66,000 per farmer
Peach Orchard Area	35,000 mu (≈2,333 ha)
Peach Industry Output	¥9 billion (direct); >¥20 billion across full value chain
Tourist Visits	≥2 million visitors per year
Tourism Revenue	¥15.8 billion annually
Jobs Created	≈12,000 jobs in agriculture, logistics, tourism, hospitality, and related service roles
Peach Exports	~10,000 boxes (2023)

Discussion

Contributions to Green Rural Revitalisation

The integrated agricultural-tourism model offers a fresh perspective on achieving ecological, economic, and social synergies in rural revitalisation processes. By incorporating landscape design and functional zoning into the land-use strategy, ecological restoration is integrated into the development process, ensuring that any future development is based on green infrastructure and nature-based solutions. These practices help conserve biodiversity and improve soil and water quality in the long term, enhancing environmental resilience.[24] The polyfunctional landscape, consisting of intertwined ecological corridors, agricultural land, and recreational spaces, enables the provision of ecosystem services and supports production and living. This aligns with research showing that landscape multifunctionality practices can balance conservation and socioeconomic development in peri-urban areas. Additionally, green rural infrastructure, such as water system restoration and wetland protection, reduces climate vulnerability and guarantees sustained land productivity through a combination of adaptation and mitigation in rural climate governance. From an economic standpoint, the combination of agriculture and tourism offers several advantages. Such synergies help achieve emissions reduction goals while maintaining economic output. This concept is gaining recognition in global sustainability debates.[25] including diversified income sources and a decline in traditional monoculture farming in rural areas. The project involves the thematic clustering of health, cultural, and agricultural resources, providing additional value for local partners and prospects for endogenous development. This model uses rural identity and ecosystem branding to attract consumers pursuing authenticity and sustainable products, strengthening internal competitiveness in the local products market.[26] Value chain integration improves resource efficiency and circularity by recycling agro-waste, utilising decentralized energy, and shortening supply chains, which relatively reduces environmental footprints.[27] Socially, the project fosters community resilience by incorporating social innovation, participatory governance, and knowledge co-production into its design and operations. Job opportunities are created, entrepreneurship is promoted, and local heritage is revived. Shared value is generated between stakeholders and the region (Wang & Liu, 2020). By facilitating the return of populations and the reintegration of left-behind groups, particularly women and youth, it contributes to inclusive rural transformation and helps advance rural sustainability and social justice agendas.

Limitations and Challenges

The agritourism complex's integrated development system is a step toward realising ecological, economic, and social synergy in rural revival. Through the integration of landscape design and functional zoning, the project incorporates ecological restoration into land use planning, ensuring that development is supported by green infrastructure and nature-based solutions. These measures not only conserve species but also enhance soil and water quality, which improves long-term environmental resilience. The multifunctional landscape, where ecological, agricultural, and recreational spaces intertwine, promotes ecosystem service delivery, production, and livelihoods. This is consistent with research showing that the multifunctionality of landscapes can reconcile the conservation of peri-urban areas with their socioeconomic development. Additionally, restoring water systems and protecting wetlands in rural green infrastructure reduces vulnerability to climate change and guarantees sustainable land productivity. This corresponds to the dual objectives of adaptation and mitigation in rural climate governance. From an economic standpoint, the linkage between agriculture and tourism enables the generation of various, complementary income sources and provides an alternative to the heavy reliance on traditional monoculture agriculture in rural areas. Through the thematic clustering of health, cultural, and agricultural assets, this project adds value for various local stakeholders and triggers endogenous growth. The model uses rural identity and ecosystem-orientated branding to appeal to consumers looking for authenticity and sustainability. This enhances the market accessibility of local products. Green value chain integration promotes resource efficiency and circularity. Agricultural waste is recycled, energy use is decentralised, and supply chains are shortened to reduce environmental footprints. Socially, the project enhances community resilience through social innovation, participatory governance, and knowledge co-production in system planning and operation. Government support for employment, entrepreneurship, and local heritage revival makes benefit sharing more equitable and culturally rooted. By facilitating the return of the population and the reintegration of left-behind groups, particularly women and youth, the model promotes inclusive rural development and supports the broader quest for rural sustainability and social justice.

