

## 区域“脊柱”太浦河： 基于原型设计的 国土空间规划补充途径

# TAIPU CANAL AS A REGIONAL SPINE: A PROTOTYPICAL APPROACH TO TERRITORIAL PLANNING

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### 摘要

2018年以来，长江三角洲区域一体化发展上升为国家战略，以加强该区域城市间的协作，但目前开放空间的保护与规划途径以定量评价为主，依然沿用自上而下的控制性规划导则。太浦河流经上海、苏州和杭州之间的区域绿心，目前主要发挥工程功能。本设计研究项目提出将太浦河升级为串联公民生活的轴线，制定新的区域发展框架，并使其串联沿线多样化的开放空间、生态系统和历史水乡古镇。项目采用了跨尺度的“地情-原型”方法，整合样本图绘、类型学研究 and 实验场地的原型设计探索，并将其贯穿于各个尺度，以评估如何将原型设计策略归纳为系统性的规划导则，并在区域尺度进行统一实施。本文总结的这种原型设计途径为中国自上而下的国土空间规划体系提供了适当补充，以更好地对愈加复杂的场地条件和更大尺度的空间规划需求。

### 关键词

原型；设计研究；景观特征；景观基础设施；国土空间规划；长江三角洲一体化；江南公园

### ABSTRACT

Since 2018, the integrated regional development of the Yangtze River Delta has been subjected as a national strategy to intensify the interconnection between its cities. However, the questions of open space conservation and planning have so far remained essentially quantitative and strongly informed by regulatory and top-down principles. Focusing on the vast green heart between Shanghai, Suzhou, and Hangzhou, this design-driven research project hypothesizes that Taipu Canal can be upgraded from its current technical role into a civic spine that frames new developments and articulates the rich diversity of open spaces, ecosystems, historic water towns and villages. The research adopts a cross-scale method of "contextual prototypes" that combines sampling, typological classification, and prototypical design explorations in pilot projects. A reflective phase zooms out to critically assess how these prototypical strategies can be systemized as structuring principles at the regional scale. The conclusion of the article discusses how this prototypical approach offers an opportunity to inductively complement the top-down Chinese territorial planning system, which needs to cope with increasingly complex conditions and vaster scales.

### KEYWORDS

Prototype; Research-by-Design; Landscape Characteristics; Landscape Infrastructure; Territorial Planning; Yangtze River Delta Integration; Jiangnan Park

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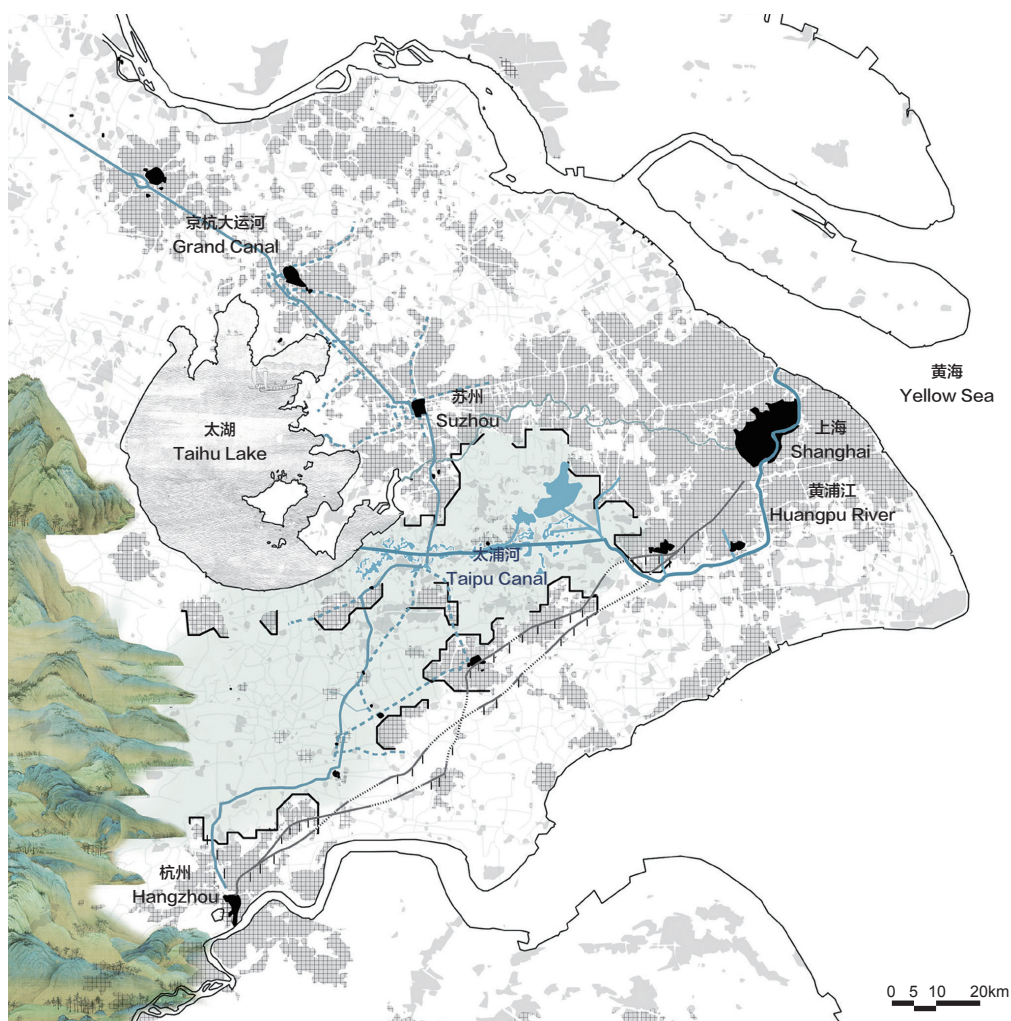
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|---------------------------|---|
| — 太浦河 Taipu Canal         | ■ 江南公园范围 Territory of Jiangnan Park     |
| — 主要水系 Main water system  | ■ 历史村落和城镇中心 Historic town / city center |
| —— 高铁线 High-speed railway | ■ 城市化区域 Urbanized area                  |
| — 城市边界 Urban edge         |   |

① 太浦河Studio 2020隶属于江南公园系列项目，由江南实验室负责人克里斯蒂安·诺尔夫副教授（西交利物浦大学城市规划与设计系）和谢雨婷博士（浙江大学园林研究所）主导，并与董楠楠副教授、戴代新副教授（同济大学建筑与城市规划学院景观学系）和来自Sasaki设计事务所的张斗共同合作完成。

1. 太浦河衔接太湖与上海的黄浦江，横跨了高速城镇化进程中的长三角巨型城市区下游地带。

1. The Taipu Canal connects Taihu Lake to the Huangpu River in Shanghai across the lower reaches of the rapidly urbanizing Yangtze River Delta megacity region.

