



# 江苏省南通市石港镇乡村河道生产性景观设计 PRODUCTIVE LANDSCAPE DESIGN FOR THE RURAL RIVER CHANNELS IN SHIGANG TOWN OF NANTONG, JIANGSU PROVINCE

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1. 湿地种植院落效果图

1. Rendering of the yard for wetland crop planting

## 1 项目背景

作为江南水乡的生命脉络, 乡村河道正面临着景观同质化、生态环境破坏等问题。基于对现有乡村河道游览模式的反思, 本文旨在探索一种兼顾河道生态保护与地域文化复兴的设计范式。在江苏省南通市石港镇乡村河道更新项目中, 项目团队将乡村河道生态保护与承载着乡村传统记忆的体验式生产性景观相结合, 力图打造乡土化、多样化的河道景观, 形成融生产、生活和生态为一体的乡村复兴模式。

## 2 传统临水生产模式

项目所在地石港渔湾原为海中沙洲, 之后海岸线东移, 石港渔湾所在地块出露水面, 沙滩上的水凹串联起来形成了曲折蜿蜒的渔湾水道, 其主水道全长15km, 流域面积3.75km<sup>2</sup>, 从南通市石港镇穿流而过。自古以来, 渔湾水道沿岸聚集了大量村庄, 村民依河而居, 形成了独具地域特色的传统临水生产生活模式:

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### 摘要

乡村河道是江南水乡所依赖的生存空间要素和生产经营场所, 体现着水乡独特的文化属性。但随着经济社会的发展, 乡村景观同质化、生态环境破坏等问题愈发严峻。本项目以江苏省南通市石港镇渔湾河道为研究对象, 在对乡村河道进行生态保护的基础上, 借鉴传统临水生产模式, 提出了乡村体验式生产性景观的设计策略, 以推动生产、生活和生态三者融合共生。

### 关键词

乡村河道; 生态修复; 临水生产模式; 院落记忆; 体验式生产性景观

### ABSTRACT

In the rural south of the lower reaches of the Yangtze River, river channels, which provide locals with space for living and production, are currently faced with problems such as featureless landscape and environmental degradation due to rapid social and economic development. Inspired by the traditional riverfront production pattern, this project aims at ecological restoration and environment protection by creating experiencing productive landscape in the Fishery Bay of Shigang Town, Nantong, Jiangsu Province, and integrating production, living, and ecology on the site as a whole.

### KEY WORDS

Rural River Channel; Ecological Restoration; Riverfront Production Pattern; Nostalgia; Experiencing Productive Landscape

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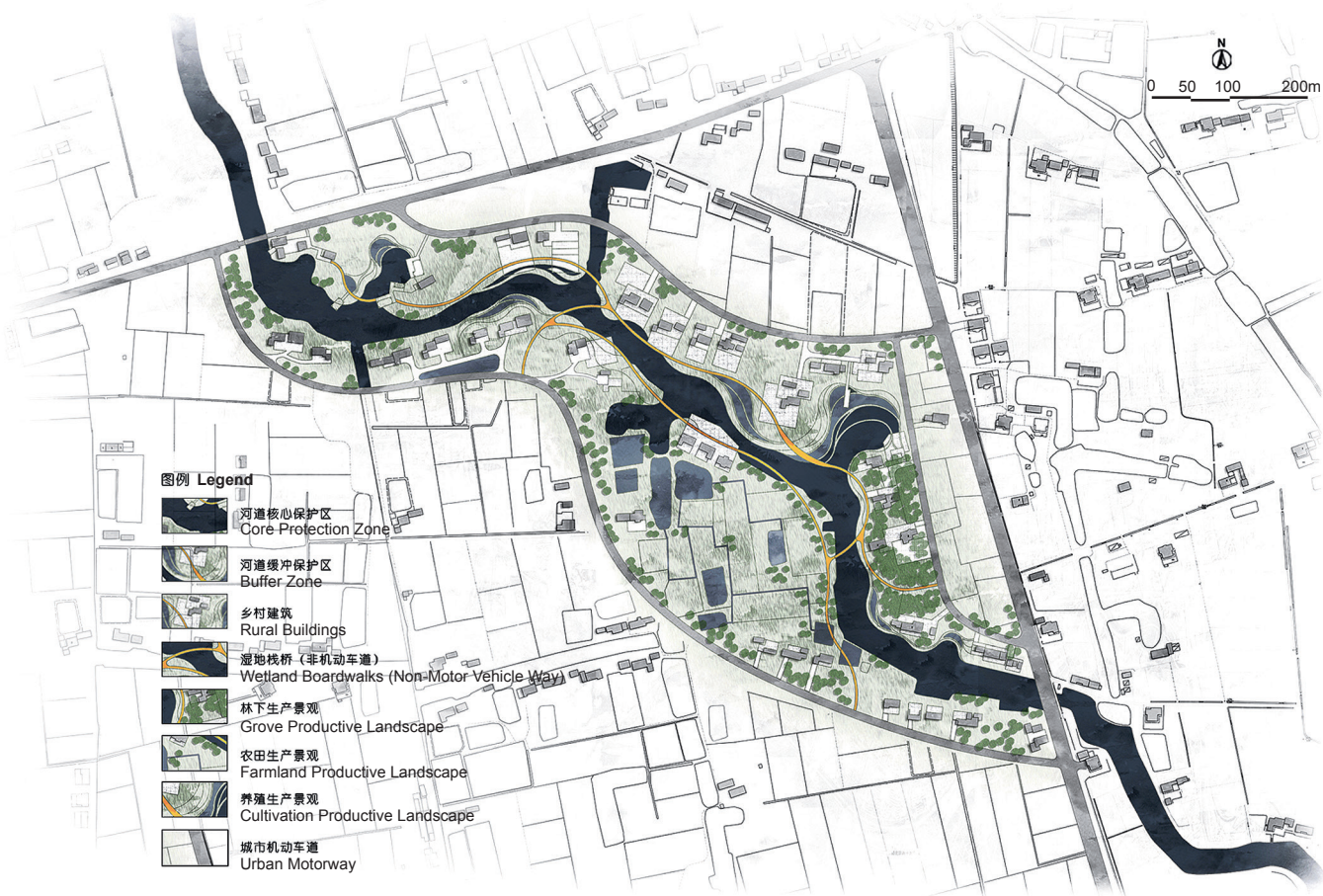
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**项目地址:**

江苏省南通市石港镇

**项目团队:**

金晶、江丽、黄亦涵、华莎

**设计时间:**

2017年1-6月

**所获奖项:**

2017年第15届亚洲设计学年奖银奖

**LOCATION:**

Shigang Town of Nantong, Jiangsu Province

**PROJECT TEAM:**

Jing Jin, Li Jiang, Yihan Huang, Sha Hua

**PROJECT PERIOD:**

January to June, 2017

**AWARD:**

Silver Award of the 2017 Asian Design Award

1) 沿河空间采用分层模式。即根据河道水位的变化, 将沿河空间划分成三个层级: 易淹层——每年夏季丰水期都会被淹没, 场地内已有部分生长良好的湿地; 过渡层——洪水期可能被淹没的区域; 居住层——一般不会被淹没的区域。

2) 生产、生活和生态有机结合。村民可在不同层级上安排不同的生产活动。在易淹层, 村民借助深入湿地的小码头和出行乘坐的独木舟将生活居所与生产水塘相连, 生产水塘中则主要种植菱角 (*Trapa bispinosa*)、菖蒲 (*Acorus calamus*) 等水生经济植物。在过渡层, 村民设置了多个用于鱼虾、家禽养殖的水塘, 并以富含微生物的池水滋养易淹层的湿地植物。而居住层中大量林木的种植则为林下养殖提供了场地。

### 3 项目挑战

2016年10月中旬, 项目团队前往石港渔湾进行实地考察调研, 发现随着乡村城镇化进程的加快, 渔湾水道的传统临水生产模式正遭受多重威胁 (图2):

1) 河道生态环境恶化。当水上运输不再是当地居民的主要交通方式时, 以河道为中心的传统生产生活方式也正在消失。大量原住民搬离水岸, 使得水道环境无人维护。河道中的植物肆意生长, 生活垃圾遍布水面, 河道环境正岌岌可危。

2) 生产活动与河道保护相冲突。由于河岸土地面积有限, 村民开始随意圈占河道区域用于养殖鱼虾、禽类, 河道水体与生产空间之间已无湿地进行过渡, 未经任何处理的废弃物

- 渔湾水道的传统临水生产模式正面临生态环境恶化、生产活动与河道保护相冲突等问题。
  - 总平面图
  - 设计策略：结合圈层式河道生态保护与体验式生产性景观模式，促进生产、生活和生态融合共生。
2. The traditional riverfront production pattern is now suffering from problems such as degraded ecological environment and conflicts between production activities and river channel protection.
- Site plan
  - Design strategies: to integrate rural production, living, and ecology with strategies of multi-layered ecological protection for river channels and experiencing productive landscape design.