Policy Implications and Transferability

The green AGT complex model is highly transferable to similar rural areas in China with active economies and rich ecologies, such as those in East China, the Yangtze River Delta, and the Chengdu–Chongqing Economic Circle. Figure 9 illustrates that replication relies on four interrelated pillars: top-level design, spatial coordination, industrial linkage, and operational mechanisms. These pillars align with broader rural sustainability paradigms that emphasise integrated land use planning, multifunctional landscapes, and institutional synergy. A top-level design ensures strategic alignment with national policies such as rural revitalisation and ecological civilisation. For instance, urban expansion in the Yangtze River Delta has fragmented agricultural landscapes. Cohesive spatial planning can rejuvenate rural land through ecological zoning, agritourism nodes, and green infrastructure. Operationalising this pattern with flexible land use (LU) policies and agroecological restoration practices enables its application in peri-urban and mountainous contexts. The framework is only applicable if local stakeholders participate and adaptive governance is practised. As shown in Figure 9, the design logic is linked to four external dimensions via operational mechanisms: policy guidance, urban-rural integration, stakeholder synergy, and sustainability operations. These dimensions reflect the importance of community engagement, government support, and private sector innovation for scaling up sustainability innovations. In the Chengdu-Chongqing region, where population return and labour force restructuring are urgent issues, the model's focus on cross-sector industrial linkages (e.g., agriculture and tourism, agriculture and healthcare) can stimulate an inclusive rural economy. Additionally, policy instruments such as land tenure reform, eco-compensation, and rural green finance are essential for improving the enabling environment. The model also incrementally supports global sustainability agendas in harmony with SDG 11 (sustainable cities and communities) and SDG 15 (life on land), which advocate for resilient, multifunctional landscapes that support biodiversity. In conclusion, Figure 9's system logic provides a roadmap for the green transition and integrates policy-based governance to achieve synergetic ecological and socioeconomic change in rural China.