## 1 背景和挑战

### 1.1 如何整合长江三角洲一体化规划中的开放空间？

为更好地协调上海、浙江、江苏和安徽巨型城市区的空间与经济发展，中共中央国务院于2019年发布了《长江三角洲区域一体化发展规划纲要》，该规划最初旨在调整区域交通、能源和城市服务的尺度<sup>[1]</sup>，后逐渐将开放空间纳入规划范畴。同年发布的《长三角生态绿色一体化发展示范区总体方案》提出了与开放空间相关的具体目标<sup>[2]</sup>，主要关注生态空间和永久基本农田的保护问题，但依然停留在定量描述和指标化层面。2020年6月，示范区国土空间总体规划方案发布<sup>[3]</sup>，明确了蓝绿开放空间的比例及风景道路、绿道和蓝道系统的长度和整体结构。尽管这是国内首个跨省域国土空间规划，具有里程碑意义，但其依然以功能区划为目标，沿用自上而下的控制性规划原则，忽略了这一生态和历史敏感地区的复杂性。

本项目从江南公园<sup>[4]</sup>的视角重新审视了这片区域，将上海、苏州和杭州之间的三角地带视为长江三角洲（下文简称“长三角”）巨型城市区的生态文化“绿心”，尝试通过由设计驱动的跨尺度方法，实现自上而下的控制性功能分区划手段与地方性解决方案的衔接。

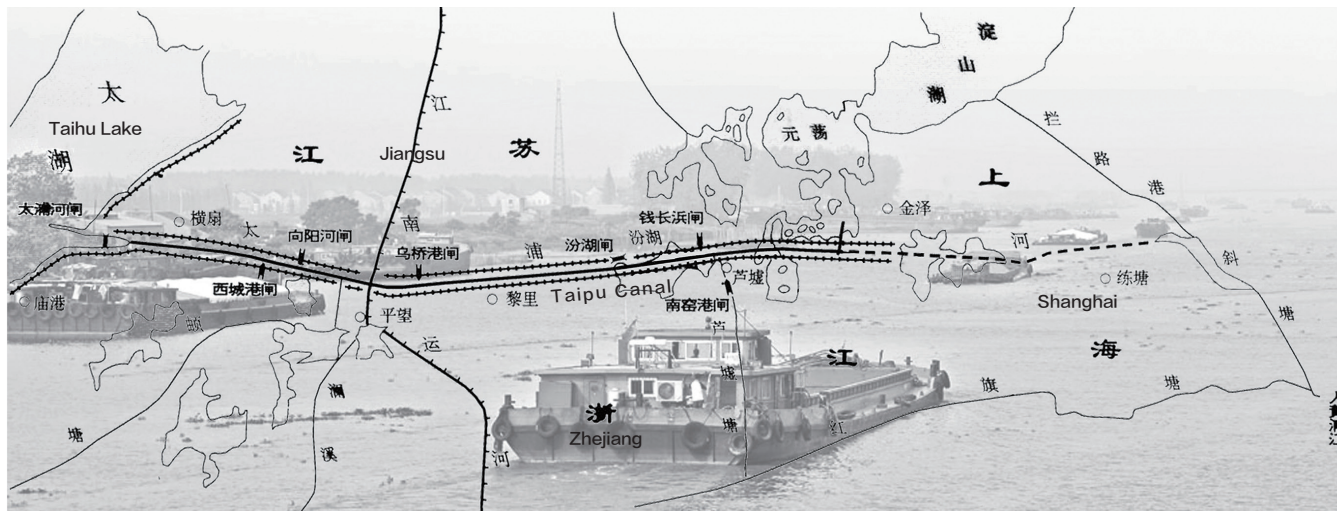
### 1.2 为什么将太浦河定位为区域脊柱？

新建绿道网络，或赋予既有线性景观或基础设施新的空间功能，从而将其纳入公园系统，是整合碎片化开放空间的有效策略之一<sup>[5][6]</sup>。其中，最著名的案例包括美国波士顿的翡翠项链公园、德国的埃姆歇公园，以及荷兰的新荷兰水线项目<sup>[7][8]</sup>。重组后的开放空间不仅能更好地发挥生态廊道和网络的作用<sup>[9]</sup>，亦有助于增强区域社会文化凝聚力。线性公园系统在空间和功能层面将孤立的场地联系起来，有效提高了居民的归属感，并通过与一个地方或区域建立有形的空间关系形成地方认同感<sup>[7]</sup>。对于游客来说，线性系统能够带来全新的序列性观赏体验，使其感受到一个区域的连贯性和多样性<sup>[10]</sup>。

太浦河是一条全长57km的排水渠，起于太湖、止于上海，横跨太湖流域生态敏感性较高的圩区（图1）。该运河于1958年开始分阶段修建，1995年竣工，发挥着重要的防洪、排水和灌溉功能，并于2016年开始成为上海大都市区的淡水供给通道。太浦河虽然只承担工程功能且可达性较差（图2），但由于河道平直、空间跨度较大，因此依然是该地区的主要空间参照物之一。近期的示范区国土空间总体规划方案将太浦河定位为重要生态廊道，进一步凸显了其战略意义。

本文介绍的设计研究项目“太浦河Studio 2020”<sup>①</sup>假设太浦河能够引导江南公园绿心区域的一体化开发，并从两个面对该地区进行重塑：在沿河道方向，运河可从当前的排水渠升级为生态游憩轴线，连接各类开放空间及生态系统；在跨河道方向，运河可将开放空间网络和水乡古镇串联起来，构建新的城市发展格局。

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2. 太浦河于1958-1995年间分阶段修建，除水利与交通用途外，自2016年起还承担了向上海供应淡水的功能。沿河的工程缓冲带降低了河道可达性，并造成了两岸地区空间上的割裂。（历史地图来源：参考文献[11]）

2. Built in several phases from 1958 to 1995, the Taipu Canal combines the hydraulic functions of drainage, transport and, since 2016, the supply of fresh water to Shanghai. Poorly accessible and bordered by technical buffers, the canal is currently impacting the region as a spatial divide [Historic map source: Ref. [11]].