被直接排入河中，导致河道水体污染严重。

3) 现有旅游开发模式不利于河道保护。目前渔湾水道开发模式依托河道旅游展开，大量游客乘坐游船进入自然水道观赏湿地景观，对湿地动植物造成扰动，打破了河道原有的生态平衡。

## 4 设计策略

针对以上问题，项目借鉴传统临水生产模式，提出恢复与重构乡村建筑与河道之间的灰色空间，在保护核心河道不受干扰的同时，采取营造体验式生产性景观的村落复兴模式，寻找一条生产、生活和生态“融合共生”的可持续发展之路（图3）。

### 4.1 河道保护——圈层式河道生态保护

依据自然保护区管理中的圈层式生态保

护模式，即“核心区-缓冲区-实验区”的划分与利用模式<sup>[1]</sup>，结合现有河道及村落肌理和湿地环境现状，项目团队将整个渔湾河道划分为河道核心保护区、河道缓冲区以及外围村落区（图4）。

1) 河道核心保护区：采取完全隔离的生态保护模式。人们只能通过架设于湿地和河道上的人行栈桥远距离观赏河道景观，以尽量减少人类对动植物栖息地自然演替过程的干扰，形成良好的生态循环系统（图5）；

2) 河道缓冲区：采用多层次湿地修复模式。即从物种、生态系统、村民生产生活等多个层面进行修复。河道缓冲区介于河道与村落之间，是重要的滨河空间。我们在此区域内种植了浮萍（*Lemna minor*）、芦苇（*Phragmites communis*）、莲藕（*Nelumbo nucifera*）、茭白（*Zizania*

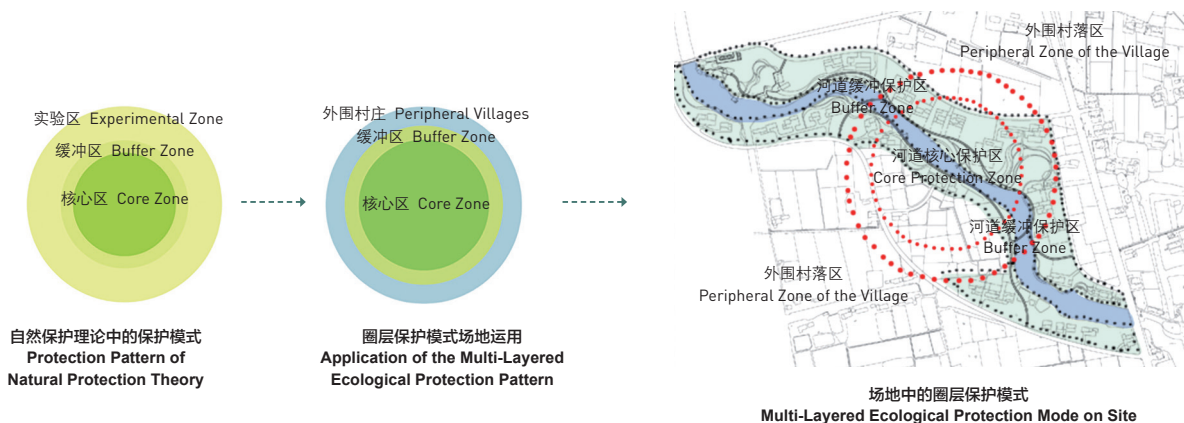
*latifolia*）、菖蒲（*Acorus calamus*）、巴茅（*Miscanthus floridulus*）等植物，试图以这重“植物过滤网”最大程度地减少乡村生产生活对河道水体的影响（图6）；

3) 外围村落区：依据景观生态学的渗透理论<sup>[2]</sup>，项目团队梳理了村落内部及周边的生态单元，通过连接、整合、修复农田、水塘、林地等斑块形成生态绿廊，从而使生态景观逐渐随斑块聚集范围的增大而增多，以实现对整个村落的生态整合。

### 4.2 村落复兴——体验式生产性景观

项目团队通过研究村庄平面布局和肌理，对传统院落结构以及临水生产模式进行了恢复和更新，以打造体验式生产性景观。设计突破传统的建筑-院落模式并引入“公共院落”的概念，以河道为纽带，串联起湿地、建筑、生产性院落等点状空间，促进沿

河道保护策略——圈层式河道生态保护模式  
River Channel Protection Strategy — Multi-Layered Ecological Protection Pattern



河道复兴策略——体验式生产性景观  
River Channel Revitalization Strategy — Experiencing Productive Landscape



河生产生活社区的形成(图7)。

以河道缓冲区为例,根据其环境现状和当地村民需求,团队将公共院落分为林下养殖、林下种植、农田种植、湿地养殖(家禽)、湿地养殖(鱼虾)和湿地种植6种类型。连接各个院落的沿河道路形成了一条生产体验游线,使乡村旅游成为新的乡村经济增长点,从而真正激发乡村活力、助力乡村振兴(图8)。

1) 林下养殖院落:在林下种植牧草或保留自然生长的杂草,用以养殖土鸡、鹅等家禽,而家禽粪便反过来又可滋养林地,形成良性循环的生态系统(图9);

2) 林下种植院落:利用现有林间空地搭建竹结构覆膜温室,生产蔬菜等经济作物。该种植温室以乡间普通温室大棚为原型,灵活组合竹结构单元,以适应不同场地的生产

需求(图10);

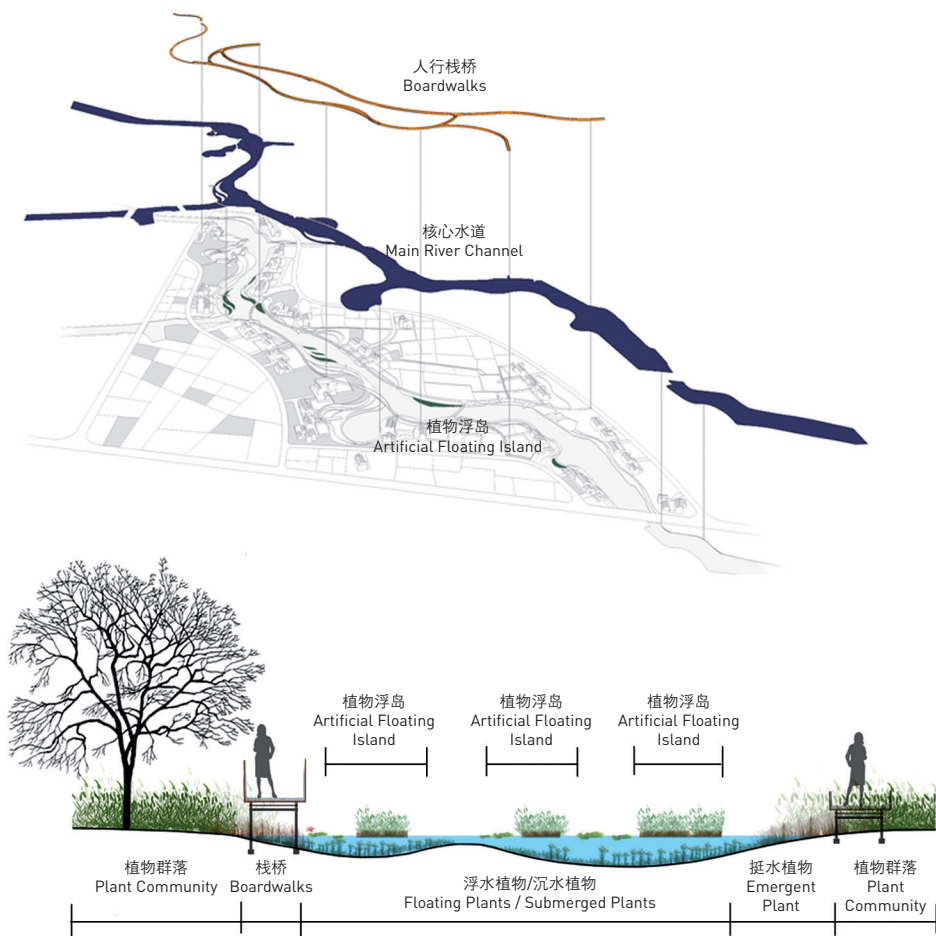
3) 农田种植院落:设计充分利用现状地形和不同农作物的外观特征及生长方式,创造出具有时令特色与鲜明形态、色彩对比的农田景观,同时软化农田硬质水渠驳岸,以湿生植物净化农田废弃水体(图11);

