Waterfront Analysis and Design

Comparative Report of Beijing, Suzhou and Yinchuan

滨水区解析与设计

北京、苏州、银川比较报告

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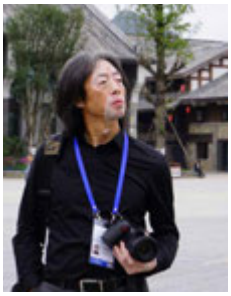
He completed his bachelor and master at Tsinghua University in architecture and urban planning and design prospectively. After this, he worked for China Academy of Urban Planning and Design for ten years. In 2013 Yifan established Urban Design Planning and Research Centre at China Architecture Design and Research Group. He was in charge of and completed numerous major planning & design projects like *International Consulting for the Urban Design of the Boot Area for the Xiong'an New Area in Hebei Province*, *Scheme Solicitation for Overall Urban Design of Beijing's Sub-centre and Detailed Urban Design of Key Regions*, *Overall Urban Design of Nansha New Area in Guangzhou*, etc., and directed significant researches like *Theoretical Framework of Urban Design in China*, and *Management Mechanism Consulting of Urban Design in China*. He has been in charge of more than 90 planning & design projects including strategic development plan, comprehensive urban plan, district plan and urban design, and published the monograph, *Designing for the City - Twelve Perspectives and Related Practices of Urban Design*.

He has also published more than 10 academic papers in journals, like *City Planning Review*, *Urban Planning International*, *Urban Studies*, etc., and has been invited to give academic lectures over 40 times in more than 30 cities in China and overseas.

杨一帆，原中国建筑设计研究院副总规划师，城市规划设计研究中心主任，现任中国城市发展规划设计咨询有限公司副总经理、首席规划师，中国住房和城乡建设部城市设计专业委员会委员，北京市城市规划学会常务理事，北京工程勘察设计协会城市更新分会会长，教授级高级城市规划师。

本科毕业于清华大学建筑学专业，硕士毕业于清华大学城市规划与设计专业，后进入中国城市规划设计研究院工作十年，2013年调入中国建筑设计研究院筹办城市规划设计研究中心。主持并完成《河北雄安新区起步区城市设计国际咨询》《北京城市副中心总体城市设计和重点地区详细城市设计方案征集》《广州南沙新区总体城市设计》等多项重大规划设计项目，主持《我国城市设计理论框架》《我国城市设计管理机制咨询》等多项重大课题研究。先后负责战略发展规划、城市总体规划、片区规划与城市设计等规划设计项目90余项，出版专著《为城市而设计——城市设计十二条认知及其实践》，在《城市规划》《国际城市规划》《城市发展研究》等学术期刊发表学术论文十余篇，受邀到国内外30多个城市进行学术讲座40余次。



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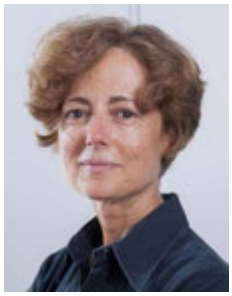
Born in 1957 in Nanjing, currently works at the School of Architecture, Harbin Institute of Technology (HIT) as a Professor, Doctoral Advisor, Director of Urban Design Research Institute and academic leader for urban and rural planning. He is also the first-class registered architect, member of Urban Planning Society of China (UPSC), Vice Chairman of Academic Committee of Urban Design, Member of Urban Design Professional Board Appointted by the Ministry of Housing and Urban-rural Development, member of Chinese Society for Urban Studies and its Urban Design Department of Historical and Cultural City Committee, and member of Academic Committee of Urban Image UPSC.

徐苏宁，1957年生于南京，任哈尔滨工业大学建筑学院教授、博士生导师、城市设计研究所所长、城乡规划学科带头人，一级注册建筑师，中国城市规划学会理事，城市设计学术委员会副主任委员，住建部城市设计专业委员会委员，中国城市科学研究会理事、历史文化名城委员会城市设计学部委员，中国城市规划学会城市影像学术委员会委员。



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Architect and urbanist, Professor in Urban Theory and Urban Design at the École Polytechnique Fédérale de Lausanne directing the Lab-U and the interdisciplinary Habitat Research Centre, and at Università IUAV of Venice. One of the founders and the scientific board members of the European Postgraduate Masters in Urbanism (EMU). She was guest professor in GSD, Harvard, a Thomas Jefferson Professorship at University of Virginia, and several European schools of Architecture. In 2013 she was the first woman to receive the Grand Prix de l'Urbanisme in France. She was awarded the title of Doctor Honoris Causa by the Catholic University of Louvain, Belgium in 2016, won the Flemish Culture Award for Architecture in 2017, and the Golden Medal of the Milan Triennale in 2018. In 1990 she founded Studio Associato Bernardo Secchi Paola Viganò (Studio Paola Viganò since 2014) with Bernardo Secchi. Studio has been practicing on architecture, landscape, and urbanism, and won numerous international competitions and awards.

建筑师、规划师，瑞士洛桑联邦理工学院（EPFL）教授，城市研究所和“人居研究中心”领导人，威尼斯建筑大学（IUAV）教授，欧洲城市硕士后项目（EMU）创始人及教学组成员之一。曾在哈佛大学、弗吉尼亚大学以及欧洲多所建筑院校担任客座教授。2013年成为第一位获法国城市规划大奖的女性。2018年荣获比利时天主教鲁汶大学（法语）荣誉博士。2017年获比利时弗莱芒区文化大奖，2018年获米兰艺术三年展金质奖章。在1990年与博纳多-赛齐先生创立了赛齐-薇佳诺工作室（2014年后为宝拉-薇佳诺工作室），致力于建筑、景观、规划实践，赢得多项国际竞赛及荣誉。

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Professor and Doctoral Advisor of Tianjin University, School of Architecture, President of Tianjin University Research Institute of Architectural Design and Urban Planning, Member of China Engineering and Consulting Association (CECA), Vice President of Higher Education Branch of CECA, senior member of Architectural Society of China, Vice Chairman of Urban Planning Society of Tianjin, Vice President of Tianjin Exploration and Design Association, and consultant of People's Government of Yingtan, Jiangxi Province. He is in charge of national key research projects, meanwhile, directs and participates in multiple scientific research projects at national and provincial & ministerial levels. He has been responsible for strategic planning, urban overall planning, all levels of urban design, etc.

天津大学建筑学院教授、博士生导师，天津大学建筑设计规划研究总院院长，中国勘察设计协会常务理事，中国勘察设计协会高等院校勘察设计分会副理事长，中国建筑学会资深会员，天津市城市规划学会副会长，天津市勘察设计协会副理事长，江西省鹰潭市人民政府顾问。国家重点研发计划课题级负责人，主持并参与多项国家级和省部级科研项目。先后负责战略发展规划、城市总体规划、各类城市设计等规划设计项目。

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LIU Hui
刘晖

Professor, PhD, Doctoral Advisor, leading the discipline of landscape architecture in the Architecture College of Xi'an University of Architecture and Technology (XAUAT). She works on the specialty education of landscape architecture and academic researches in three directions, including Theory and History of Chinese Landscape Culture, Theory and Method of Planning and Designing Landscape in Arid and Semiarid Regions, and the Evolution of Modern Urban Morphology in Xi'an. She has been involved, leading or collaborating, in 7 researches unded by National Natural Science Foundation of China, 7 monograghs and more than 30 papers. Besides, she has directed over 20 practices. She is currently a member of Teaching and Steering Sub-committee of Landscape Architecture Education Under the Ministry of Education, and member of Chinese Society of Landscape Architecture (CHSLA).

教授，博士，博士生导师，西安建筑科技大学建筑学院，风景园林学科带头人。从事专业教育及学术研究：中国地景文化历史与理论、干旱半干旱地区景观规划设计理论与方法、西安近现代城市形态演进。主持参加7项国家自然科学基金课题，主编及合编著作7部，发表论文30余篇，主持实践项目20余项。担任教育部高等学校建筑类风景园林专业教学指导分委员会委员，中国风景园林学会理事。

Associate Editor/副主编

Marco LUB
马可·陆

Born in 1970, Dutch architect, urban designer and academic. He is educated at the Delft University of Technology in the Netherlands. His design experience is built up with work at several internationally known Dutch developing and design offices like Ballast Nedam and One Architecture whilst running projects in collaboration with for example O.M.A. and MVRDV. In this work he was rewarded with the Dutch Young Architect Talent Grant. With the Dutch urban designer Peter Smit he established the firm CITY4870, designing on all levels of urbanism. In recent years, Marco LUB is focusing on the academics. Together with a great team, he founded the first bachelor school of Urban Design in the Netherlands at the Saxion University of Applied Science. Nowadays he is a senior lecturer at the faculty of Architecture TUD and conducting his PhD research about Dutch/Chinese urban design education.

1970年生，荷兰建筑师，城市设计师，教育工作者。毕业于代尔夫特理工大学（TUD），曾就职于荷兰Ballast Nedam和One Architecture等国际知名设计事务所，同时还与O.M.A.、MVRDV等公司合作多个项目，并因此获得了荷兰青年建筑师人才大奖。他与荷兰城市设计师Peter Smit共同创立了CITY4870公司，主要提供各种城市规划设计方案。近年来，马可·陆主要关注学术方面，他与他的团队在萨克逊应用科学大学成立了荷兰第一所城市设计本科学校。目前,他是代尔夫特理工大学（TUD）建筑学院的资深讲师，同时承担题为“中荷城市设计教育”的相关博士研究。

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Luiz de CARVALHO FILHO
路易斯·德·卡瓦洛·菲洛

Born in 1972, coordinator of the European Post master in Urbanism – EMU at Delft University of Technology (TU Delft) in the Netherl and also a guest researcher at the Politecnico di Torino in Italy. He is an architect, urbanist and urban designer with over 20 years of experience. He graduated as an architect in Brazil and has an advanced master's degree (with honours) in Urbanism from TU Delft.His research focuses on planning instruments and urban morphology, particularly investigating the processes of segregation and encounter in the urban environment. His work has been presented and published in several conferences such as the Association of European Schools of Planning 2017, the International Seminar on Urban Form 2018, The International Planning History Society 2018 and at the Space Syntax symposia, 2015, 2017, 2019.

1972年生，荷兰代尔夫特理工大学（TUD）欧洲城市规划硕士后项目（EMU）协调人，意大利都灵理工大学客座研究员，建筑师、城市规划专家及城市设计师，在该领域具有20余年的专业经验，曾参与巴西公共和私营领域的大型城市更新改造项目。路易斯·德·卡瓦洛·菲洛的研究方向主要是规划手段和城市形态，特别是对城市环境中的空间分隔和人景互动的调查研究。他的研究成果已在诸多会议上展示和发表，例如，2017欧洲规划院校大会、2018城市形态国际研讨会、2018国际城市规划史学会，以及2015、2017和2019空间句法学术研讨会。

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Foreword
前言

Anjun SUN
孙安军

President of Urban Planning Society of China
中国城市规划学会理事长

Many cities in China are naturally and closely connected to water since they have been built, with water playing a unique ecological, economic and cultural role in the city development while also forming picturesque scenery celebrated by numerous literati. Nowadays, exploring the relationship between city and water from the perspective of urban design to craft customized urban waterfronts featuring the city's characteristics will undoubtedly provide valuable references for better urban space planning, and thus quality urban development.

Tapping into the model of industry-university-research institution cooperation, the Urban Planning and Design Research Center of China Architecture Design and Research Group partnered with several universities from China, the Netherlands, Switzerland and Italy to select Beijing, Suzhou and Yinchuan, cities located in North, East and Northwest China respectively, as research objects. From different spatial scales of areas, cities and waterfronts, they carried out distinct and in-depth studies into the structure and historical changes of the water networks in the three cities. Tailored to different types of urban waterfronts, the research presents specific design and guiding strategies in the view of urban design, forming instructive urban design guidelines for the construction of these cities.

中国相当多的城市自诞生以来就与水环境有着天然而紧密的联系，水在城市的发展过程中发挥了独特的生态、经济和文化等作用，也成为无数文人墨客笔下吟颂的风景。如今，从城市设计角度探循城市与水环境的关系，研究因地制宜、各具特色的城市滨水空间，无疑将为提升城市空间品质进而实现城市高质量发展提供有益的借鉴。

中国建筑设计研究院有限公司城市规划设计研究中心发挥自身独特的产学研优势，联合来自中国和荷兰、瑞士、意大利的多所高校，在中国华北、华东和西北地区选择了北京、苏州、银川三个城市，对上述三个城市市域水网格局及其历史演变，在区域、城市、滨水地区等不同空间尺度上，进行了独特而深入的基础研究，针对不同类型的城市滨水空间从城市设计的角度提出了具体的滨水区设计引导策略，形成了对三个城市建设具有指导意义的城市设计导则。

由杨一帆副总规划师主编的《滨水区解析与设计：北京、苏州、银川比较研究报告》这本专著正是对上述研究与实践案例的系统总结。在北京、苏州、银川三个目标城市已经建立了一系列固有观念和习惯做法、许多地区已大面积建成的情况下，本书通过对三个目标城市及若干滨水地区典型案例的分析，突破既有的观念束缚，通过系统的科学方法，深入剖析普遍规律和个性化特征，不但在基础理论和方法论层面上，对城市滨水区空间进行了深入研究；而且，围绕城市水系、滨水区布局和空间开展了具体的规划设计实践，将研究成果转化为设计成果，体现出独具特色的价值传导逻辑

Edited by the deputy chief planner Yifan Yang, Waterfront Analysis and Design Comparative Report of Beijing, Suzhou and Yinchuan systematically summarizes the research and planning cases. Conventional concepts and strategies concerning urban planning implemented in Beijing, Suzhou and Yinchuan have long been established, and the construction of many areas in these cities have been widely finished. Under such circumstances, based on analyses of the three cities and several typical cases of waterfront planning, this book breaks through the established conceptual constraints and delves into the commonalities and differences among the cases through systematic scientific approaches. On top of conducting the intensive research into urban waterfronts planning at levels of both basic theory and methodology, this book also presents specific practices of urban waterfront planning and design customized to the urban water system, as well as the layout and space of waterfront areas. By displaying how research findings can be applied into urban design, this book is of unique significance on value transmission.

The book is broken down into four chapters, namely Comparison, Beijing, Suzhou and Yinchuan. Comparing and researching the water-city relations of the three cities.

Chapter Comparison makes clear of the development characteristics of urban spatial structure based on changes of water systems in these cities with different geographical environments, and researches the patterns of urban spatial organization. Finally, the chapter summarizes the creating mode and focus of urban waterfronts under the effects of different natural environments, water networks and city landscapes.

Chapter Beijing is compiled jointly by Harbin Institute of Technology and China Architecture Design and Research Group. Led by Professor Suning Xu, the study is structured as the combination of "research", "judgment" and "design". Studying the historical changes of water-city relation in Beijing and comparing the water-city relation of world typical capitals with that of prominent Chinese ancient capitals.

本书主要内容由比较篇、北京篇、苏州篇和银川篇构成。比较篇着眼于对三个目标城市“城”“水”关系的比较研究，从不同地域环境三个城市水系变迁的历史脉络梳理城市空间结构的发展特点，研判空间组织规律，总结凝练出不同自然环境、水网格局与城市风貌影响下的城市滨水区空间塑造方式与关注重点。北京篇由哈尔滨工业大学和中国建筑设计研究院合作。在徐苏宁教授的主持下，以“研”、“判”、“设”的工作架构，从北京“城”“水”关系历史演变、世界典型首都和中国代表性古都“城”“水”关系比较出发，确定北京滨水区建设的总体目标；以生态、空间、需求、历史、经济和美学六个维度对滨水区价值体系进行评价，以这六个维度确立城市设计策略，用典型节点设计加以验证。苏州篇由瑞士洛桑联邦理工大学、意大利威尼斯建筑大学、中国天津大学、中国苏州西安交通利物浦大学和中国建筑设计研究院合作。联合研究团队在宏观层面上，通过对苏州市区空间结构的分析研究，以城市功能、不同水系水网结构、生态保护、城市风貌等多要素综合确定重要城市滨水空间，提出分级分类、可操作的规划设计策略与指引；在微观层面，围绕“疏朗有致、涵养水源、临水而居、开放共享、体现历史文化”的目标对各类滨水空间提出设计要点。银川篇由荷兰代尔夫特理工大学、中国西安建筑科技大学、中国宁夏大学和中国建筑设计研究院合作。联合研究团队采用了通过设计的研究（RTD）这一研究方法，即通过设计来进一步明确问题，探索各种可能性和解决问题的方法，并在银川城市整体、滨水场地所在城市片区、滨水场地空间多个层级上寻求综合解决方案；由风景园林设计师和城市设计师共同引导银川滨水空间设计研究，突出了基于生态学的分析思路和设计策略。特别值得一提的是，上述三个城市的研究分别是由不同国家学生、教师和机构研究人员联合进行的，在联合研究过程中体现出了不同文化与设计理念的碰撞和融合。三个城市的研究成果呈现出较强的差异性，见仁见智，各有千秋。

本书不但提供了不同地域城市滨水空间城市设计的具体案例，而且也就有关城市设计方法进行了系统梳理，对滨水地区空间塑造提供了价值论与方法论方面的指导。对城市滨水空间规划设计工作，具有重要的参考价值。我相信，本书的出版，将为全国的相关规划管理和编制机构研究城市滨水区问题，进行城市滨水区城市设计，提供独特的研究视角和重要的工作借鉴。感谢所有参与本书研究的高校和设计院组成的联合研究团队，在这一专业领域所做出的努力和贡献。

This chapter sets the overall goal for Beijing's waterfront development; The value system of the waterfront area is evaluated in 6 dimensions, including ecology, space, demand, history, economy and aesthetics, based on which the urban design strategy is crafted and verified with the design of typical nodes.

Chapter Suzhou is put together by Swiss Federal Institute of Technology in Lausanne, Iuav University of Venice, Tianjin University, Xi'an Jiaotong-Liverpool University in Suzhou and China Architecture Design and Research Group. At the macro level, the joint research team analyzed the spatial structure of Suzhou urban area, selected important urban waterfronts based on the comprehensive considerations of urban functions, different water network structures, ecological protection and urban landscapes, and proposed practical urban design strategy and guidance at various grades and of different types; At the micro level, dedicated to the objectives of "properly clustered water networks, water conservation, living along the water, open and sharing, and reflection of historical culture", the team offered key points for different urban waterfront designs.

Chapter Yinchuan is collectively compiled by Delft University of Technology, Xi'an University of Architecture and Technology, Ningxia University and China Architecture Design and Research Group. Adopting the RTD (research through design) method, in other words, further defining research questions through designing and exploring various possibilities and solutions, the joint research team attempted to identify comprehensive solutions at multiple levels: Yinchuan city as a whole, the urban areas where the waterfronts are located, and the waterfronts themselves; Jointly led by landscape architects and urban designers, the research of waterfront design in Yinchuan highlights the ecology-based analysis method and design strategy.

It is worth mentioning that studies on the above three cities were conducted jointly by students, faculties, and institutional researchers from different countries, reflecting the collision and integration of different cultures and design philosophies in the course of joint research. Research findings concerning these cities display immense differences, and each has its own values, which do not bear any indications of the quality and credibility of the research.

While presenting cases of urban waterfront design in different cities, this book also provides a systematic overview of urban design approaches, offering axiological and methodological guidance on waterfront planning, which is of great significance to the planning and design of urban waterfronts. I believe that this book will empower the relevant planning, management and compiling institutions nationwide with unique research perspectives and valuable references on facilitating the research and design of urban waterfronts. I would like to thank the joint research teams of all the involved universities and China Architecture Design and Research Group for their efforts and contributions in this specific field.

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文森特 · 纳丁 教授

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Across the world, transformation of waterfronts is a major challenge for city planning, urban and landscape design, architecture and real estate. Development must create sustainable liveable communities, and maintain ecological values. Success requires a wide range of skills and innovative thinking.

This book shows what can be achieved in tackling these complex issues through international collaboration between universities, government and practitioners. It is the culmination of a complex project initiated by the CADG and involving numerous municipalities and universities in China and Europe. The project concentrated on design and planning solutions that resolved potential conflicts between urban development and the sensitive water environment. This book records a sample of the rich and varied ideas the project delivered.

At TU Delft we are delighted with the learning opportunities provided for senior students and staff on questions of waterfront development, and especially for the experience of comparing world views and perspectives from China and Europe. Both students and staff have benefitted greatly from being involved. The lessons from the project and memories of the collaboration have made a lasting impression on the team.

I wish to thank all those involved and congratulate them on this splendid achievement. I know that the book will be valued by many who are seeking inspiration on waterfront development.

纵观全球，滨水区改造是城市规划、城市和景观设计、建筑及房地产领域面临的一大重要挑战。开发滨水区必须营造可持续的宜居环境，同时维护生态价值。要在这些方面获得成功，需要掌握广泛的技能，并具备创新思维。

本书展示了在解决这些复杂问题过程中，大学、政府和从业者之间通过国际合作所取得的成果。本综合性项目由中国建筑设计研究院有限公司（CADG）发起，中国和欧洲的许多城市和高校参与其中。项目主要关注于解决城市发展和敏感水环境之间潜在冲突的设计和规划方案。本书摘录了该项目提出的各种丰富构思。

代尔夫特理工大学很荣幸能够通过本项目为高年级学生和教职员工提供针对滨水区发展问题的学习机会，尤其是对中国和欧洲视角开展的比较。师生们从中受益匪浅，从项目中获得了经验教训，项目过程中的合作也给他们留下了深刻的印象。

我要感谢所有参与其中的人，并祝贺他们取得了如此辉煌的成绩。我相信这本书将会受到众多寻求滨水区发展思路的人们的重视。

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环二环绿水绿

Preface

前言

Research Background

研究背景

The joint research is proposed based on the following backgrounds: firstly, under the guidance of the *New Urban Agenda* adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) and the *Paris Agreement* signed by the UN Parties, the exploration for the solution towards sustainable development and more habitable environment construction for mankind in the world have entered a new stage; secondly, the urbanization process in China has entered a new stage. The pursuit of high-quality development and urban space has become the core issue of urban and rural construction. Urban design is an important tool for the improvement in the quality of urban space. In the new era, and its methology and tools of urban design is requested to be innovated, in terms of coping with comtemporary international and domestic challenges. As for China's urban design, we are reorganizing the academic framework, setting up the management system, exploring the implementation path, and urgently seeking for exchanges with peers in the world, in order to explore new ways to work towards new challenges and new requirements.

Due to its broad relevance to humanities, nature, engineering, and socio-economic activities, the urban waterfront space is often the prior research subject in urban design. Starting from the focus on the waterfront space may help to explore urban design research methods and implementation mechanisms towards new challenges.