### 1.3 如何塑造复杂的异质性景观？

值得注意的是，长三角地区的开放空间并非一片白板。经过数百年的高强度开发，这里聚集了大量人口，有着从圩田演变而来的各类景观。受地形和历史条件影响，这些景观的特征也不一而同<sup>[12]</sup>。其中，太浦河是一个特例，其直线形态与周边景观的有机肌理格格不入。不同于自公元7世纪以来持续影响着江南地区发展的京杭大运河<sup>[13]</sup>，太浦河未

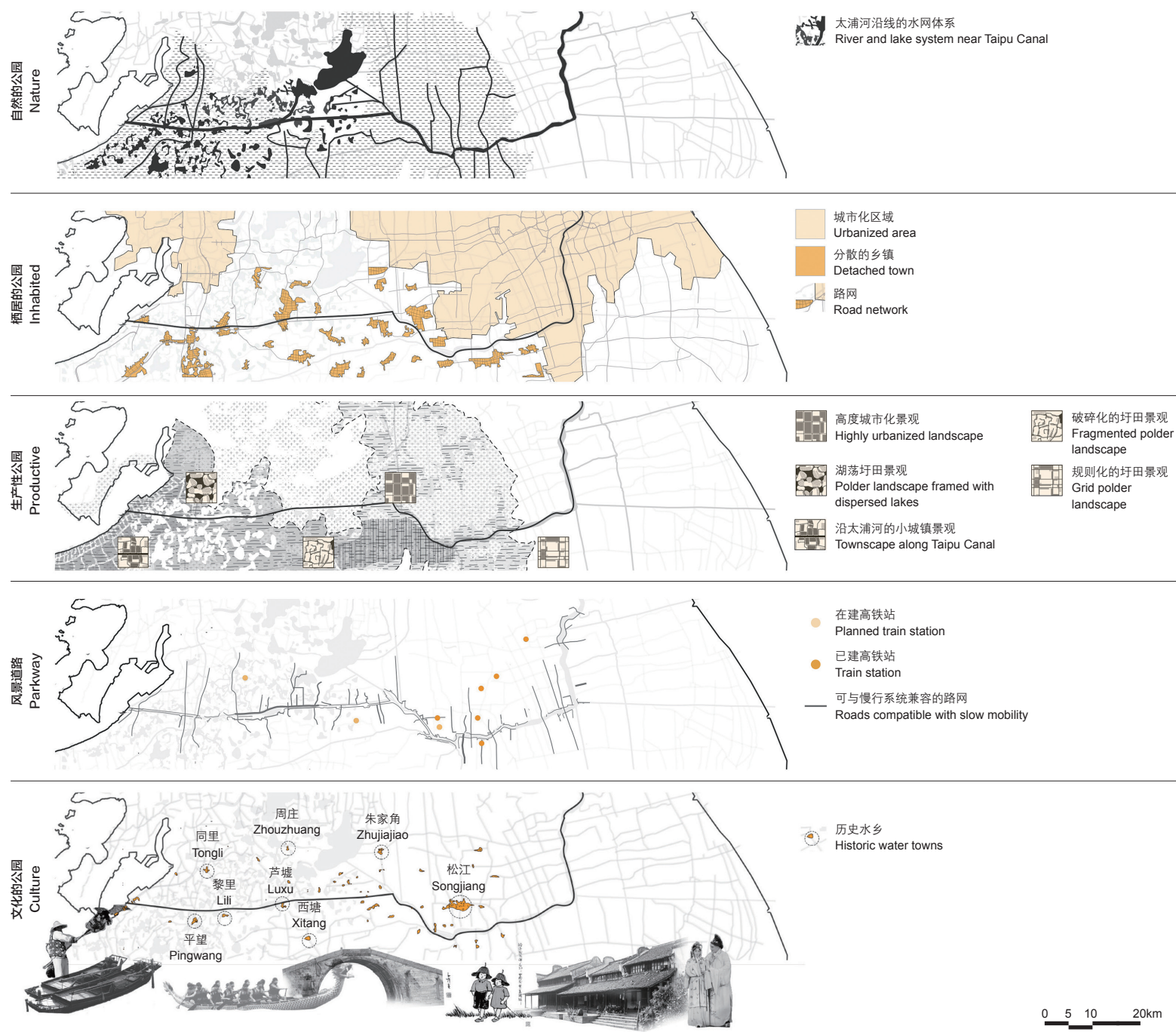
能推动沿线地区的发展，反而宛如异质性景观中的一道伤痕，将原有的城镇群、湖泊和林地割裂开来。

近期的示范区国土空间规划针对太浦河生态廊道提出了一系列环境治理和生态修复措施，但仍未考虑河流沿线的景观异质性。规划根据太浦河沿线的圩田景观基底划定了4个生态区（大湖区、溇港区、湖荡区与河网区）<sup>[3]</sup>，但针对不同景观类型及其生态空间的解决方案仍然