4) 湿地养殖(家禽)院落:通过养殖鸭、鹅等喜水家禽,与水生植物和浮游微生物形成良好的生态循环。院落里设有利用富有乡村气息的竹材料设计的造型有趣的鸭窝,为游客提供了集中观赏水禽的好去处(图12);

5) 湿地养殖(鱼虾)院落:通过养殖鱼虾提高水产生产力,形成自给自足、自产自销的生产模式。湿地泡里鱼虾的排泄物将为水生植物提供营养,滋养这片阻隔生活垃圾的天然屏障(图13);

- 5-1. 河道核心保护区分析图:人行栈桥架设于湿地和河道之上。
- 5-2. 河道核心保护区剖面图
- 5-3. 河道核心保护区效果图:人们只能从栈桥上远距离观赏河道景观,以尽量减少人类对动植物栖息地自然演替过程的干扰。
- 6. 河道缓冲区设计:结合场地驳岸现状设计不同类型的人工湿地。

- 5-1. Analysis diagram of the core protection zone: boardwalks are elevated along and above wetlands and river channels.
- 5-2. Section of the core protection zone
- 5-3. Rendering of the core protection zone: visitors could enjoy the riverside landscape from elevated boardwalks to minimize human intervention to the habitats and improve ecosystem services.
- 6. Buffer zone for river channel protection: various types of constructed wetlands are designed according to the waterfront existing.



5-1  
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6) 湿地种植院落: 主要种植莲藕、菱角等水生经济作物, 既可以增加当地村民的水产收入, 同时也加强了湿地修复的力度, 形成了美丽的湿地景观。点缀于成片荷花之中的采摘平台为游客提供了体验采收乐趣的场所, 形成了独特的农业体验(图1, 14)。

#### 4.3 农业设施建构——“模块化编织”

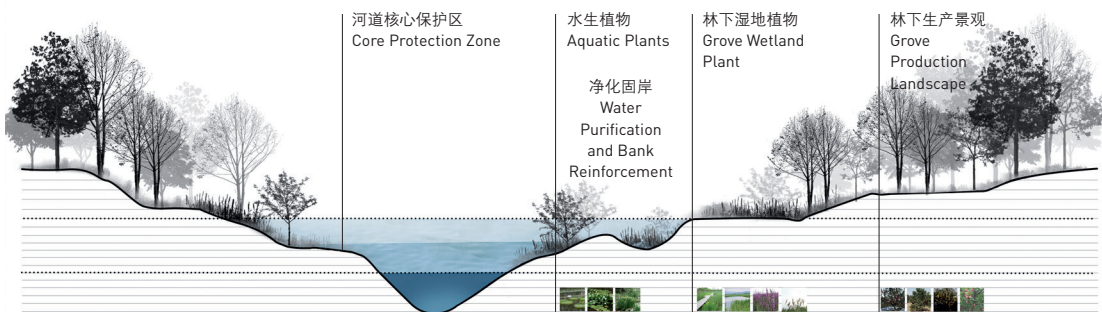
项目中的农业设施大多采用竹结构, 其设计灵感来源于当地村民编织竹制品的生活场景, 试图以传统编织手法创造出自然的空间体验。设计将竹材与现代建构方式结合, 例如用金属构件取代原有捆扎连接方式, 提高生产设施的稳定性和拆搭灵活性; 同时充分发挥竹的韧性, 结合河道形态和院落形态, 使其成为场地中的特色景观节点。此外, 这些设施的建构采用“模块化编织”模式, 这是一种适用于不同空间类型, 可满足生活、生产、生态等多种功能的空间介入模式, 村民可依照自身需求进行组建。由此, 村民将不仅是生产设施的使用者, 更以设计者的身份参与到其建构过程中来。

项目中所建构的农业设施可分为三类: 直线型、曲面型、曲直结合型。直线型竹构主要运用于林下养殖院落的鸡窝、农田种植院落的农作物观察廊、湿地种植院落的水生植物采摘台等; 曲面型竹构利用竹片弯曲成弧形, 形成柔和、灵动的围合空间, 主要运用于湿地养殖院落的鸭窝等; 曲直结合型竹构主要运用于湿地养殖院落的栈桥及垂钓空间、林下种植院落的温室大棚等。

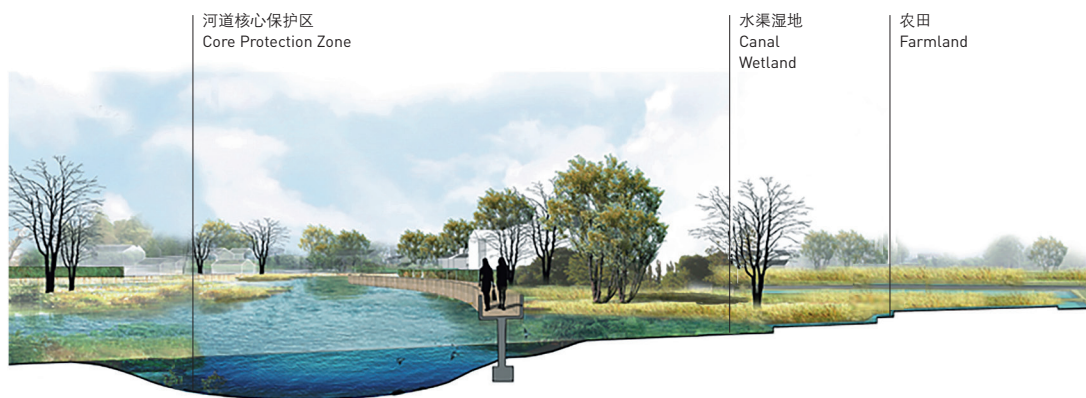
## 5 结语

河道保护与村落复兴二者相辅相成, 只有在修复河道生态的同时并重村落生产性景观建设, 才能实现石港渔湾自然、社会、文化环境的和谐发展。人与自然之间存在一种共生关系。千百年前, 河道的形态塑造了人们最初的生产生活方式, 而现如今, 人类的行为也正深刻影响着河道的景观面貌。设计试图强调人类行为对地域景观的积极作用, 呼吁以设计手段修复环境、振兴乡村。LAF