这项联合研究计划的提出，主要基于两个背景：第一，在联合国住房和城市可持续发展大会（简称“人居三”大会）通过的《新城市议程》和联合国缔约方共同签署的《巴黎协定》指引下，全球范围内应对可持续发展和更适宜的人居环境建设进入到新的探索阶段；第二，中国城镇化的发展进入新阶段，追求高质量的发展和城市空间成为城乡建设的核心议题。城市设计本就是研究提升城市空间品质的重要工具，新时期更呼唤城市设计重新整理和革新其方法和一系列工具，以应对当下国际国内的共同挑战。中国的城市设计工作正在重新梳理学术框架，构建管理体系，探索实施路径，急需与世界同行深入交流，探索适应新挑战和新要求的新方法。

城市滨水空间往往因为富集人文、自然、工程、社会经济活动要素，而成为城市设计优先研究的课题。以滨水空间为聚焦点，探讨应对新挑战的城市设计研究方法、落实机制可能会是一个好的切入点。

Therefore, commissioned by Beijing Municipal Commission of Planning and Natural Resources,Suzhou Natural Resource and Planning Bureau, and Yinchuan Natural Resource Bureau, Urban Planning Design and Research Centre of China Architecture Design and Research Group (hereinafter referred to as "CADG") leads the research on the urban design of waterfront space in three typical cities respectively, in collaboration with universities from China, Netherlands, Switzerland and Italy. The three cities are chosen from the Northern China, the south of the middle and lower reaches of the Yangtze River, and Northwestern China. CADG and Harbin Institute of Technology jointly have studied Beijing. CADG has studied Suzhou together with Tianjin University, École Polytechnique Fédérale de Lausanne (EPFL), Università IUAV di Venezia (IUAV) and Xi'an Jiaotong-Liverpool University. CADG has studied Yinchuan jointly with Xi'an University of Architecture and Technology (XAUAT), Technische Universiteit Delft (TUD), and Ningxia University. Parallel and independent researches have been carried out, finally forming the research reports and design guidelines for the waterfront space in each of the three cities.

During the research phase, CADG organized the exchanges and comparative researches of the three joint working groups. Under the premise of not affecting the research independence, three groups fully exchanged and explored forward-looking yet operational urban design strategies and technical approaches. The research on the three cities focuses on two work levels: macro-scale analysis of the formation mechanism and structural characteristics of urban and rural waterfront space, as well as micro-scale study of urban design strategies and measures that can concretely guide the construction of waterfront space.

This international joint research work has been strongly supportted by the aforementioned three urban planning authorities, with the assistance of relevant units, and the help and guidance from over 30 experts in various fields. Without those genuine help, it is impossible to achieve the current research results. Sincere thanks to them!

因此，由中国建筑设计研究院 · 城市规划设计研究中心（下称"中建院"）策划并组织，联合分别来自中国和荷兰、瑞士、意大利的多所高校，在中国选择华北、江南和西北三个典型地域，并分别获得北京市规划和自然资源委员会、苏州市自然资源和规划局、银川市自然资源局的委托，展开对三个城市的滨水空间城市设计研究。其中中建院与哈尔滨工业大学联合研究北京，中建院与天津大学、瑞士洛桑理工学院（École Polytechnique Fédérale de Lausanne，简称"EPFL"）、威尼斯建筑大学、苏州西交利物浦大学联合研究苏州，中建院与西安建筑科技大学（Xi' an University of Architecture and Technology，简称"XAUAT"）、荷兰代尔夫特理工大学（Technische Universiteit Delft，简称"TUD"）、宁夏大学联合研究银川，三个城市分别进行平行而独立的研究，最终形成分别指引各城市滨水空间设计的研究报告和设计导则。

工作过程中由中建院组织协调三个联合工作组的工作交流和比较研究，在不影响各组研究独立性的前提下，充分交流探讨，共同探索兼具前瞻性和操作性的城市设计策略与技术方法。对三个城市的研究均聚焦于两个层次的工作：宏观上分析城乡滨水区的形成机理和结构特征，微观上研究指导城市滨水空间建设的设计策略和措施。

本项跨国联合研究工作得到三个城市规划主管部门的大力支持，各相关单位的协助，和30余位多专业领域专家的帮助和指导，没有他们的真诚帮助，联合课题组难以获得今天的研究成果。在这里一并表达衷心感谢！

Research Objectives

研究目的

Based on the waterfront areas of Beijing, Suzhou and Yinchuan, this research has three objectives:

Firstly, implementing objective: study the historical evolution of urban water system and water-city pattern of Beijing, Suzhou and Yinchuan, propose specific design guiding strategies for different types of waterfront space from the perspective of urban design, and further articulate it into urban design guidelines according to which the construction of three cities can be supervised.

Secondly, academic objective: summarize and compare the research results of the evolution of the water system and the mechanism of its formation, water capacity, water-city pattern, the waterfront space design principle and strategy, and the typical waterfront space pattern in three cities, and provide references of waterfront urban design for cities in the semi-humid areas of North China, humid areas in the southeast, and arid areas in the northwest.

Thirdly, organizational objective: benefit from the extensive participation through workshops by the professional design institutions and both domestic and foreign universities, promote the exchange among students, and expand the academic activities. At the same time, produce innovative ideas in working methodologies. At the same time, from Chinese and foreign universities, and pave the way for future urban design and development.

本次基于北京、苏州、银川三个城市滨水区的研究有三重目标：

第一，实施目标：分别对北京、苏州、银川三个城市市域水网历史演变、水城格局等进行研究，针对不同类型的滨水空间从城市设计角度提出具体的滨水区设计引导策略，并进一步形成对三个城市的建设具有指导意义和能够作为管控依据的城市设计导则。

第二，学术目标：通过对三个城市水网演变与形成机理、水体承载功能、水城格局、滨水空间设计原则与设计策略、滨水空间典型空间模式等方面的比较总结，对华北半湿润地区、东南湿润地区、西北干旱地区城市提供滨水地区城市设计经验借鉴。

第三，组织目标：希望通过专业设计机构、国内外院校广泛参与的工作营，发挥各单位、院校的优势，促进国内大学和国外大学学生之间的充分交流，在学术方面有更多的拓展。同时，在工作方法上有创新的思路，为未来的城市设计研究拓展空间。

YANG Yifan

杨一帆

PART 1

Comparing Three Cities: Beijing, Suzhou and Yinchuan

第1部分

北京、苏州、银川三城比较

Introduction

引言

The research included in this chapter is carried out by CAGD. Firstly, the entire water system development history of the 3 cities is analyzed to figure out the historical evolution of the local urban space and urban water system, study the value and effect of urban water system in terms of urban function improvement, landscape enhancement, ecological restoration, etc., and float the overall pattern of water system landscape within the urban spatial structure. Secondly, the local waterfront construction mode is put forward based on the above studies, and more researches are carried out in terms of design of style zoning and public space, construction of waterfront space, organization of transportation system, etc. to extract the construction modes and techniques with local features. Finally, the comparative study on the different geographical environments of the 3 cities is conducted to propose the space shaping ways and design methods of the urban waterfront space under the influence of different natural environments, water network patterns and cityscapes.

本章研究由中国建筑设计研究院有限公司完成。首先分析三个城市的整体水系变迁历史，梳理本地城市空间发展与城市水系变迁的历史脉络，研究城市水系在城市功能完善、景观提升、生态修复等方面的价值和作用，提出城市空间结构下水系景观的整体格局。通过以上研究继而提出滨水空间本土建设模式，就风貌分区、公共空间的构建、亲水空间的打造、交通系统的组织等方面展开研究，提取具有地方特色的建设模式、手法。最后对三个不同地域环境的城市进行对比研究，提出在不同自然环境、水网格局和城市风貌的影响下，城市滨水区的空间塑造方式和设计方法。

1.1 – Water Structure

1.1 – 水系格局

1.1.1 – **Historical Evolution and Formation Mechanism of Water System in the Three Cities**
三城水网体系历史演变与形成机理

1.1.1.1 – Beijing
北京

As a world-famous ancient cultural capital, Beijing is a 3,000 years old town with 800 years history as a capital. The river and lake water system of the city of Beijing was built in the Jin Dynasty and then completed in the Yuan Dynasty. Through deliberate operations of the water system in the Ming and Qing Dynasties, a relatively complete urban water system was constructed. The river and lake water system of the city of Beijing has a profound impact on Beijing's urban development and has played a decisive role in the choice of Beijing as the capital of the Jin, Yuan, Ming and Qing Dynasties. Beijing used to be a military defensive town in the north, and later became the capital of the Jin, Yuan, Ming and Qing Dynasties. All the dynasties of China attached great importance to the construction of hydraulic facilities and built numerous hydraulic projects to satisfy the needs of flood control, irrigation and water transport, which demonstrated wisdom and skills. Therefore, protecting the historical features of Beijing urban river and lake water system is an integral part of protecting the famous histoyry and culture of the city, and protecting its image as an ancient capital.

北京作为世界闻名的古都，具有三千年的建城史和八百年的建都史。北京的水利建设与城市建设息息相关。北京的大量河道始建于金代，补充完善于元代，经明清两朝的利用和发展，形成了体系完整、功能完备的水系网络。北京作为军事防御重镇和五朝都城，为满足漕运、灌溉、防洪的客观需要，非常重视引水和排水工程，构建了大量的水利设施。因此，北京水系和历史风貌的保护和恢复是保护北京古都风貌的重要部分。

Since the founding of the People's Republic of China, the urban functions of Beijing water systems have gradually degraded in the context of large-scale city expansion. A large number of water systems have lost their original functions of grain transport, irrigation and defense, and the royal river channels supplying water for imperial gardens were not entitled to special status any more. Steadily eroded by new lands, the water systems in the ancient city have had their patterns faded away. Moreover, Beijing has been plagued by the shortage of safety precautions for urban flood control, as well as the lack of urban water resources. Therefore, on one hand, the government by means of referring to the water management policy issued by the State Council, has decided to build Guanting Reservoir and Miyun Reservoir at the upstream of water system networks, and excavate Jingmi Diversion Canal to introduce plenty of drinking water into the urban area, which can replenish the surface water and underground water here that have declined year by year; on the other hand, lots of river channels for drainage have been dug and dredged in Beijing in order to strengthen the city security. Many natural river channels and ponds were straightened with curves cut off, and thus formed into artificial drainage river channels during this period.

新中国成立后，在城市大规模扩张的背景下，北京水系的城市功能逐渐退化，大量水系失去了原有漕运、灌溉、防御功能，为皇家园林供水的御用河道，也不再享有特殊身份。城市新建用地不断侵蚀水系，古都水系格局逐渐消失。此外，北京受城市防洪安全措施不足和城市水源匮乏两方面的困扰。于是，结合国务院的治水方针，政府决定在水系网络的上游建设官厅水库和密云水库，并开掘京密引水渠将大量的清水引入北京城区，补充城区内逐年减少的地表水和地下水；另一方面，在加强城市安全方面，北京开凿、疏浚了大量的排水河道，在此期间，北京的众多天然河道、池塘被裁弯取直，形成了人工排水河道。

1.1.1.2 – Suzhou
苏州

Suzhou is located in the middle of the Yangtze River Delta, surrounded by a plain with a rich river network in the north, east and south. Constellated with lakes and crisscrossed with river channels, Suzhou has been renowned as "water resort" since the ancient times. Suzhou controls the outlet of Taihu Lake,which discharges to the east via waterways such as Lou River, Wusong River and Huangpu River.

Suzhou is a city that is born from water, thrives on water, and is proud of water. With adense water network, Suzhou is a typical city for the Southern Yangtze River region. In 514 BC, Wu Zixu proposed the concept of "understanding soil quality and water conditions, observing weather and Feng Shui", "building up the city, and deepening the moats" to build the ancient city. Since then, the water system of the ancient city began to appear.

苏州市地处长江三角洲中部，苏州市的北、东、南三面是平原河网地区，湖泊星罗棋布，河道纵横交错，自古以来就有"泽国"之称。苏州扼太湖下游河道之咽喉，太湖水由娄江、吴淞江、黄浦江等向东分流。

苏州是一座因水而生、因水而兴、因水而荣的城市，水网密布、具有典型江南水乡的特点。自公元前514年伍子胥"相土尝水、象天法地"，"筑斯城、凿斯水"营建阖闾大城开始，苏州古城区水系雏形初现。

FIG. 1.1 The Map of Hydraulic Facilites in the Seven Administrative Districts in Southeast China, Source: Siku Quanshu (Complete Library in Four Sections)
东南水利七府总图,来源：四库全书

Chun Shen made a slight renovation of the ancient city of Suzhou, closed the Xu Gate, added a Feng Gate in the southeast and many vertical and horizontal rivers in the city to store the storm water. In the Tang Dynasty, the Jiangnan Canal was built, andthe water system became more fluid. In the Song Dynasty, with the river channels as the backbone and the water system as the vein, the double- chessboard layout characterized by the streets and rivers side by side while the water and land routes in parallel, was more complete. At that time, rivers in the ancient city were densely intertwined and interwoven into a network, especially in the residential areas.

At the beginning of the Yuan Dynasty, the Italian Marco Polo described Suzhou as "Venice of the East". In the Ming Dynasty, the ancient city of Suzhou became an important national industrial and business city, which increased the population density and space demands, so new canals in the ancient city were rapidly constructed. In the late Ming Dynasty, the development of the water system in the ancient city of Suzhoureached its peak.

During the period of the Republic of China, Suzhou was a national trading port open to the world. the political and economic status of Suzhou dropped sharply due to the strongly economic and cultural affect from the Western countries, the opening of Shanghai, and the destruction caused by the Taiping Rebellion. although a large number of rivers were filled, the basic urban layout of "three horizontal river channels, four vertical river channels and two rings"[1] was not changed (HE, 2014).

楚时，春申君改造了苏州古城区，封闭了胥门，增设城东南葑门，并为存储降雨开凿若干小型沟渠。唐朝时，随着修建江南运河，苏州水网也得到了进一步的完善。至宋朝，苏州古城区内河道密布，纵横交织，且以聚居区最为密集，形成了著名的河街相依的水陆"双棋盘"格局。元初，苏州古城获得"东方威尼斯"称号。明代，苏州成为经济中心，也成为了江南地区人口最密集的地区，苏州古城水系发展达到历史上的鼎盛时期。

民国时期，苏州作为全国对外开放的通商口岸，面临西方先进的经济文化的冲击。上海的开埠与太平天国战争的破坏，使苏州政治经济地位急剧下降。大量河道被填塞，但"三横四直加两环"[2]的城市基本格局始终没有发生改变（何峰，2014）。

1
Three horizontal rivers, four vertical rivers and two rings: in the ninth year of Chongzhen Emperor's Reign (1639) in late Ming Dynasty, Zhang Guowei, Governor of the south of the Yangtze River, compiled Water Conservancy Encyclopedia of Suzhou, along with his drawing of General Layout of River Channels and Division and Ruling Diagram of Four Corners inside Suzhou attached. As it is said in the book, "In addition to the three horizontal rivers and four vertical rivers, there are hundreds of other rivers inside the city which are crossed like meridians and parallels. All of them are flowing from west to east and from south to north, which have never dried up passing through dynasties of Tang, Song and Yuan." During this period, "three horizontal rivers, four vertical rivers and two rings" is the prominent feature of the backbone water systems.

2
三横四直加两环：明末崇祯九年（1639年）江南巡抚张国维纂辑《吴中水利全书》时，一并绘制《苏州府城内水道总图及四隅分治图》附于书中。其中有"城内河流三横四直之外，如经如纬，尚以百计，皆自西趋东，自南趋北，历唐宋元不湮"的记载。此时，骨干水系以"三横四直加两环"为显著特点。

1.1.1.3 – Yinchuan
银川

Yinchuan's water bodies can be classified into three types according to their formation mechanisms:

Type 1: Relics of the old Yellow River course. The Yellow River is famous for its "heavy sedimentation, frequent dike breach, and river channel diversion", with an old saying that "dykes breaks twice in every three years, and river channel deviates every one hundred years". For more than 2,000 years, the Yellow River channel has oscillated back and forth on the plains. The river mainstream course has moved eastward eventually to the present position of the riverbed.Therefore, the Yellow River formed a series of lakes of different sizes on the Yinchuan Plain. For example, Hequan Lake, Mingcui Lake, Zhoujia Lake, Yanjia Lake, Qingshui Lake, Fujia Lake, etc. they are in-between Huinong Canal and Hanyan Canal in different sizes and distributed along the north-south line. All the lakes are the relics of the old Yellow River course. This kind of deep lake with a long history can store much water, produce significant ecological services through its connection to the Yellow River, and reduce the secondary salinization.

Type 2: Man-made ditches. Originated from the Qin and Han Dynasties, and developed in the dynasties of the Tang, Song, Yuan, Ming, Qing, and Republic of China, Yinchuan's irrigation project has a long history of more than 2,200 years. The arterial canals such as Tanglai, Hanyan, Huinong, Qin, Han, Yunting (Minsheng) as well as the tributary canals and drainage ditches , which were constructed from the ancient times, are basically well preserved and still play an important role in industrial and agricultural production in Yinchuan. After the establishment of the People's Republic of China, some parts of the canal were straightened, and most of the hydraulic facilities were modernized; however, most of the channels retained the original location, and some traditional irrigation facilities were still pre-served.

Type 3: Inter-channel depression lakes. This kind of lakes and marshlands are secondary lakes that emerged with the development of irrigation.

银川的水体按形成机理可分为三种：

第一类是黄河故道遗迹。黄河以“善淤、善决、善徙”而著称，自古有“三年两决口，百年一改道”之说。两千多年来，黄河河道曾在平原上来回摆动，河道主流最终东移，迁至现今的河床位置。因此，黄河在银川平原上形成了一系列大小不一的湖泊。例如惠农渠与汉延渠之间的鹤泉湖、鸣翠湖、周家湖、阎家湖、清水湖、福家湖等，它们大小不一，呈南北带状分布，均为黄河故道遗迹。鸣翠湖水域在明代末期才最终定型，迄今约400年左右。这种湖泊深度较大，蓄水多，成湖历史悠久，与黄河相沟通，生态效应明显，次生盐渍化小。

第二类是人工沟渠。银川的灌溉工程始于秦汉，经历唐、宋、元、明、清、民国等朝代，至今已有长达两千二百多年的发展史。历史上遗留下来的唐徕、汉延、惠农、秦、汉、云亭（民生）等干渠以及各级支渠和排水沟基本保存完好，且仍在银川地区的工农业生产中发挥重要作用；除建国后部分渠段进行裁弯取直工程外，绝大部分渠道仍保留原有的位置走线；大部分水利设施在建国后进行了现代化改建，但仍有部分传统水工设施得以保留。

第三类是渠间洼地湖。这种湖沼是随着灌区开发而出现的次生湖。

In the long-term historical development, many canals were built in Yinchuan, but the drainage facilities were not constructed correspondingly. The serious imbalance between irrigation and drainage resulted in a large number of inter-channel depressions that turned into lakes.

In Yinchuan, due to the channel barrier, except for the Huinong Canal on the easternmost side, other arterial canals cannot safely discharge their water into the river. When the river rises or it rains heavily, the water can only be discharged into the lakes and the ditches, which caused the chaotic canal and ditch construction, depressions , and a dense distribution of lakes and marshes in the middle and lower reaches of the Yinchuan Plain. Since the Han and Tang Dynasties, the area of lakes and marshes has reached the maximum surface during the Qing Dynasty and the Republic of China. This kind of shallow water body has a great water evaporation, and raises the ground water level, which causes the salinization of ground water and soil. (Wang, 1992)

After the Liberation, due to the establishment of a drainage system, many shallow lakes and depressions were drained, and the lake areas were greatly reduced. Water bodies like Qizilian Lake, Guan Lake, Wangjiaguang Lake and Chang-tan Wetland exist in Yinchuan. At present, Yinchuan is realizing the project of returning farmland (pond) to lake in some key lake and wetland areas, following the principle of "improvement of the wetlands within the city, restoration for the wetlands in the urban areas, and protection of the natural wetlands in suburban areas"(Tan, 2015), to expand the wetland areas and benefit from their ecological services.

在长期的历史发展过程中，银川地区兴建了很多水渠，而没有建设相应的排水设施，灌排不平衡的问题非常突出，造成大量的渠间洼地积水成湖。

以银川地区来说，由于渠道阻隔，除最东侧的惠农渠外，其它干渠均不能安全退水入河，在河水上涨或暴雨时，渠水只能泄入湖沟，这造成了历史上银川平原中下游地区沟道混乱、洼地积水、湖沼密布的局面。湖沼面积自汉唐开始扩张，在清代和民国期间达到历史最大值。这种水体面积大而水深小，自然蒸发量极其可观，并使地下水位抬高，咸化了潜水和土壤（汪一鸣，1992）。

新中国成立后，由于排水沟渠的系统建设以及城市的快速发展，许多浅水湖泊与积水洼地被疏干，湖泊面积也大大缩小，至今仍有七子连湖、关湖、王家广湖、长滩湿地等水体。目前银川以“城内湿地以治理为主，城边湿地以恢复为主，城郊湿地以自然保护为主”的原则(谭鹏，2015)，在部分重点湖泊湿地区域进行退地(池)还湖工程，以扩大湿地面积，发挥湿地生态功能。

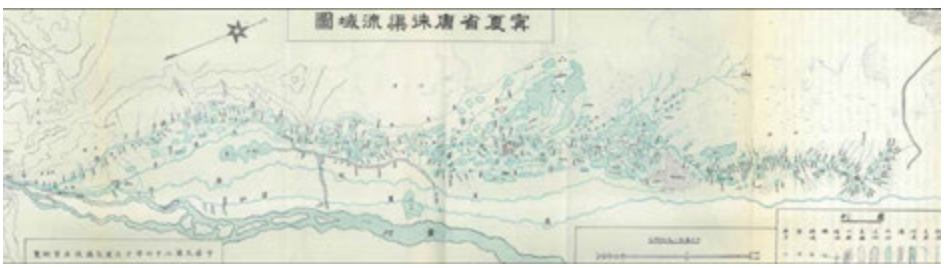


FIG. 1.2 Tanglai Canal Basin in Ningxia Province(1935), Source: Yinchuan Codification Committee. Yinchuan City Book[M]. Ningxia Renmin Press. 1998, 08.

宁夏省唐徕渠流域图(1935), 来源：银川市编纂委员会.银川市志[M].宁夏人民出版社.1998,08.

1.1.2 – **Overview of the Current Water System**
水网体系现状概况

1.1.2.1 – Beijing
北京

The Beijing Plain, surrounded by mountains on three sides, is located at the northwestern part of the North China Plain.