表1: 跨尺度的原型设计方法  
Table 1: Overview of the cross-scale prototypical method

	<p>分析 关注内容 Analysis what we look at</p>	<p>诠释 具体行动 Interpretation what we do</p>	<p>设计 产出成果 Design what we produce</p>
<p>XL (100km) 尺度: 区域 XL (100 km) Region</p>	<p>景观特征及系统 Landscape characteristics and systems</p>	<p>识别典型的条件 Identify typical spatial conditions</p>	<p>区域尺度的规划目标 (连续性、一致性、认同感) Regional scale intentions (continuity, cohesion, identity)</p>
<p>L (5km × 10km) 尺度: 纵断面 L (5 km × 10 km) Transects</p>	<p>历史演变研究 + 对现有规划和项目的评价 Historical evolution + critical review of existing plans and projects</p>	<p>探索如何激活特色景观(子)系统以强化太浦河的空间塑造作用 Explore how characteristic landscape (sub)systems can be activated to enhance the structuring role of the Taipu Canal</p>	<p>景观途径主导的策略性框架规划 Landscape-based strategic framework plan</p>
<p>M (1km × 1km) 尺度: 项目 M (1 km × 1 km) Projects</p>	<p>典型地情 / 要素的详细分析 Detail of a typical context / element</p>	<p>详细的设计措施 Detail design interventions</p>	<p>针对典型地情 / 要素的原型项目 A prototypical project for a typical context / element</p>
<p>回溯L尺度和XL尺度 Back to L and XL Scales</p>	<p>区域内的其他类似场地 Other comparable conditions at the regional scale</p>	<p>验证原型项目 / 策略在其他类似场地中的适用性 Verify the applicability of the prototypical projects / strategies in other comparable contexts</p>	<p>区域尺度的系列规划设计导则 A set of design and planning principles at the regional scale</p>

3. 根据江南公园的5个维度对太浦河进行专题分析。
3. Thematic analysis of the Taipu Canal at the XL scale according to the five dimensions of Jiangnan Park.



缺失。因此，将太浦河打造为区域“脊柱”不能局限于单一的空间方案，而应实现沿岸景观在连续性与多样性之间，以及维持一致性与应对异质性之间的平衡。

## 2 方法：太浦河地情—原型设计

鉴于自上而下的规划方式通常会带来将复杂地域问题简化的风

险<sup>[4][15]</sup>，本项目采用了跨尺度的“地情—原型”方法来把握长三角地区的高度复杂性。“地情”旨在反映对地域特征的细致理解，“原型”则强调通过生成实验性的解决方案，创建补充通用控制性规划的设计途径。为此，本项目综合运用样本图绘、类型学研究和设计探索手段，从XL、L和M三个互补的尺度对区域进行解读、展现和设计（表1）。

包括建筑学、城市规划、景观生态学和地理学在内的多个空间学

科均需要将复杂的环境解构为一系列典型的构成元素（或类型），进而通过原型概念探索重组这些元素的可能性<sup>[11][16]-[22]</sup>。这套方法常被用于空间规划和管理领域，以制定兼顾景观多样性保护和土地资源可持续利用的策略<sup>[23]-[25]</sup>。在景观管理与研究中，将复杂、多变的景观归纳为不同的类型或空间单元有助于更好地解读景观<sup>[19][26][27]</sup>。

## 2.1 XL尺度

XL尺度的研究区域长达100km，覆盖太浦河全线，包括其流入黄浦江的河段。为了从区域尺度评估太浦河塑造空间的潜力，项目团队通过查阅历史档案和地图、卫星影像、数据集和规划资料，并结合江南公园的五大主题<sup>[4]</sup>，从多个维度对太浦河进行了图绘并提出了相应的策略（图3）：

自然的公园：提升太浦河沿岸缓冲带的生物多样性，修复和连接破碎的蓝绿生态网络，从而打造生态轴线。

栖居的公园：将太浦河从民用基础设施转型为串联公民生活的基础设施，将水利设施（如水闸和桥梁等）和废弃的滨水岸线改造为公共空间，以凸显水乡的地域特色。

生产性公园：作为淡水输送渠道和交通基础设施，太浦河串联着各类生产性景观，可以将其升级为可支持短链物流经济模式的本地资源供应基地。

风景道路：太浦河将太湖和上海市中心联系起来，但太浦河及其支流的沿岸空间尚未得到有效利用。可将这些空间开发为连接火车站

和港口的非机动车交通网络，实现多式联运。

文化的公园：太浦河与京杭大运河在江南地区交汇，可作为连通沿线知名与不知名水乡的文化纽带，并可在地标性场所举办多种大型文化活动。

## 2.2 L尺度

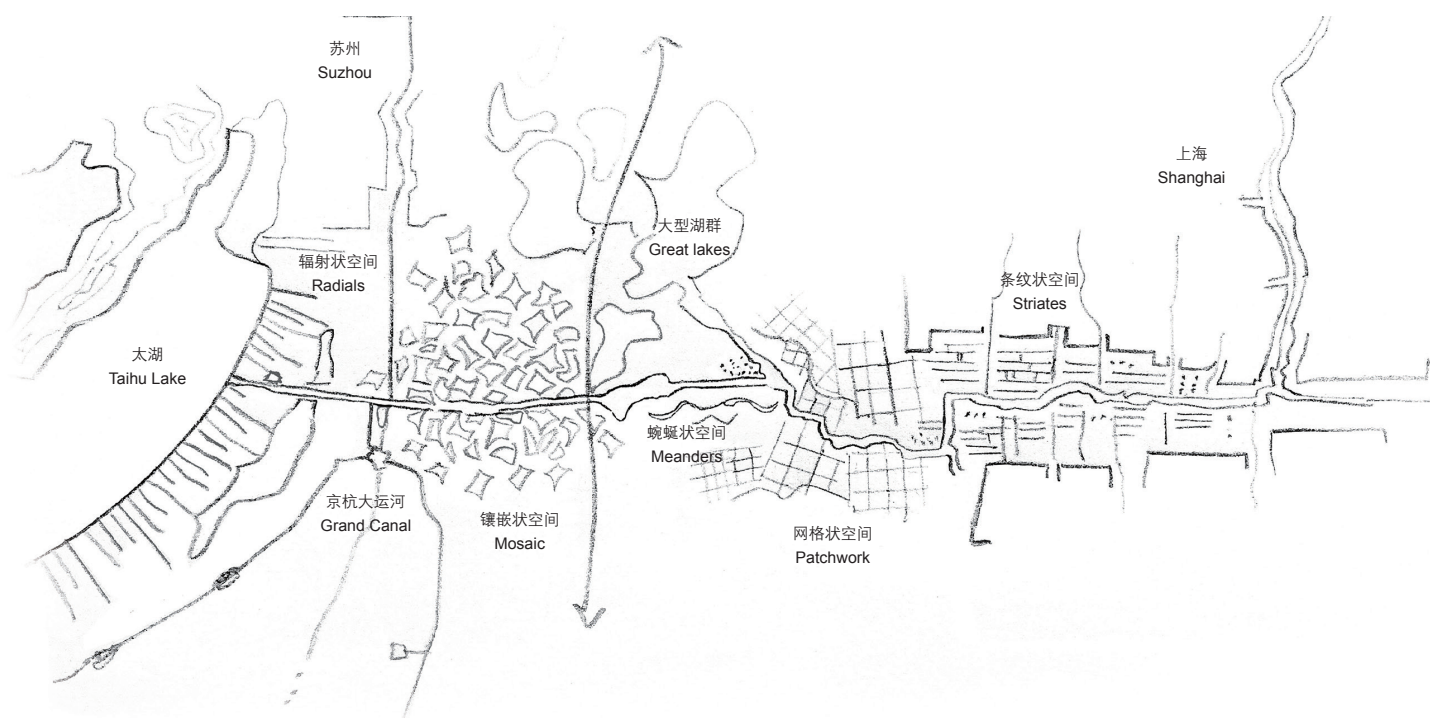
将景观特征、基础设施系统和XL尺度专题分析结果汇总为一张综合性概念图，以体现太浦河沿线的典型空间特征（图4）。从每种典型空间选取5km×10km的纵断面样本区域，研究其历史演变、地方特征及当前所面临的环境和发展挑战（图5），并描述每个纵断面的景观格局、基础设施与城镇形态之间的复杂关系。为展示该区域空间的视觉特征，项目运用中国传统地图中平立面相结合的绘图方法，并对该区域的典型迁移方式、建筑、基础设施和景观4类常见元素进行了提取和描绘（图6）。

