

1

## 技术路线

Research Framework

数据种类  
Data Source

1. 大众点评数据	2. Strava 运动数据	5. 竞赛提供数据
1.1 休闲娱乐设施 1.2 餐饮设施位置	2.1 步行和跑步累积路径 2.2 自行车骑行累积路径	5.1 基地及周边 CAD 5.2 上位规划报告文件 5.3 场地人群活动情况数据 5.4 轨道公交数据 5.5 控规数据
3. 街景图像数据	4. OpenStreetMap	
3.1 百度街景 API 3.2 每 300-500 米取点下载	4.1 街道路网 4.2 河流水系 4.3 公园绿地	

算法技术  
Tech & Algorithm

1. 空间分析	2. 人工智能和图学	3. 数据统计
1.1 ArcGIS 空间分析 1.2 Python 大数据可视化 1.3 Grasshopper 最短路径模拟	2.1 深度学习 PSPNet 算法 2.2 图像语义学习和分割 2.3 机器学习	3.1 RStudio 多元逻辑回归

分析流程  
Analysis Flow

1. 空间分析	2. 街景图像识别	3. 路径模拟
1.1 餐饮设施分布 1.2 休闲娱乐设施分布 1.3 与河流位置关系 1.4 骑行、跑步和步行活动分布和强度	2.1 街道量化指标体系建立 2.2 随机选取照片样本请建筑师、规划师就围合度打分(0-6 分别代表过于稀疏、疏密、较不稀疏、良好、较局促、局促、非常局促) 2.3 深度学习 PSPNet 算法对街景照片进行语义分割，得到相应量化指标 2.4 进行模型训练 2.5 用机器学习给待评估的照片标注做预测	3.1 最短路径算法用于 OD 分析，模拟从公交站点往基地的步行和自行车交通路径 3.2 模拟从附近居民区往基地的步行和自行车交通路径

结果解读  
Results Discussion

1. 对比优化路径	2. 街道围合度评价	3. 水上活动分析
1.1 实际跑步和骑行活动的路径与模拟的居民活动路径做对比 1.2 实际跑步和骑行活动路径与模拟的公交站点往返街道路径对比	2.1 计算优化路径上的平均街道空间质量，发现问题 2.2 将优化路径上现有商业设施数量与浦东核心地区商业设施数量对比，发现问题	3.1 从基地出发滨水路上线的商业、餐饮和娱乐设施数量和活跃度

设计策略  
Design Strategies

1. 增强可达性	2. 加强滨水生态	3. 水上活动分析
1.1 通过景观手段改善通往滨江重要路径的街道环境，吸引更多人群，鼓励绿色出行 1.2 增加线路上沿街商业和休闲功能，用底层商业建筑围合街道，活跃气氛	2.1 设计多样的黄浦江岸线，增加游船码头和餐饮设施，增加人工湿地等生态功能 2.2 将防洪功能和城市活力有机结合在一起 2.3 延续民生码头历史文脉，发展农产品特色文化氛围	3.1 重塑黄浦江和运河的运输功能，借无人驾船发展春风，在基地发展无人船研发和相关产业 3.2 无人船用于对区域内乃至上海的滨水餐饮和休闲空间的鲜蔬运送和游客轮渡

规划策略和目标  
Strategy & Goal

Mixed Use  
Minsheng Dock Flood Mediate

Aesthetic  
Art Accessible Active

**MART**  
MinSheng District

Renovation  
Reuse Revitalize

Technical Tourist

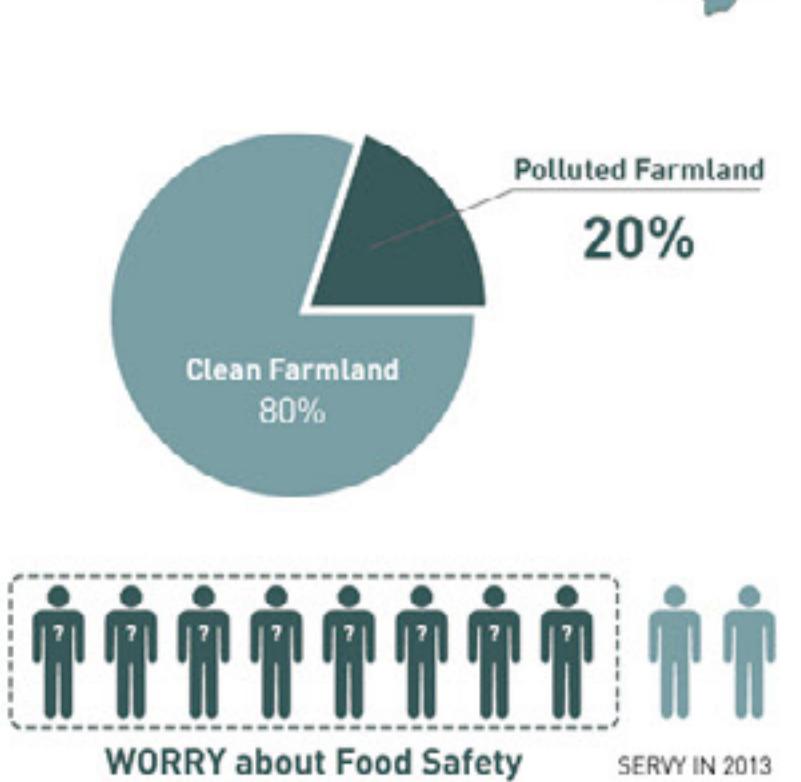
## 机遇和挑战 Problems As Opportunities

### 01. Food Security

**Population** increases while food production decreases in Shanghai.

55% **Vegetables** consumed in Shanghai come from regions outside the city.

85% **Grains** consumed in Shanghai come from regions outside the city.



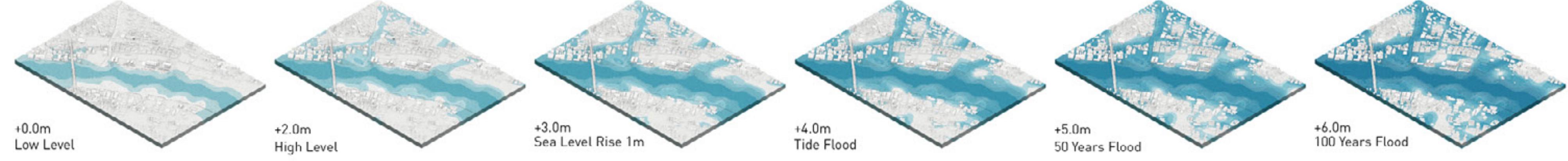
### 02. Food Safety

20% farmland in China has been polluted.

In 2013, 80% Chinese people worried about food safety.

In 2015, Cadmium is found in rice.

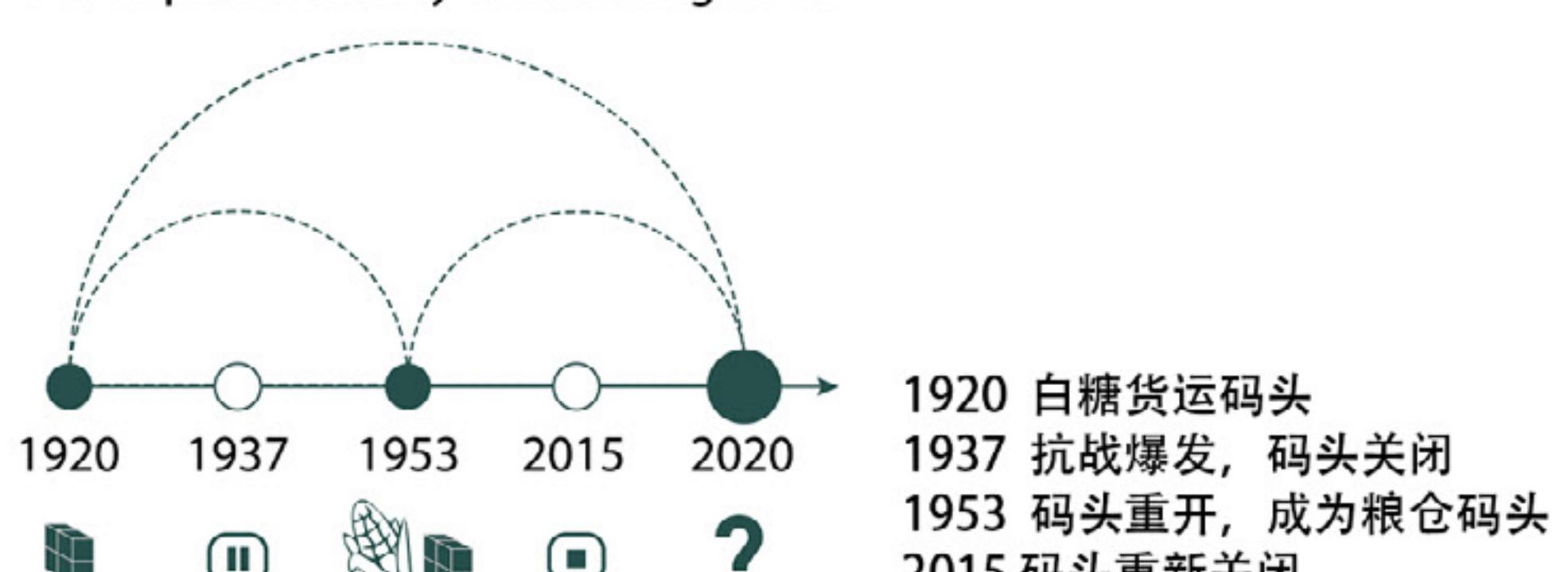
### 04. High Flood Risk



## 黄浦江开发历史 Development History of Huangpu River



## 民生码头发展历史 Development History of Minsheng Dock



### 03. Water Pollution

In 2010, 32% environmental emergencies are caused by water pollution.

17% rivers are so polluted that are not suitable for human contact.

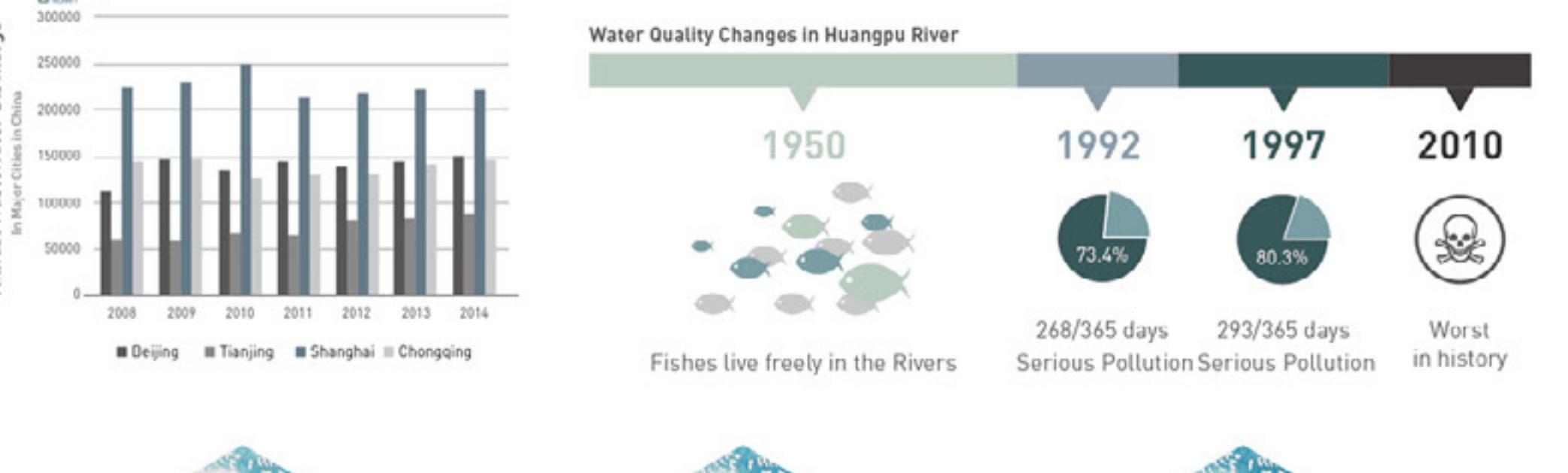
Shanghai has been the **Largest** annual wastewater discharge city in China.