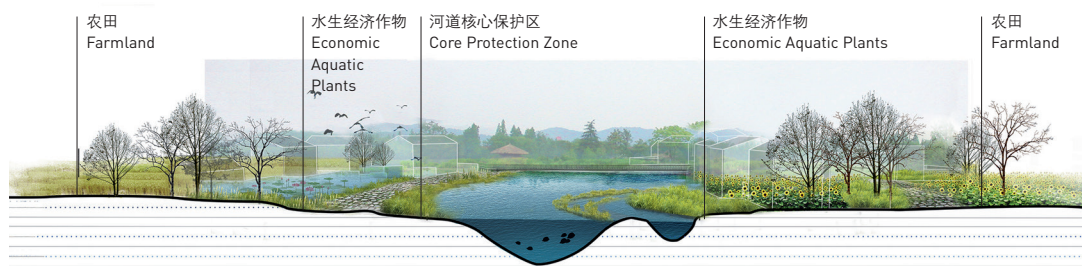
林下湿地分析图  
Grove Wetland Analysis



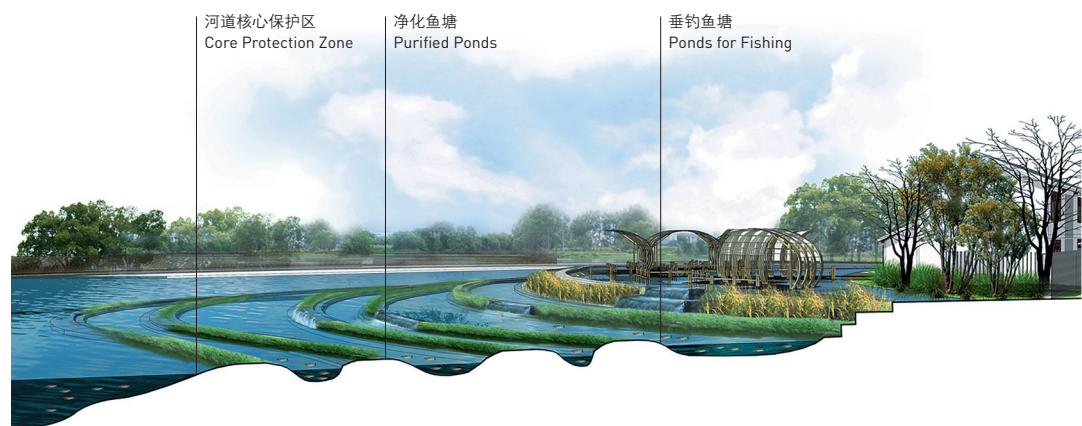
农田水渠湿地分析图  
Farmland Canal Wetland Analysis



经济作物湿地分析图  
Economic Plant Wetland Analysis



鱼菜共生湿地分析图  
Aquaponic Wetland Analysis



## 1 Project Background

River channels which hold a crucial ecological significance to the villages that lie along the Yangtze River are currently facing with problems such as featureless landscape and environmental degradation. Instead of developing a new tourism plan for the site — the Fishery Bay of Shigang Town, Nantong, Jiangsu Province, this project explores an alternative scheme for village revitalization that focuses on both ecological restoration and cultural revival of the river channel network. The project team proposed a concept to create experiencing productive landscape, to promote ecological protection, and to celebrate nostalgia. The rejuvenated river channels with diverse local characteristics will better integrate riverfront production, living, and ecology as a whole.

## 2 Traditional Riverfront Production Pattern

The Fishery Bay in Shigang Town was originally a non-submerged sandbank in the sea. As the shoreline moved eastward, a main river channel of 15 km in length was eventually formed by connecting the puddles sandbank. It covers a watershed of 3.75 km<sup>2</sup> and flows throughout the village. For thousands of years, villagers have settled down along the river channel network in Fishery Bay and formed a unique traditional riverfront production pattern:

1) A layered riverfront: According to water-level changes, the riverfront area could be divided into three layers: the flood-prone zone with wetlands in good condition, where would be inundated during storms; the transition zone where likely to be inundated during floods; and the settlement zone where stays away from flood.

2) An integration of production, living, and ecology: Production activities are spontaneously operated in different zones.

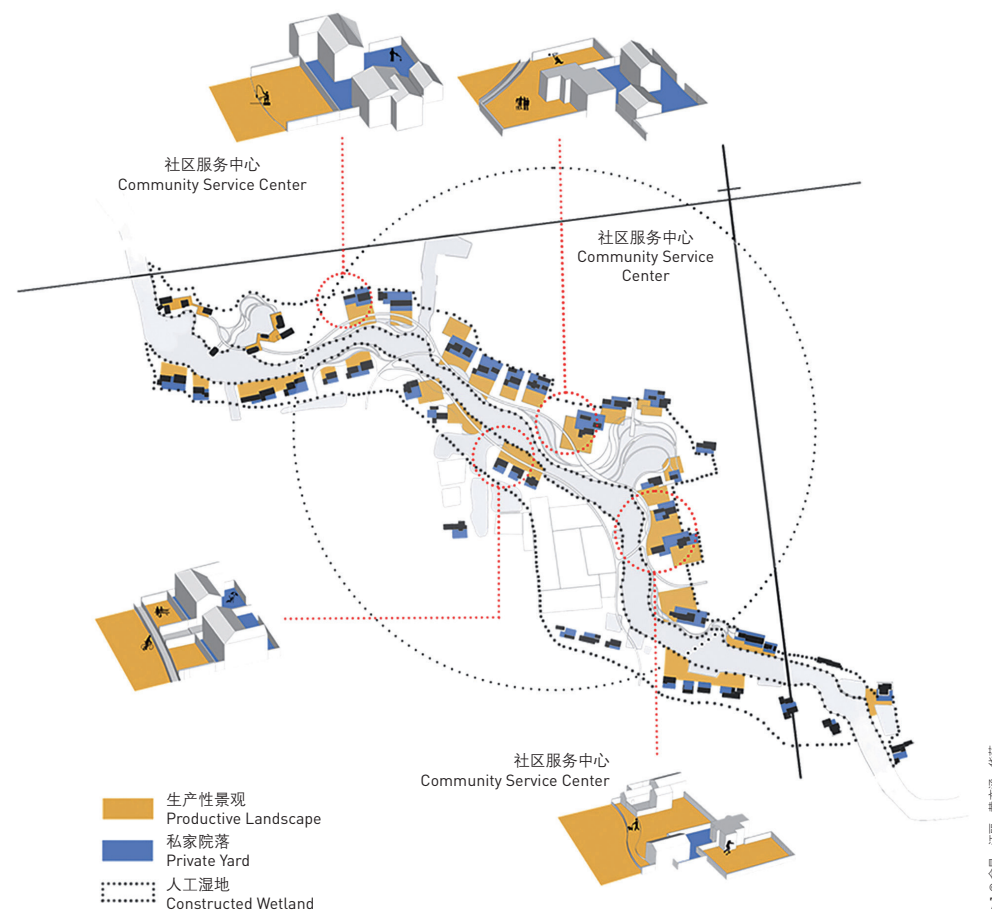
In the flood-prone zone, piers and boats are used to access to the productive ponds, where aquatic economic vegetation are planted, such as *Trapa bispinosa* and *Acorus calamus*. In the transition zone, ponds are built for aquaculture and fowl farming, and the rich microbes in the ponds become nutrients for the wetland plants in the flood-prone zone. A large number of trees are planted in the settlement zone, allowing for fowl farming in the grove.