根据L尺度分析而制定的设计策略探讨了如何通过优化太浦河与周边地区的空间关系来解决每个纵断面样本地区发展所面临的挑战。这种基于尺度调节的规划途径能够将既有开发活动与规划预期的转型有效整合为统一的行动方案，适用于水资源管理、环境保护、后工业更新和城市发展等多个方面。

## 2.3 M尺度

框架规划提出的策略在1km×1km的原型项目场地得到了验证，并

4. 综合性概念图上标示了太浦河沿线不同的典型空间特征。
4. Synthetic interpretive mapping identifying the different typical spatial conditions crossed by the canal.



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衍生出更为详细的设计方案（图7）。这一尺度主要针对场地内的某一典型元素（如一条支流、一座典型村庄或一类基础设施）提出具体的实施策略，并探讨对潜在利益相关方的影响。

#### 2.4 尺度回溯：推导规划导则

最后，项目回溯到L尺度和XL尺度，在区域尺度重新定位这些原型项目以及相应的场地策略。通过识别太浦河沿线其他具有相似特征的场地，可以评估将原型设计策略归纳为系统性规划导则并优化整个区域结构的可能性。在太浦河项目中，对6个纵断面的对比分析表明，整个区域普遍面临运河沿岸生物多样性低、去工业化，以及由水路运输衰落和现代道路系统割裂导致的公共空间网络破碎等挑战。这些原型项目的比较结果也强调了不同场地面临的共同机遇，例如可通过改造跨河道方向的废弃空间、运河支流及道路基础设施来提高太浦河沿线地区的空间连贯性。在策略层面，6个原型项目均体现了将农业生产、生态修复、风景道路建设和水资源管理等多部门项目议程整合为统一的空间规划的可能性。

### 3 结论与讨论：将原型设计作为国土空间规划的补充途径

项目运用基于原型设计的跨尺度规划方法，探索了太浦河在长三角区域绿心塑造空间的潜力，并为示范区自上而下的国土空间规划模式提供了补充路径。该方法将宏观尺度的多维度主题分析和中观尺度的原型项目相结合，推导系统性的规划导则来提高开放空间和生态系统的多样性、串联水乡古镇及塑造城市开发新格局。此外，该规划方法不仅适用于长三角这一特定的地理环境，也为其他地区国土空间规划的完善提供了参考，帮助更好地应对愈加复杂的场地条件和更大尺度的空间规划需求。下文试图通过解答以下问题，对这一设计研究项目的成果进行讨论。

#### （1）示范区国土空间规划存在哪些不足？

近期发布的示范区国土空间规划是跨省域国土空间规划实践的里程碑，为长三角一体化发展添加了生态、绿色的维度。尽管该国土空间规划尝试了跨省级行政主体之间的协作，但仍未脱离基于定量评价手段、自上而下的传统规划模式，无法灵活应对该地区的多样性、复杂性和动态性。根据景观特征将该地区的国土空间分为4类，代表了在规划思路上的突破，但对不同景观类型采用同一的评价方法仍会催生“一刀切”、同质化的规划方案。此外，人性化视角在示范区国土空间规划中也有所缺失。

#### （2）基于原型设计的规划途径如何弥补上述不足？

项目采用了包含样本分析、景观元素、系统及特征分类、基于原型的设计实践等过程的复杂规划途径，初步解读了太浦河流域的复杂性，并对研究区域进行了从宏观规划到微观设计再回到宏观的双向研

究推导。项目在尺度回溯阶段将基于地情的设计策略和原型项目重置于区域语境中进行评估和比较，发现了在一体化规划中整合不同部门项目和议程时所面临的共同挑战和机遇。这种“从特殊到一般”的规划原则推导过程可从三方面完善现行的国土空间规划手段：

首先，这一规划途径提供了人性化尺度的视角，丰富了国土空间的描绘方式。示范区现有的各类规划忽视了空间质量，而该项目则通过将区域概观与具体的场地印象相结合，对国土空间进行度量，从而确定合理的规划设计尺度。其次，该途径考虑了国土空间的复杂性。自上而下的区域规划手段往往忽略地方特征，功能区规划容易导致国土空间的割裂。而跨尺度的原型设计途径充分尊重了当地的独特性，并提供了多维度的视角，通过整合跨部门的项目，进一步维持或强化国土空间的复杂性。最后，该途径提高了规划的可操作性。地情—原型方法可基于真实地情推进策略的可行性论证，亦有助于调动潜在的利益相关方和可利用资源。因此，这种方法能够有效协调各部门的项目议程，共同协作、形成统一的规划目标并付诸实施。LAF