China

Shanghai

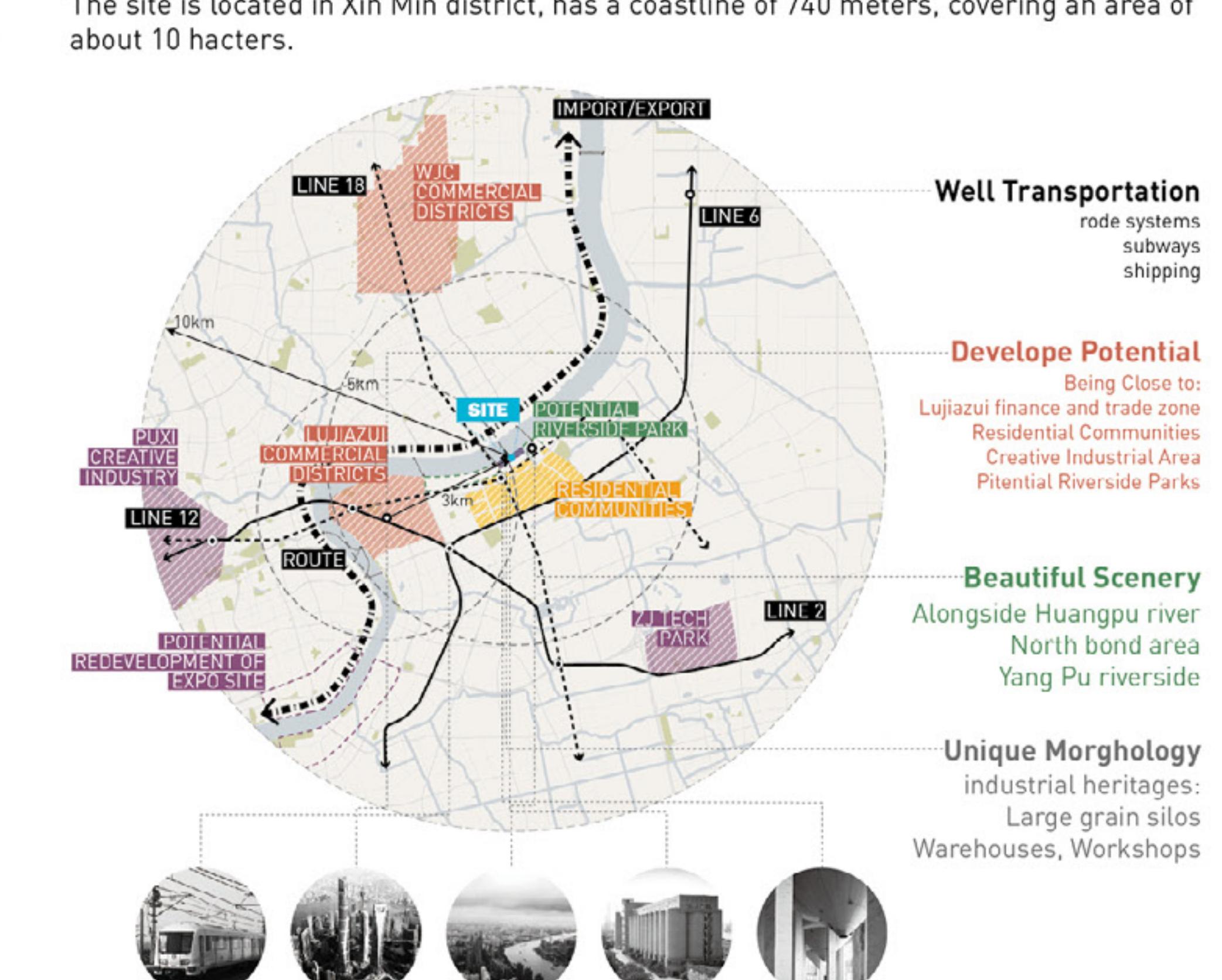
Sanitary Sewage

became the main reason for the water pollution in Huangpu river since 2004.



## 基地及周边现状 Site Analysis

The site is located in Xin Min district, has a coastline of 740 meters, covering an area of about 10 hectares.





2

重塑宜人、优美和活跃的街道环境  
Accessible, Aesthetic & Active Street

#### 街道空间质量评价原则 Metrics of Street Quality Measures

#### 基地周边空间质量评价 Measure the Streets

##### 可量化的五个维度 5 Measures

行人感受	街景照片
·愉悦感 ·舒适感 ·安全感	专家打分 ● 街景照片 · 人视角 · 接近真实 · 标准化
机器学习 计算机视觉	
物理要素 ·人行道宽度 ·街道宽度 ·交通流量 ·乔木遮盖 ·行人数量 ·小气候	可量化的 空间品质 ·人尺度 ·丰富性 ·围合度 ·透明性 ·意向性

##### 围合度 Enclosure



##### 丰富性 Diversity



##### 人尺度 Human Scale



##### 透明性 Transparency

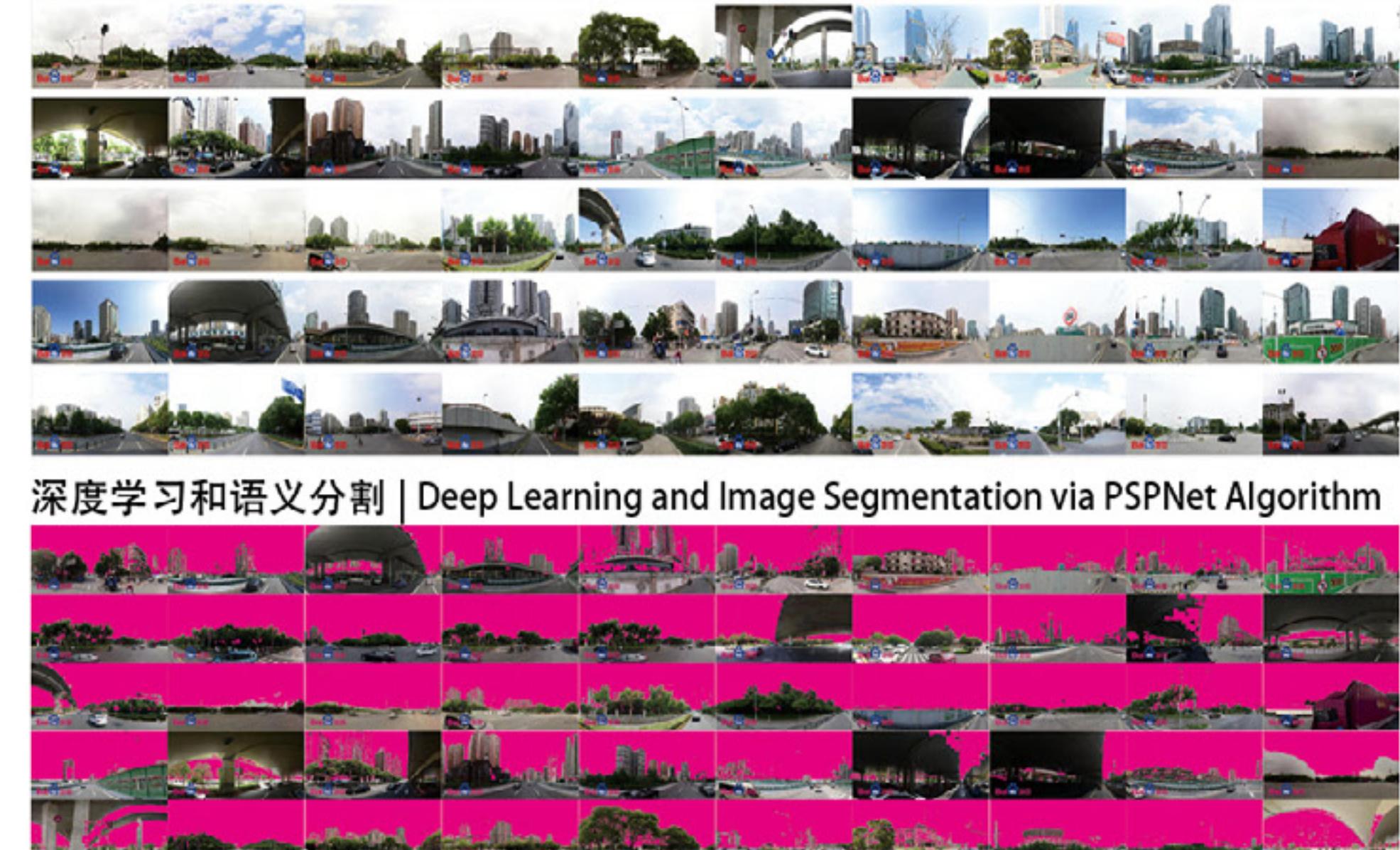


##### 意向性 Intentionality



#### 技术支持：深度学习和街景照片 Deep Learning & Street View Image Segmentation and Analysis

百度街景下载 | Baidu Street View API



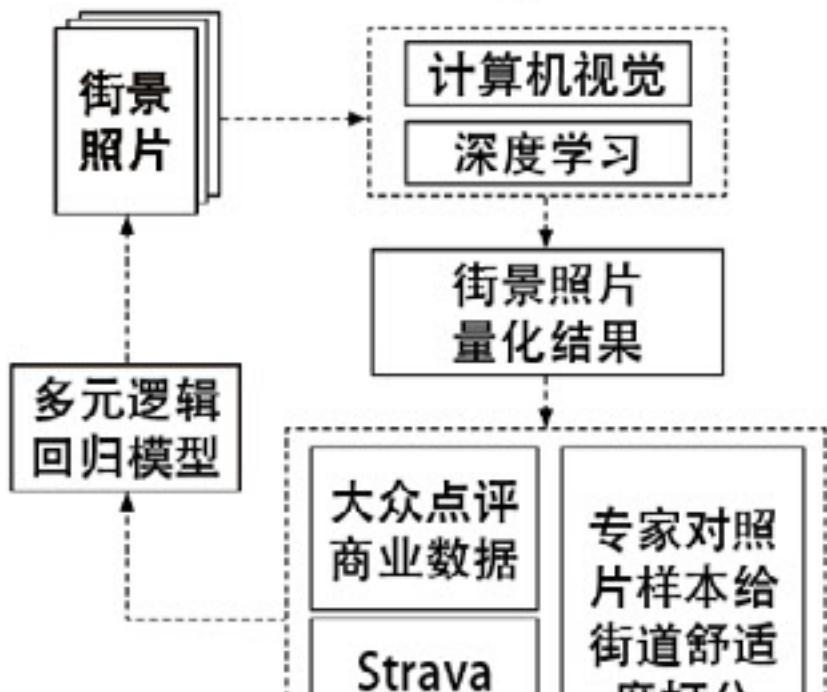
#### 街道色彩和跑步、骑行活跃度分析 Associations between streetscape color and human activities

研究中我们提出问题，何种颜色或颜色组合更受实际使用者以及规划建筑设计师的欢迎，采用以下两个方法采集数据和分析：

(1) 百度 API 对道路每隔 300-500m 取点获取街景照片并分析其除了天空、绿树和道路之外的主要色彩组成，并与大众点评的活动数据和 Strava 的步行骑行数据关联，试图找到最“受欢迎”或“最让人心情舒适”的颜色。

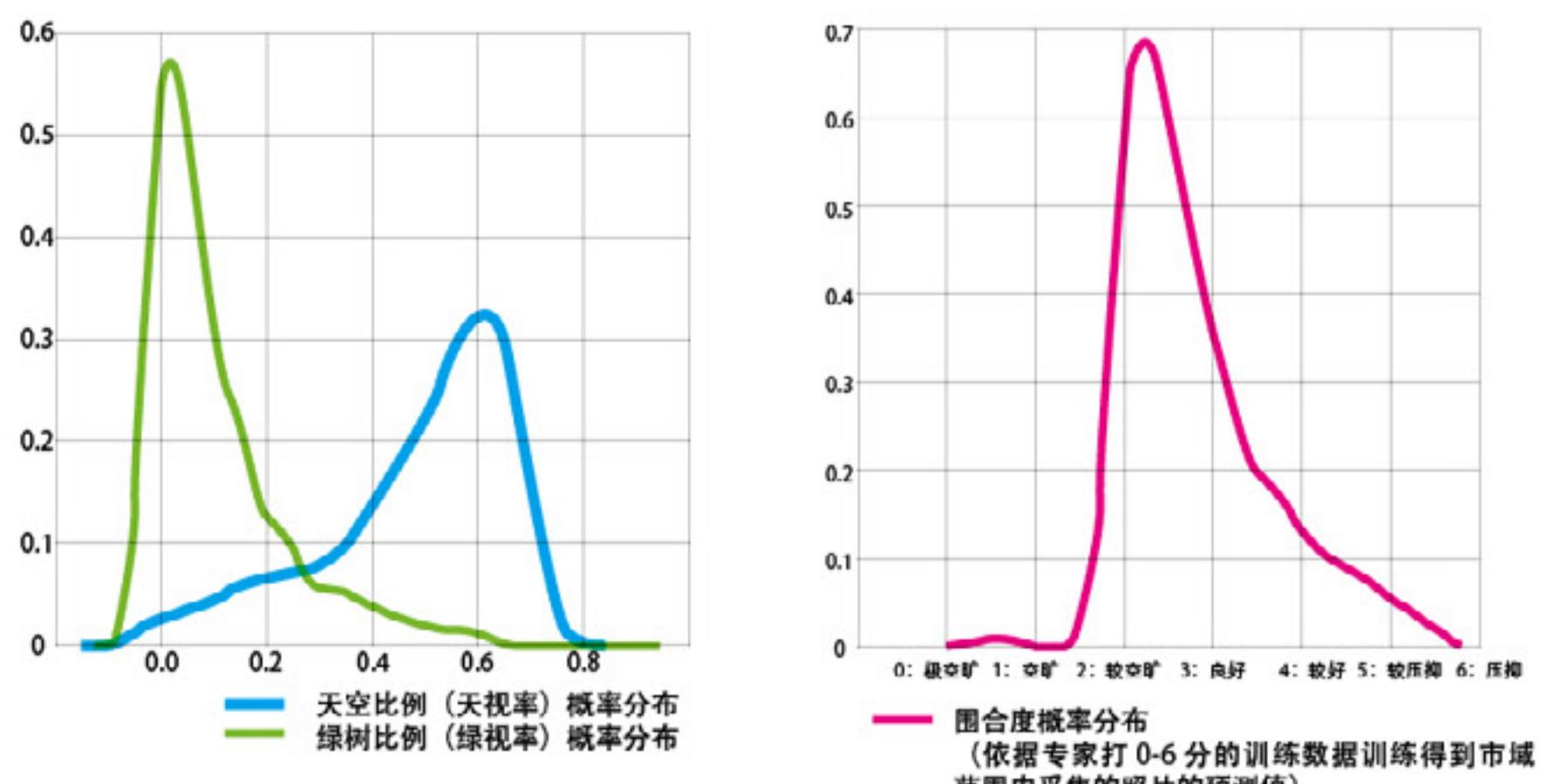
(2) 同时也通过专家打分机制，研究获得舒适度分数较高的照片中的主要颜色。研究发现，无论是对于跑步和骑行，是商业活动，还是专家打分，照片中绿树、蓝天、水景均对活动或分数有积极贡献。此外，基地周边最为常见颜色组成如下图，以灰黑褐为主，工业风貌十足，但较为消极。因此，本方案提出，在街道和公共空间环境梳理和更新中，应该利用好植物和水景，增加自然和人尺度氛围，提高心理舒适度。