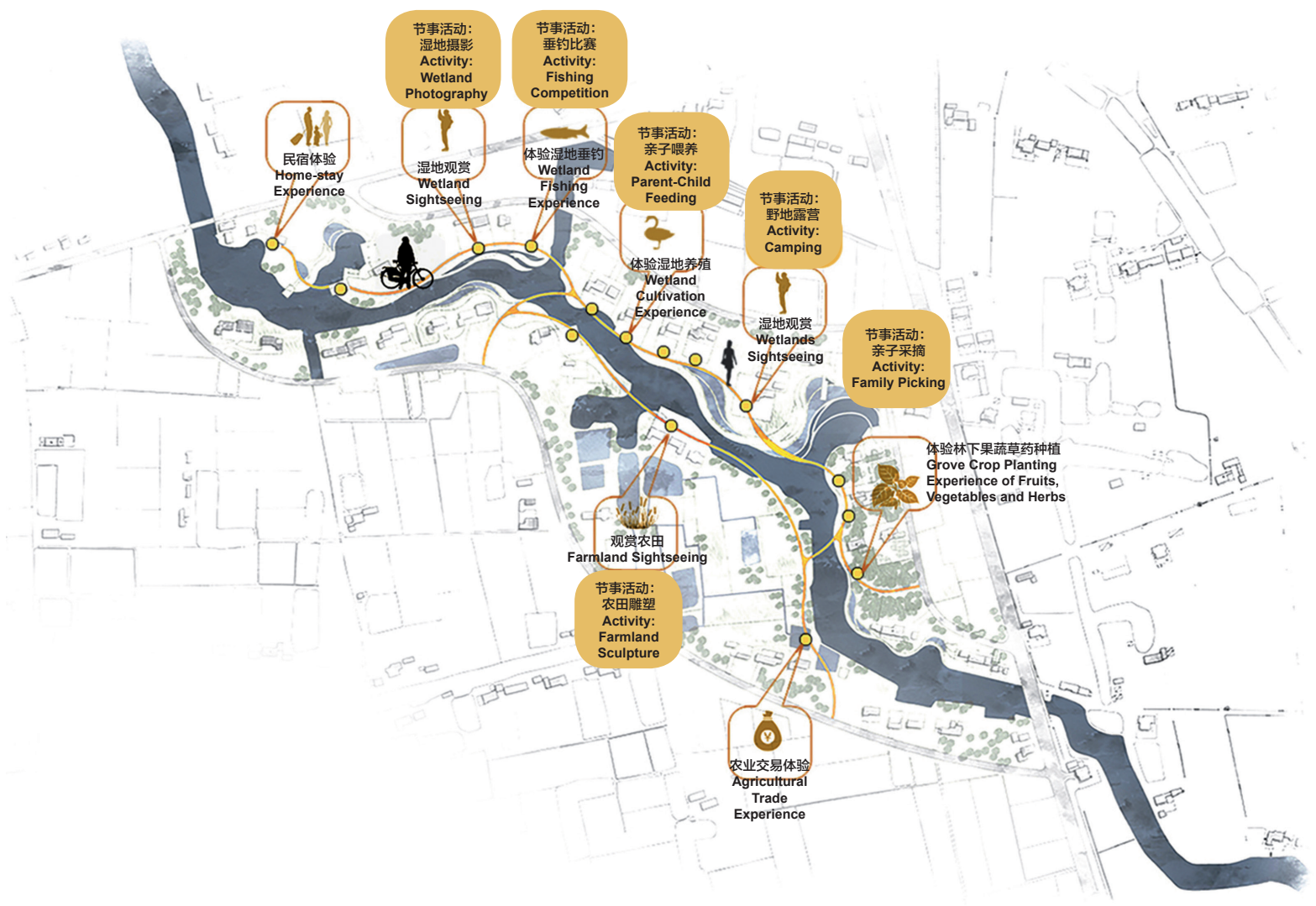
## 3 Project Challenges

In mid-October 2016, after a field investigation in the Fishery Bay, the project team found that due to rapid urbanization, the traditional riverfront production pattern is now suffering from multiple ecological

7. 在河道缓冲区中引入“公共院落”概念，打造体验式生产性景观。
8. 在河道缓冲区中引入旅游节事活动，使乡村旅游成为新的乡村经济增长点。

7. The concept of “public yards” is introduced in the design of the buffer zone to create experiencing productive landscape.
8. Tourist programs and folk ceremonies are introduced into the buffer zone. With a blooming tourism, the village will be better revitalized.





threatens (Fig. 2):

1) Environmental degradation. As the construction of land-traffic infrastructures, villagers are less relying upon the river channel network, coupled with a big change on the local production and lifestyle. Since most inhabitants relocated their settlements away from the river, the river channel becomes a dump by household garbage with plants overly-growing.

2) Conflicts between production activities and river channel protection. Villagers expanded their production activities into the river channel network by occupying water surface with enclosed fishery and duckery.

The disappearance of the barrier area has resulted in a heavy pollution problem caused by the untreated breeding waste discharged directly into the river.

3) Disturbance by tourism development. As a typical water village, the Fishery Bay is developed into a scenic area featuring river sightseeing, which has brought severe impacts on the river and wetland ecosystem.

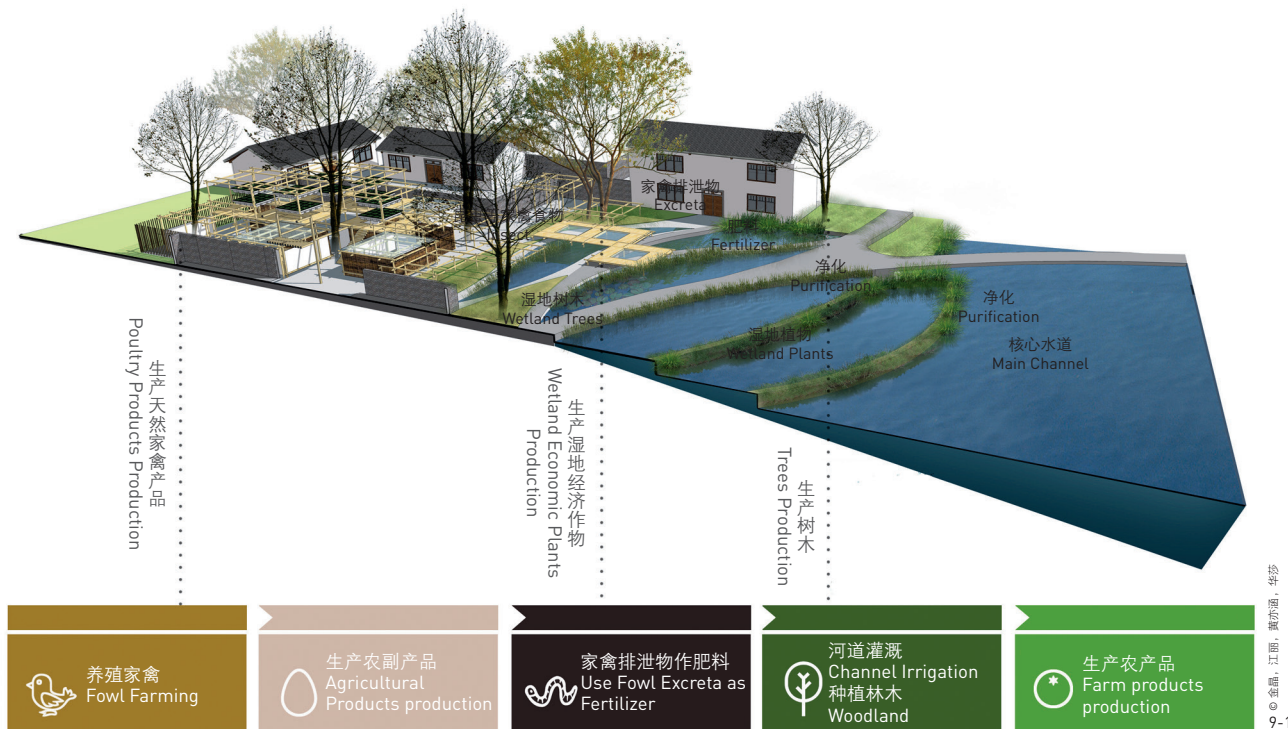
#### 4 Design Strategies

Inspired by the traditional riverfront production pattern, this project proposes to

restore barriers between rural constructs and the river channel network. Through a sustainable integration of production, living, and ecology as a whole, the village will be revitalized into a destination with experiencing productive landscape, while protecting the ecosystem of the river channel (Fig. 3).

#### 4.1 A Multi-Layered Ecological Protection Pattern

A multi-layered ecological protection pattern, which divides a site area into core zone, buffer zone, and experimental zone, is usually employed in nature

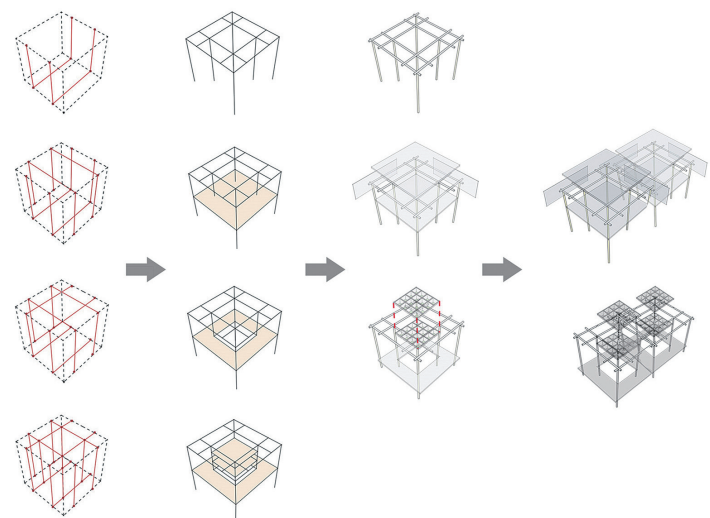


reserve management<sup>[1]</sup>, so is in this project. The project site is divided into the core protection zone, buffer zone, and the peripheral zone of the village, considering the existing fabric of the river channel network and village, as well as the wetland environment (Fig. 4).