#### 致谢

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#### 项目信息

项目地址：中国江苏省、浙江省、上海市

项目长度：100km

项目指导：Christian Nolf、谢雨婷、董楠楠、戴代新、张斗

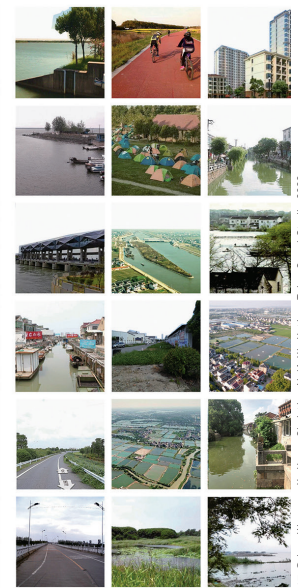
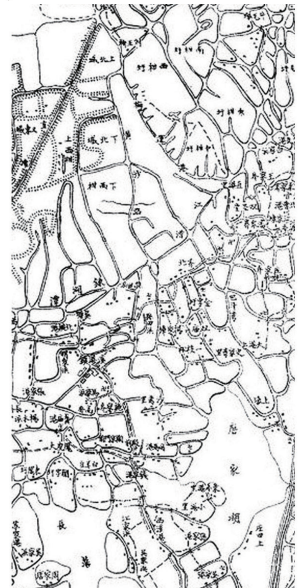
项目团队：徐雯雯、张悦、陈琳、应佳欣、吴雪琳、朱泽宇、厉超、王星儿、陈雨聪、王君妍、包纪元、郭梦阳（浙江大学）；赵易秋、潘丽君、徐元、吕玉言、罗雯雯、蔡奇峰、李晓威（西交利物浦大学）；曹阳、侯昭薇、王佳菲、赵双睿、冯婧婕、丛楷昕、欧阳慕莹、汪方心怡、朱雯、陈奕、江卉卿（同济大学）

客座点评：Kelly Shannon（比利时鲁汶大学）、Lee Parks（AECOM）、刘伟（长三角生态绿色一体化发展示范区总体方案执行委员会生态规划建筑办公室）

设计时间：2020年3~6月



5. L尺度纵断面: 对每个纵断面进行历史分析、空间特征解读以及现有规划评价, 并制定策略性规划框架(图5-1)。图5-2为放大后的纵断面1, 展示了如何将位于建成区夹缝内的开放空间作为公共花园, 并将水闸及其所在的小岛改造为公园, 从而改善漉港圩田景观与太浦河道之间的消极空间关系(历史地图来源: 参考文献[28])。



5. L scale transects: for each transect, the historical analysis, the interpretation of local characteristics, and the critical review of existing plans lead to the formulation of a strategic framework plan (Fig. 5-1). The zoom on Transect 1 (Fig. 5-2) illustrates how the accidental relationship between the radial Lougang polder landscape and the intrusive canal can be re-articulated by the requalification of interstitial open spaces in collective gardens, and by the reclamation of the sluice island as a public park [Historic map source: Ref. [28]].

## 1 Context and Challenges

### 1.1 How to Consolidate the Open Space of the Yangtze River Delta Integration Plan?

Responding to the urgent need to coordinate the spatial and economic development of the megacity region spanning across Shanghai and the three provinces of Zhejiang, Jiangsu, and Anhui, in 2019, the Central Committee and the State Council launched the Yangtze River Delta (YRD) Integration Plan. Primarily driven by the “re-scaling” at a regional level of transportation, energy, and urban services<sup>[1]</sup>, the YRD integration plan has gradually included environmental ambitions. In 2019, the Overall Plan for the Demonstration Zone for Integrated Ecological and Green Development in the YRD incorporated specific objectives related to open space<sup>[2]</sup>. However, focused

on the preservation of ecological space and permanent prime farmland, these objectives remained limited to quantitative prescriptions and quotas. In June 2020, a more precise plan for the demonstration zone was published<sup>[3]</sup>, specifying the proportion of green and blue open space, as well as the length and overall structure of a parkway, greenway, and blue waterway system. Even though this plan marks a milestone as the first cross-provincial territorial plan in China, the planning approach remains strongly informed by regulatory, top-down, and functional zoning principles that tend to overlook the complexity of this ecologically and historically sensitive area.

The project introduced in this article explores the same area, but from the perspective of Jiangnan Park<sup>[4]</sup>, a territorial vision that regards the vast triangular region between Shanghai, Suzhou, and Hangzhou as the ecological and cultural “green

① Taipu Canal Studio 2020 is a part of the Jiangnan Park project and is directed by the joint-initiative of the Jiangnan Lab, promoted by Associate Professor Christian Nolf (Department of Urban Planning and Design, Xi'an Jiaotong-Liverpool University) and Dr. Xie Yuting (Institute of Landscape Architecture, Zhejiang University). This joint studio was developed in cooperation with Associate Professor Dong Nannan and Associate Professor Dai Daixin (Department of Landscape Studies, College of Architecture and Urban Planning, Tongji University), as well as with Zhang Dou from Sasaki.

heart” of the YRD megacity region. It investigates how cross-scale and design-driven approaches can bridge the gap between current top-down regulatory zoning approaches and local site-specific solutions.

## 1.2 Why Considering the Taipu Canal as a Regional Spine?

An evident strategy to consolidate fragmented open spaces is to re-articulate them in a park system<sup>[5]</sup>. This can be achieved by introducing new webs of greenways<sup>[6]</sup>, or by conferring a new structuring role to an existing linear landscape or infrastructural element. The re-articulation strategy along an existing linear element has been most famously illustrated in the Emerald Necklace in Boston, USA, the Emscher Park in Germany, and the New Dutch Waterline in the Netherlands<sup>[7][8]</sup>. The rewearing of open spaces does not only strengthen their role as ecological corridors and networks<sup>[9]</sup>; it can also contribute to the socio-cultural cohesion of a region. By connecting isolated places physically and functionally, a linear park system can reinforce the sense of belonging of the residents and establish a local identity through tangible relationships to the place or a region<sup>[7]</sup>. Likewise, for the visitors, an articulating linear system can open up new sequential perspectives that reveal the coherence and diversity of a region<sup>[10]</sup>.