##### 数据和研究方法 Data and Methodology



#### 基于计算机视觉和人工智能的海量街景图片评价方法 Street Quality Measured by Computer Vision, AI and Street Images

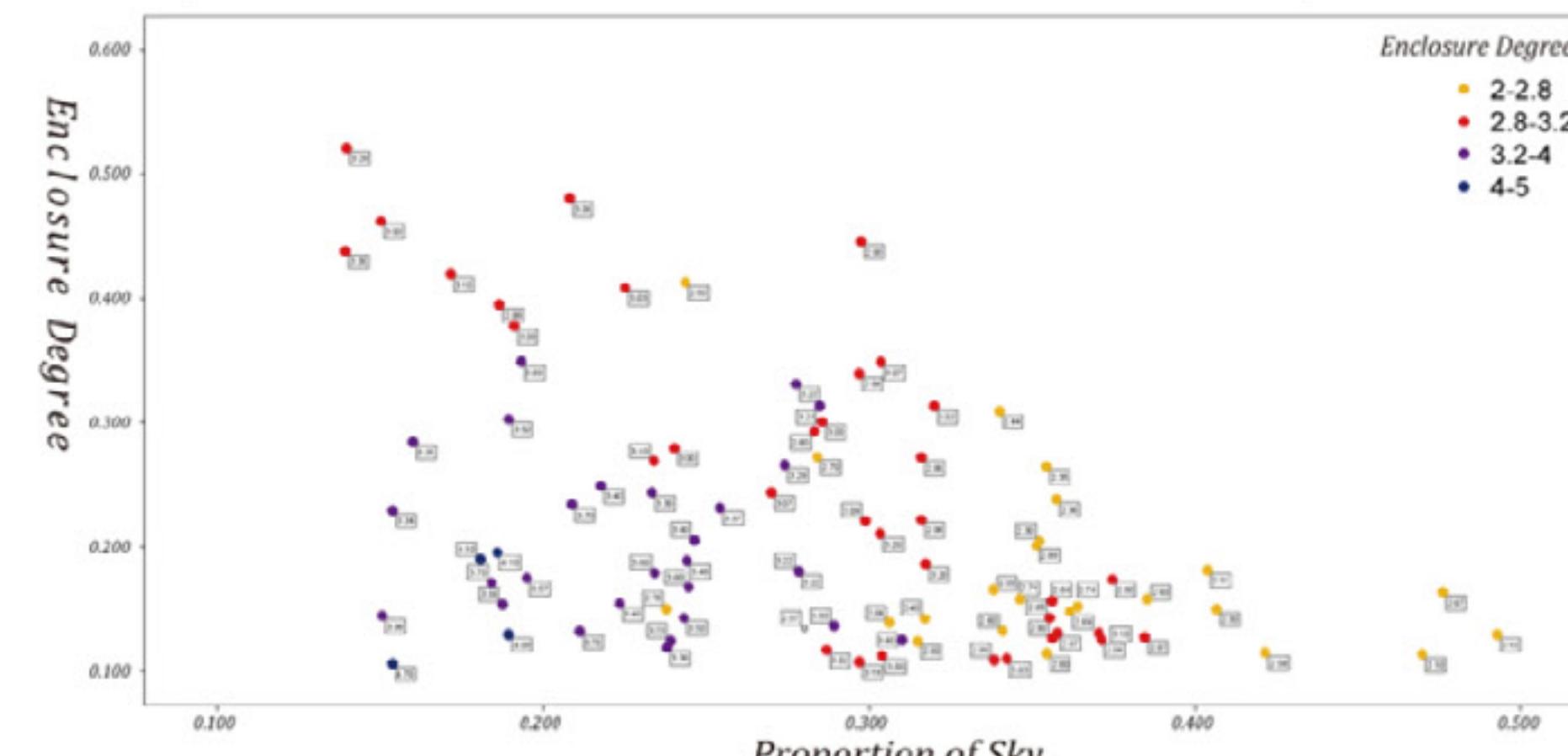
市域范围街景照片的围合度预测结果



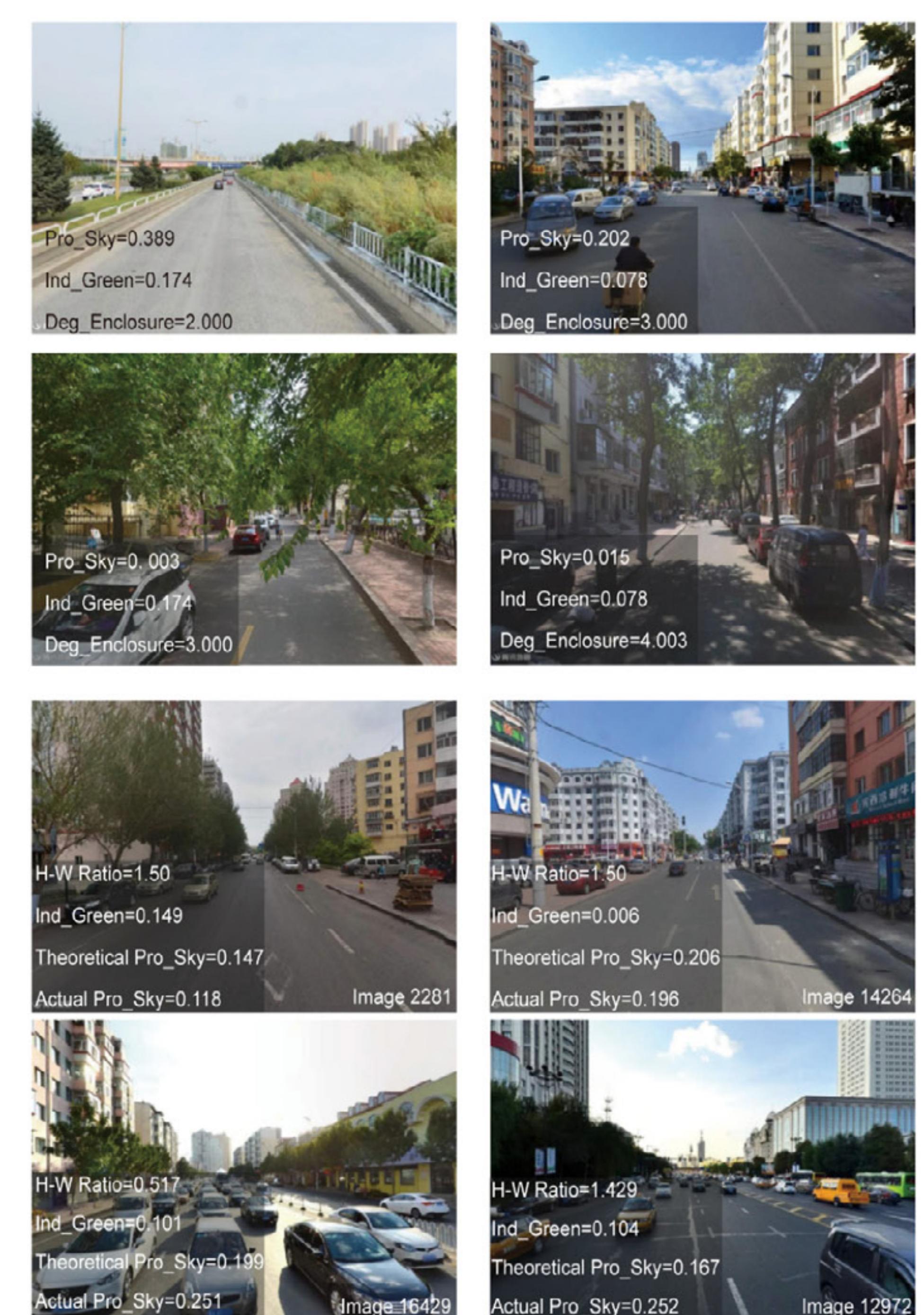
##### 街景照片的围合度模型

$$X_1 = 5.779 - 5.494 \cdot X_2 - 1.521 e^{X_3}$$

Here, the parameter  $X_1$  represents *Enclosure Degree*, parameter  $X_2$  represents *Proportion of Sky*,  $X_3$  represents *Green View Index*. By fitting our data, we can determine our function as below with  $R^2=0.651$ ,  $\delta=.000$



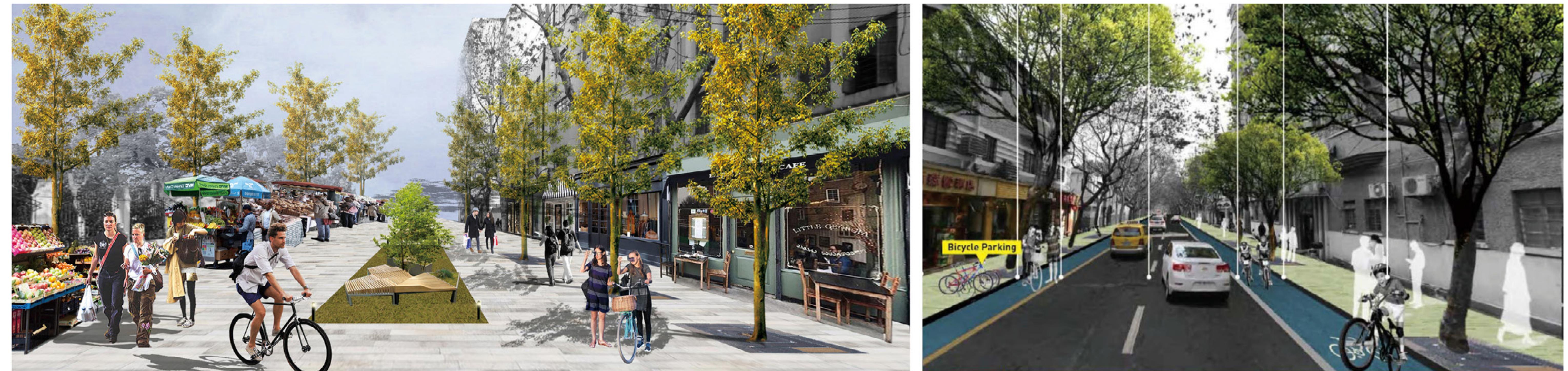
In this figure, it is obvious that both *Proportion of Sky* and *Green View Index* have positive effect on the *Enclosure Degree*. However when the value of *Green View Index* is larger than 0.278, this variation has a significant influence on the *Enclosure Degree*. Those points' *Enclosure Degree* are almost marked 3(the best value), much better than other images whose *Proportion of Sky* is at the same level.