北京平原三面环山，地势平坦，西北高、东南低。

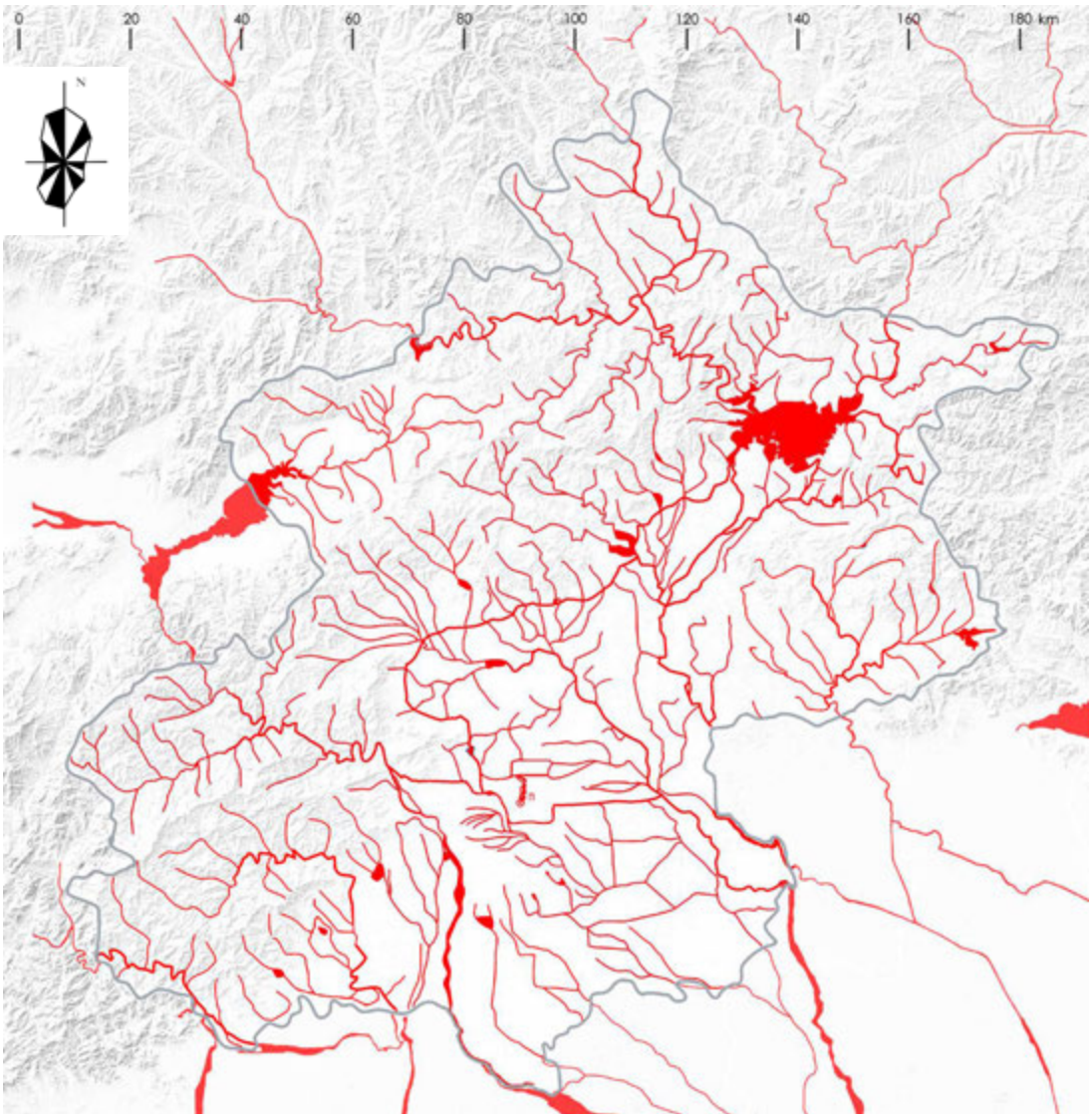


FIG. 1.3 The Waterfront Space in Beijing, Source: Openstreetmap
北京市域水系概况图, 来源：Openstreetmap

The terrain is higher in the northwest and lower in the southeast, and the flat plain slowly slopes toward the shore of the Bohai Sea.Large and small rivers rises from the surrounding mountains, and flows through the small Beijing Plain into the Haihe River to the east. There are five major rivers in Beijing: from east to west, the Ji Canal River, Chaobai River, the North Canal, Yongding River and Daqing River, as the five major water systems in Beijing. Except the source of the North Canal is in Beijing, Ji Canal River, Chaobai River and Daqing River originate in Hebei Province, and Yongding River originates in Shanxi Province and Inner Mongolia Autonomous Region. Among them, Yongding River, the North Canal and Chaobai River are related closer to the built-up area in Beijing.

自燕山山脉与太行山脉发育的河流水系，流经平原地区，向东汇入渤海。北京境内有五大河流，从东到西分别为蓟运河、潮白河、北运河、永定河和大清河。除北运河发源于本市，蓟运河、潮白河、大清河发源于河北省，永定河发源于山西省和内蒙古自治区，其中永定河、北运河及潮白河与北京建成区联系最为紧密。

1.1.2.2 – Suzhou
苏州

Bordered by the Yangtze River on the north and the Taihu Lake on the west, the basic pattern of Suzhou's river system and water resources system are framed. There are four backbone rivers in the basin, namely Wangyu River, Wusong River, Taipu River and the Grand Canal. Wangyu River, Wusong River and Taipu River traverse the city from east to west, which are located in the northern, central and southern parts of Suzhou. The Grand Canal, which is ocated in the western part of the city, stretches from the north to the south, and plays a role in connecting the north and the south.These backbone rivers divide the urban area of Suzhou (including 6 administrative districts: Gusu District, New District, Industrial Park, Wuzhong District, Xiangcheng District, and Wujiang District) into four relatively independent and closely related water management parts: Yangcheng, Dianmao, Binhu and Punan.

Being richin river and lake resources, constellated with lakes and crisscrossed by a great number of rivers and canals, Suzhou is endowed with a unique water system pattern of "One River, One Hundred Lakes and Ten Thousand Rivers".

苏州北靠长江，西倚太湖，长江与太湖形成其河流水系的基本格局。境内有望虞河、吴淞江、太浦河和京杭运河四条流域性骨干河道，其中前三者横贯市域东西，分别位于苏州市北部、中部与南部。京杭运河位于市域西侧，纵贯南北，起到承上启下的作用。经流域性骨干河道分割，苏州市区（姑苏区、高新区、工业园区、吴中区、相城区、吴江区6个行政区）形成相对独立又紧密联系的阳澄、淀泖、滨湖、浦南四个水利分片。

苏州河湖资源丰富，境内河道纵横，湖泊众多，河湖相连，形成"一江、百湖、万河"的独特水网水系格局。

Within the urban area of Suzhou, 58 rivers and canals are listed as Backbone waterways in Jiangsu Province, with a total length of about 515km. There are more than 3,200 ordinary river channels with a total length of about 3,300km; and 67 are listed in the Provincial Lake Protection List, with a total area of about 285km2. Among them, Yuanhetang, Lou River, Yongchangjing, Jimintang, Huguang Canal, Muguang Canal, Xujiang, Xingchuan Road, Hengcao Road and other backbone river channels function as main drainage channels. The main lakes in Suzhou are: Cao Lake and Yangcheng Lake in the north, Jinji Lake, Dushu Lake, Cheng Lake, Jiuli Lake and Yuandang in the middle, and Beimayang and Jinyuyang in the south.

苏州市区范围内，被列入江苏省骨干河道名录的有58条，总长约515km；一般河道有3200余条，总长约3300km；列入省湖泊保护名录的有67个，总面积约285km²。其中元和塘、娄江、永昌泾、济民塘、浒光运河、木光运河、胥江、行船路、横草路等骨干河道，承担重要的引排任务；境内较大型的湖泊有北部的漕湖、阳澄湖，中部的金鸡湖、独墅湖、澄湖、九里湖、元荡及南部的北麻漾、金鱼漾等。

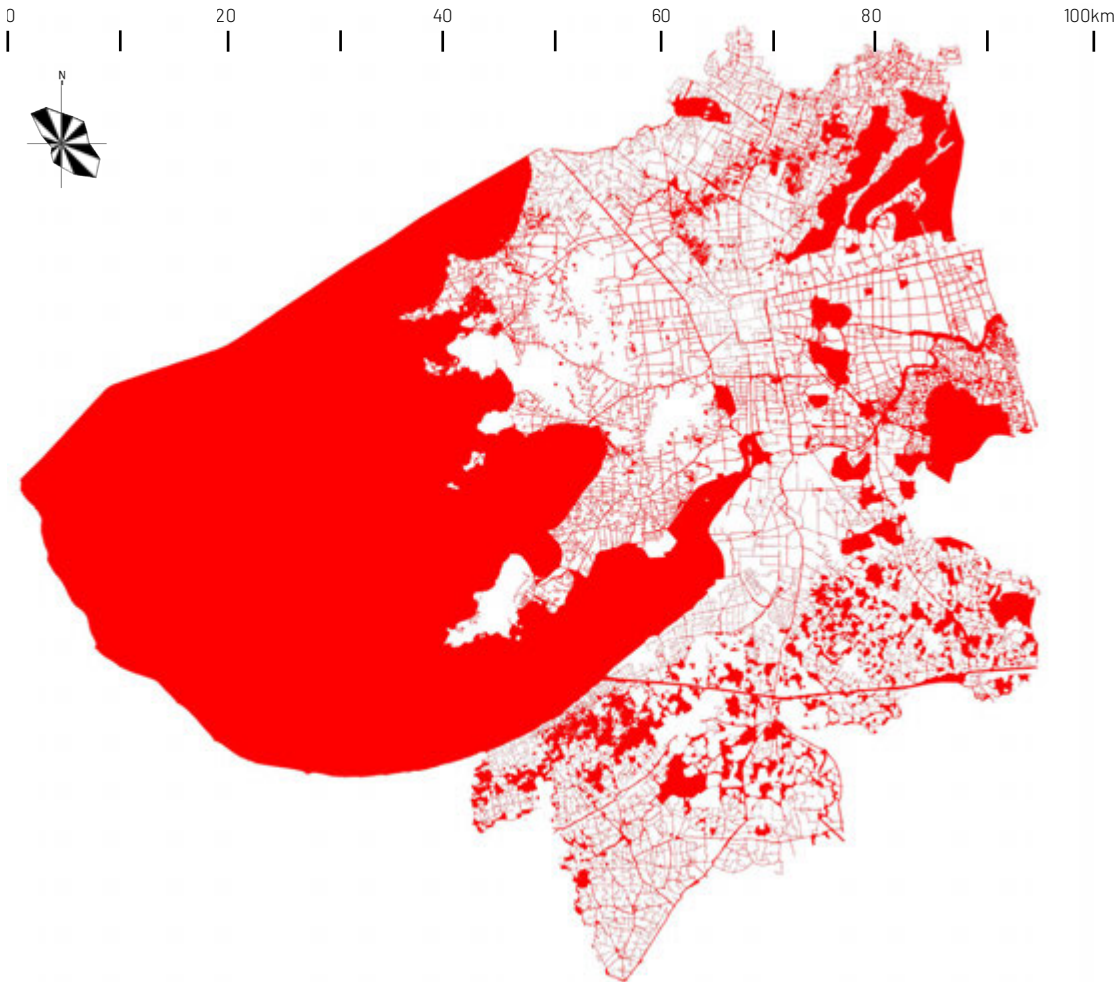


FIG. 1.4 Schematic Diagram of Suzhou Water System, Source: Openstreetmap.
苏州水系概况图，来源：Openstreetmap

1.1.2.3 – Yinchuan
银川

Crisscrossed with ditches, Yinchuan has numerous natural lakes and wetlands which are widely distributed. Yinchuan has a rare characteristics of the lake group in the arid regions. The connected seventy-two lakes are representative of the natural lakes and wetlands in the Yinchuan Plain. During the development of the city, original wetlands and water surfaces were gradually reduced.

银川沟渠纵横，天然湖泊众多，湿地数量大，分布广，有着西北干旱地区少见的湖群特征，历史上的七十二连湖是银川平原上大量天然湖泊湿地的典型代表。随着城市发展，原有湿地被逐渐侵蚀，水域面积减少。

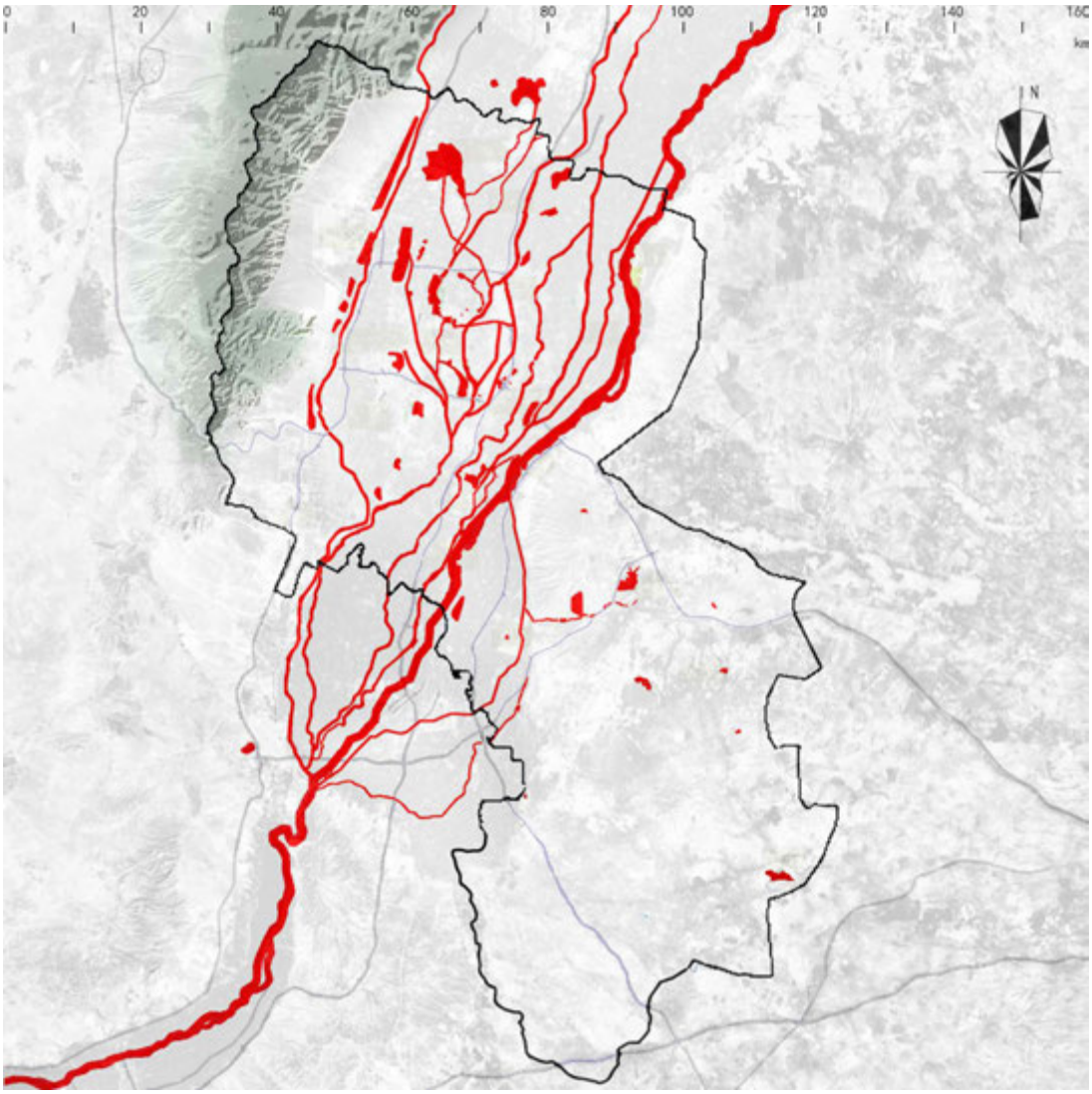


FIG. 1.5 Schematic Diagram of Yinchuan Water System, Source: Drawn by Yinchuan Team
银川水系概况图, 来源：银川组自绘

In the later development process of the city, more emphasis was paid on the waterfront space, and some water areas were restored and expanded in Yinchuan. Since 2003, Yinchuan has started projects of water body dredging, water body connection and returning farmland to lake. ome water areas such as the Yuehai Lake and the Rhinoceros Lake have been restored.

At present, the city's wetlands cover an area of 53,100 hectares, including 200 natural lakes and marsh wetlands, of which 20 lakes and marshes cover an area of over 100 hectares. In Yinchuan, there are 6 state-level wetland parks (Mingcui Lake, Yuehai Lake, Huangshagudu, Hequan Lake, the Yellow River Bund, Bao Lake), 6 autonomous region-level wetland parks, 8 city-level wetland parks, and 3 wetland conservation community. The wetland occupies 10.65% of the urban area, 78.5% of which are protected. On October 25th, 2018, the United Nations International Wetland Convention Organization announced at the 13th Session of the Contracting Parties in Dubai that Yinchuan City was awarded as one of the first "International Wetland Cities" in the world. At the session, 18 cities around the world won this award, including 6 Chinese cities: Yinchuan, Haikou, Harbin, Chengde, Changshu and Dongying. Yinchuan was the only city in western China to receive this award. (Fan, 2019)

However, due to the rapid development of Yinchuan City, the water consumption in industrial and agricultural production and daily life became huge. As a result, the water flow of the main stem of Yellow River decreases, some sections of the river is at dead storage water level, and a large portion of the riverbeds are dry. In some parts of the channel system (especially the channels in the city center), water pollution is serious, and the environment on both sides of the channels ispoor. With the urbanization process, a large number of residential communities are planned to be constructed at the surroundings of some lakes and wetlands in the suburbs, which threatens the ecology and landscape of the lake body.

随着对滨水空间的重视，银川恢复扩大了部分水域面积。银川市从2003年开始进行水系疏浚、水体连通和退田环湖工程，阅海、犀牛湖等水域得到恢复。

据银川市湿地办资料显示，目前全市湿地面积5.31万公顷，有自然湖泊、沼泽湿地近200个，其中面积在100公顷以上的湖泊、沼泽有20多个。全市有6处国家级湿地公园（鸣翠湖、阅海、黄沙古渡、鹤泉湖、黄河外滩、宝湖）、6处自治区级湿地公园、8处市级湿地公园、3处湿地保护小区，市区湿地率达到10.65%，湿地保护率达到78.5%。2018年10月25日，联合国国际湿地公约组织在迪拜召开的第十三届缔约方大会上宣布，银川市荣获全球首批"国际湿地城市"称号。在获此殊荣的全球18个城市中，中国占6个，而银川作为中国唯一的西部城市获此奖项。(范晓儒，2019)

但由于银川城市的快速发展，工农业生产和居民生活用水量巨大，导致黄河干流水流量减少，部分河段处于死水状态，有大面积河床裸露。部分渠系（特别是中心城区内的渠段）水污染严重，渠道两岸环境较差；伴随城市化进程，城郊部分湖泊湿地周边修建了大量居住小区，湖体的生态和景观受到一定威胁。

1.1.3 – **Comparison of Water System Functions**
水网功能比较

1.1.3.1 – Beijing
北京

Water culture—Beijing City has been constructed closely to the Yongding River, North Canal and Chaobai River. In history, these three waterbodies formed diversified cultural relics by combining with farming, the imperial and grain transport. The protected cultural heritage are mainly temples and ancestral halls, imperial gardens and hydraulic facilities, all of which reflected the scenes of life that local people were living by water back then.

水文化——北京城的建设与永定河、北运河、潮白河关系密切。历史上，这三条水系与农耕文化、皇家文化、漕运文化相结合，形成了多样的文化遗存。大量文物保护单位以庙宇祠堂、皇家园林和水工设施为主，体现了当时本地人逐水而居的生活场景。

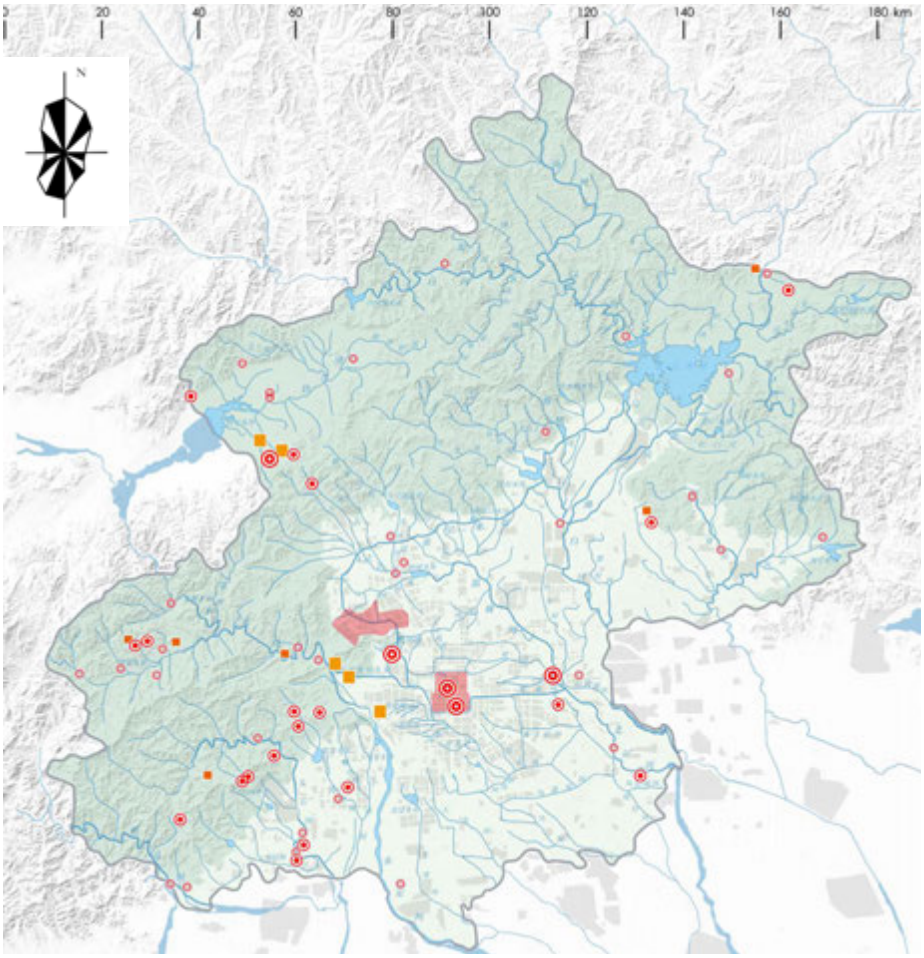


FIG. 1.6 The Layout Plan of Historical & Cultural Heritage at the Waterfront of Beijing, Source: Drawn by Beijing Team
北京市域滨水空间主要历史文化遗迹分布图，来源：北京组自绘

Water function—Since 2000, affected by the rapid demographic growth and urban expansion, 70% of the waterfront space is occupied by industry, transportation and civic facilities. The function of the water system is also changed. Originally, the water system provided the functions of water transport for trade, military defense and farmland irrigation; now, the water system functions as the source of drinking water supply for the urban residents, and flood-discarge channels to ensure urban safety. A small number of waterways also serve as landscape spaces.