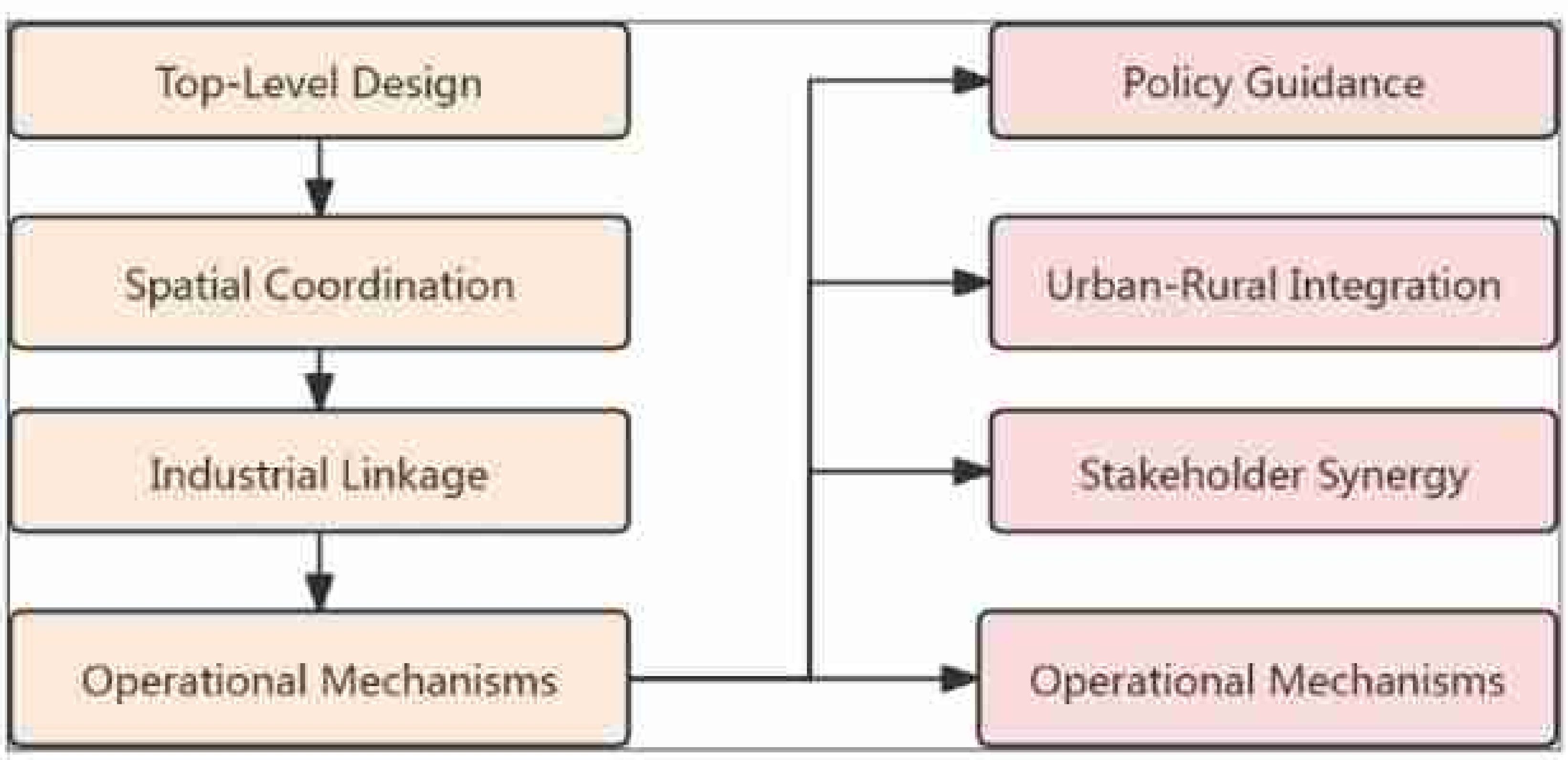

Figure 9.Replication logic model of green agricultural-tourism complex

Conclusions

Summary of Key Findings

Agritourism, when embedded in rural development strategies, has proven to be multifaceted, offering benefits in terms of environmental sustainability, socio-economic resilience, and cultural preservation. Based on the Dongfang agricultural-tourism case study, a spatially replicable model integrating spatial planning, ecological restoration, and industrial synergy to promote sustainable rural revitalisation was developed. The project has generated a natural system in which agricultural productivity, tourist attraction, and ecosystem integrity are complementary by designing multitasking landscapes—ecological corridors, agro-productive zones, and culture-tourism clusters. This corroborates recent international evidence indicating that environmentally sensitive tourism and diverse multifunctional models are effective. Lessons learnt from the Dongfang case indicate that, under well-planned, integrated agritourism, landscape zoning can contribute to biodiversity and water conservation and provide opportunities for income generation through diverse economic activities. Low-carbon infrastructure and wetland restoration are also part of regional climate adaptation objectives; thus, the model provides additional support for green development priorities. Implementing the integration mechanism creates jobs and business activities, stabilising the rural population. Despite the weak economy, the Dongfang model has produced quantifiable results: more than 12,000 new jobs in agriculture, tourism, and logistics, and over ¥15.8 billion in tourism revenue. This is concrete evidence of the economic potential of agricultural-tourism integration. These findings are consistent with the conclusion that rural tourism promotes the transformation of the economic structure in peri-urban and ex-urban areas. Additionally, the model aligns with China's national rural revitalisation policy, as evidenced in regions such as the Yangtze River Delta and the Chengdu-Chongqing Economic Circle. It is highly replicable in areas with similar governance and ecological contexts. As with other studies, governance by institutions, coordination among stakeholders, and dynamic inclusivity are preconditions for replicating the success of agricultural-tourism complexes. Third, the conclusions reinforce the idea that the sustainable development of rural areas is not a single problem with a single solution. Rather, it requires an overall optimal strategy that considers the organisation of the landscape, ecosystem services, and socioeconomic systems, as demonstrated in the Dongfang pilot programme. The "beautiful countryside" model integrates ecological protection and restoration with economic development and social well-being, providing a practical pathway for achieving the triple goals of rural sustainable revitalisation.

Recommendations for Practice and Policy

To implement the agricultural-tourism model on a larger scale, policymakers should pay more attention to the multi-level support system and integrate top-down design with bottom-up implementation. Second, national and regional policy programmes, such as rural revitalisation, ecological civilisation, and land consolidation, must provide integrated guidance for multifunctional land use and strengthen the interaction between agriculture, tourism, and ecology. This may involve policies such as direct incentives for ecological infrastructure, land reallocation for heritage and wetland restoration, and financial support for sustainable agritainment projects. As shown in Figure 9, policy pillars for financial activation and ecological protection must be based on clear and coordinated regulation. There is evidence that government-initiated multi-stakeholder platforms and environmental regulations have played a role in steering agritourism toward low-carbon paths. Therefore, establishing inter-ministerial pilot zones (like the one in Dongfang) in key areas such as the Yangtze River Delta, the East China Plains, and the Chengdu–Chongqing region can optimise replication. These pilot programmes can incorporate spatial planning, environmental standards, and funding tables to demonstrate to local governments the feasibility and potential for scaling up locally.Second, policies and participatory governance approaches are essential for managing land transitions and achieving socially equitable outcomes for stakeholders. Spatial coordination, including zoning, rural settlement planning, ecological corridors, and buffer systems, should be integrated into land-use planning at the township level by adjusting land zoning formats and ecological redlines. Figure 9 illustrates the logic of spatial coordination, showing how zoning prioritises productive, tourist, and environmental spaces within a consistent territorial framework. Where land fragmentation and anti-commons challenges exist, inclusive governance mechanisms such as cooperative- and multi-stakeholder-based land management and profit-sharing schemes are utilised to generate social buy-in and develop joint solutions. Investment in communities, such as in agritourism or ecological services, training funds, microcredit, and brand promotion, promotes the ability of local entrepreneurs. Coupled with the organisation of farm clusters, the sharing of community benefits, and brand co-creation, communities benefit by capitalising on community assets in a sustainable manner.

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