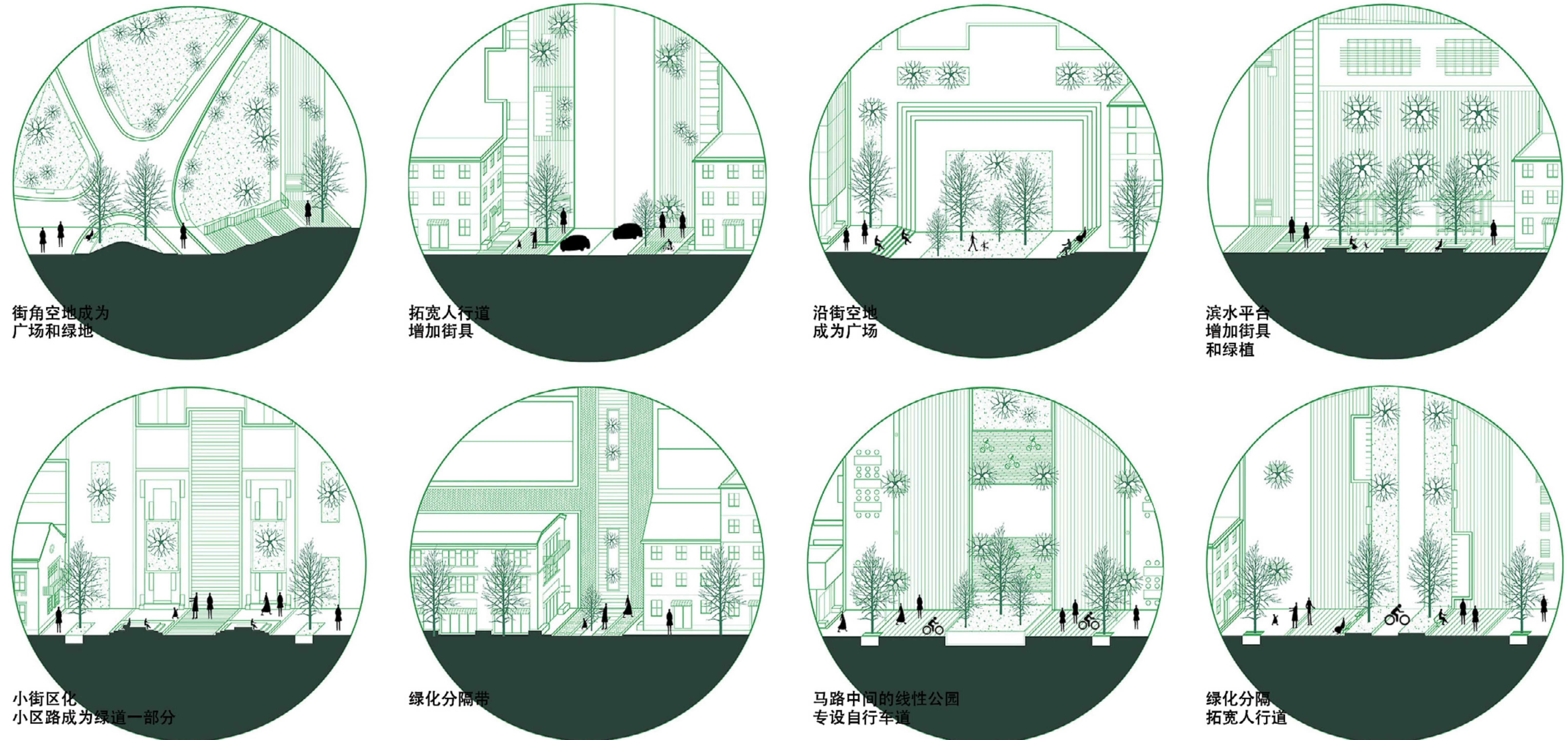


3

重塑宜人、优美和活跃的街道环境  
Accessible, Aesthetic & Active Street



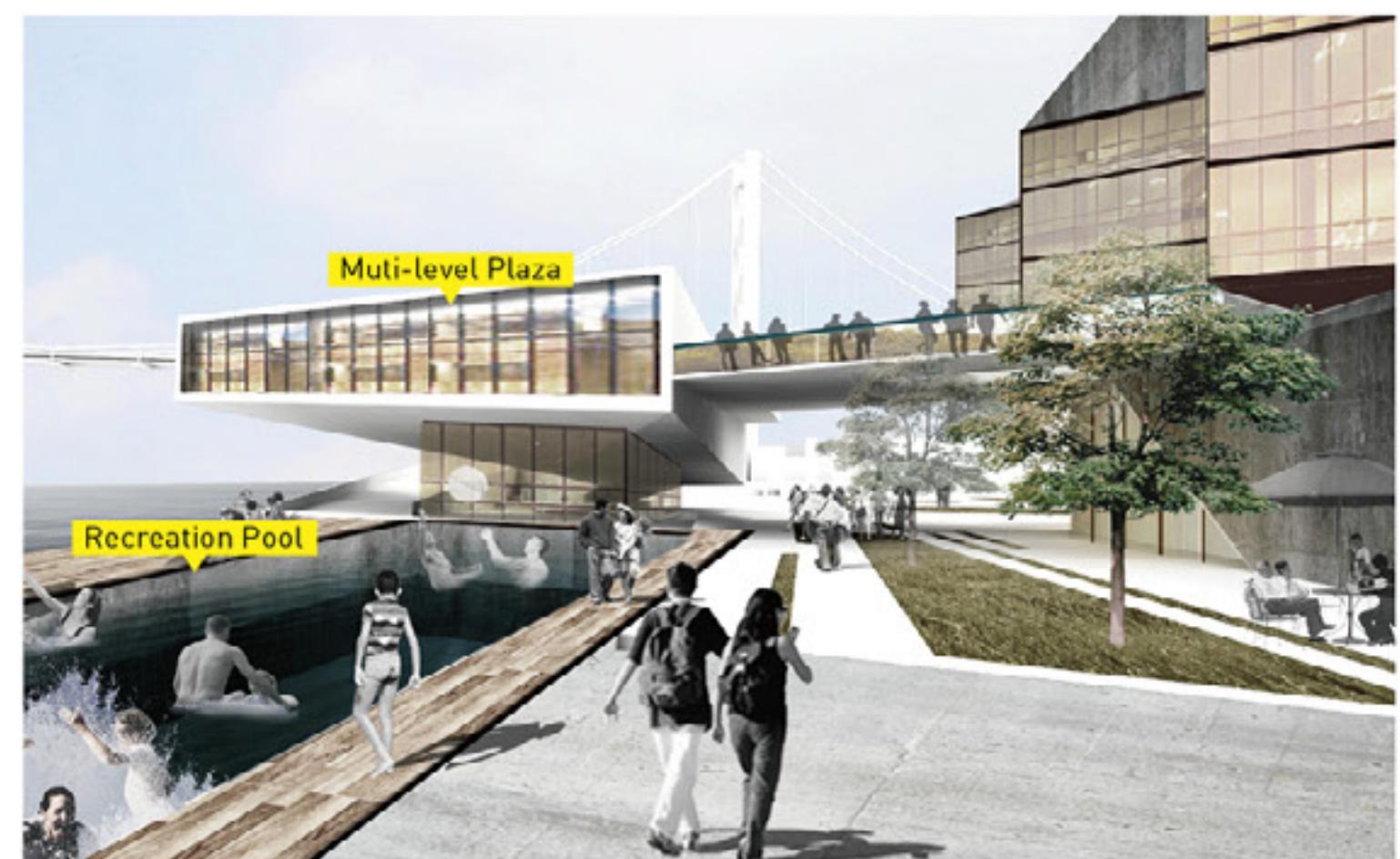
街道空间更新节点设计  
Street Renovation Design Details