The Taipu Canal is a 57-kilometer-long drainage channel linking Taihu Lake to Shanghai across the ecological sensitive polder areas of Taihu Basin (Fig. 1). Excavated in different

phases from 1958 to 1995, the Taipu Canal has played an important role in flood control, drainage, irrigation, and since 2016, supply of fresh water to the Shanghai metropolitan area. Despite its purely technical function and limited accessibility (Fig. 2), the canal by default stands out as a main spatial referent in the region because of its straight route and majestic scale. Its strategic importance has been further comforted by the recent territorial planning of the demonstration zone that designates it as a main ecological corridor.

Taipu Canal Studio 2020<sup>①</sup>, a design-driven research project, hypothesizes that the Taipu Canal can guide the spatial development of the vast green heart of Jiangnan Park as a cohesive entity, and can (re)articulate the region in two directions: longitudinally, the canal can be upgraded from its current drainage function into an ecological and recreational spine that links the rich diversity of open spaces and ecosystems; transversally, the canal can interweave the network of open spaces, connect historic water towns and villages, and frame new urban developments.

## 1.3 How to Articulate a Complex Heterogeneous Landscape?

It is important to note that the YRD's open space is anything but empty. Densely populated and intensively exploited for several centuries, the area is characterized by a multiplicity of typical landscapes that all derive from polder structures, but with variations linked to distinct topographical conditions and historical evolutions<sup>[12]</sup>. Interestingly, the Taipu Canal remains an exception in this complex and historically charged context. Designed as a straight line to drain water, the Taipu Canal contrasts drastically with the organic and cellular patterns of its surrounding landscapes. At the difference with the Grand Canal that conditioned the development of the Jiangnan region since the early 7th century<sup>[13]</sup>, the relatively recent Taipu Canal has not generated development along its route. Bordering the backside of modest towns, splitting lakes in two, or crossing patches of forests, the Taipu Canal still appears as an incision across a juxtaposition of heterogeneous landscapes.

In the recent official territorial plan for the zone, the environmental governance and ecological restoration solutions for the Taipu Canal as an ecological corridor are homogenous from east to west. Even though four ecological zones along the Taipu have been framed according to the underneath polder landscape structures (Great Lakes, Lougang, Hudang, and River Network Zones)<sup>[3]</sup>, specific design solutions for different landscape types and their ecological spaces are still missing. The project presented in this article considers that the requalification of the Taipu Canal as a regional spine cannot be limited to a



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network connected to several train stations and ports.

Cultural Park: as the perpendicular counterpart of the Grand Canal in the Jiangnan region, the Taipu Canal can support multiple cultural circuits linking the constellation of well-known and less-known water towns and villages, while also hosting major cultural events in emblematic sites.

## 2.2 L Scale

The landscape characteristics, the infrastructural systems, and the results of the thematic analyses at the XL scale were summarized in a synthetic interpretative map that identifies a set of typical spatial conditions crossed by the canal (Fig. 4). For each typical condition, a representative transect of 5 km × 10 km was sampled and examined in terms of historical evolution, local characteristics, and current environmental and developmental challenges (Fig. 5). The complex relationships between landscape pattern, infrastructures, and forms of urbanization of each transect were described. In order to capture the visual identity of the region, the local characteristics were represented using a traditional Chinese mapping technique combining plan and elevation. A toolbox of common elements found in the region were featured and classified into four categories of typical usages, buildings, infrastructures, and landscapes (Fig. 6).

On the basis of this analysis at the L scale, contextual design strategies were imagined, exploring in each transect how an enhanced relationship between the Taipu Canal and its surrounding could contribute to addressing local development challenges. This rescaling approach provides a framework that integrates and aligns ongoing and planned transformations—for water management, environmental protection, post-industrial requalification, and urban development—toward a coherent agenda.

## 2.3 M Scale

The strategies of the framework plans were then tested in concrete prototypical projects in 1 km × 1 km sites (Fig. 7). By focusing on a characteristic element (e.g., a tributary, a typical village, an infrastructural element), this level of detail helped visualizing how the strategies can be implemented on the ground and which stakeholders are potentially impacted.

## 2.4 Zoom out: Inducing Structuring Principles

The last phase zoomed out to position the site-specific strategies and prototypical projects in a wider regional context at the L and XL scales. By identifying similar conditions in other sites along the canal, this zoom-out exercise hence

assessed the capacity of prototypical strategies to be systemized as structuring principles at the regional scale. In the case of the Taipu Canal, the comparison of the six transects highlighted several common challenges, such as the limited biodiversity of the canal fringes, the process of deindustrialization, and the fragmentation of public space networks due to the decline of water transport and the divisive impact of the road system. The comparison of prototypical projects also highlighted common opportunities, such as the potential of transversal marginal spaces, tributaries, and road infrastructures to restore the spatial cohesion of the areas crossed by the Taipu Canal. In terms of strategy, finally, the six prototypical projects highlighted the possibilities of combining sectoral programs and agendas of agriculture, ecological restoration, parkways, water management etc. in integrative spatial projects.