水功能——新中国成立后，北京大量的滨水空间被工业厂房、城市道路、市政线路所侵占。受饮用水短缺和降雨不均衡的影响，河道功能转向为城市运载饮用水和排解洪涝的功能，其中只有少量河道还兼顾景观功能。

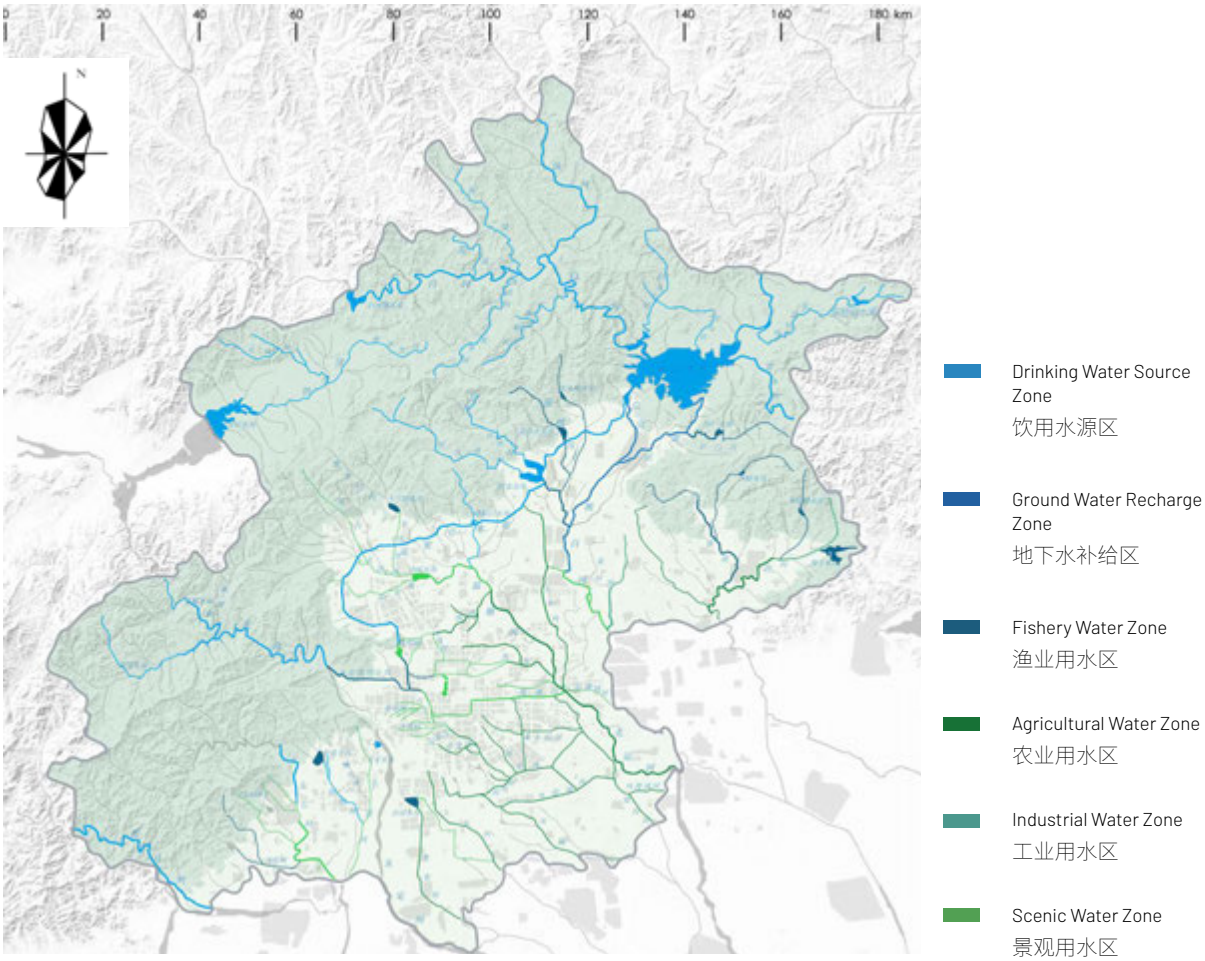


FIG. 1.7 Beijing Waterfront Space Water Function Layout Plan, Source: Drawn by Beijing Team
北京市域水功能分布图，来源：北京组自绘

Water ecology—With an annual evaporation higher than the precipitation in Beijing, little precipitation is stored. Affected by the hydrologic and geologic conditions in North China, the water quality and quantity vary considerably in different areas. From the northwest to the southeast in Beijing, "many reservoirs concentrated in mountains, partial dried rivers in front of mountains and water body retention in plains" is the basic condition.

水生态——北京的气候特点为蒸发量大于降雨量、降水易落难蓄。受地质条件的影响，不同地区的水质、水量情况差异显著，自西北向东南形成了山区水库集中、山前局部断流、平原水体瘀滞的水生态格局。

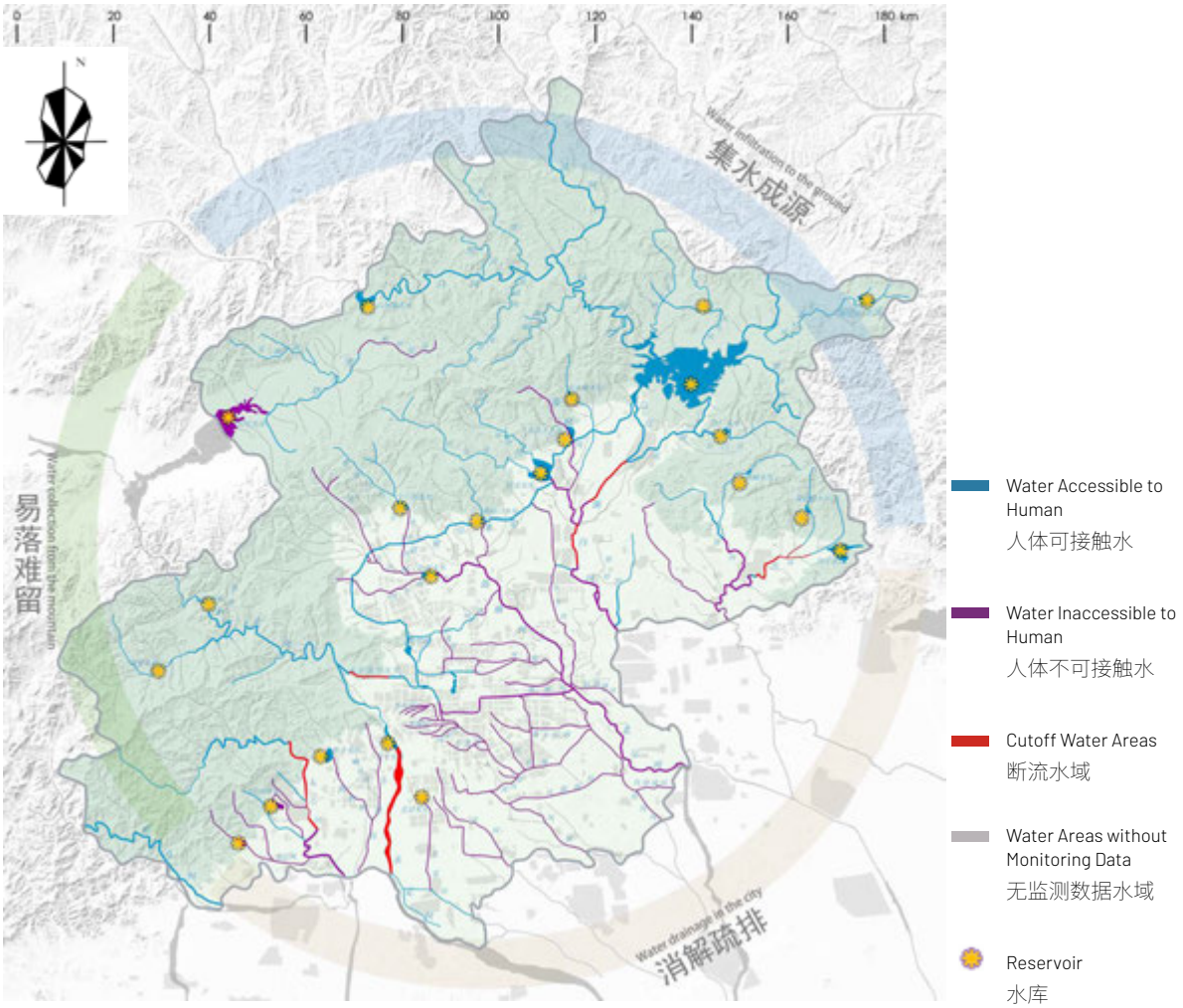


FIG. 1.8 Beijing Water Ecology Pattern, Source: Drawn by Beijing Team
北京市域水生态格局图，来源：北京组自绘

Water activities—The public urban life is compromised by the insufficient quantity and quality of public facilities in the waterfront in Beijing. In general, the lakes are used more frequently than the rivers. It's popular to boat and skate on the lakes, enjoy the breeze on the lakeside, and watch willows and lotus along the river.

水上活动——北京滨水活动空间较少。总体上，湖泊比河道的利用率高，各季节滨水空间的活动类型差异较大。公共服务设施缺乏和可达性较差是影响北京滨水空间公共活动介入的主要因素。

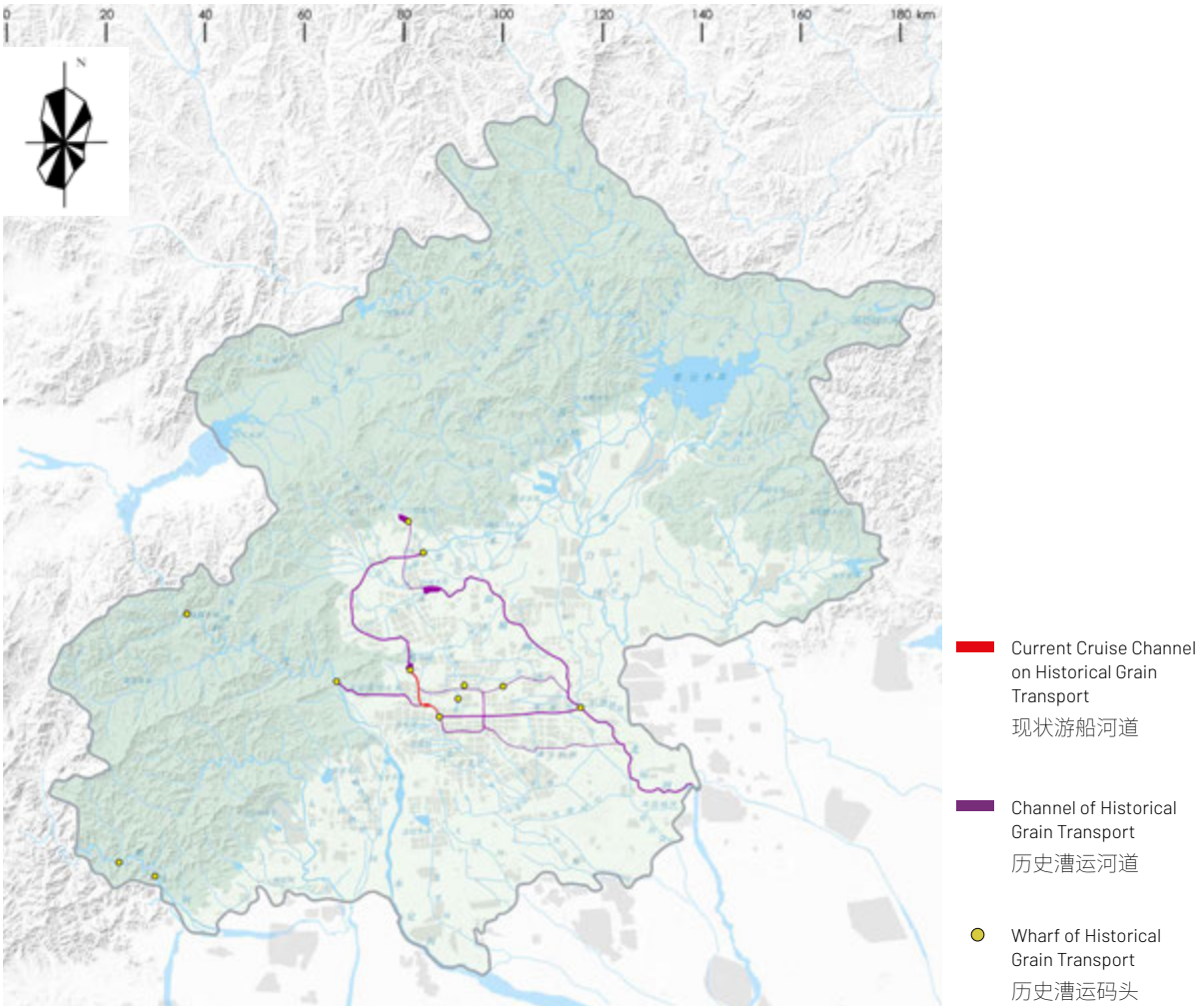


FIG. 1.9 Beijing Water Transportation Layout Plan Source: Drawn by Beijing Team
北京市域水上交通分布图，来源：北京组自绘

1.1.3.2 – Suzhou
苏州

Water safety—Suzhou is located at the shore of Taihu Lake. It is a low-lying city with a dense water system, which has been threatened by frequent floods over the past years. Flooding is mainly caused by the "plum rains" and typhoon rainstorms. The floods resulted from plum rain happen from June to July, which are characterized by long duration, wide distribution, and large quantity in precipitation. The floods caused by typhoon rainstorms usually happen in August and September, which are characterized by short duration, fierce wind, concentrated rainfall, and great damage.

The Taihu Lake is the hub of Suzhou's water system. The water of Taihu Lake is mainly discharged into the Yangtze River in two ways: to the northeast through Wangyu River, and to the east through the Dianliu and the Huangpu River. The water of canals enters Wangting Town from the west and flows out at Pingwang Town to the south. The "Three Rivers" that are orginally discharged to the sea are today discharged into the Yangtze River through Lou River, Wusong River and Taipu River through the Huangpu to the east.

水安全——苏州地处太湖之滨，水网稠密，地势低洼，历史上洪涝灾害频繁。洪涝灾害主要由梅雨和台风暴雨两种雨型引起，梅雨型水灾的特点是历时长、分布广、雨量大，发生时间在6—7月份，台风暴雨型水灾的特点是时间短、风势猛、雨量集中、危害大，一般发生在8—9月份。

苏州的河网水系主要以太湖为枢纽，太湖水有两条主要的流出路径，向西北流入望虞河，向东流入淀柳汇入黄浦江，两条路径最终均泄入长江；运河水由西入望亭，南出平望；原出海的"三江"，即通过娄江、吴淞江、太浦河由黄浦江东泄入长江。

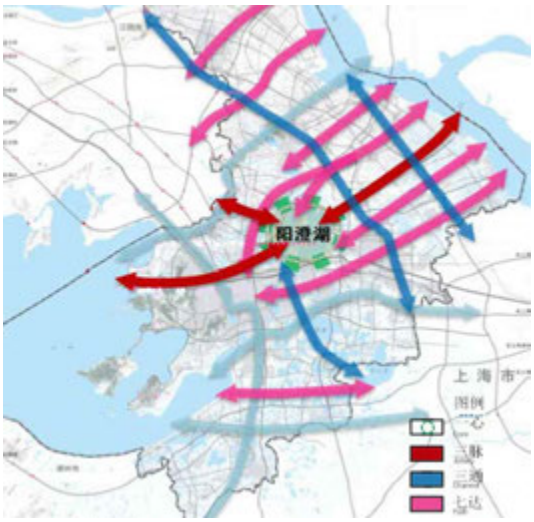


FIG. 1.10 Map of the Main Water Distribution in the Urban Area, Source: The Specific Planning of the Water Network in Suzhou.
市域骨干水量调配示意,来源:《苏州市河网水系专项规划》

FIG. 1.11 The in-and-out water volume of Suzhou, 2015, Source: Website of Taihu Basin Administration, Ministry of Water Resources
2015年苏州市出入境水量图,来源:水利部太湖流域管理局官方网站

Water ecology—Suzhou is located in the plain area with a dense river network and flat ground level. Although there are many rivers, Suzhou falls into the situation of water stagnation, fast siltation speed, weak self-purification capacity of the water body, and frequent pollution accumulation. Taihu Lake and Yangcheng Lake are heavily polluted; wetlands and marshes are largely reduced, the water system is seriously damaged, and the natural flow velocity of the rivers and self-purification capacity are low.

To protect the ecological resources of Suzhou, the natural waterfront of rivers and lakeshave oughts to be increased by the implementation of forest buffers, wet ponds, and wetlands, etc., so that the waterfront green space can collect, store, filter and purify urban rainwater, and reduces the runoffs. By doing this, river basin ecosystems would hopefully be balanced, provide suitable habitats for plants and animals, and restore the ecosystems.

水生态——因苏州处于平原河网地区，地势平坦，河道虽多但现状水流滞缓，淤积速度较快，水体自净能力差，易形成污水积集。太湖、阳澄湖等湖水污染较重，湿地沼泽大量减少，河道水系严重破坏，河水自然流速和自净能力较低。

因此保护苏州生态资源，应通过设置植被缓冲带、湿塘、湿地等，提高河湖自然岸线比例，促进滨水绿地起到接纳、滞蓄、过滤、净化城市雨水，消弱地表径流的作用。进而促进流域生态系统平衡，为植物、动物提供合适的生存和栖息环境，修复生态系统。

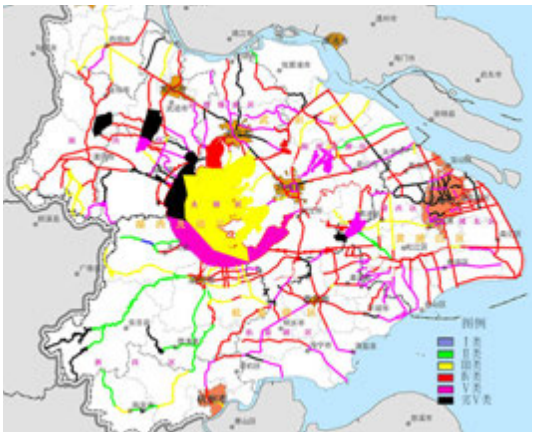


FIG. 1.12 Water Quality Status Chart of Taihu Lake Basin Water Functional Area with Full Indicators in July 2018, Source: Taihu Lake Health Report

2018年7月太湖流域水功能区全指标评价水质现状，来源：太湖健康状况报告

FIG. 1.13 Map of the Main Ecological Corridors in Suzhou, Source: The Specific Planning of the Water Network in Suzhou

市域骨干生态廊道示意，来源：《苏州市河网水系专项规划》

Water culture—The famous historical and cultural City of Suzhou is located in area of water towns in Jiangnan (the South of the Yangtze River), and it hasa unique river network water system, which carries the regional cultures and waters cultures with various styles and distinctive characteristics such as Wu Culture, Southern Jiangsu Culture, Yangtze River Culture, Canal and Lake Culture.

The historical water systems, such as the Grand Canal, City Moat, Shantang River, Shangtang River, Xu River and Lou River, connect the history and culture. The waterfront space of the three historical relics and culture agglomeration areas—Dian District, Taihu Lake and the Ancient City, records the traditional cultural context.

水文化——苏州是中国著名的江南水乡城市、历史文化名城。河网水系是其风貌特色之一，承载了苏州的吴文化、苏南文化、长江文化、运河文化、湖泊文化等风格多样、特色鲜明的地域文化和水域文化。

京杭大运河、护城河、山塘河、上塘河、胥江、娄江等历史水系串联着众多历史和文化节点，淀区、太湖、古城三个历史遗留风貌和文化集聚区，成为延续传统文化脉络的主要空间载体。

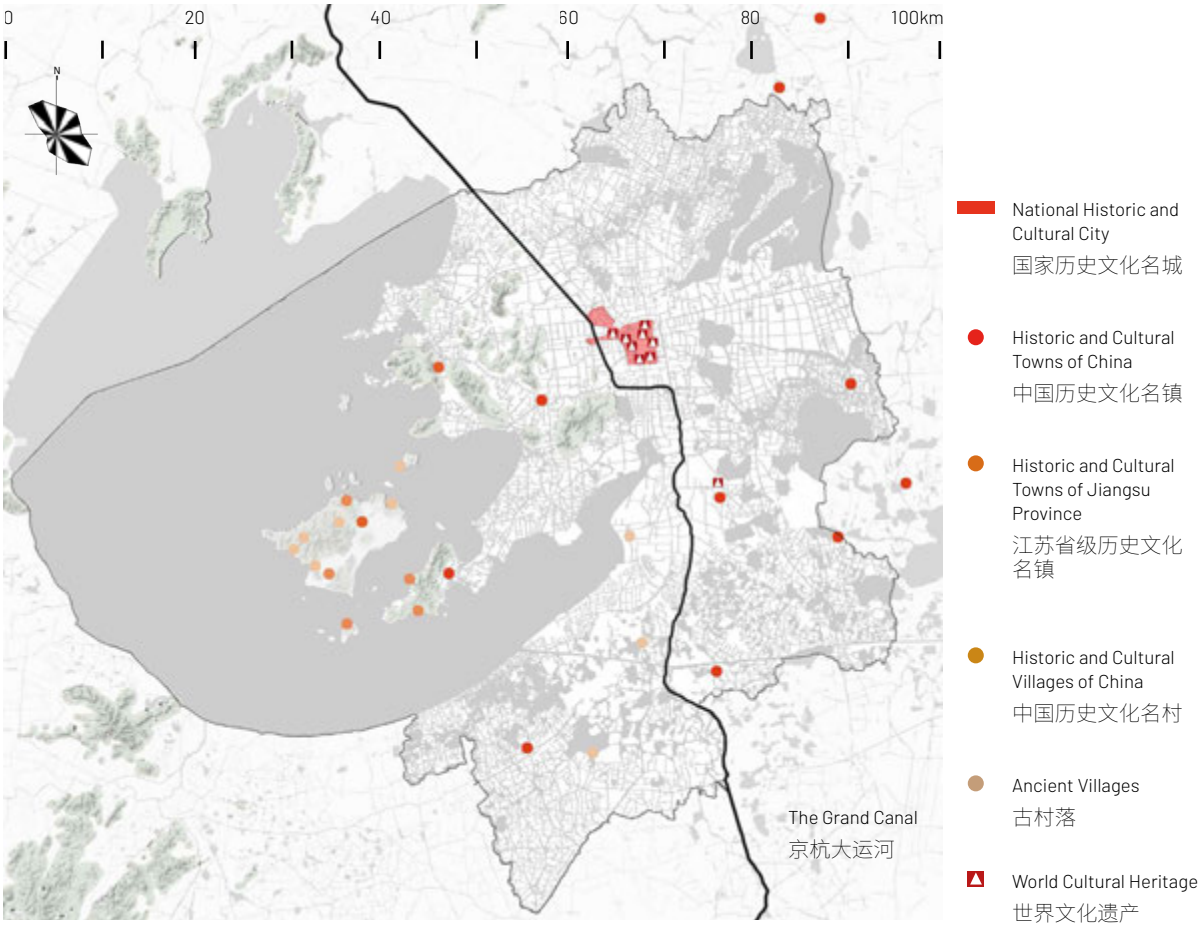


FIG. 1.14 Historic and Cultural Heritage Protection Planning Map of Suzhou, Source: The Masterplan of Suzhou 2011-2020

苏州市区历史文化遗产保护规划图，来源：苏州市城市总体规划（2011-2020）

Water transport—Located in the southeastern part of Jiangsu Province, Suzhou is bordered by Shanghai, Zhejiang, Taihu Lake and the Yangtze River. Due to this position advantage, the economy thrives. Crisscrossed with rivers and canals, and endowed with rich water way resources, Suzhou has the natural conditions for developing inland water transportation, and is one of the most developed regions in the Yangtze River Delta and Jiangsu Province in water transport. Serving the urban industrial economic belt and promoting the economic development of the surrounding regions with modern , Suzhou's inland water transport, especially its unobstructed, efficient, safe and ecological system, has made outstanding contributions to the urban development.