弹性、生态和休闲的滨水岸线空间  
Resilient & Recreational Waterfront

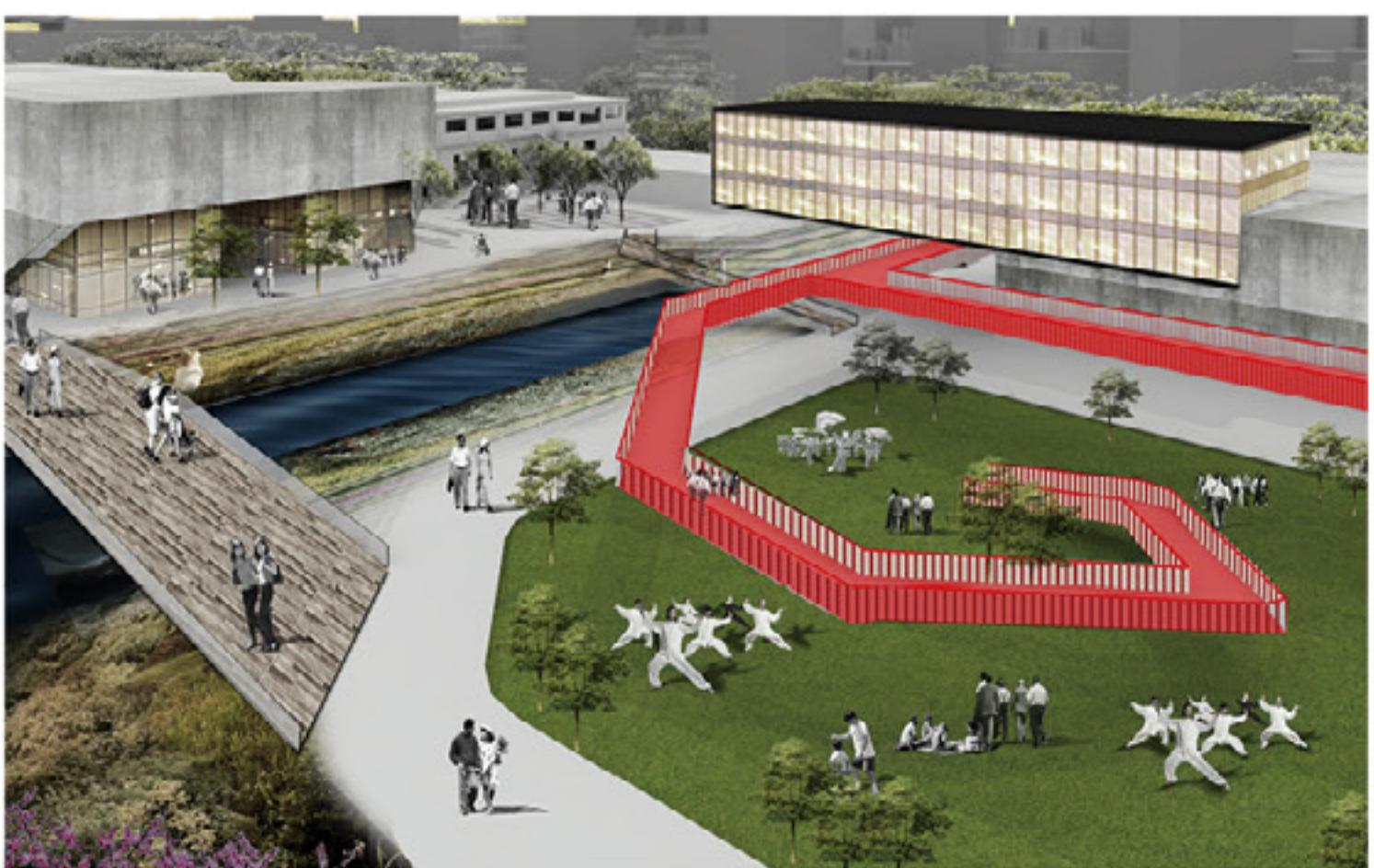
4



迎客水岸  
Gateway Waterfront



生产水岸  
Productive Waterfront

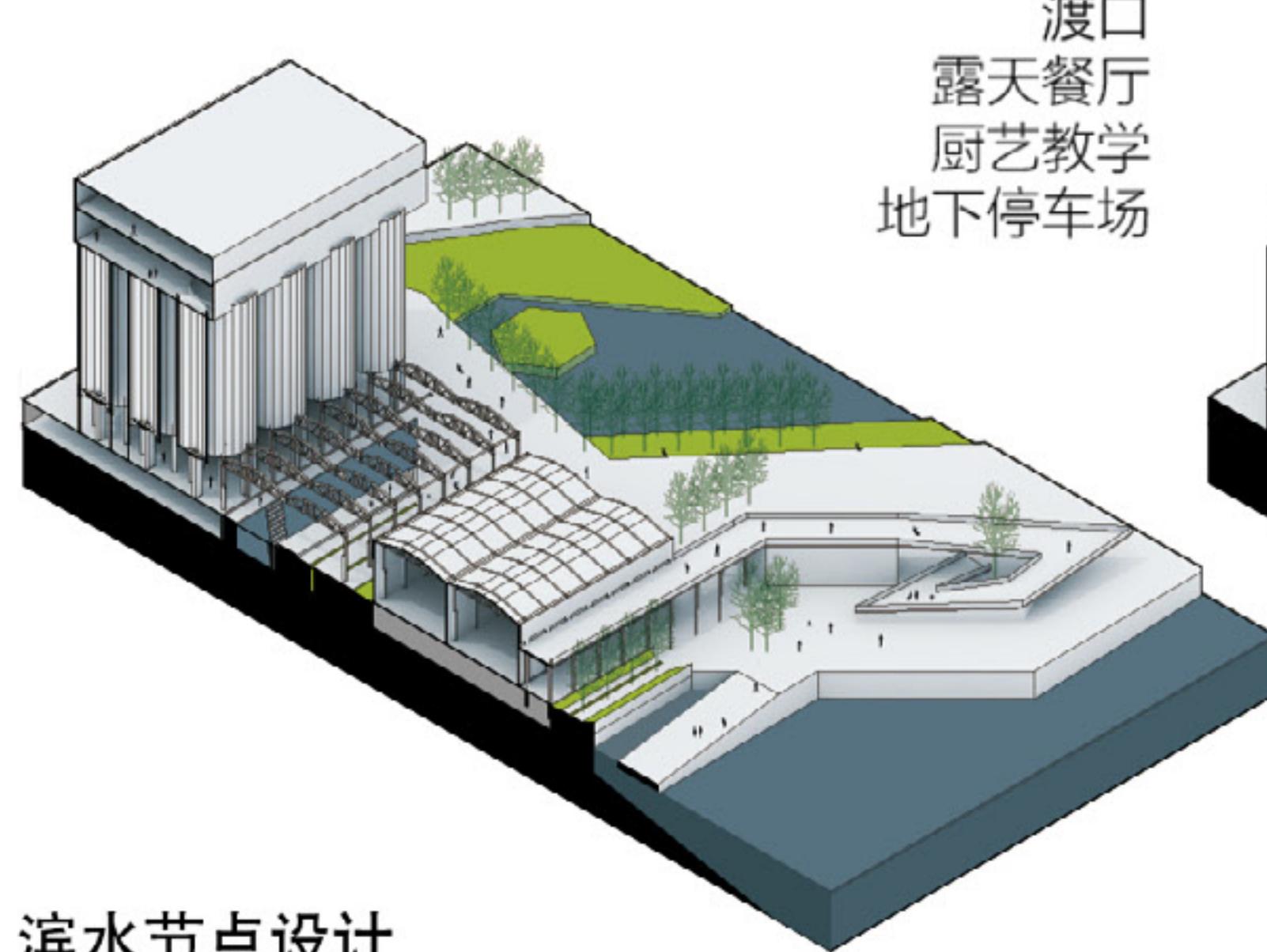


生态水岸  
Ecological Waterfront

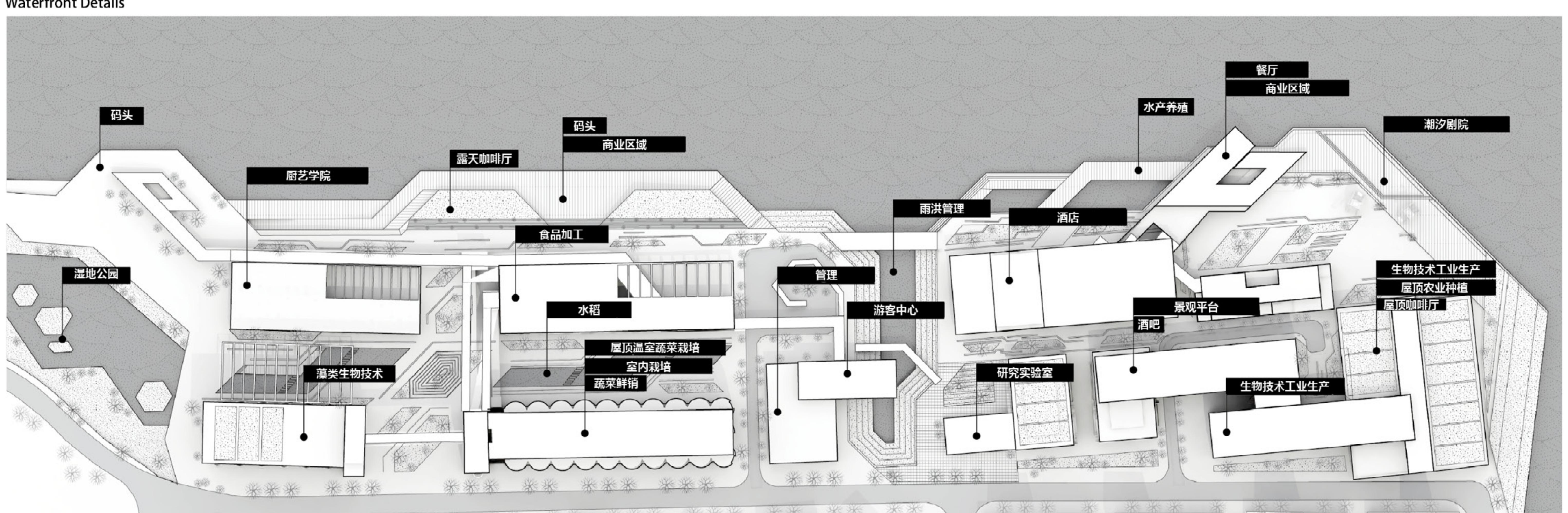
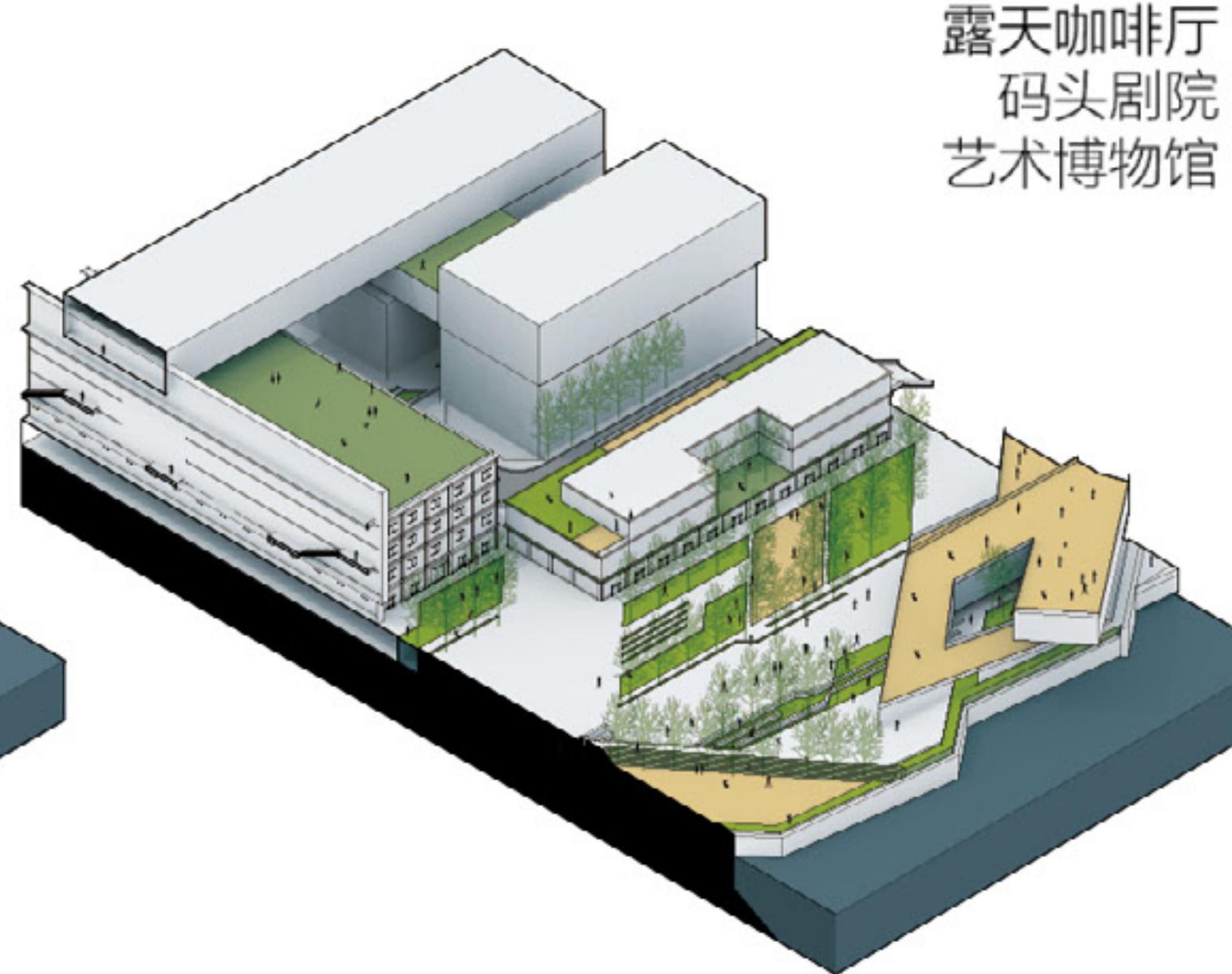
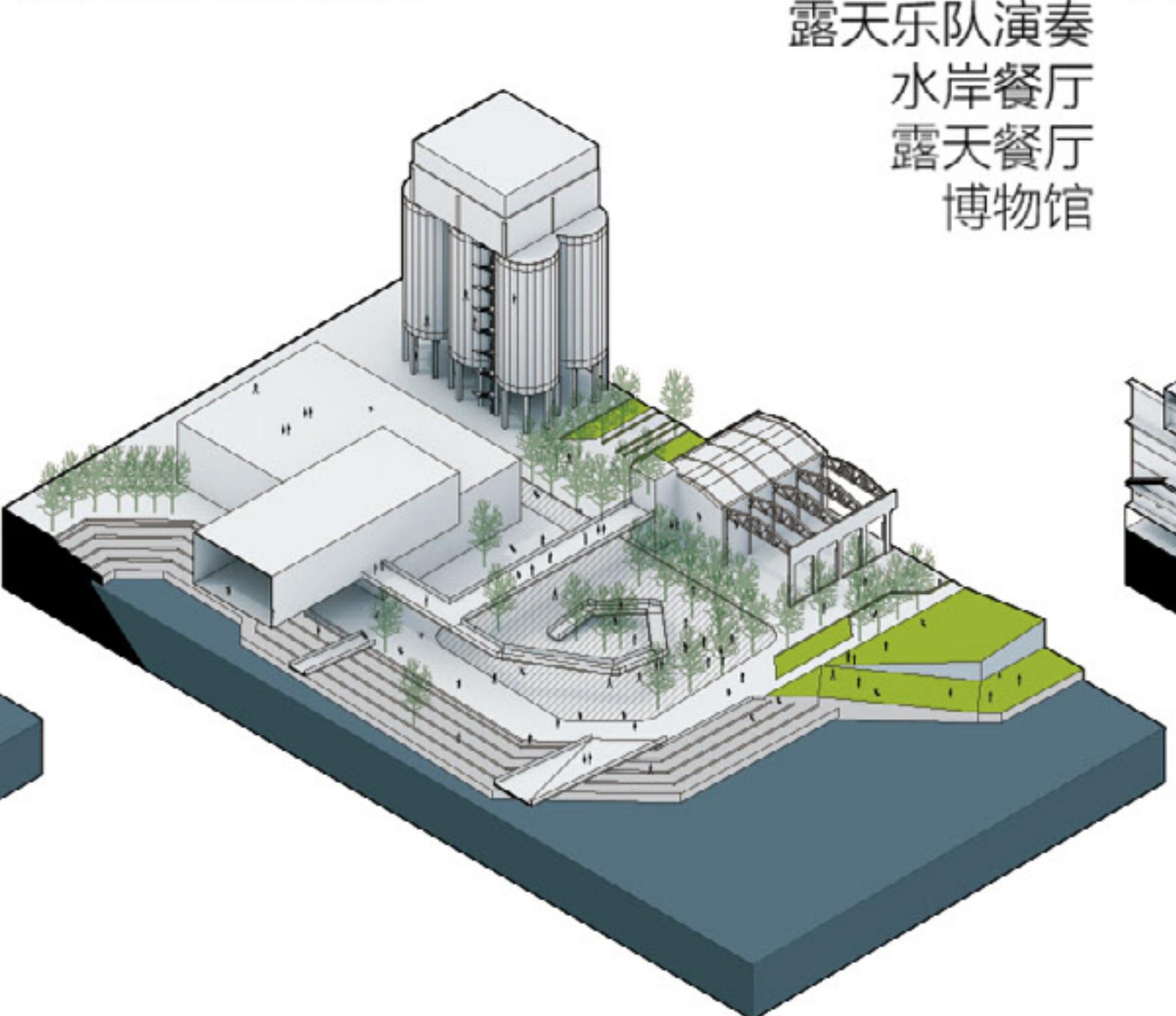
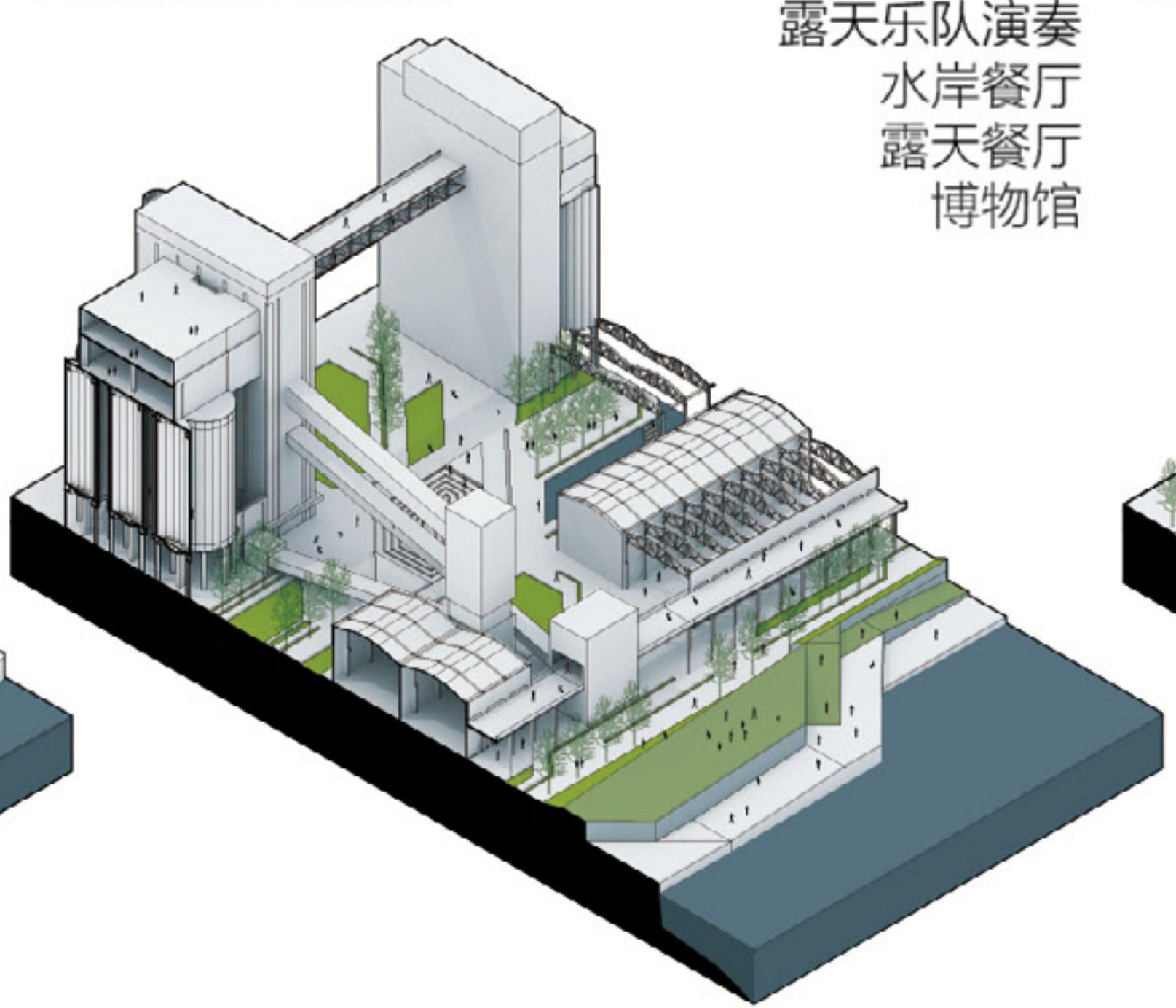