1) Core protection zone: This area would be under a complete protection where visitors are not allowed to access but could enjoy the riverfront landscape from elevated boardwalks set along and above river banks, minimizing human intervention to the habitats and helping natural

successions of ecosystem (Fig. 5);

2) Buffer zone: In this area, a multi-layered wetland restoration pattern is established that supports biodiversity restoration, ecosystem improvement, and villagers' production and daily life. The buffer zone lies between rivers and

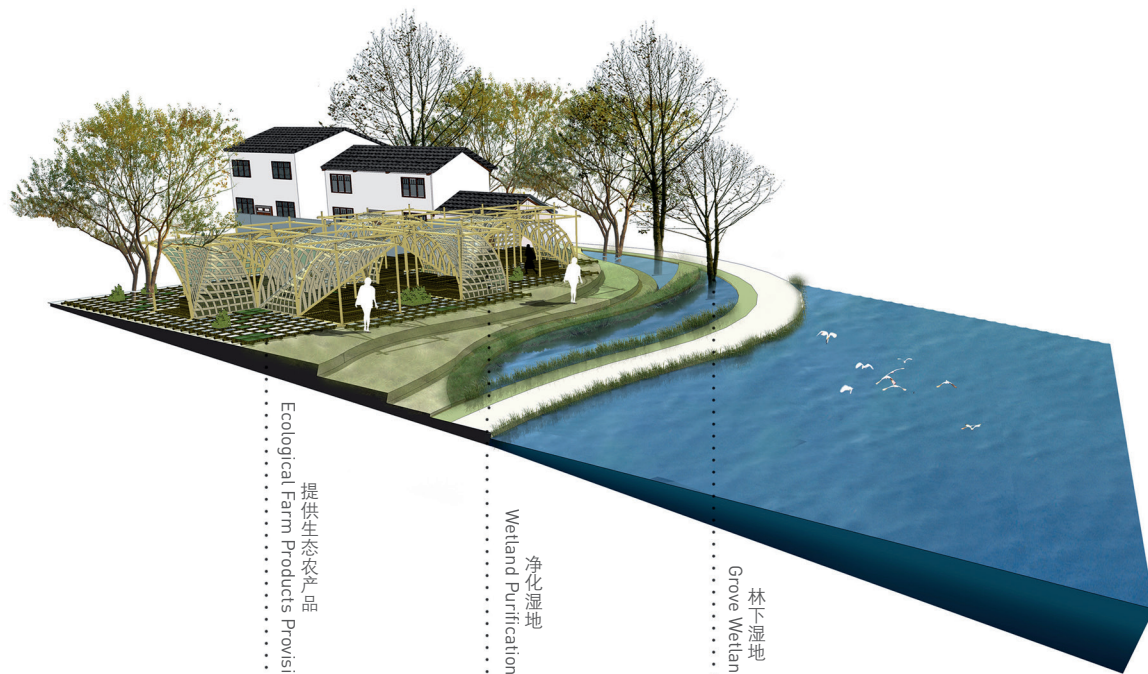


rural constructs, not only linking the village with the riverfront, but also acting as a natural filter by planting native vegetation, including *Lemna minor*, *Phragmites communis*, *Nelumbo nucifera*, *Zizania latifolia*, *Acorus calamus*, and *Miscanthus floridulus*, to mitigate the pollution problem of the water body (Fig. 6);

3) Peripheral zone of the village:  
Based on the permeation theory in Landscape Ecology<sup>[2]</sup>, the design connects, integrates, and restores biotopes in and around the village, including farmlands, ponds, and woodlands, to establish an ecological corridor that improves the environmental and landscape integration.

#### 4.2 Experiencing Productive Landscape Design for Village Revitalization

Through an investigation on the village layout and fabric, the design team hopes to rejuvenate the beautiful village through experiencing productive landscapes by transforming traditional building-yard structure into “public yards” on the riverfront, which are designed to link the existing scattered

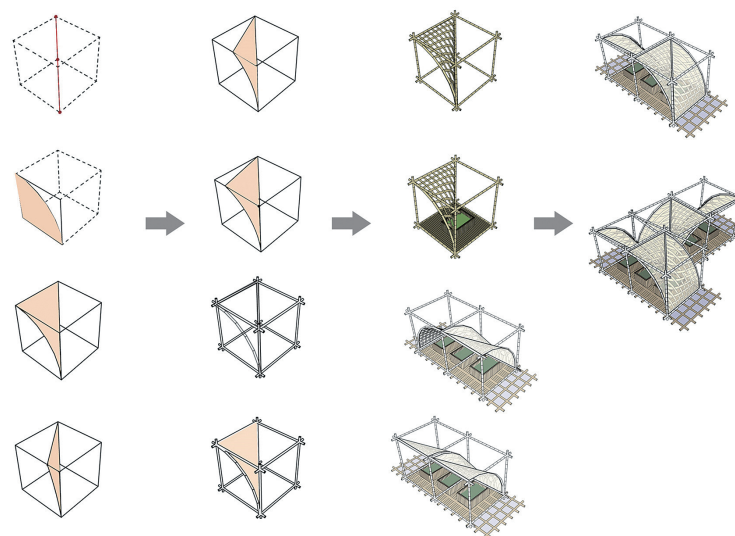


10. 林下种植院落生态分析图(图10-1)、效果图(图10-2)及农业设施搭建过程示意图(图10-3): 由竹结构搭建的温室可用于生产蔬菜等经济作物。

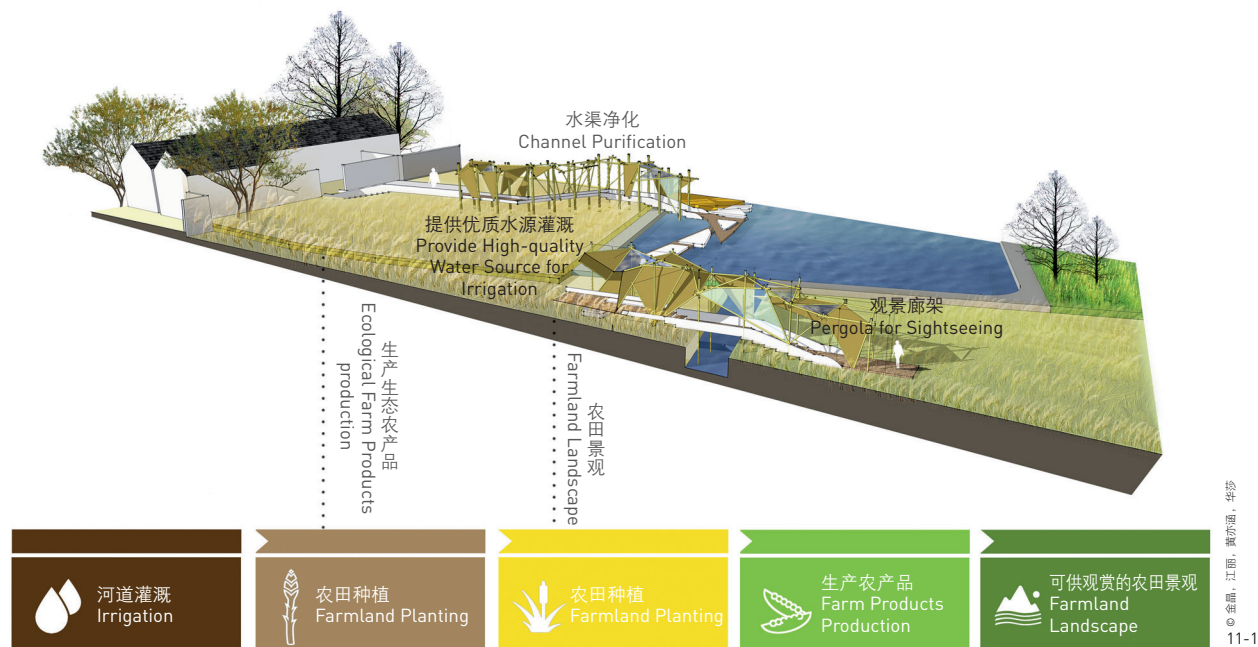
10. Ecosystem analysis diagram (Fig. 10-1), rendering (Fig. 10-2), and building process of the agricultural facilities (Fig. 10-3) of the yards for grove crop planting: the greenhouses made of bamboo structures may be used for cash crop planting.