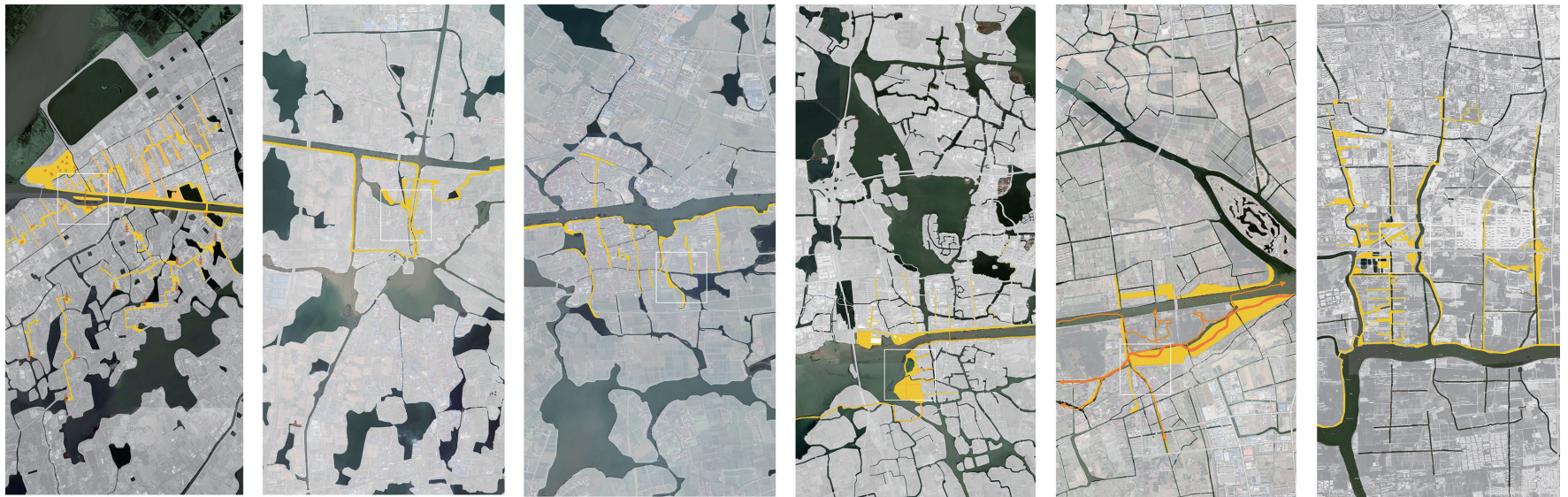
## 3 Conclusion and Discussion: Toward a Prototypical Approach to Territorial Planning

Developed to assess the potential structuring role of the Taipu Canal as a regional spine in the green heart of the YRD, the cross-scale prototypical approach presented in this article offers a useful alternative to the top-down method applied in the recent territorial planning for the demonstration zone. Combining a multidimensional thematic analysis at the large scale and pilot projects at the medium scale, it aims to identify systemic principles to articulate the rich diversity of open spaces and ecosystems, link historic water towns and villages, and frame new urban developments. In addition, it can be argued that beyond the specific geographic context of the YRD, this approach also offers possibilities to complement the regulatory territorial planning for other territories, which has to cope with increasingly complex conditions and vaster scales. The authors try to discuss the outcomes of the research-by-design project in line with the following research questions.

(1) What is lacking in the territorial planning for the demonstration zone?

The very recently released territorial planning for the demonstration zone in the YRD marks a milestone in two senses: it scales-up the planning scope across provincial territories; it adds an ecological and green dimension to the YRD integration plan. Even though this territorial plan is exemplary of cross-provincial coordination, it still applies quantitative and top-down principles inherited from past planning practices. It remains too rigid to respond in an adaptive manner to the diversity, complexity and dynamics of this area.

框架规划 Framework plan  
(5 km × 10 km)



原型项目 Prototypical project  
(1 km × 1 km)



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The decomposition of the territory into four types of landscape characteristics represents an appreciable progress. However, these different landscapes are evaluated according to a single assessment method, which entails risks of generating simplified and homogeneous planning solutions. Finally, human perspective is missing in the official territorial plan.

(2) How could this prototypical approach complement it?

The project presented in this article is a preliminary attempt to grasp the complexity of the vast Taipu Canal territory. To this end, it uses a comprehensive approach, comprising a process of sampling, classification of typical elements, systems

and characteristics, as well as prototypical design explorations. This process iterates in scales from the general large scale to the details and back. The zoom out phase positions the site-specific strategies and prototypical projects in a wider regional context. The repositioning and comparison of prototypical projects highlight the common challenges and opportunities to combine sectoral programs and agendas in integrative plans. This inductive process, which reasons from the specific to the general to define structuring principles, complements territorial planning in three ways:

First, it enriches the description of the territory with a human-sized perspective. The combination of the regional

- 使用相同的表现手法和元素对比不同纵断面的策略性框架规划与原型项目，揭示了太浦河沿线多样化的空间特征，同时发现了不同场地面临的共同挑战与机遇。
- Facilitated by the use of common representation modes and elements, the comparison of strategic framework plans and prototypical projects for the different transects reveals the rich diversity of conditions encountered along the Taipu Canal, but also some recurring challenges and opportunities.

overview with phenomenological impressions on the ground makes it possible to capture space qualities that are invisible in plan; it also takes the measure of the territory and helps to define appropriate scales of planning and intervention. Second, it acknowledges the complexity of territories. Too often, top-down regional planning approaches are limited, by ease and by inadvertence of local specificities, to zoning plans that separate functions and thereby disintegrate territories into sterile fragments. Based on distinct characteristics of places, the cross-scale prototypical approach provides multiple perspectives on space that hence makes it possible to envisage the combination of different programs that maintain or reinforce the complexity of territories. Third, it supplements planning with an operative dimension. The contextual prototype method not only provides in-field insights on the physical feasibility of implementing a strategy; it also identifies which stakeholders would be impacted and which resources could potentially be mobilized. As such, the method can contribute to aligning agendas and forming coalitions to converge and operationalize planning objectives. **LAF**

#### ACKNOWLEDGEMENT

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#### PROJECT INFORMATION

**LOCATION:** Jiangsu and Zhejiang Province and Shanghai City, China

**AREA (LENGTH):** 100 km

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**STUDIO TEAM:** Xu Wenwen, Zhang Yue, Chen Lin, Ying Jiabin, Wu Xuelin, Zhu Zeyu, Li Chao, Wang Xinger, Chen Yucong, Wang Junyan, Bao Jiyuan, Guo Mengyang (Zhejiang University); Zhao Yiqu, Pan Lijun, Xu Yuan, Lyu Yuyan, Luo Wenwen, Cai Qifeng, Li Xiaowei (Xi'an Jiaotong-Liverpool University); Cao Yang, Hou Zhaowei, Wang Jiafei, Zhao Shuangrui, Feng Jingjie, Cong Kaixin, Ouyang Muying, Wang Fangxinyi, Zhu Wen, Chen Yi, Jiang Huiqing (Tongji University)

**GUEST CRITICS:** Kelly Shannon (KU Leuven), Lee Parks (AECOM), Liu Wei (Office of Ecology, Planning & Construction, Executive Committee of Yangtze River Delta Ecological Green Integrated Development Demonstration Zone)

**DESIGN PERIOD:** March to June, 2020

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