休闲水岸  
Recreational Waterfront

精品酒店  
露天乐队演奏  
生物技术研究中心  
露天咖啡厅  
码头剧院  
艺术博物馆



滨水节点设计  
Waterfront Details

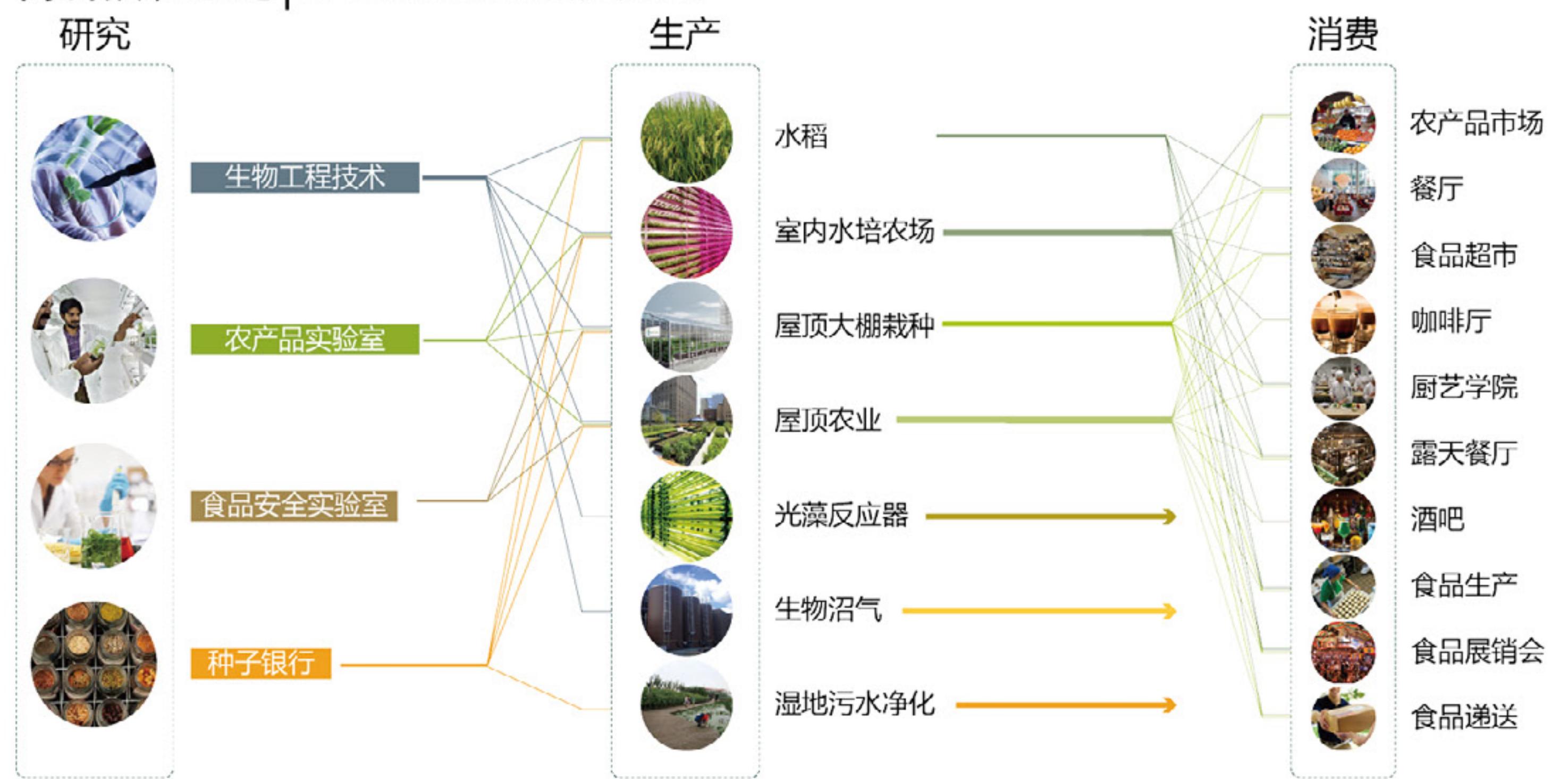




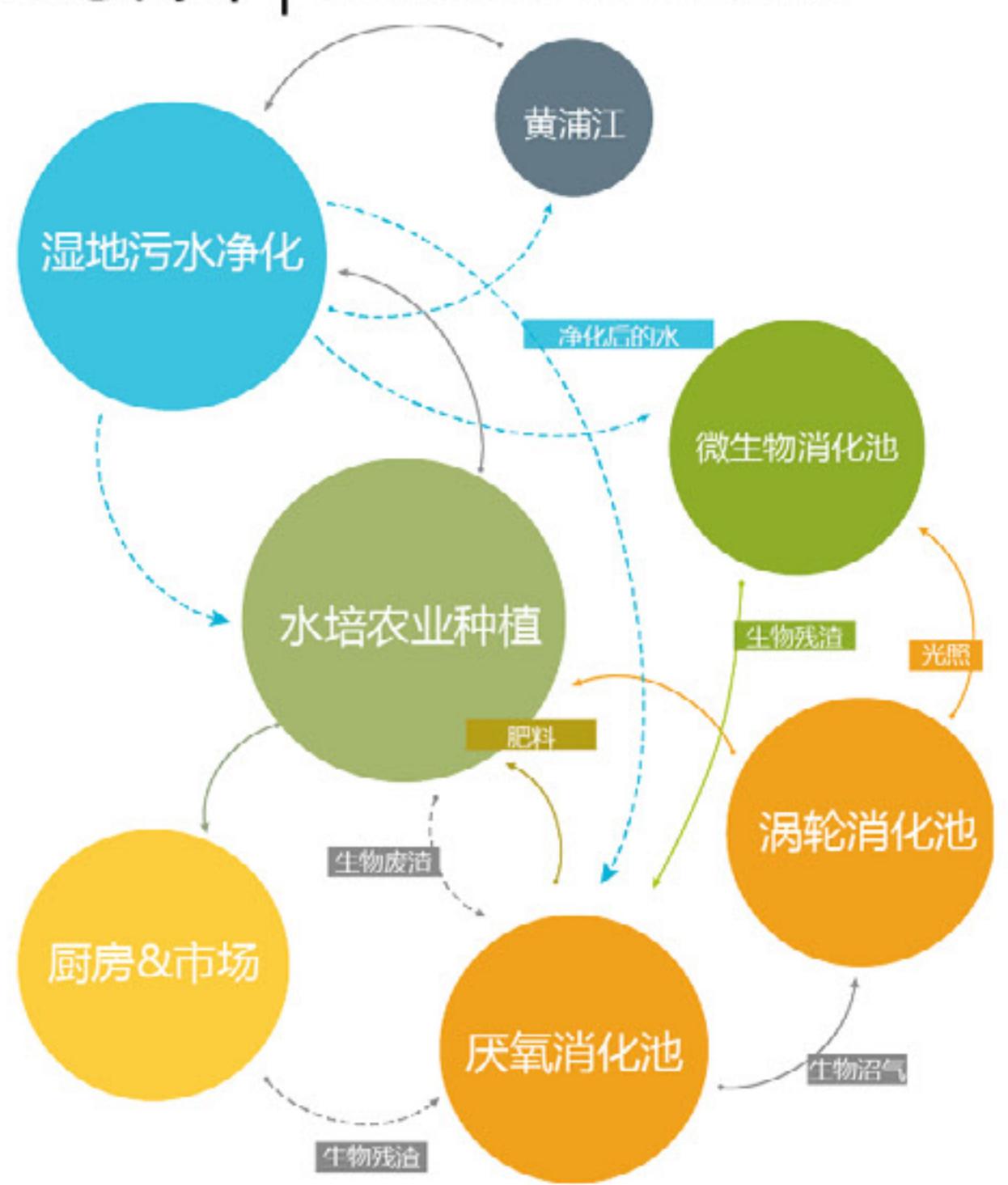
5

强调科技创新的产业和空间转型  
Tech-oriented Transformation

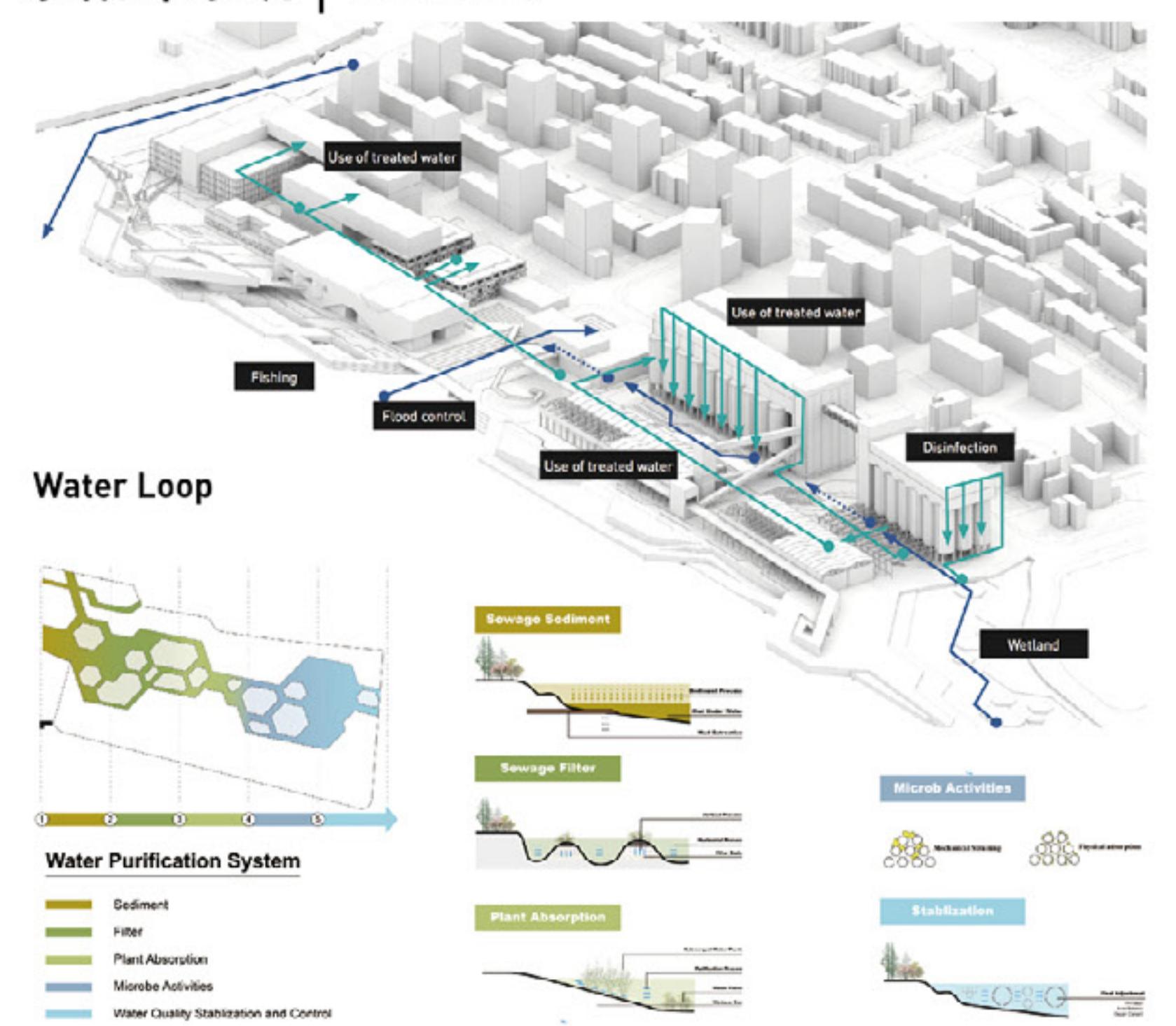
#### 高科技农业链 | Hi-tech Food Industry System