水运输——苏州市位于江苏省东南部，东临上海，南接浙江，西抱太湖，北依长江，地理位置重要，经济发达；境内河道纵横交织，水运资源丰富，具备发展内河航运的自然条件，是长三角、江苏省内河航运最为发达的地区之一。苏州内河航运为城市的兴起做出了突出的贡献，逐步建成畅通、高效、平安、绿色的现代化内河水运体系，服务于市域产业集聚区，促进了周边地区经济发展。

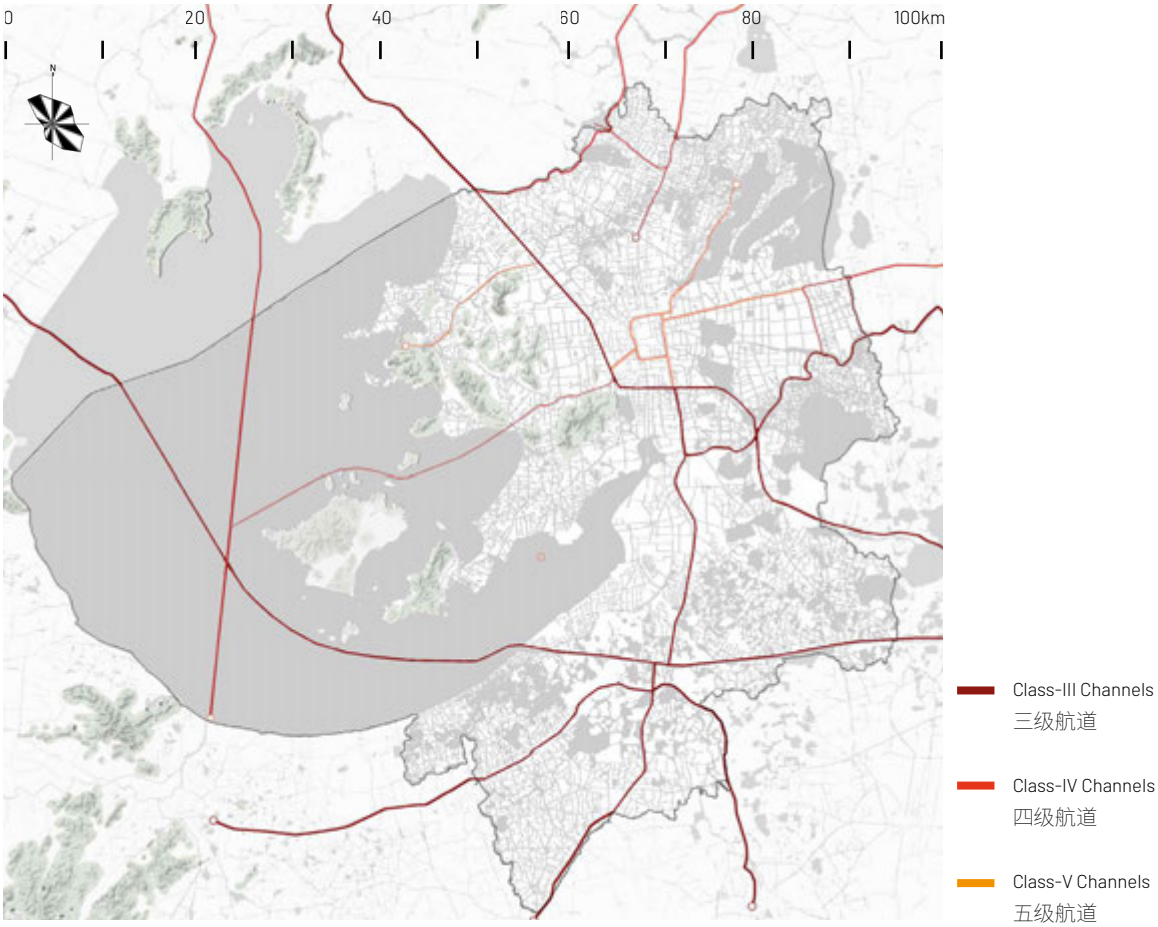


FIG. 1.15 The Arterial Water Transportation in Suzhou, Source: The Planning of the Arterial Water Transportation in Suzhou(2030)

苏州市干线航道网，来源：苏州市干线航道网规划（2030年）

Water activities —There arevarious water activities in Suzhou for a long history. In recent years, on both banks of the rivers and island oasis in the middle of the river, water entertainments and sports such as water parks , kayaking and standup paddling have become popular for development; the tranditional and folk sport in the region, such as "boxing on the boat", rowing", Dragon Boat Race on Taihu Lake, and traditional water culture festivals such as Taihu Lake Fishing Festival and official & fishing boat programs are gradually recovering; daily activities such as winter swimming, fishing and scenery viewing are popular.

However, The insufficient integration of resource leads to the, the current scattered and small-scale water activities. The water environment is threatened du to the little attention paid to ecological and environmental protection.

水上活动——苏州水上活动类型丰富，历史悠久。近年河流两岸、河心绿洲等水上游览，水上乐园等水上娱乐及皮划艇、立桨冲浪等水上体育活动成为开发热点；船拳、摇快船等水乡特色民间体育活动，太湖龙舟竞渡等民间传统活动及太湖开捕节,官船、渔船表演等传统水文化节庆活动逐渐复苏；冬泳、垂钓、赏景等日常活动亦较为常见。

然而由于资源缺乏整合,现状水上活动零散不成规模，对生态环境保护缺乏重视，这些活动对水环境产生一定威胁。

FIG. 1.16 Water Activities in Suzhou, Source: Picture 2, 3, 6, 7 and 8 by LI Qian, Picture 1 from YOUTH website, Picture 4 from KUAIBAO website, Picture 5 from SOHU website.

苏州水上活动（官船表演、古城游船、垂钓、江南船拳、太湖开捕节、皮划艇俱乐部、观景、洗衣）来源：图2、3、6、7由李茜拍摄，图1来自青年网，图4来自看点快报，图5来自搜狐网

1.1.3.3 – Yinchuan
银川

Water safety—The flood control projects in Yinchuan City mainly target at the mountain torrents of the Helan Mountain and the flooding of the Yellow River, including flood discharge ditches on both sides of the Yellow River, flood discharge ditches along the Helan Mountain, and ancient channels in the city. The flood control standard in Yinchuan requires the capacity to manage a 100-year flood. The flood control and ice jam control standards for the Yellow River embankment in Yinchuan section demand is once in 20 years.

水安全——银川市的防洪工程主要针对贺兰山山洪与黄河泛洪，包括贺兰山沿线泄洪沟渠、黄河两岸泄洪沟渠与市内古渠道。银川防洪标准为一百年一遇，银川段黄河堤防防洪、防凌标准为二十年一遇。

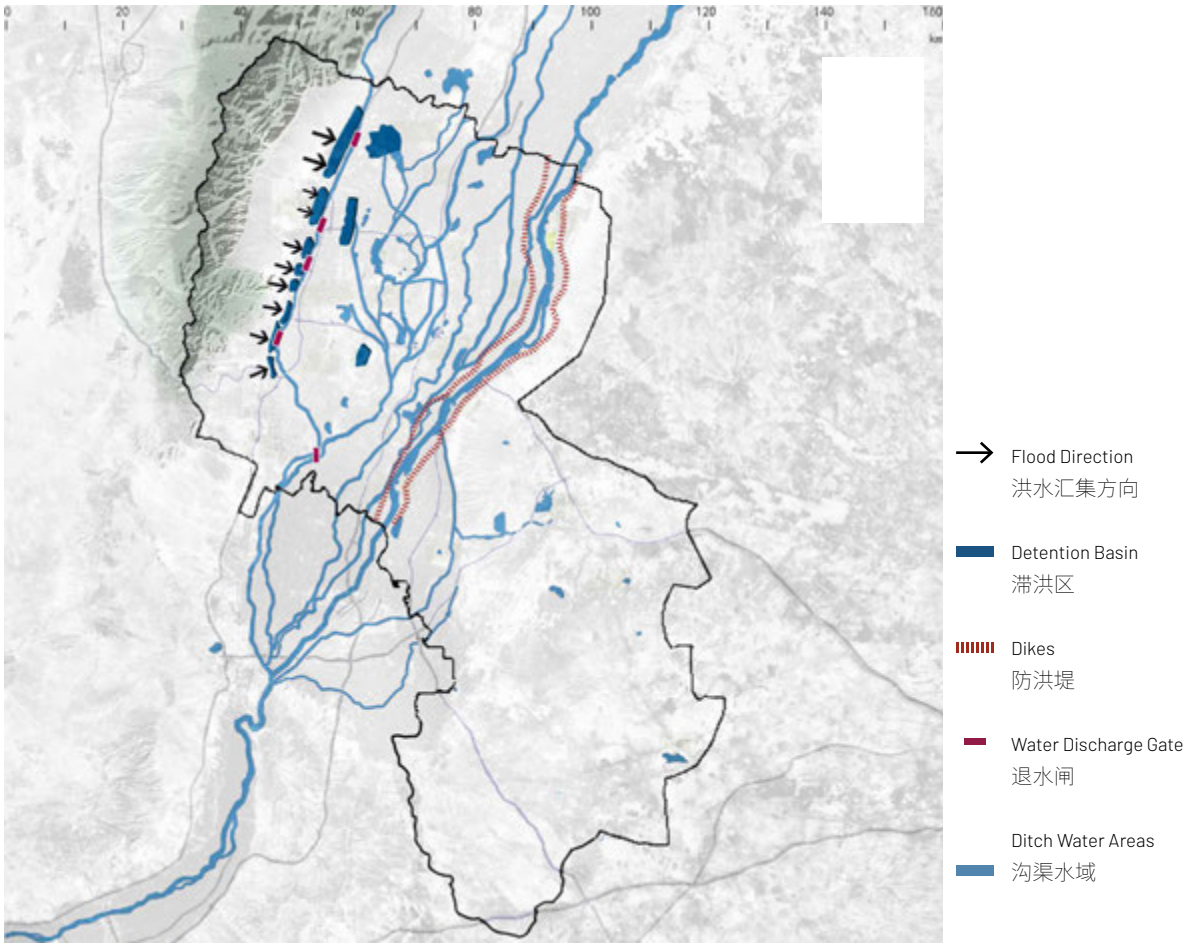


FIG. 1.17 Flood Control Plan of Yinchuan, Source: Drawn by Yinchuan Team
银川市域防洪规划图, 来源：银川组自绘

Vegetation is sparse on the steep east side of the Helan Mountain. Most heavy rains happen from July to September, and the floods are also formed at that time. According to the urban flood control requirements, the floods within the normal standard will be introduced into the flood retention reservoir, and then discharged into the flood detention area through the flood ditches. After the detention, the floods will enter the main drainage ditch of the west of river, and then flow into the lakes and wetlands to supplement the water for ecological purposes. The floods exceeding the standard are diverted on the north and south sides of the city, and then discharged into the Yellow River by drainage ditch.

In the Ningxia section of the Yellow River, the floods mainly come from the rainfall on the upper reaches of the river. The flood season is from June to October, especially in September. With a large flood volume and fat peak pattern, the flood rises and falls slowly and lasts for about 45 days. Usually taking place from January to March, the ice jam season is divided into three stages: the running ice, the frozen river, and the defreezing river. During the frozen river and the defreezing river stages, an iced dam is usually formed, which blocks the river, raises the water level, and then causes disasters.

With the development of new-type urbanization and industrialization, the population of Yinchuan central urban area grows rapidly, which increases the pressure of flood control and flood discharge. Waterlogging often occurs during heavy rainstorms. Internal waterlogging often happens in water bodies such as the Yuehai Lake, the Diannong River and the Yinxin Ditch.

Water ecology—The ecological background in Yinchuan is relatively fragile. With the rapid advancement of industrialization and urbanization, the pressure on water ecological environment is gradually increased. The main problems are the shortage of water resources and water environment pollution.

贺兰山东麓山势陡峭，植被稀疏，降雨多以暴雨形式集中出现在7-9月，洪水也同步形成。结合城市防洪要求，将正常标准内洪水导入拦洪库，再通过泄洪沟渠泄入滞洪区，停滞后进入河西总排水干沟，依次注入湖泊湿地，补充生态用水；超标准洪水在城市南北两侧实施分流，由排水干沟排入黄河。

黄河宁夏段的洪水主要来自上游河段，由降雨形成，汛期为6-10月，尤以9月份居多，洪量大，且峰型较胖，洪水涨落平缓，历时长约45天。凌汛期通常发生在1-3月，分为流凌、冰层封河、化冰开河三个阶段。一般情况下在封河与开河时，容易形成冰坝堵塞河道，抬高水位，继而造成灾害。

随着新型城镇化、工业化的发展，银川中心城区人口快速集聚与城市的快速发展，使防洪排涝压力进一步加大，在遭遇大暴雨时常出现渍水现象，内涝高风险主要集中在阅海、典农河和银新干沟等水体周边。

水生态——银川生态本底较为脆弱，随着工业化、城市化的快速推进，水生态环境承载压力日趋加大，核心问题表现在水资源短缺与水环境污染。

The total runoff amount in Ningxia, which is only 1/5 of the average value of the Yellow River Basin, and 1/15 of the national average value, is small and decreasing year by year. At the same time, the industrial and domestic usage of water in Yinchuan is supplied from ground water, which causes extremely high exploitation and utilization rate of ground water. It's urgent to transform Yinchuan into a water-saving city, develop and utilize unconventional water sources, improve sewage treatment rate and reuse rate, and reduce the dependence on the Yellow River and the over-exploitation of ground water.

宁夏地区径流总量少，是黄河流域平均值的1/5，是全国平均值的1/15，且在逐年减少。同时银川市的工业、生活用水全部来自于地下水，地下水开采利用率过高，银川市迫切需要建设节水型城市，开发利用非常规水源，提高污水处理率和污水回用率，降低对黄河水的依赖和地下水的过度开采。

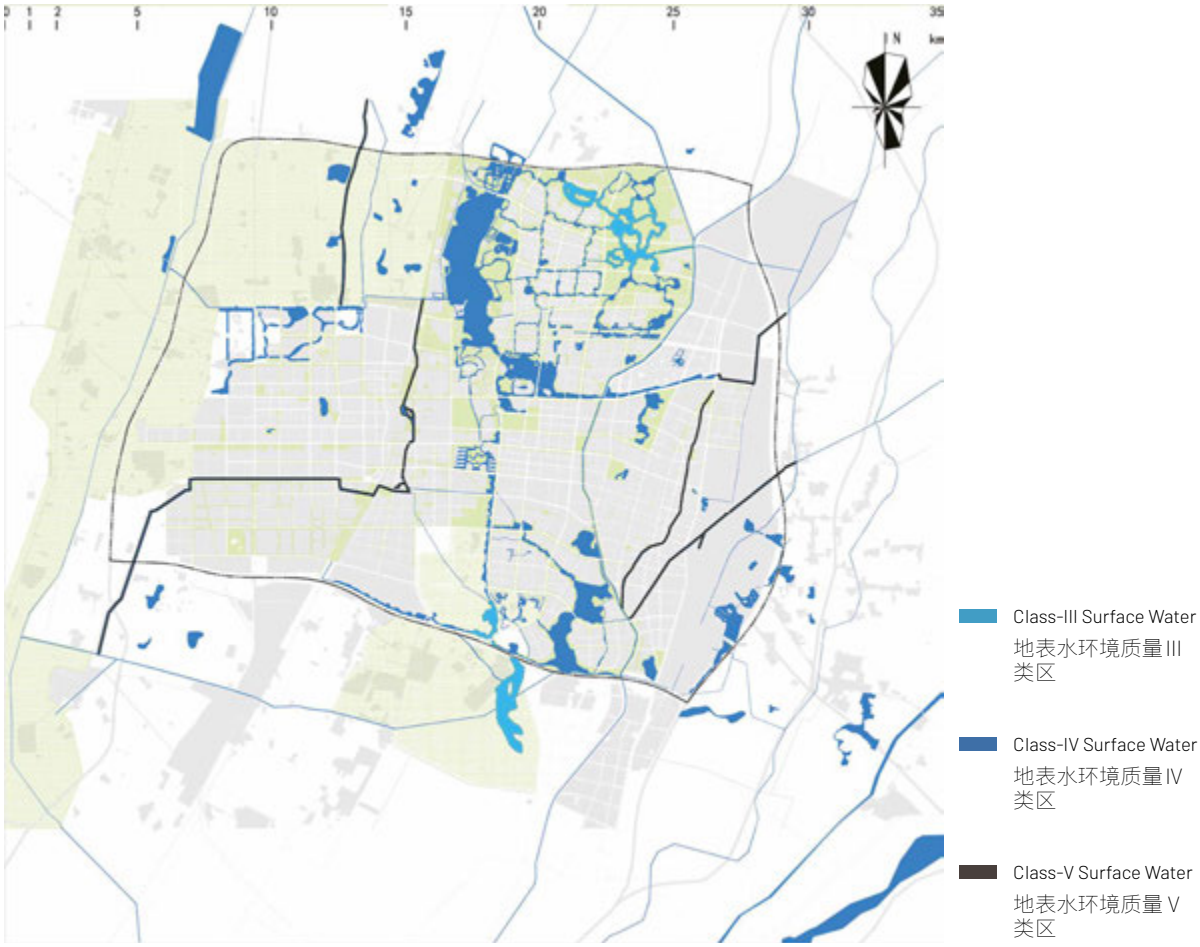


FIG. 1.18 Surface Water Environmental Quality in Yinchuan Central City, Source: Drawn by Yinchuan Team
银川中心城区地表水环境质量图，来源：银川组自绘

In recent years, quality of the water environment of the Yellow River in Yinchuan has been improving year by year, and has reached Class III water quality. However, the lake ecosystem in the urban area has been damaged, and both lakes and ground water have different degrees of pollution. Due to the excessive mining and the industrial and domestic pollution, ammonia nitrogen, nitrite nitrogen, iron and manganese in the water source site increase year by year.

Water culture—Originated from the Qin and Han Dynasties, and developed in the dynasties of the Tang, Song, Yuan, Ming, Qing, and the Republic of China, the ditch system in Yinchuan has a long history of more than 2,200 years. It still plays an important role in the industrial and agricultural productionand people's lives of Yinchuan. As a typical living heritage, the ditch system is not only possessed with economic and ecological values, but also special cultural values. In addition, the water system of the rivers, lakes and ditches, especially Tanglai Canal and Xigan Canal, connects many historical and cultural heritages and carries the historical integration between the water and the city in Yinchuan.

With a densely distributed river network and lakes, Yinchuan is famous for its "seventy-two lakes", and known as "the south of the lower reaches of Yangtze River in the Northwest China". During the Ming and Qing Dynasties, the lake landscapes such as "Moon Lake and Evening Glow", "Guan Bridge and Willow Scenery", "Han Canal Rises in Spring", "Fisherman's Song for Seventy-two Lakes" and "Rains stopped in Nantang" became a famous northwestern scenery at that time. (Ma, 2016)

近年来银川黄河水环境质量呈现逐年好转趋势，已达到III类水质，但市区内湖泊生态系统遭到一定破坏，湖泊与地下水均有不同程度的污染。由于开采量过大以及工业、生活污染等原因，水源地的氨氮、亚硝酸盐氮、铁、锰有逐年上升的趋势。

水文化——银川境内的沟渠体系，始于秦汉，经历唐、宋、元、明、清、民国等朝代，已有长达两千二百多年的发展史，至今仍在银川的工农业生产和人民生活中发挥着重要作用，是典型的活态遗产，不但具有现实的经济价值和生态价值，而且有着十分特殊的文化价值。此外，河湖沟渠水系，尤其是唐徕渠、西干渠还串联了诸多历史文化遗产，承载着银川水城共融的历史积淀。

历史上的银川河网密布，湖泊众多，因此素有"七十二连湖"、"塞上江南"的美名。明、清时期，"月湖夕照"、"官桥柳色"、"汉渠春涨"、"连湖渔歌"、"南塘雨霁"等湖泊景观成为当时的西北盛景。(马依楠，2016)

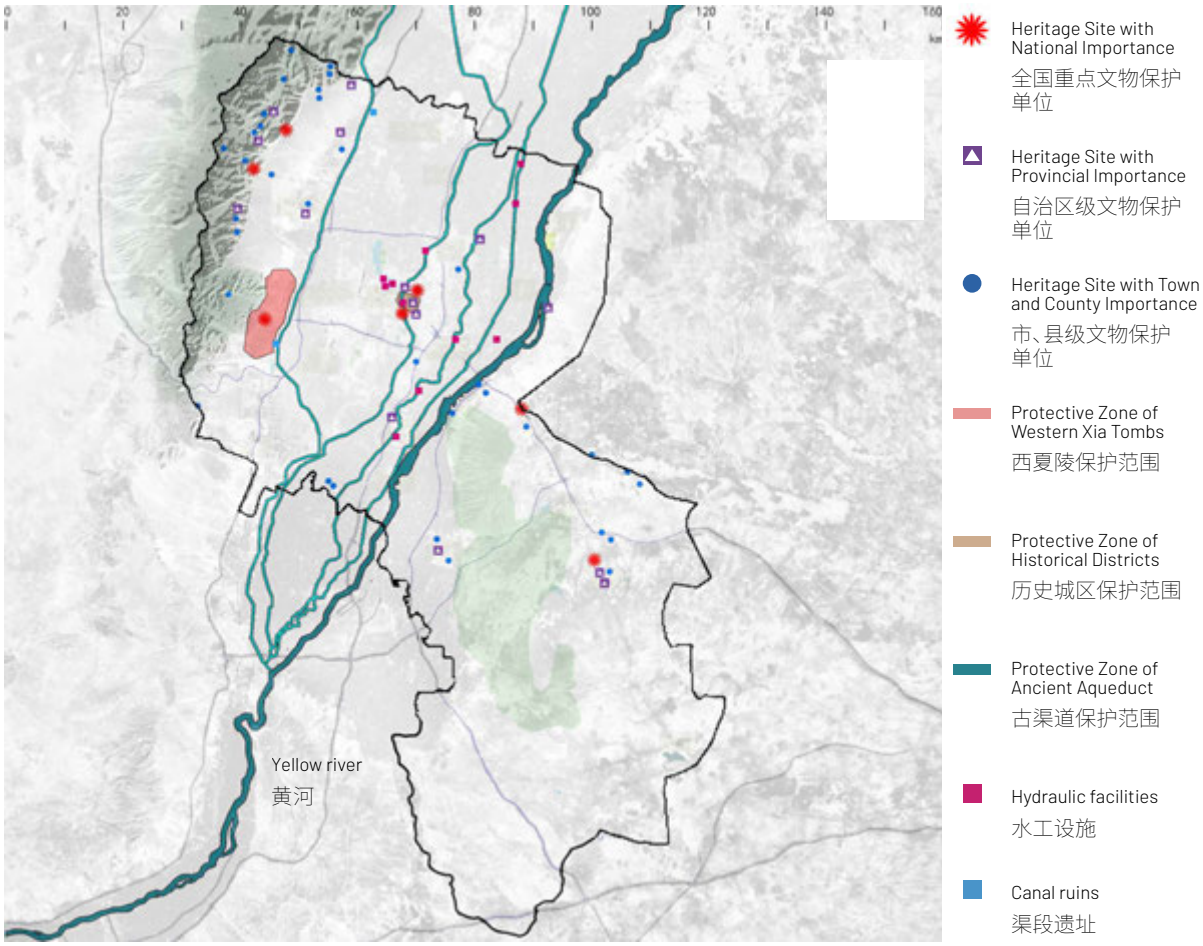


FIG. 1.19 Distribution of historical and cultural heritage in Yinchuan, Source: Drawn by Yinchuan Team.
银川市域历史文化遗产分布，来源：银川组自绘

Water transport—The Yinchuan section of the Yellow River has a long history of water transport. During the Northern Wei Dynasty, water transport began to be conducted on the upper reaches of the Yellow River, which is unprecedented in history. In the Yuan Dynasty, the Silk Road in Hetao Plain was built with Yinchuan as the center. In the Qing Dynasty, the Emperor Kangxi went towards the north along the river, and established many trade ports along the banks of the river, thus recovering the Ningxia Yellow River water transport industry from the decline in the Ming Dynasty. (Qiao, 2014)

水运输——黄河银川段水运历史悠久，北魏时期即开启了黄河上游水运的先河，元代开启了以银川为中心的河套丝路，清朝康熙顺河北上，开通了沿河两岸的不少贸易市口，从而使宁夏黄河水运业从明代的衰败中恢复过来。(乔建萍，2014)

However, the wandering Yinchuan section of the Yellow River is a sandy riverbed with different depths and unfixed swales, causing the navigation to be restricted. In recent years, in order to satisfy the needs of tourism, Yinchuan has dredged the Yellow River, reinforced the river bank, and built shipping projects. Inland navigation is expected to be available in June 2019, which will connect with many tourist attractions. Other rivers and lakes shipping tour activities, e.g., the Yingchuan Night Tour at Yuehai Bay Program launched in 2018, are also gradually emerging.