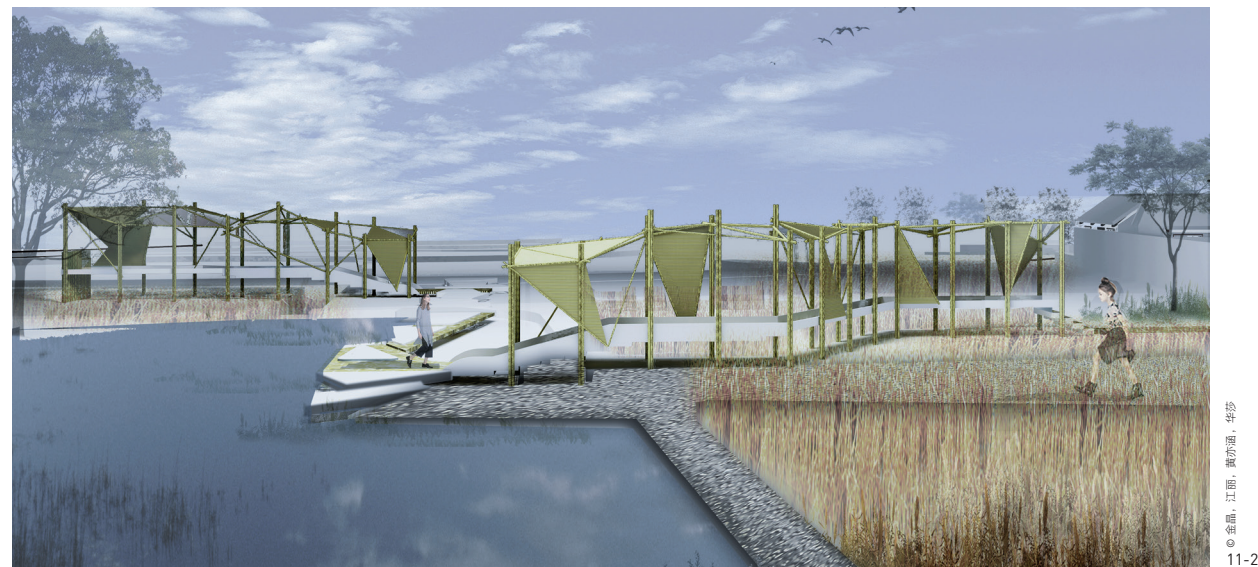
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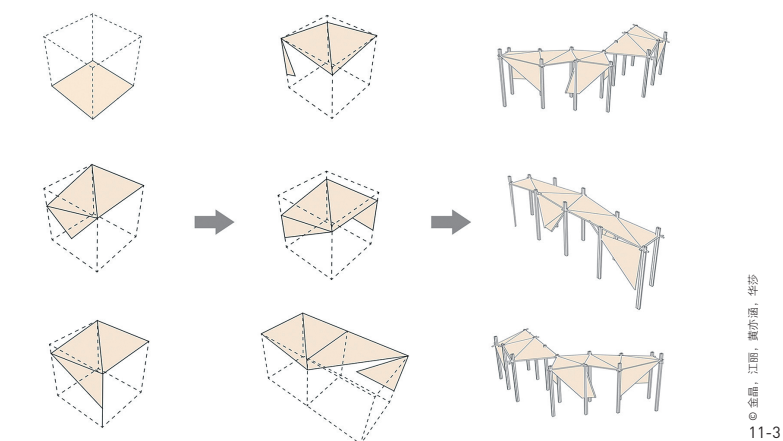
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wetlands, constructs, and the yards for productive activities along the river, reshaping communities for living and production (Fig. 7).

In the buffer zone, specially, considering the environmental conditions and villagers' needs, 6 types of public yards are designed, supporting respectively grove fowl breeding, grove crop planting, farmland crop planting, wetland waterfowl breeding, wetland fishery and shrimp farming, and wetland crop planting. Meanwhile, these yards are connected by the river channel network, providing a tour route for visitors to experience the productive landscape (Fig. 8). With a blooming tourism, the village will be better revitalized.

1) Yards for grove fowl breeding: An ecological cycle is created in these yards by seeding pastures or remaining the existing grassland to breed chickens and geese, whose excreta could in turn nourish the land (Fig. 9);

2) Yards for grove crop planting: Bamboo structures covered with films are introduced in grove clearings as greenhouses for crop planting. Adopted from the ordinary greenhouses, these bamboo structures could adapt to various terrains and production requirements with flexibly-assembling units (Fig. 10);

3) Yards for farmland crop planting: Such yards fully take advantage of the terrain and the growth habits of different crops to create colorful farmland landscape with seasonal features. Meanwhile, the existing hard-paved revetments could be replaced with wetland plants which may also help purify the water body (Fig. 11);

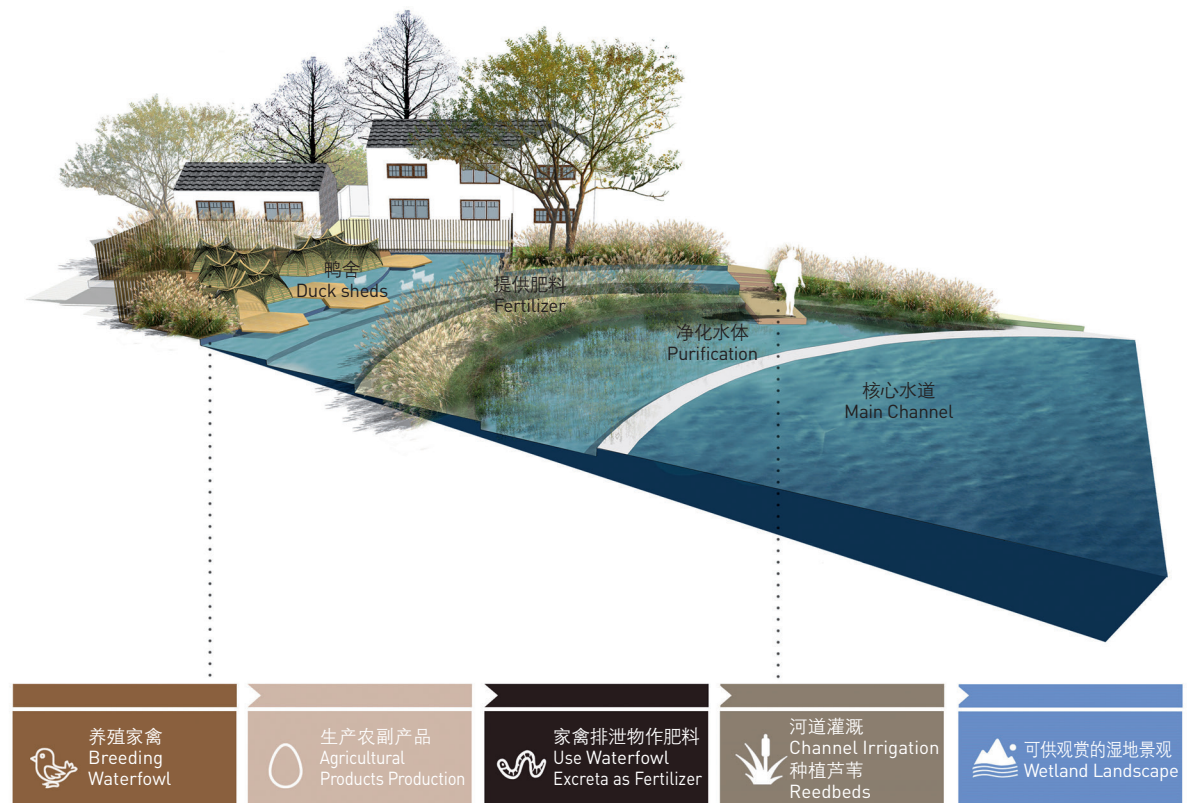
4) Yards for wetland waterfowl breeding: Ducks, geese, and other waterfowls, together with aquatic plants and planktons, form a sound ecological cycle. Visitors may also enjoy scenes of waterfowl playing under the sheds

11. 农田种植院落生态分析图(图11-1)、效果图(图11-2)及农业设施搭建过程示意图(图11-3): 在创造具有时令特色与鲜明形态、色彩对比的农田景观的同时, 利用湿生植物净化农田废弃水体。

12. 湿地养殖(家禽)院落生态分析图(图12-1)、效果图(图12-2)及农业设施搭建过程示意图(图12-3): 鸭、鹅等喜水家禽与水生植物和浮游微生物形成了良好的生态循环。

11. Ecosystem analysis diagram (Fig. 11-1), rendering (Fig. 11-2), and building process of the agricultural facilities (Fig. 11-3) of the yards for farmland crop planting: creating seasonal and colorful farmland landscape, while purifying the waterbody around the farmland by wetland plants.