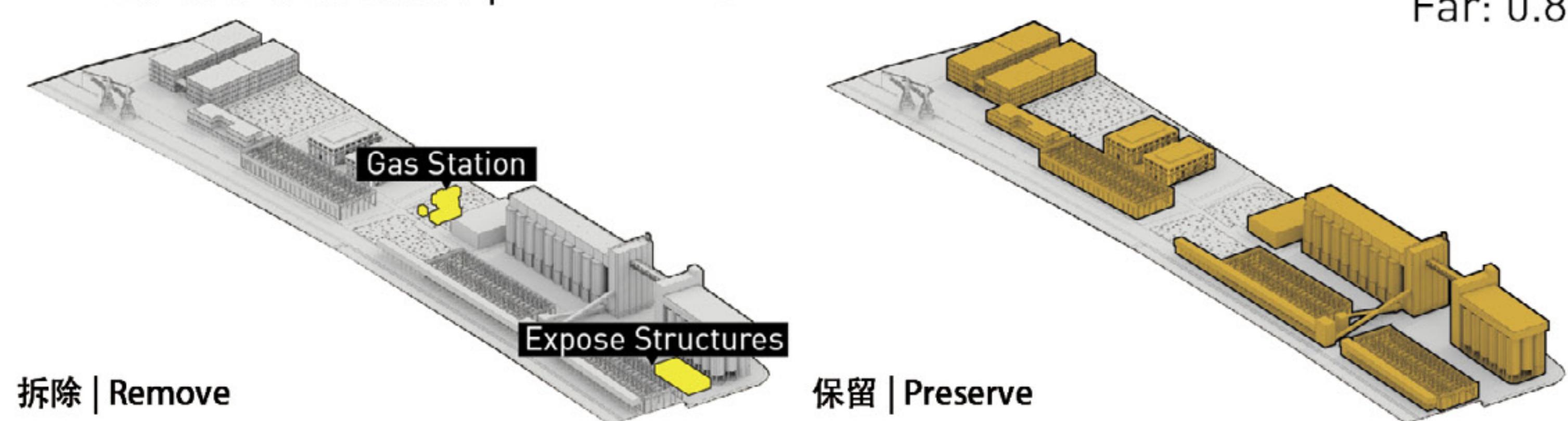
#### 生态闭环 | Closed Loop of Eco System



#### 水循环系统 | Water Loop



#### 工业遗产保护和改造利用 | Industrial Heritage Preservation and Renovation



拆除 | Remove

保留 | Preserve

加建 | New Built

联系 | Passages

#### 高科技都市农业 | Hi-tech Urban Agriculture



27.3%

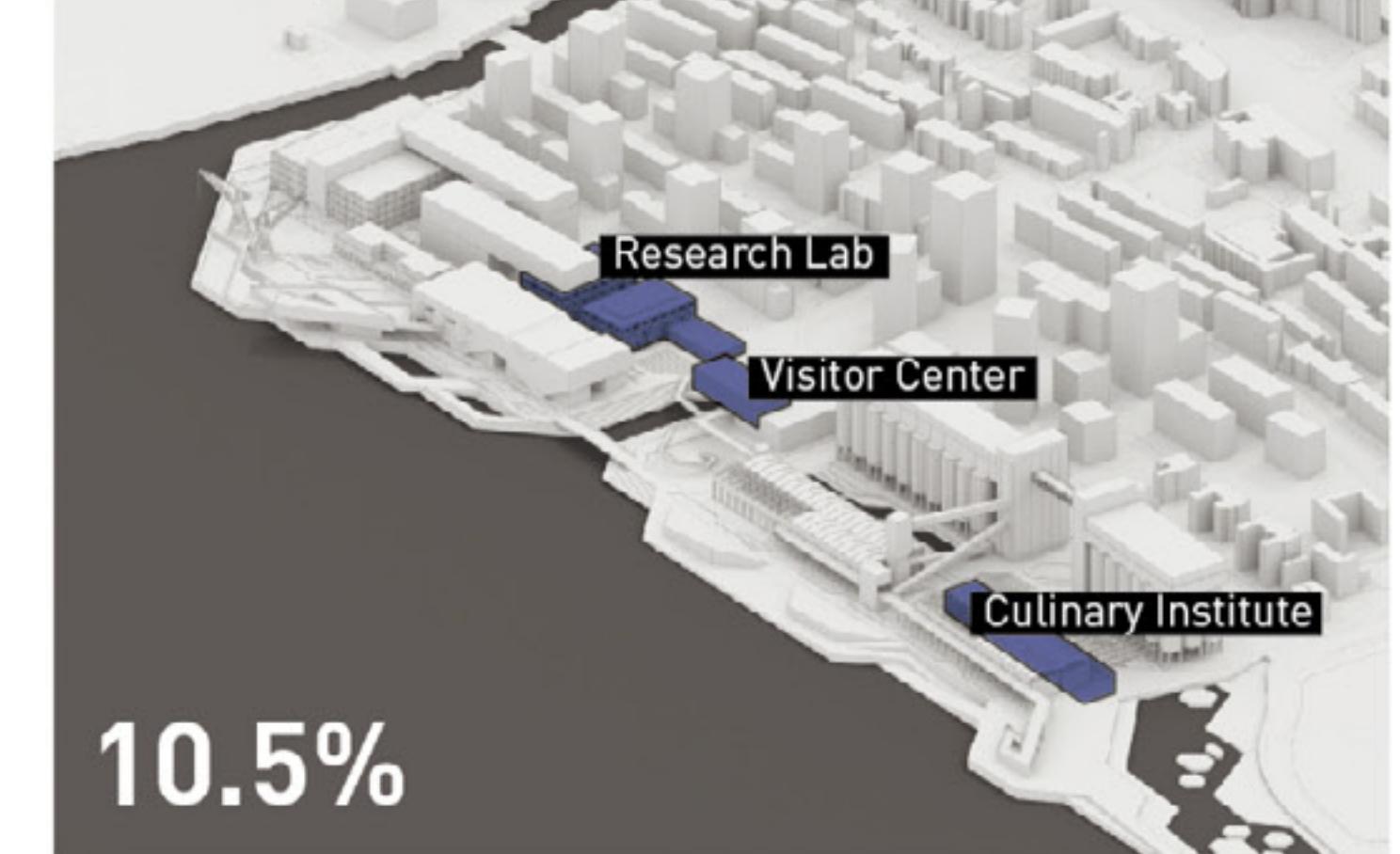
商业 | Commercial



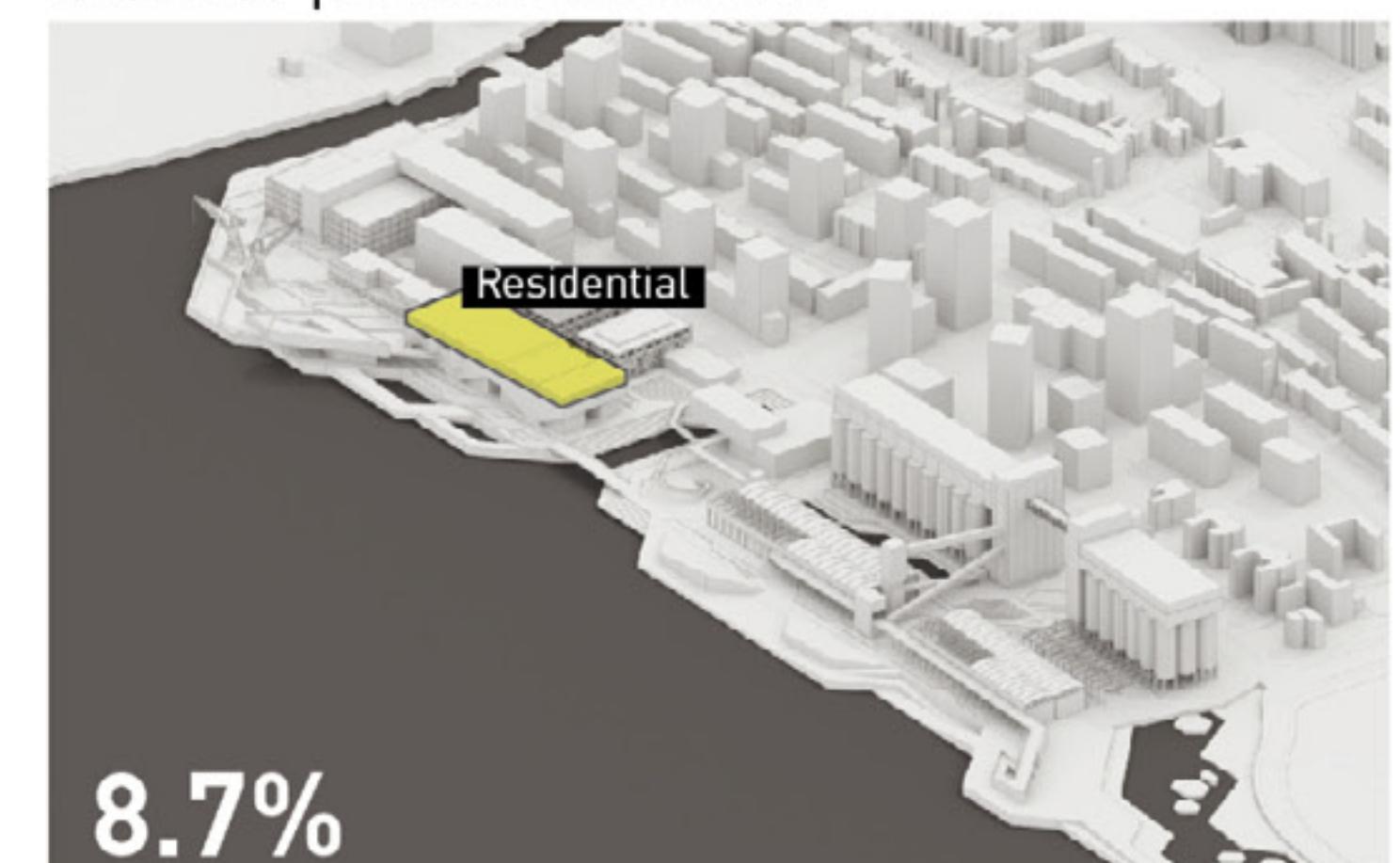
办公和管理 | Office and Management

27%

教育科研 | Research and Education

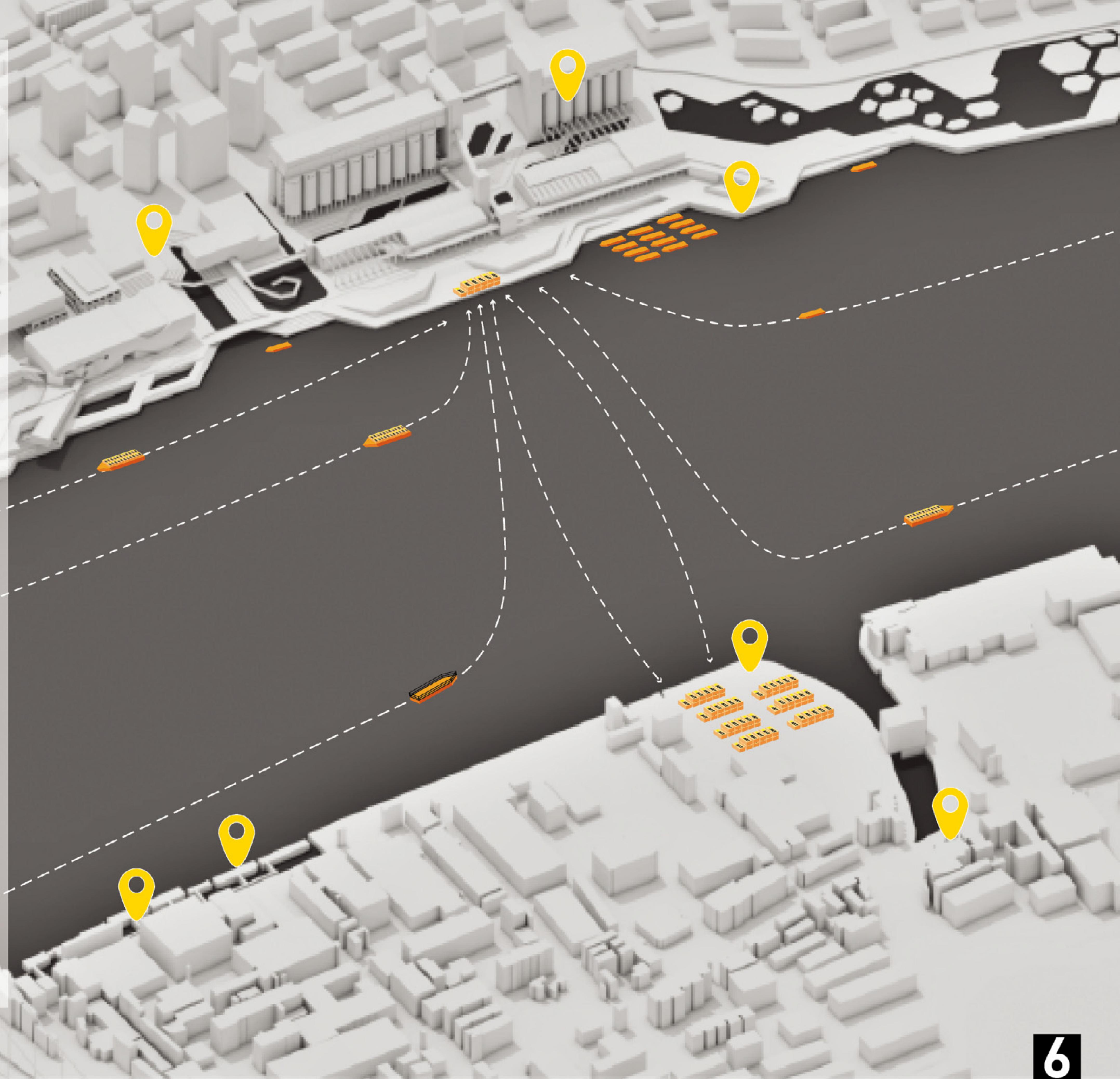
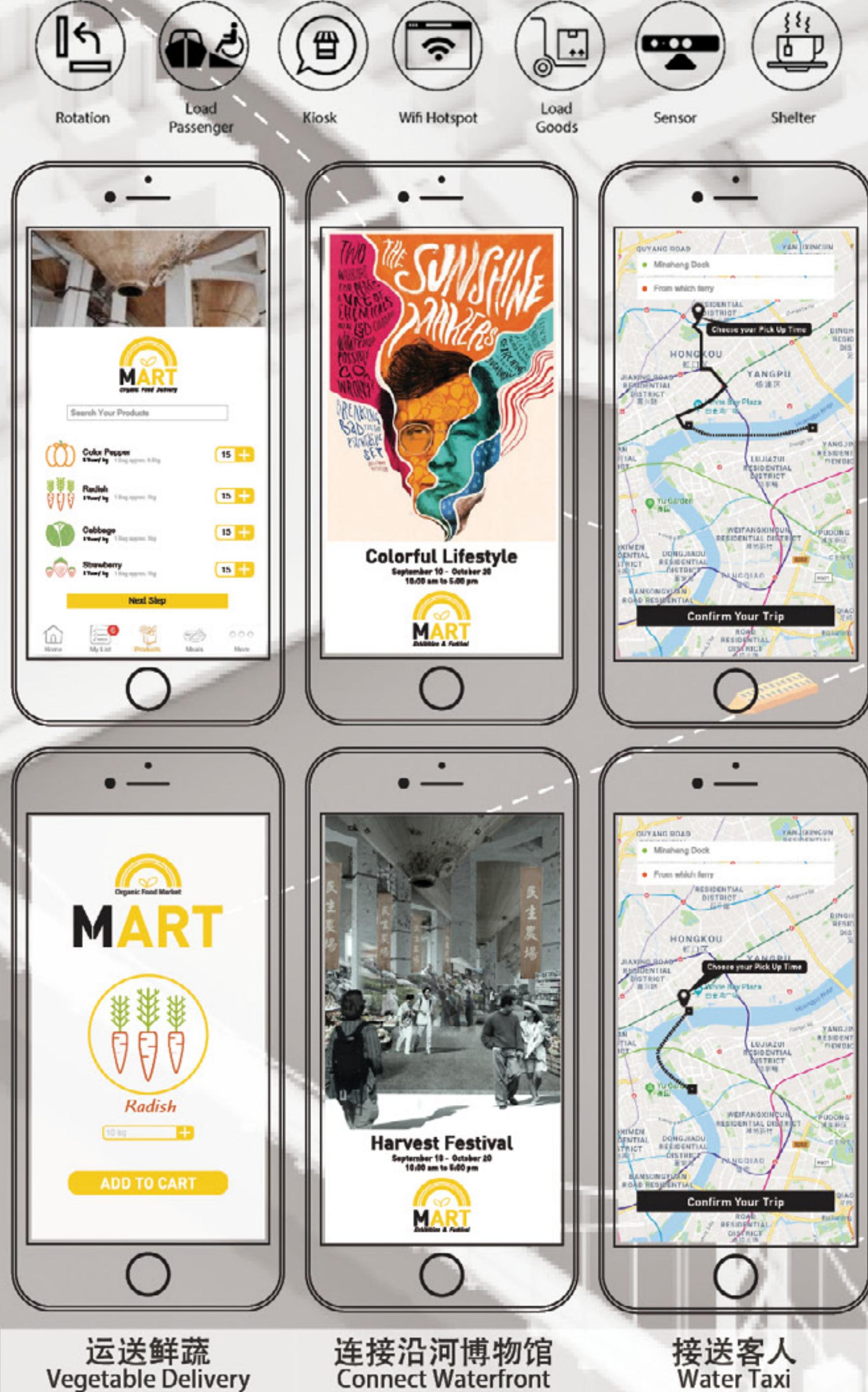