然而目前因黄河银川段为沙质河床，属于游荡性河段，河床深浅不一，滩槽不固定，通航受到限制。近年来由于旅游业的需要，银川市对黄河进行清淤、加固河岸，建设航运工程，预计于2019年6月实现通航，联通多个旅游景区。除黄河外，其他河湖水系航运游览活动（如2018年启动的阅海湾夜游银川项目）也逐步兴起。

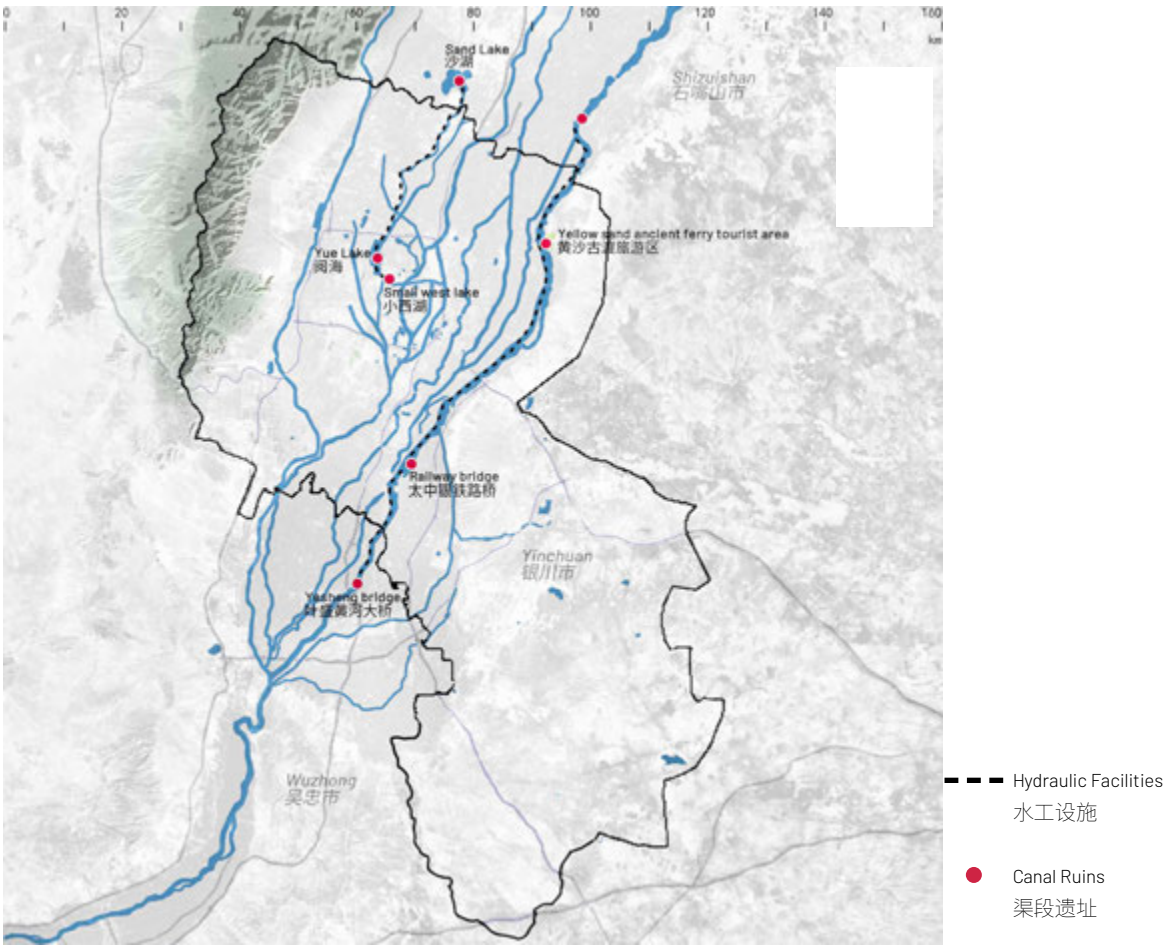


FIG. 1.20 Shipping Functional in Yinchuan, Source: Drawn by Yinchuan Team
银川市水体航运功能图，来源：银川组自绘

Water activity—As a city with four distinct seasons, Yinchuan has various water activities in different seasons. More tour waterfront activities can be held in the large lakes in the countryside, such as appreciation of lotus, bird watching, photography, fishing, boating, kayaking, and other water programs. Under more controls, the waterfront activities in the urban area are mainly life-style waterfront activities, mainly including walking, rest, swimming, fitness, square dance, playing musical instruments, etc. Due to a long icing period in winter, various and characteristic ice activities take place in Yinchuan such as ice skating, ice car and ice fishing. The waterfront space in winter is still full of vigor.

水上活动——银川气候四季分明，不同季节水上活动丰富多彩。郊野的大型湖体可容纳更多游览型的滨水活动，如赏荷、观鸟、摄影、垂钓，以及游船、皮划艇等水上项目。市区的滨水活动以生活型滨水活动为主，主要有散步、休憩、游泳、健身、广场舞、弹奏乐器等，市区内的滨水空间会有更多的活动管制。银川冬季结冰期长，能够拥有丰富的、极富特色的冰上活动，例如滑冰、冰车、凿冰钓鱼等，冬季的滨水空间仍具有相当的活力。

FIG. 1.21 Waterfront Activities in Summer, Source: Taken by Yinchuan Team.
夏季滨水活动，来源：银川组拍摄

FIG. 1.22 Waterfront Activities in Winter, Source: Taken by Yinchuan Team.
冬季滨水活动，来源：银川组拍摄

1.1.4 – **Comparison of Water City Layout**
水城格局比较

1.1.4.1 – Beijing
北京

The water systems in Beijing originate from the mountain areas. The end of the mountain and the accumulation of the water—Beijing Plain boasts the vast catchment area with its back against Yan Mountains and Taihang Mountains. The water source is formed through gathering in the northwest, then introduced to Beijing Plain by natural rivers like the Yongding River, North Canal and Chaobai River, and retained into lakes and shallow lakes at last.

Five rivers run through the capital—The five rivers inside Beijing are all originated from the northwestern mountains and even the Mongolian Plateau. They are the significant water supply channels of Beijing. Ju River and Yongding River flow directly into the sea. Juma River and the North Canal flow into Bo Sea after flowing through Hai River.

Building water around the city—The water systems in the urban area of Beijing are ring structured. They come from Yuquan Mountain, connect down to the Tonghui River, link up with green lands, rivers and lakes in the urban area, and form a water system pattern with sluice gate control and connected rivers and lakes.

Ancient city with water charm—The six lakes in ancient Beijing are important integral parts of the water system pattern. In the Yuan Dynasty, Guo Shoujing introduced the water of Baifu Spring in Weng Mountain into Jishuitan Pond. The South Lake was formed while excavating in the south of Taiye Pool for city reconstruction in the Ming and Qing Dynasties. The six lakes were known as the Three Front Seas and Three Rear Seas in Qing Dynasty. They currently come from Miyun Reservoir and become significant cultural landscapes of Beijing.

山停水聚——北京平原背靠燕山和太行山脉，有着广袤的汇水区域。水源由西北聚集而成，通过永定河、北运河、潮白河几条自然河流将水系引至北京平原，滞留形成湖淀。

五河贯都——北京境内的五条河发源于西北山地乃至蒙古高原，是北京重要的水源供应通道。其中沟河与永定河分别经蓟运河、潮白新河、永定新河直接入海，拒马河与北运河都流经海河后注入渤海。

环城营水——北京城区水系成环状结构，环状水系上接玉泉山下通通惠河，串联城区绿地湖泊，形成涵闸控制、河湖连通的水系格局。

水韵古都——北京老城的六处湖泊是水系格局的重要组成部分。元代郭守敬将瓮山白浮泉水注入积水潭。明清时期为改造城池，在太液池南部开挖形成了南海。清代，这些湖泊被称为前三海和后三海。现“六海”的水源均来自密云水库，是北京重要的文化景观。

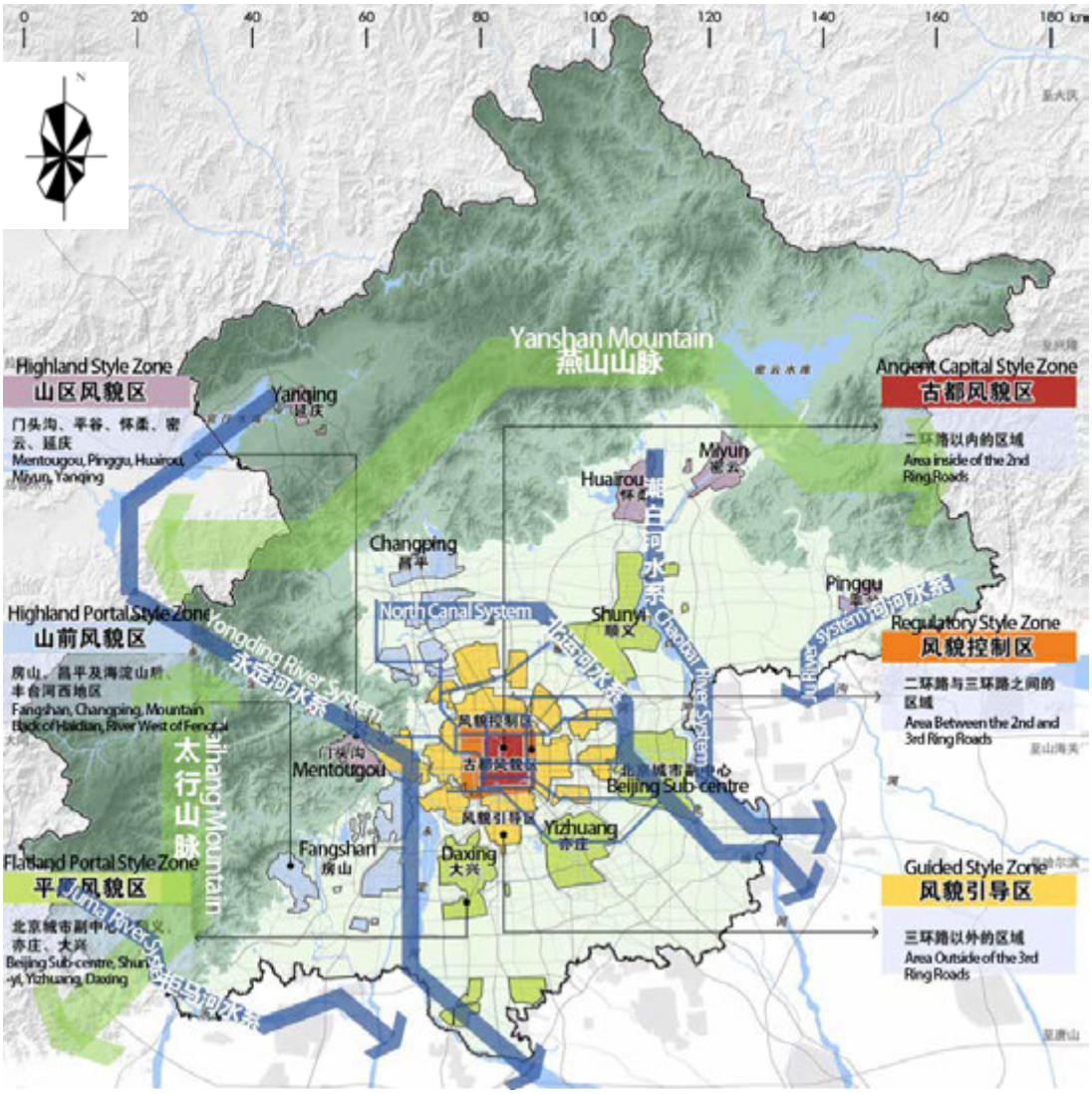


FIG. 1.23 Overall Water System Layout in Beijing, Source: Drawn by Beijing Team

北京整体水系格局，来源：北京组自绘

1.1.4.2 – Suzhou
苏州

One water system with two sources: Suzhou river network water system (one system) adjoins Yangtze River in the north and the Taihu Lake in the south (two sources) which are the fundamental sources of Suzhou water system. The two sources sutain water supply and the environmental capacity. They are the ecological core resources for the urban area. They are also important water bodies which receives the regional flood water.

One belt and three connections: Stretching across the urban area of Suzhou, Wangyu River, Wusong River and Taipu River are the three basin-wide backbone channels (three connections) directly connecting the Taihu Lake and Yangtze River. The Grand Canal (one belt) runs through the north and south as a transversal connection. The three connections and one belt form the artery of the urban water system.

Network of rivers and lakes: Surrounding the ancient city, the water system in the urban area forms a multi- level urban water system pattern with connected rivers and lakes. The urban water system is divided into three circles: the periphery, the middle, and the center. Among them, large and medium-sized lakes and shallow lakes are distributed in "the city periphery" within a high-density water system; Rivers, canals, and small-medium size lakes are distributed within the middle circle; the historical waterways are located in the ancitent center circle.

Introduce the water into the city: The water system in the ancient city of Suzhou is mainly artificially excavated. Inheriting the horizontal and longitudinal structure in Kaogong ji (Book of Diverse Crafts), and adopting a checkerboard grid system, the "three vertical, three horizontal and one ring" backbone water system was created. In the long history of integrating the urban peripherical water system and the northern residents, the urban skeleton of "the streets and rivers going side by side while the water and land routes running in parallel" has been gradually formed.

一网双源：苏州河网水系（一网）北枕长江、南滨太湖，长江和太湖（双源）两大水域是苏州水网的根本源头，是市域供水水源、环境容量主要支撑以及生态核心资源，也是区域洪涝水外排的重要承纳水体。

一带三联：望虞河、吴淞江、太浦河横跨苏州市域，是直接联通太湖、长江的三条流域性骨干通道（三联），京杭运河（一带）贯穿南北，共同组成市域水系的骨架。

河湖成网：市内水系围绕古城形成通江达湖、河湖相连，多层次城市水系格局。市区水系划分为外围、中部、中心三个圈层。其中“城市外围”为大、中型湖泊及湖荡分布区，水系密度高；“城市中部”为河道及中、小型湖泊分布区；“城市中心”为苏州古城水系分布区。

引水入城：苏州古城水系主要为人工开凿，传承了《周礼考工记》中的经纬涂制，采用了棋盘式方格网系统，形成了三纵三横一环的骨干水系。在城市外围水系和北部居民的长期磨合中逐渐形成了“水陆并行，河街相邻”的城市骨架。

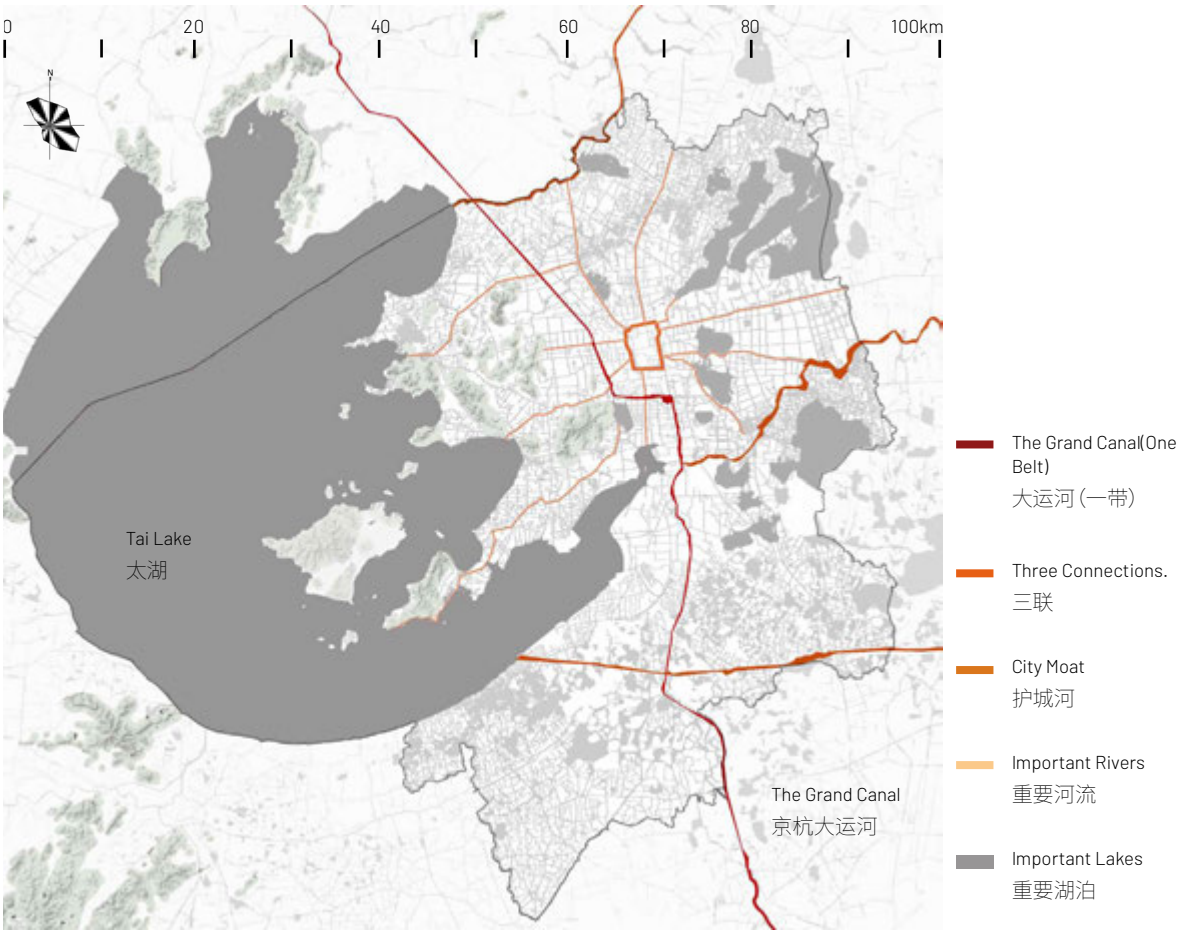


FIG. 1.24 Skeleton Diagram of Suzhou Water Network, Source: Drawn by Suzhou Team
苏州水网骨架示意图，来源：苏州组自绘

1.1.4.3 – Yinchuan
银川

Chuan-shaped structure: With distinctive features, the Chuan-shaped water system pattern is formed by landforms and historical human activities. As a yellow river irrigation area, Yinchuan Plain gradually formed a multi-head channel system in ancient China with and dam-free water diversion system. The arterial canals were arranged in parallel with the Yellow River and the Chuan-shaped structure took shape from the south to the north, thus dividing the irrigation area into north-south strips. (Wang, 1992)

川字结构：“川”字水系格局是地形地貌、人类历史活动的共同作用结果，具有鲜明的特色。银川平原是引黄灌区，在古代无坝引水条件下逐渐形成了多首制渠系，各干渠与黄河平行排列，自南向北流淌形成“川”字结构，将灌区土地分割为南北长条。(汪一鸣，1992)

Connected canals and lakes: Due to the lack of drain- age facilities in the past, the from the irrigation canal were discharged into the in-between-canal depressions. The water was accumulated into a lake, thus produced a pattern of densely distributed lakes and marshes. Therefore, most of the tributary canals end in lakes and marshes. With the improvement of modern drainage system, the water bodies formed by the accumulated depression water has gradually disappeared. The current large-scale lakes are the Sand Lake, Long Lake, Majia Lake, and Nong Lake, etc.

渠湖相连：由于历史上排水设施的欠缺，灌溉渠水溢流泄入渠间洼地，积水成湖，逐渐形成了湖沼密布的形态，因此历史上几乎大多数支渠末端均为湖沼，随着现代排水体系的完善，洼地积水而形成的水体逐渐消失，至今仍保留的较大规模湖体有沙湖、长湖、马家湖、农湖等。

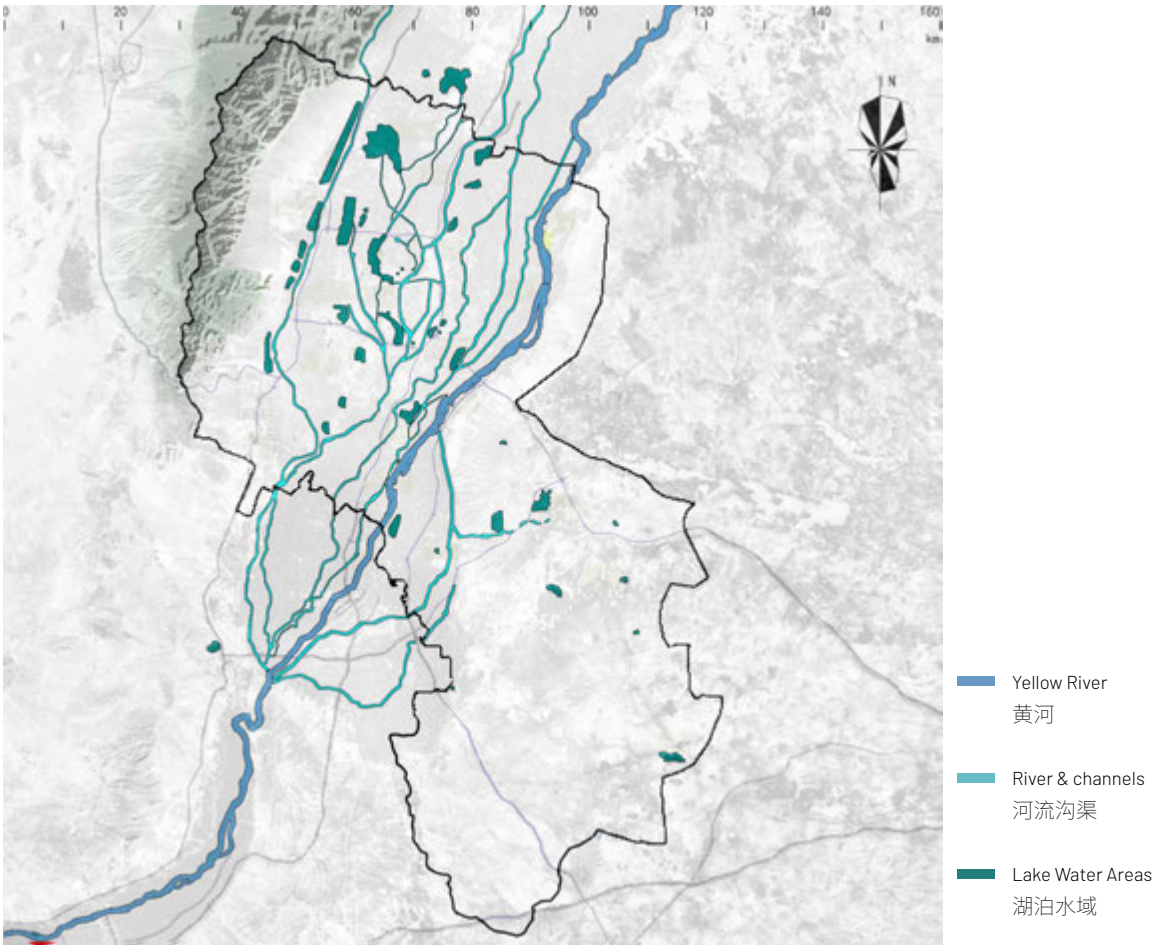


FIG. 1.25 Overall Water System Layout in Yinchuan, Source: Drawn by Yinchuan Team.
银川整体水系格局，来源：银川组自绘

1.1.5 – **Divisions**
分区

1.1.5.1 – Beijing
北京

Corresponding to the urban space structure of "One core, one main and one subsidiary center; two axes, multiple poles and one area" proposed in the Beijing Master Planning (2016-2035), an overall controls are taken for the Core Functional Zone of the Capital, the Central Urban Zone, Beijing's Subsidiary Center, five new cities in the plain, and Ecological Conservation Area.