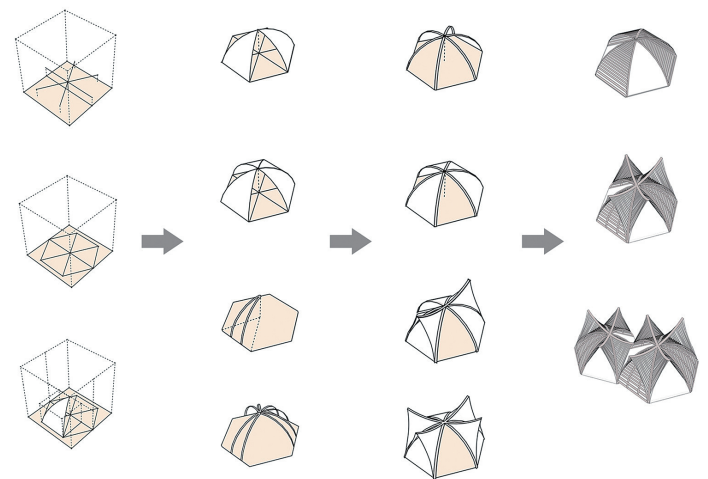
12. Ecosystem analysis diagram (Fig. 12-1), rendering (Fig. 12-2), and building process of the agricultural facilities (Fig. 12-3) of the yards for wetland waterfowl breeding: ducks, geese, and other waterfowls, together with aquatic plants and planktons, form a sound ecological cycle.



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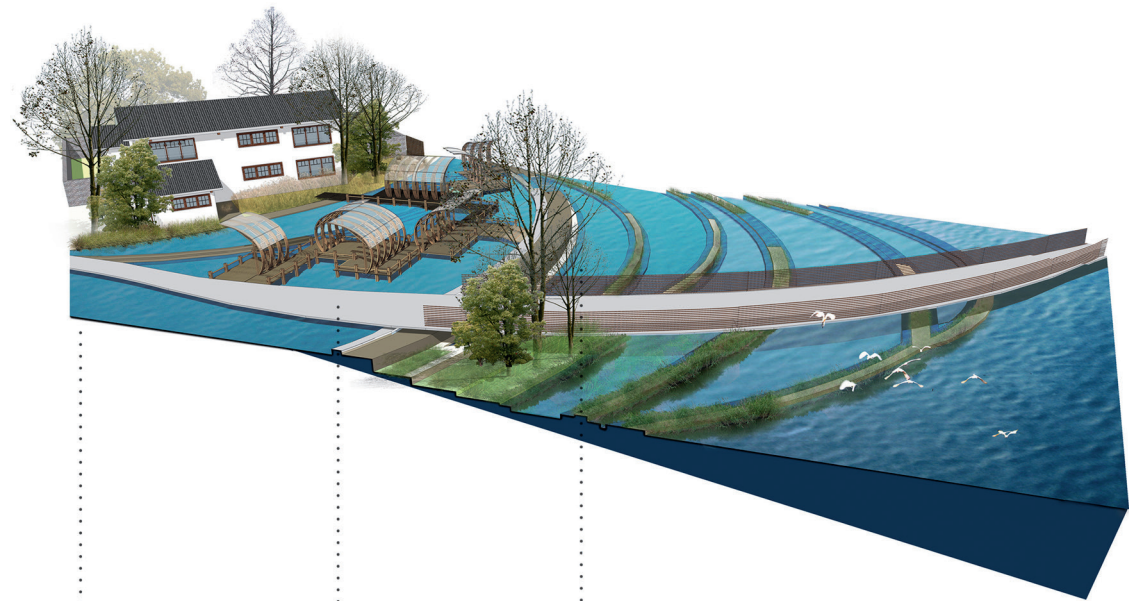


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made of bamboos in special rural shapes (Fig. 12);

5) Yards for wetland fishery and shrimp farming: Fishery and shrimps farming in the wetlands will increase the yield of aquatic products and establish a self-sufficient production mode. In turn, aquaculture waste will nourish the plants which function as a natural barrier to domestic wastes (Fig. 13);

6) Yards for wetland crop planting: In such yards, aquatic crops such as *Nelumbo nucifera* and *Trapa bispinosa* are planted which would not only increase locals' income but also facilitate wetland restoration to form a beautiful landscape. The platforms for plant picking elevated above lotus flowers provide visitors a unique experience of agricultural harvesting (Fig. 1, 14).



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### 4.3 Modular Agricultural Facilities

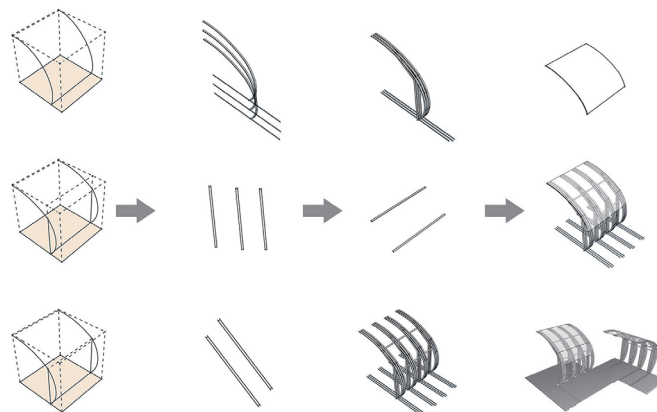
Most agricultural facilities applied in this project are constructed with bamboo structures, inspired by the local weaving tradition to create diverse natural spaces. Integrated with modern construction methods like using metal fittings instead of ropes, these bamboo-made facilities are more stable and easier to reshape according to various shapes of river channels and yards, being unique landscapes in themselves. In addition, the modular construction pattern could also be applied for a diversity of spatial types, which allows villagers to design these low-tech facilities by themselves to meet different production, living, and ecological needs.

Three shapes of agricultural facilities are included in this project: the linear-shaped structure, mainly used in the yards for grove fowl breeding (chicken coops), farmland crop planting (rest and observation pavilions), and wetland crop planting (platforms for plant picking); the curve-shaped structure, used to form light



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and flexible enclosing spaces for waterfowl breeding in wetlands; and, a combined structure of linear and curved materials, used to build boardwalks, fishing spaces, and greenhouses.

## 5 Conclusion

River channel protection and village revitalization are both significant and could achieve a win-win in the natural, social, and cultural development of the site village, supporting a harmonious human-nature relationship. Till now, the river channel network, which had influenced the locals' production and lifestyle, are heavily impacted by human activities. With design interventions, this project is expected to realize ecological restoration and village revitalization by reinforcing human's positive role in local landscape design. **LAF**

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- [2] Wu, J. G. (2000). *Landscape Ecology — Concepts and Theories*. *Chinese Journal of Ecology*, 19(1), 42-52.

13. 湿地养殖（鱼虾）院落生态分析图（图13-1）、效果图（图13-2）及农业设施搭建过程示意图（图13-3）：湿地中的鱼虾与水生植物相互滋养，构成了良好的生态循环。
14. 湿地种植院落生态分析图（图14-1）、效果图（图14-2）及农业设施搭建过程示意图（图14-3）：水生经济作物的种植既可增加水产收入，也促进了湿地景观的修复。

13. Ecosystem analysis diagram (Fig. 13-1), rendering (Fig. 13-2), and building process of the agricultural facilities (Fig. 13-3) of the yards for wetland fishery and shrimp farming: Fishes, shrimps, and aquatic plants bred in the wetlands form a sound ecological cycle.
14. Ecosystem analysis diagram (Fig. 14-1), rendering (Fig. 14-2), and building process of the agricultural facilities (Fig. 14-3) of the yards for wetland crop planting: aquatic cash crop planting could both increase local villagers' income and facilitate wetland restoration.