酒店服务 | Hotel and Service



8.7%

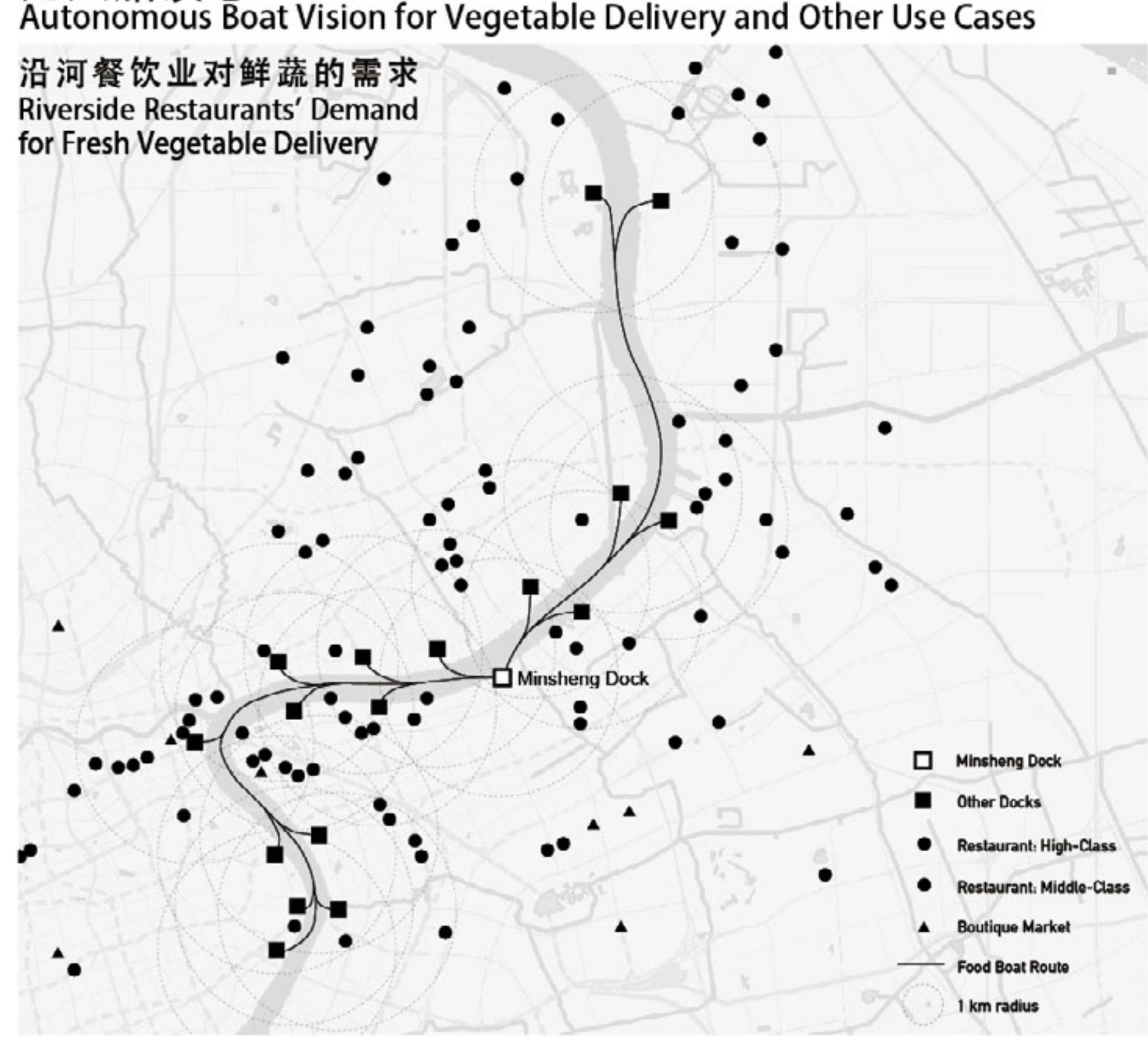
## 无人船场景 Autonomous Boat Use Cases



强调科技创新的产业和空间转型  
Tech-oriented Transformation

6

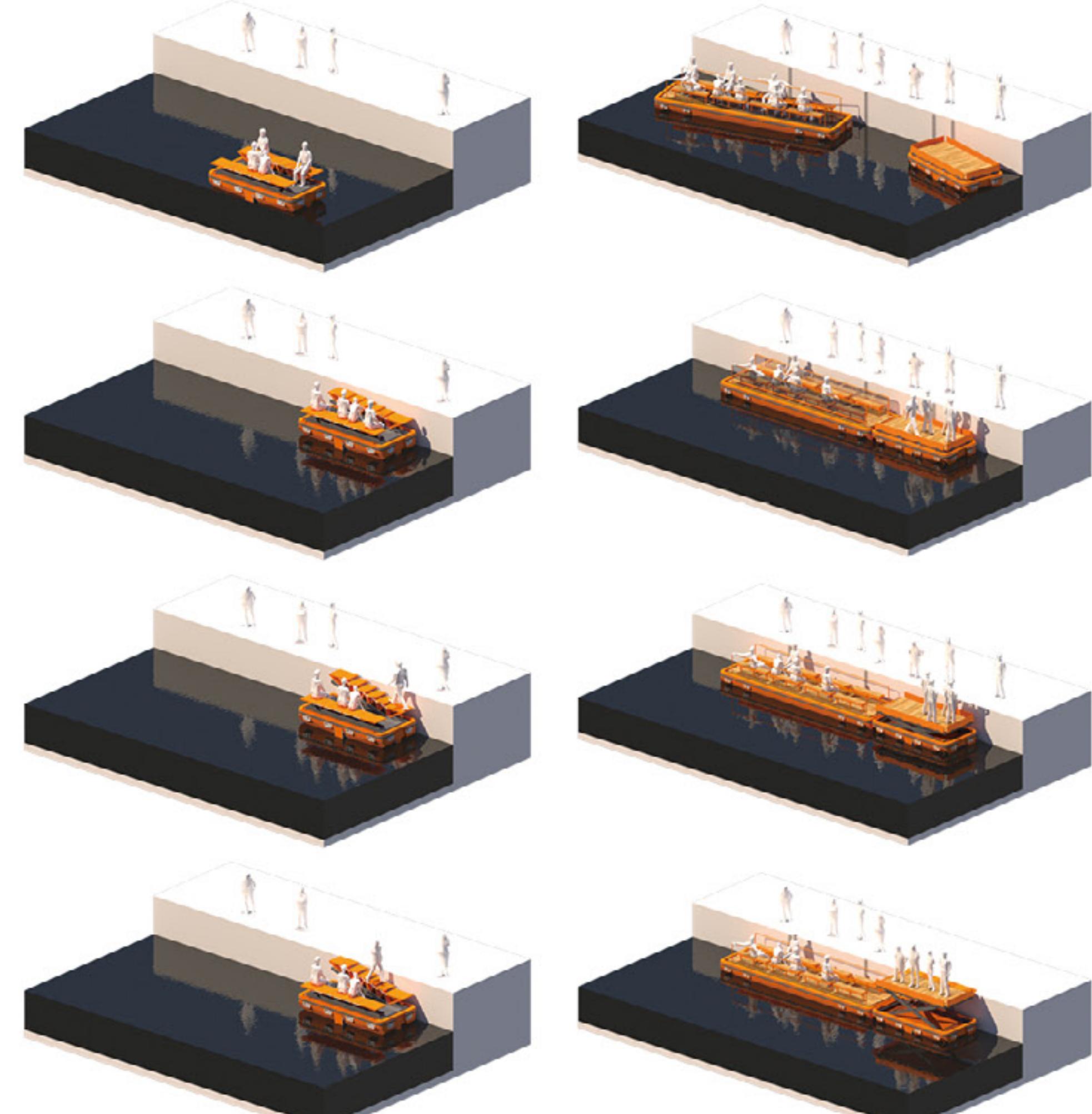
## 无人船设想 Autonomous Boat Vision for Vegetable Delivery and Other Use Cases



无人船和驳岸设计 | Autonomous Boat Visions

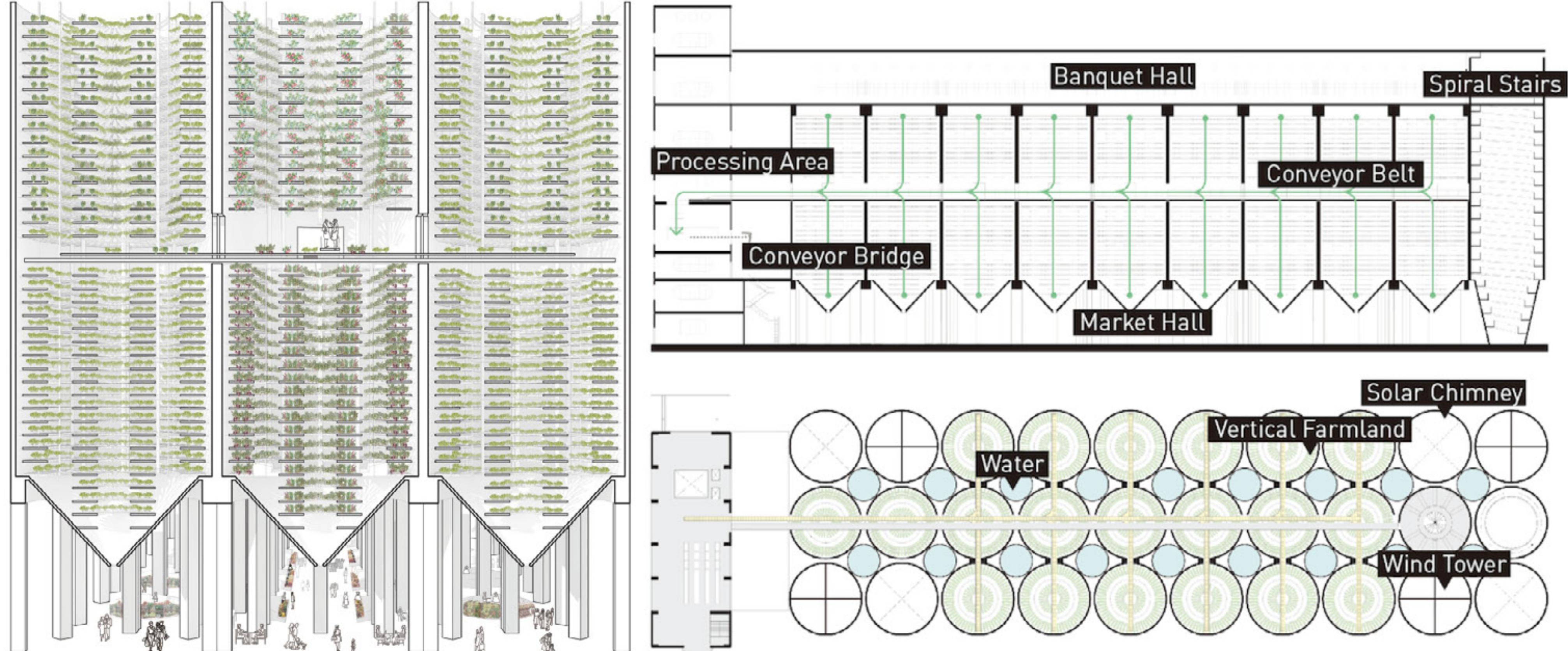
无人驾驶技术已经成为各个全球城市竞相争夺的科技领域，上海的陆上交通错综复杂，水网络发达且有悠久的利用运河运送大米的历史。在方案中，民生码头将恢复生产和储藏粮食作用，通过高科技高效率的水栽培技术，成为新的城市农业实验基地，种植新鲜果蔬供给上海黄浦江、苏州河及大大小小运河沿线的参观。

作为的士和鲜蔬快运



作为游览巴士

## 筒仓改造为室内农业和市场分析 From Silos to Hydroponic Indoor Farm and Market Space



筒仓下的鲜销市场 | Market Under the Silo