One core: Core Functional Zone of the Capital

In this Zone, the water system has a profound historical and cultural background, and the waterfront space is short of land resources. Therefore, based on the principle of the overall historic city conservation, the historical rivers and lakes should be restored and protected, and the water system pattern and characteristics of the ancient capital should be respected and maintained. With the water system as the link, the cultural discovery routes with walking and bicycle as the main mobility modes should be developed, relying on the historical heritage of the waterfront and integrating the open space along the line.

One main (center): Central Urban Zone

It is the main area to evacuate non-capital functions. With good water system landscape environment, this Zone should be planned and designed focusing on improving the urban and ecological quality. Large-scale green space should be constructed to promote the integrated development of the water and city, expand the impacts and service ranges of waterfront space, and provide the opportunity of enjoying and experiencing the urban waterfront space.

《北京城市总体规划（2016年—2035年）》提出了“一核一主一副，两轴多点一区”的城市空间结构，对首都功能核心区、中心城区、北京城市副中心、5个位于平原地区的新城和生态涵养区进行总体管控。

一核：首都功能核心区

核心区内水系历史文化底蕴深厚，滨水空间用地资源紧张，应坚持老城整体保护的原则，恢复和保护历史河湖水系，尊重并保持古都水系格局和风貌。以水系为纽带，以滨水历史遗存为依托，结合沿线开放空间，组织以步行和自行车为主要通行方式的文化探访线路。

一主：中心城区

中心城区内水系景观环境基础较好，规划设计中应以提升城市品质和生态水平为主要任务，构建大尺度绿色空间，促进水城共融发展，扩大滨水空间的影响和服务范围，提供观赏、体验城市滨水空间的机会。

One subsidiary (center): Beijing's Subsidiary Center

Beijing's Subsidiary Center, one of the two new wings of Beijing, should be planned and developed on the basis of the world foresight, international standards, Chinese characteristics, and high positioning, striving to be built into an exemplaryworld-class harmonious and livable city, a exemplary new type of urbanization, and an exemplary case for the coordinated Beijing- Tianjin-Hebei regional development.

一副：北京城市副中心

北京城市副中心为北京新两翼中的一翼。应当坚持世界眼光、国际标准、中国特色、高点定位，规划建设，着力打造国际一流的和谐宜居之都示范区、新型城镇化示范区和京津冀区域协同发展示范区。

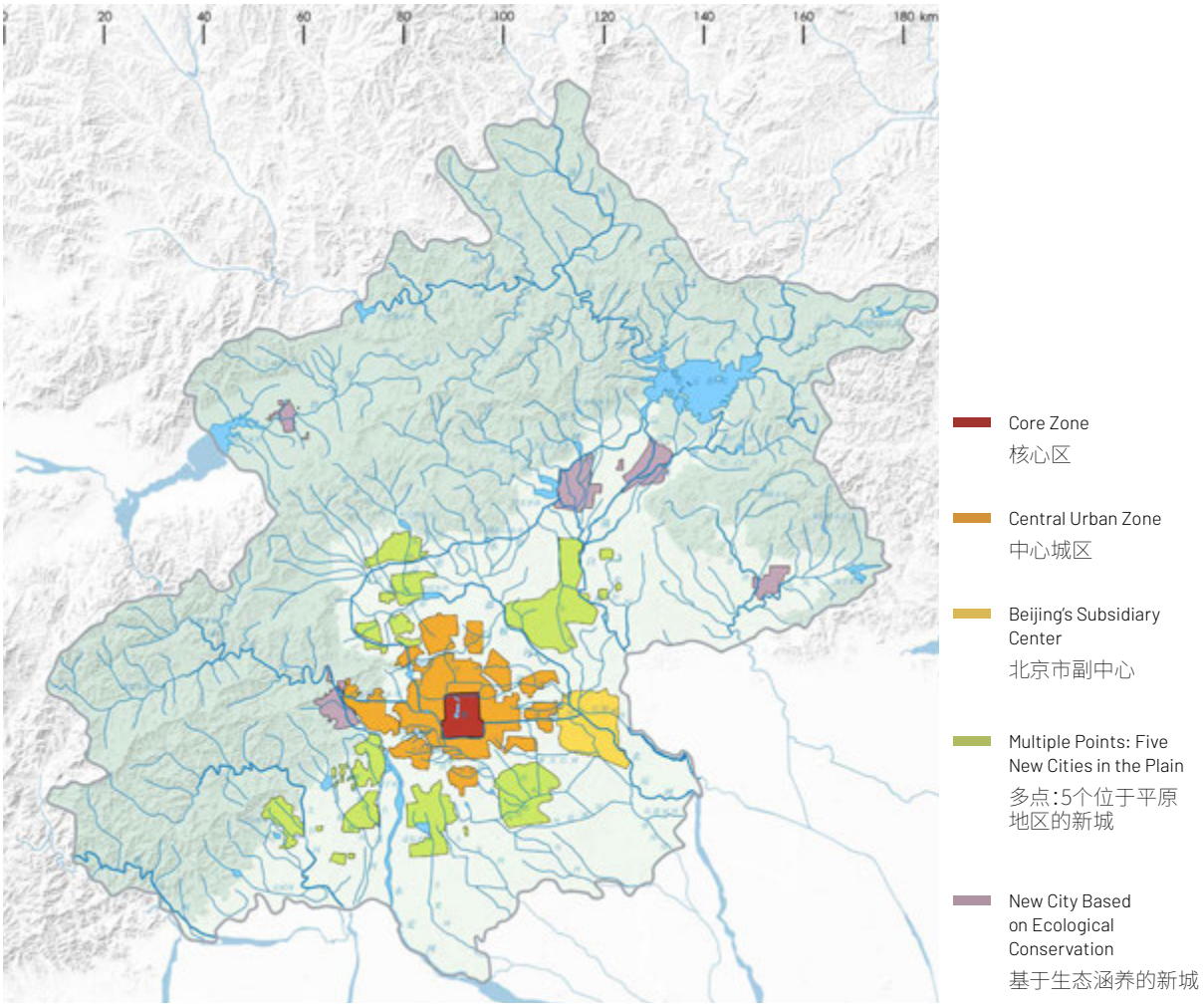


FIG. 1.26 Beijing Waterfront Space Landscape Zoning Plan, Source: Drawn by Beijing Team.
北京市域滨水空间风貌分区图，来源：北京组自绘

Multiple poles: five new cities in the plain

In this area, rivers, lakes and wetlands should be restored according to the natural and hydrological conditions, and large-scale wetland parks and safari parks should be built as part of the large-scale Royal Garden Scenic Area on the northwest side together with the Ming Tombs Scenic Area and Three Mountains and Five Gardens.

Remove the urban construction land that has a negative impact on the environment along the waterfront space. Through connecting the existing pits, wetlands and irrigation channels in agricultural and forestry land, the rural areas will have abundant habitats and landscape quality.

One area: Ecological Conservation Area

With an objective of water conservation, the planning and design should emphasize on the greening of the water source area and the reduction of land loss and soil erosion. Strictly protect the two reservoirs and one channel[1] to conserve ground water. Carry out ecological restoration for the two reservoirs and one channel, Guanting Reservoir and Yongding River Basin, and implement the source greening and riverbed restoration projects, to enhance the surface water storage capacity, reduce land loss and soil erosion, to achieve natural infiltration of surface water, to replenish and protect local ground water, and to gradually restore a balanced ecosystem at the water source sites.

多点：5 个位于平原地区的新城

该区域应恢复自然水文条件下的河湖湿地，建设大型湿地公园及野生动物园区，与十三陵景区、三山五园并列成为西北侧大型皇家苑囿风景区。清退滨水空间沿线对环境产生负面影响的城市建设用地。通过农林用地中现有坑塘、湿地、灌渠的串联，为郊野地区提供丰富的生境和景观层次。

一区：生态涵养区

生态涵养区应以水源涵养为目标，强调源头覆绿、降低水土流失。严格保护引水水源，涵养地下水。针对两库一渠[2]、官厅水库、永定河流域开展生态修复，通过源头覆绿、河床改造等工程，增加地表水调蓄能力，降低水土流失，实现地表水自然下渗，回补并保护本地地下水，逐步恢复平衡的水源地生态系统。

1
The two reservoirs and one channel: Miyun Reservoir, Huai'rou Reservoir and Jingmi Diversion Canal

2
两库一渠：密云水库、怀柔水库与京密引水渠

1.1.5.2 – Suzhou
苏州

The Suzhou water system consists of natural lakes, rivers and artificially excavated rivers. Affected by regional rivers and regional lakes, it can be divided into three basic forms of water system: lakeside, shallow lake and plain grid. Based on urban functions and features, and taken in to consideration the the form and distribution of water system, the waterfront space is divided into six types of areas:

Located in the area with dense water system dominated by Taihu Lake, the Taihu Lakeside Scenic Area is distributed in three administrative districts: Xiangcheng District, New District and Wuzhong District. It is an important protected area as a drinking water source. Constellated with hills and twisting lake shores, this division has rich cultural resources such as ancient towns and villages.

Located in Xiangcheng District, the Northern Town Shallow Lake Scenic Area is a low and flat territory. Mainly occupied by farmlands, it is covered with dense river channels and ponds, and the capillary waterways remain intact.

As an area with dense water system dominated by Yangcheng Lake, the Yangcheng Shallow Lake Ecological and Scenic Area is a protected area as a drinking water source.It is a lake wetland, with a concentration of biodiversity.

Most of the Ancient City Central water-street Scenic Area is located within the City moat. This division keeps the double chessboard pattern of "the streetsand rivers going side by side while the water and land routes running in parallel", and retains the unique features of "small bridges and flowing water, white walls and black rooftiles, and historical sites and famous gardens".

苏州水网由自然湖泊、自然河道及人为开挖河道组成，可划分为滨湖、湖荡、平原格网三种基本水网形态。基于城市功能与风貌，结合水网形态及分布情况，将滨水空间划分为六类"滨水空间景观风貌引导区"：

太湖滨湖风貌区位于以太湖为主的水网密集区内，涉及相城区、高新区和吴中区三个行政区，是重要的饮用水源保护区。片区内丘陵点缀，湖岸曲折，古镇古村等文化资源丰富。

北部城镇湖淀风貌区位于相城区，地势低平，以农田为主，河道池塘密布，细小水道保持完整。

阳澄湖生态湖淀风貌区是以阳澄湖为主的水网密集区，饮用水源保护区，湖泊湿地。片区内生物多样性较高。

古城中心水巷风貌区大部分位于护城河以内。片区秉承"水陆并行、河街相邻"的双棋盘格局，是"小桥流水、粉墙黛瓦、史迹名园"的独特风貌承载区。

Located in the four administrative districts: New District, Industrial Park, Gusu District and Wuzhong District, the Central Town River Network Scenic Area is a continuous urbanconstruction area with a grid layout. This area mainly consists of medium-sized lakes and rivers.

The Southern Water Town Lake Scenic Area is located in the two administrative districts: Wuzhong District and Wujiang District. Based on the region of wetlands, it is covered with dense river channels and ponds and has rich cultural resources such as ancient towns and villages.

中部城镇河网风貌区涉及高新区、工业园区、姑苏区、吴中区四个行政区，是城镇连绵建设地区，水系以中型湖泊与河道为主，呈网格状布局。

南部水乡湖淀风貌区涉及吴中区、吴江区两个行政区。片区以湿地水乡为基地，河道池塘密布，古镇古村等文化资源丰富。

FIG. 1.27 The Taihu Lakeside Scenic Area
太湖滨湖风貌区

FIG. 1.28 The Northern Town Shallow Lake Scenic Area
北部城镇湖淀风貌区

FIG. 1.29 The Yangcheng Shallow Lake Ecological Lake Scenic Area
阳澄湖生态湖淀风貌区

FIG. 1.30 The Ancient City Central Water Lane Scenic Area
古城中心水巷风貌区

FIG. 1.31 The Central Town River Network Scenic Area
中部城镇河网风貌区

FIG. 1.32 The Southern Water Region Shallow Lake Scenic Area
南部水乡湖淀风貌区

1.1.5.3 – Yinchuan
银川

According to the function of the city and the shape and characteristics of the water bodies, the waterfront space is divided into the Dynamic Cultural City Scenic Area (Xixia District), the Modern Lake City Scenic Area (Jinfeng District), the Ancient City of the Frontier Scenic Area (Xingqing District), and the Livable Industry and City Integration Scenic Area (Helan Desheng Cluster).

依据城市功能及水体形态特征，将滨水空间划分为活力文城风貌区（西夏区）、现代湖城风貌区（金凤区）、塞上古城风貌区（兴庆区）、宜居产城风貌区（贺兰德胜组团）。

Located in the west of Yinchuan, and adjacent to Helan Mountain, the Dynamic Cultural City Scenic Area (Xixia District) is a high terrian. The water system mainly consists of the flooding reservoirs

活力文城风貌区（西夏区）位于银川西部，毗邻贺兰山，地形较高，水系主要为贺兰山沿线的拦洪库，泄洪沟渠，以及建设区内部的景观河湖。

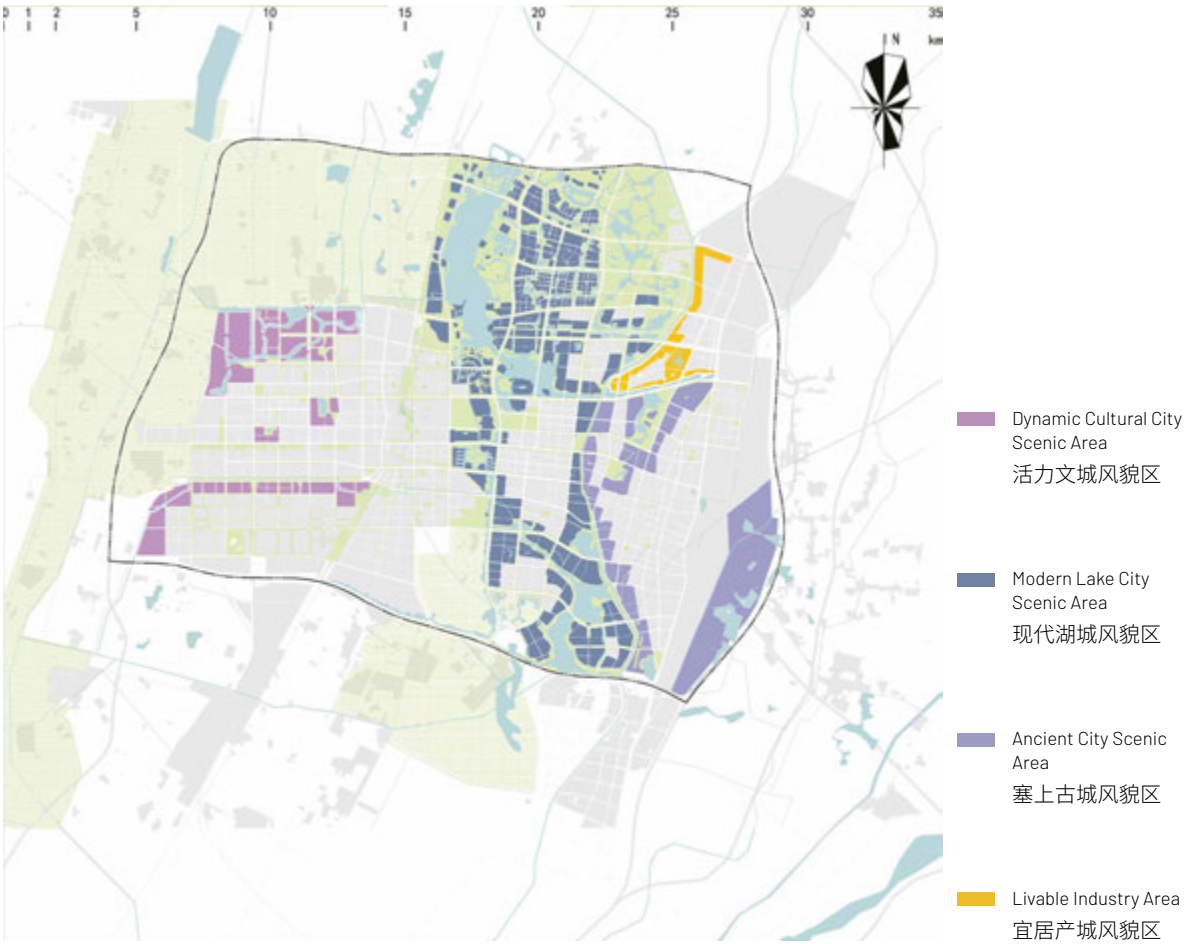


FIG. 1.33 Waterfront landscape zone in Yinchuan central city, Source: Drawn by Yinchuan Team.
银川市中心城区滨水风貌分区，来源：银川组自绘

and flood discharge ditches along the Helan Mountain, and the landscape rivers and lakes inside the construction area. Xixia District is in the transition stage from the industrial cluster to the higher education research cluster. It plans to be built into a modern ecological and cultural innovative district with rich cultural atmosphere, urban vitality and outstanding ecological characteristics.

Located in the middle of Yinchuan, the Modern Lake City Scenic Area (Jinfeng District) used to be a countryside corridor between two urban clusters. Although it was further built with the development of the city, it still has the most adequate water body and ecological space in Yinchuan. Therefore, for the construction of this division, we should fully reflect the close relationship between the city and the water, highlight the international and modern urban functions and waterfront features, and create a graceful, vigorous and fashionable "modern lake city" in Jinfeng District.

With respect to the Ancient City of the Frontier Scenic Area (Xingqing District), a historical district of Yinchuan, we should focus on the protective renovation of historical blocks, and gradually restore the historical and cultural landscapes such as "Ancient Tower Rising High in the Sky", "Chengtian Temple Tower Shadow" and "Guan Bridge and Willow Scenery".

The Livable Industry and City Integration Scenic Area (Helan Desheng Cluster) has two ecological corridors, namely, the Diannong River and the Tanglai Canal. The project construction along the riverside should be strictly controlled, thus forming a harmonious and beautiful urban interface in the waterfront area, and creating a modern green urban with favorable living and working environment as well as integrated development of industries and the city.

西夏区处于由工业组团向高教科研组团的转型阶段，规划着力建设人文气息浓郁、城市活力四射、生态特质突出的现代生态文创特色风貌。

现代湖城风貌区（金凤区）位于银川中部，曾经是两个城市组团之间的郊野廊道，虽然随着城市发展而成为建设区域，但仍然拥有银川最为充足的水体与生态空间。因此，这一片区应充分体现城市与水的紧密联系，突出国际化、现代化城市功能和滨水特色景观，打造金凤区雍容大气、活力时尚的"现代湖城"风貌。

塞上古城风貌区（兴庆区）作为银川历史城区，应重点对历史街区进行保护性更新，逐步恢复"古塔凌霄"、"承天塔影"、"官桥柳色"等历史文化景观。

宜居产城风貌区（贺兰德胜组团）拥有典农河、唐徕渠两条生态走廊，应严格控制滨河沿线项目建设，形成滨水地区和谐优美的城市界面，打造宜居宜业、产城融合发展的现代绿色城区风貌。

1.2 – Design Strategy

1.2 – 设计策略

1.2.1 – **Comparison of Waterfront Space Design Principles & Strategies**
滨水空间设计原则与设计策略比较

1.2.1.1 – Beijing
北京

Create the waterfront space for all—— Strengthen the integration and sharing of blue and green resources to ensure that the crisscrossed blue network system of the Beijing water system is available to different parts of the city. Make overall plans for the rational layout of urban mobility and urban functions, properly handle the accessibility and visibility of waterfront space, and realize the public space intertwined by blue-green networks.

Create the waterfront space with definite levels —— Understand the different roles that the water system and waterfront space play in the city. Sticking to the people-oriented principle, we should not only play the role of waterfront space in protecting the city, but also improve the quality of waterfront space to meet people's needs for the public space and environment. The waterfront space design features are highlighted by constructing different types and hierarchies of waterfront space.

Create the waterfront space that inherits history—— Based on Beijing's waterfront space pattern and historical remains, we highlight Beijing's historical characteristics in terms of shaping the landscape architectural style, inherit and promote the history and culture, protect the water network pattern, actively restore the occupied and landfilled waterfront space, and

塑造全民共享的滨水空间——加强蓝绿资源整合与共享，确保城市的不同部分均能够享受北京水系纵横的蓝网系统。统筹兼顾城市交通、城市功能的合理布局，妥善处理滨水空间可达性和可见性，实现蓝绿网络交织的公共空间。

塑造分级明确的滨水空间——了解水系和滨水空间在城市中所扮演的不同角色。坚持以人为本，既要发挥其在城市中的保障作用，也要考虑通过提高滨水空间品质来满足人们对公共空间环境的需要。通过构建不同类型、不同级别的滨水空间来突出滨水空间设计特色。

塑造传承历史的滨水空间——立足北京滨水空间格局和历史遗存，在景观塑造、建筑风貌方面突出北京历史特征，继承和弘扬历史文化，保护水网格局，积极恢复被侵占和填埋的滨水空间。重视历史河道和它们之间连续性和整体性的价值。

attach importance to the value of historical rivers and the continuity and integrity between them.

Create the waterfront space for wet and dry seasons—— Pay attention to the water system's seasonal changes, high and low precipitation, and artificial regulation. Incorporate landscape treatment, public use and flood control measures into the design for different seasons. Construct a flexible waterfront space landscape to meet Beijing's unique hydrological changes and climate characteristics, and guarantee the all-season quality of the waterfront environment.

Create the waterfront space that conserves water resources —— Conform to the principle of ecologicalrestoration, connect the waterfront space design to the improvement of environmental conditions, improve the ecological and landscape performance of the network, and gradually reconcile urban problems such as lack of water resources and poor waterfront environment. Combined with the construction of the "two channels and one network" pattern, systematically enhance the ecological quality of the waterfront space.

塑造丰枯兼容的滨水空间——重视水系的季节变化、降雨丰枯及人工调蓄规律，将景观处理、公共使用和防洪措施纳入不同季节的设计中。通过构建弹性的滨水空间景观，应对北京独特的水文变化和气候特征，保障滨水环境的全季节品质。

塑造涵养水资源的滨水空间——遵循生态修复的原则，将滨水空间设计与环境条件的改善联系起来，提高网络的生态和景观性能，逐步改善水资源匮乏、滨水环境不良等城市问题。结合绿道蓝网格局的建设，系统提升滨水空间生态品质。

1.2.1.2 – Suzhou
苏州

Sparse and well-spaced waterfront space — The landscape pattern can be summarized as: "Facing the mountain on one side, surrounded by lakes on seven sides; the ancient city in the middle, and the green wedge penetrating into the city." The shallow lakes of the "Four-Corner Landscape" are still the main parts of the Suzhou landscape pattern. Thelakes and the mountains in the west are bound together to form an important landscape pattern enclosing the city. The Grand Canal and Wusong River mainly form a dense river network with connected large and small river channels. The river network connects the four-corner landscapes and Taihu Lake in the west, forming the basic territorial landscape of the "south of the lower reaches of the Yangtze River".With a history of more than 2,000 years, the ancient city is located at the center of its surrounding landscape pattern.

疏朗有致的滨水空间——苏州山水格局可概括为"一面望山，七面环湖；古城居中，绿楔入城"。大阳山、灵岩山等西部山体构成了苏州西部绿色屏障，城外"大山"与狮山、何山等城内"小山"共同形成山体绿楔，从西至东延伸进城市。"四角山水"的四角湖荡仍然是苏州山水格局的主要部分，其中包括：三角咀西北湖荡；阳澄湖等东北湖荡；独墅湖等东南湖荡；石湖等西南湖荡。近年来东部金鸡湖周边景观风貌逐步成形；北部荷塘月色大型湿地公园也建设完成；未来南部太湖经过疏浚和整理，也将成为围绕中心城区的重要滨水区。与西部山体配合，湖山环映，共同形成了围合城市的重要山水格局。以京杭大运河、吴淞江为主，大小河道相互沟通形成的密集河网，联系了四角山水和西部太湖，形成"江南水乡"的基本大地景观。具有两千多年历史的苏州古城居于周边山水格局围绕的中心，周边自然景观通过河网、绿廊向城市逐层渗透，形成城乡结合的整体生态系统。

The surrounding natural landscape penetrates into the city layer by layer through the river network and the green corridor, forming an overall ecosystem of integrated urban and rural areas.

Living at the waterfront— As a typical feature of Suzhou's traditional urban space and pattern, the "double chessboard" pattern of the water and land routes running in parallel reflects the traditional urban operation mode and landscape features of Suzhou. The characteristics of Suzhou's water city are penetrated into spaces with different dimensions and scales, from urban and rural to neighborhood. Respect the historical and cultural texture of the land along the river, explore the intrinsic potential in riverside scenic tourism, and open and symbiotic public activities. Realizeorderly the composite functions of water tourism, public communication and landscape leisure on the basis of the people-oriented principle.

Plain river network waterfront space that conserves water resources — On the basis of strictly adhering to the urban safety bottom line, we should pay attention to the sponge storage function of small and medium rivers, and enhance the urban flood control and drainage capacities. The river channels with various functions act as the carrier of space and urban life, the planning and construction of which should be transformed from engineering-oriented to the overall space integration.

We should not only consider the irrigation requirements for river's level, function, water level change, flow velocity and flow volume, but also emphasize the service for the people, the interdependent and complementary relations between the urban and rural layouts, striving to achieve harmony between the city and the water, as well as the people and the water.

Waterfront space with characteristics of the south of the lower reaches of the Yangtze River — The water texture of the Suzhou land of fish and rice includes its developed farming culture and rural territorial landscape. We should protect its remarkable landscape pattern, guide the rural green space to infiltrate into the city, and connect

临水而居的滨水空间——水路并行的"双棋盘"格局是苏州传统城市空间和格局的典型特征。它反映了苏州传统的城市运行方式和景观特色。苏州的水城特征渗透在从城乡到邻里，不同尺度的各个空间层面。因此应尊重沿河陆侧空间的历史文化肌理，发展沿河景观游览、公共活动，人与自然开放共生的复合功能。

涵养水资源的平原河网滨水空间——在严守城市安全底线的基础上，注重发挥中小河道的海绵调蓄功能，增强城市防洪排涝能力，河道作为城市多种功能的复合空间、城市生活交往的空间载体，其规划建设要从只注重工程设计向整体空间一体化设计转变。

不仅要考虑河道的等级、功能、水位变化、流速及流量等水工要求，更应强调为人民服务，强调与城镇、乡村布局、相辅相成的关系，努力做到城水相融，人水相依。

体现江南水乡特质的滨水空间——苏州鱼米之乡的水乡肌理，包括其发达的农耕文化和乡村大地景观。应保护良好的山水格局，引导郊野绿地向城市渗透，沟通开敞空间系统。取得人工环境与自然美景的和谐统一。

the open space systems, in order to achieve a harmonious unity between the artificial environment and natural scenery.

Open and shared waterfront space — Transform the productive shoreline to living ecological shoreline, constantly revitalize resources, encourage the transformation and development of river channels and lands along the rivers, create public open spaces, and build qualitative waterfront environment. Display the city charm of ecologically livable, open, diverse and renewable features, and enhance the service capacity of river channels and waterfront land to the city.

开放共享的滨水空间——从生产型岸线到生活生态型岸线转变，不断盘活资源，鼓励河道及其沿河陆侧的转型发展，打造公共开放空间，提升水岸环境品质。体现生态宜居、开放多元、生生不息的城市魅力，提升河道及滨水陆侧空间对城市的服务能力。

1.2.1.3 – Yinchuan
银川

Guarantee the ecology of Yinchuan water system —— Ecology is the primary task of planning and designing the water system in Yinchuan, so we should first maintain the sustainability and diversity of waters and habitats, and propose design requirements for water quantity, water quality, section form, vegetation selection and configuration methods.

Strengthen the features of Yinchuan —— Strengthen the magnificent and clear features of the northwest- ern city, and highlight the Chuan-shaped water system pattern and historical characteristics of the city. The view corridors, building height, color control, and night lighting should meet accordingly to the proposed design requirements.

Stimulate the vitality of Yinchuan waterfront space—— Yinchuan has abundant waterfront activities and unique ice activities in winter due to its long ice period. As for the planning of the waterfront space, we should enrich the types of activities in summer and winter, prolong the activity duration, improve the activity experience, and propose design requirements for the accessibility of waterfront space, waterfront buildings and functions, activity facilities, and suitability for the elderly and children.

保障银川水系生态——生态保育应作为首要目标，规划设计应首先维护水域、生境的可持续与多样性，对水量、水质、断面形式、植物选择与配置手法提出相应要求。

强化银川风貌个性——强化大气舒朗的西北城市风貌，彰显川字形水系格局与城市历史特质。对视线通廊、建筑高度、色彩的管控、夜景照明提出相应的设计要求。

激发银川滨水活力——银川具有丰富的滨水活动，而且银川结冰期长，冬季的冰上活动别具特色，滨水空间的规划应丰富夏季与冬季的活动类型，延长活动时间，提升活动体验，对滨水空间可达性、滨水建筑与功能、活动设施、适老适幼性设计提出相应的设计要求。

1.2.2 – **Summary of Typical Waterfront Space Patterns (Refinement)**
滨水空间典型模式提炼

1.2.2.1 – Waterfront Space
驳岸空间

Beijing
北京

The environmental quality of waterfront space in Beijing has a close relationship with the functionality of the river. The network of rivers in Beijing functions as water transportation and water drainage, among which a few draining rivers serve as landscapes.

Restricted by drainage efficiency and surrounding land space, most river profiles in central city are concrete revetments with huge vertical height difference, while those in the suburbs and partially

北京的滨水空间环境品质与河道功能关系密切。北京水网分为两种功能：一种是输水河道如京密引水渠；另一种是排水河道，其中，少量排水河道可以兼顾景观功能。

受供排水效率和周边用地空间的限制，中心城大部分河道断面是竖向高差较大的混凝土驳岸，而郊区和局部整治后的河道断面是自然生态的。

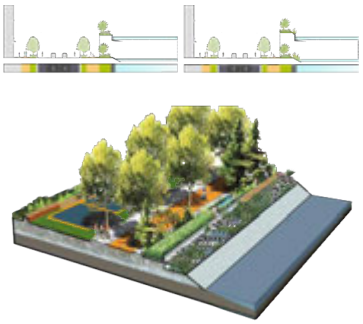


FIG. 1.34 Water Conservancy Type
水利保障型

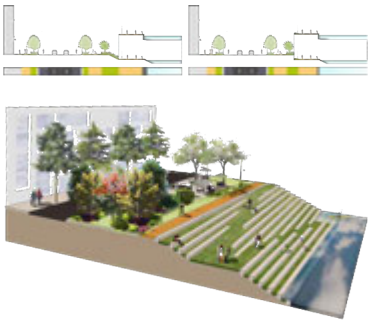


FIG. 1.35 Artificial Setback Type
人工退台型

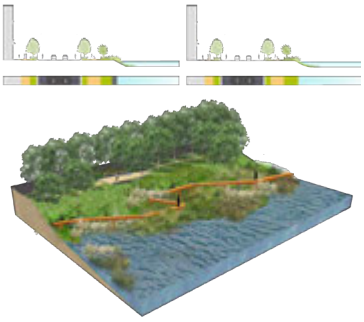


FIG. 1.36 Ecological Preservation Type
生态保育型

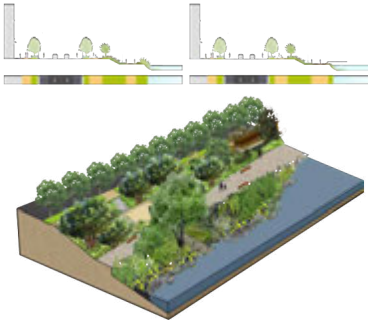


FIG. 1.37 Natural Hydrophilicity Type
自然亲水型

realigned rivers are natural and ecological. According to the type of river profile, river function, and accessibility to water, water space can be classified into 4 types, namely water conservancy type, artificial setback type, ecological preservation type and natural hydrophilicity type.

按断面类型、河道功能以及是否可亲水等条件分类，驳岸空间可以分为水利保障型、人工退台型、生态保育型和自然亲水型4类。

Suzhou
苏州

The section form of water bodies in Suzhou is closely affected by the functions of the water bodies. The section size should meet the safety, flood control, shipping, and ecological requirements. In this research, we categorizes the waters space into four categories: ecological rural section, trapezoidal section, rectangular section and composite section, to propose the ecological protection and control plan for revetment according to the characteristics of urban river channels.

苏州驳岸空间的断面形式受水体功能的密切影响，断面形式应满足安全要求、防洪要求、航运要求、生态要求。针对城市河道特点，提出护岸生态保护治理方案，课题将驳岸空间分为自然生态型、人工生态型、人工硬化型、复合型断面四类。

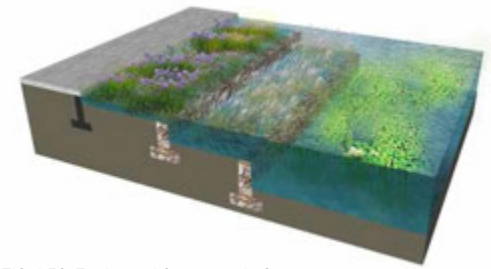


FIG. 1.38 Ecological Countryside Section
自然生态型断面

FIG. 1.39 Trapezoidal Section
人工生态型断面

FIG. 1.40 Rectangular Section
人工硬化型断面

FIG. 1.41 Composite Section
复合型断面

Most of the sections for the ecological conservation water bodies and the water bodies in rural and suburb areas are ecological countryside sections.With regard to the planning of this kind of sections, the main purpose is to protect the native blue- green space and provide high-quality countryside experience for the public. The composite section is recommended to be adopted in the waters space with a wide distance between the river mouth and the building or municipal road red line. The composite section form is generated through a combination of the ecological revetment and the basic vertical revetment. Landscape facilities such as close-to-water terraces, walking path and stairs are added. The green area is increased. When the distance between the river mouth and the building or municipal road red line exceeds 6M, it's recommended to adopt the slope-type revetment, add multi-level land steps and railings, etc., and avoid the use of straight walls to improve the ecological landscape environment, and increase water intimacy space with vertical changes. When the river mouth is basically overlapped with the building or municipal road red line, vertical revetments are often used, which are common in historical scenic area.

生态保育型水体及乡村、郊野地区水体断面多为自然生态型，在规划中以保护原生蓝绿空间，为市民提供高品质郊野体验为主要目的；河堤与建筑或市政道路红线距离超过6M的驳岸空间建议采用人工生态型断面，鼓励增加多级台阶、栏杆等，避免采用直切堤岸，提升生态景观环境，增加竖向变化的亲水空间；河口与建筑或市政道路红线距离较近或需聚集大量人群活动的滨水空间一般采用人工硬化型断面；河口与建筑或市政道路红线距离较宽的驳岸空间鼓励采用复合型断面，断面形式在垂直护岸的基础上与生态护岸相结合，增加亲水平台、漫步道、台阶等景观设施，提高种植绿化面积。

Yinchuan
银川

The form of water space in Yinchuan is directly related to the function of water bodies. The water bodies in the central urban area of Yinchuan are divided into three types according to their functions: irrigation ditches with artificial dyke, such as Tanglai Canal, Xigan Canal and Liangtian Canal; drainage river channels, which are in generally natural sections, such as Guan Lake and Diannong River; landscape water bodies, which usually have exquisite green spaces and artificial slopes, such as Yuehai Bay Business District and the land- scape water body on Tuanjie Road.

银川的驳岸空间形态与水体功能直接相关。银川市中心城区的水体分为三种功能：一是灌溉沟渠，有人工提防，例如唐徕渠和良田渠；二是排水河道，一般为自然断面，如关湖、典农河等；三是景观水体，通常有精致的绿地和人工坡岸，如阅海湾商务区和团结路的景观水体等。

According to the revetment type and the water body dimension, the water space can be categorized into five types:natural ecological sections, natural waterside sections, manmade protective sections, natural landscape sections, hard landscape sections. Natural ecological sections are mostly located by large lakes; natural waterside sections are mostly near Diannong River and other drainage river channels; manmade protective sections are mostly located nearby Tanglai Canal and other irrigation canals; while most natural landscape sections are surrounding landscape water bodies in parks, such as Bao Lake and Beita Lake, and most hard landscape sections are around Tuanjie Road and other landscape river channels.

结合驳岸类型与水体规模，可将驳岸空间分为自然生态断面、自然亲水断面、人工防护断面、自然景观断面、硬质景观断面五种类型。自然生态断面多位于大型湖泊周边，自然亲水断面多位于典农河等排水河道周边，人工防护断面多位于唐徕渠等灌溉水渠周边，自然景观断面多位于宝湖、北塔湖等公园景观水体周边，硬质景观断面多位于团结路等景观河道周边。

FIG. 1.42 Natural ecological sections
自然生态断面

FIG. 1.43 Natural waterside sections
自然亲水断面

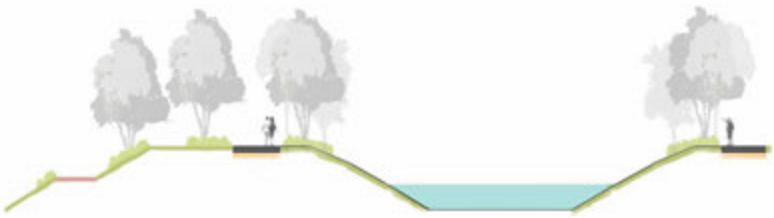


FIG. 1.44 Made protective sections
人工防护断面

FIG. 1.45 Natural landscape sections
自然景观断面

FIG. 1.46 Hard landscape sections
硬质景观断面

1.2.2.2 – Land Space
陆侧空间

Beijing
北京

Users of Beijing waterfront space have a close relationship with functions of waterfront space. Land use within the waterfront space is categorized as production, living, ecology, and transportation. Highways and urban arterial roads occupies a larger part in Beijing waterfront space.

北京滨水空间的使用人群与滨水空间的用地功能关系密切。滨水空间范围内的用地功能包括生产、生活、生态、交通4类。其中，公路和城市干路是北京滨水空间用地功能中占比较多的类型。

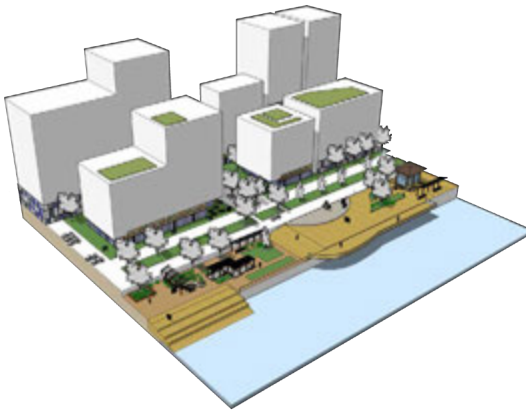


FIG. 1.47 Production
生产

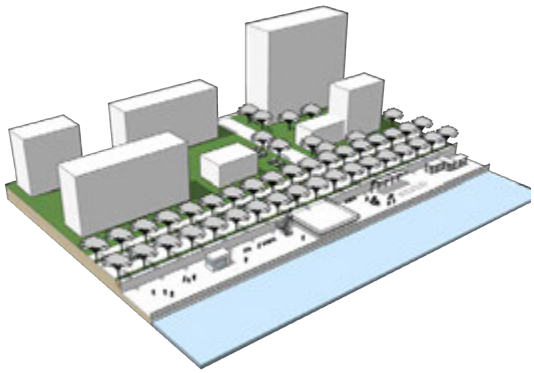


FIG. 1.48 Livelihood
生活

FIG. 1.49 Ecology
生态

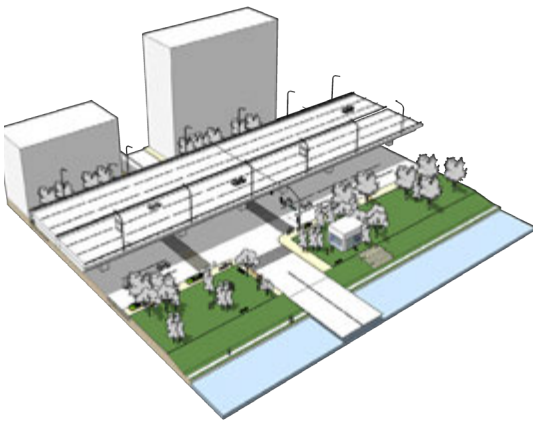


FIG. 1.50 Mobility Expressway
交通（快速路）

As for the land space, we should consider the requirements of the collaborative design and emphasize on the integrity of the waterfront space. According to the hinterland functions, the spaces affected and separated by mobility, the spaces of historical, village and city features (including production, living and ecology), the land space is categrized into eight types: mobility barrier type, mobility impact type, historical feature type, village countryside type, life supporting type, comprehensive service type, park ecology type, and storage and production type.

陆侧空间应考虑与水域协同设计的要求，强调滨水空间整体性，按腹地功能、建设模式、历史文化与景观价值，以及受交通影响的情况等，将陆侧空间归纳为交通阻隔型、交通影响型、历史风貌型、历史风貌协调型、社区生活型、综合服务型、公园生态型、仓储生产型8大类。

FIG. 1.51 Mobility Barrier Type
交通阻隔型

FIG. 1.52 Composite Section Type
交通影响型

FIG. 1.53 Historical Feature Type
历史风貌型

FIG. 1.54 Village Countryside Type
历史风貌协调型

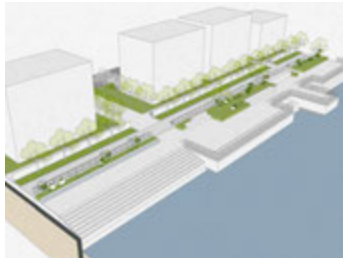


FIG. 1.55 Life Supporting Type
社区生活型

FIG. 1.56 Comprehensive Service Type
综合服务型

FIG. 1.57 Park Ecology Type
公园生态型

FIG. 1.58 Storage and Production Type
仓储生产型

Yinchuan
银川

According to the functions of land use surrounding the water body, the land space can be classified into four segments: public space segment, living recreation segment, park and intimate segment, and natural countryside segment. The surrounding areas of Yinchuan's current waterfront area are mainly residential and park green spaces. The waterfront space lacks direct contact with business facilities and public facilities, so an obvious waterfront vitality area hasn't been formed yet.

根据水体周边用地功能，可将陆侧空间归纳为4大类——公共空间段、生活游憩段、公园亲水段、自然郊野段。银川现状滨水区周边用地以居住和公园绿地为主，滨水空间与商业设施、公共设施缺少直接联系，尚未形成明显的滨水活力区域。

FIG. 1.59 Public Space Section
公共空间段

FIG. 1.60 Living Recreation Section
生活游憩段

FIG. 1.61 Park and Intimate Section
公园亲水段

FIG. 1.62 Natural Countryside Section
自然郊野段

1.2.3 – **Summary of Waterfront Urban Design Approach**
滨水空间城市设计研究方法提炼与总结

1.2.3.1 – Beijing
北京

Core Issue
核心议题

Beijing is rich in the network of rivers, and "water conservancy" plays a very important role in the construction of the city of Beijing at different periods. The core objective of Beijing waterfront space research is, based on the relationship of city and river through the history, to analyze how water impacts ecological environment, urban space and public life in the circular and metabolic process. The research focuses on the mechanism of the formation of the waterfront from the perspective of water ecology, history and geography,and behavioral requirements, to grasp the rule of spatial configuration through typological analysis, and provides suggestions for to improve the machenism of implementaton from the perspective of administrative implementation.

北京的河道网络十分丰富，"水利"也是各个时期北京城市营造过程中的重要影响因素。北京滨水空间研究的核心议题是基于对历代北京水城关系的解读，分析水在城市中循环和代谢的同时，如何影响生态环境、城市空间和市民生活。本研究重点从水生态视角、历史地理视角、行为需求视角切入滨水空间形成机理的研究，用类型分析方法把握空间形态规律，从管理实施角度提出改善机制的建议。

Technological Methodology
技术路线

Water ecology perspective:

geographical position and topography, etc., precipitation in Beijing is characterized by uneven space-time distribution, and dry and wet seasonal alternation. Given hydrological features and distribution of hydraulic facilities, an ecological design principle of regulating the dry and wet season is provided to guide waterfront space design.

Historical and geographical perspective: Beijing has a rich and inter-connected network of rivers, which is an important element of urbanization.

水生态视角：

受水气补充条件和地理位置、地形等条件的影响，北京境内降水具有时空分布不均、丰枯交替发生等特点。根据水文特征与水工设施布局，提出丰枯有季的生态设计原则，指导滨水空间设计。

历史地理视角：北京的水系网络十分丰富，不仅相互连接，也是城市营造中重要的要素。

From navigation and grain transportation in Liao and Jin dynasties, to water diversion to west mountains in Yuan dynasty, and further to imperial garden and moat water systems in Ming and Qing dynasties, all of the rivers are artificiallybuilt blue network system. Based on the development progress of Beijing water network and understanding of relationship between river function and urban frame, design goals in line with waterfront space features of different sections are proposed. development progress in the water network in Beijing and understanding of relationship between river function and urban pattern, design goals in line with waterfront space features of different sections are proposed.

Behavioral requirements perspective:

Due to the water supply security as the mian function of the water network in Beijing, there is little room for public activities within the river channels. However, citizens have always longed for water activities. According to people's utilization requirements of the waterfront space in different seasons, space for urban water utilization and public activity is integrated, and regulation suggestions are proposed in order to improve environmental quality of waterfront space.

Method of type analysis:

Design requirements of different types of waterfront space are not only restricted by their own functions, but also affected by local and surrounding land functions. By sorting sections of waters and land, design requirements of water bodies, river channels, and neighboring functions are specified, and problem-oriented design points aimed at different types of profiles are proposed.

Administrative implementation perspective:

According to impacts of city evolution on the water system distribution in modern times, multi-department coordination and management mechanism and pertinent design guideline are proposed based on the duty of each relevant urban administrative and institutional body.

从辽代、金代通航运粮，到元代西山引水，再到明清时期的皇家园林和护城河水系，均是人工开凿形成的蓝网系统。我们根据北京水网的发展历程，理解水系功能与城市格局的关系，从而对不同河段的滨水空间特征提出设计目标。

行为需求视角：

由于北京水网的主要功能是保障城市用水，河道内部可容纳市民活动的空间不多，但市民对水上活动的热爱由来已久。根据不同季节滨水空间人群使用需求，整合城市用水空间与市民活动空间，提出整治建议，提升滨水空间环境质量。

类型分析方法：

不同类型滨水空间的设计要求不仅受其自身功能限制，还因为其所在区域和周边用地功能影响。通过对水域和陆域部分的分类，明确水体、河道、相邻功能的设计需求，以问题为导向，提出不同类型断面的设计要点。

管理实施视角：

根据近代城市发展演变对水系格局的影响，根据城市相关管理与职能机构的事权，提出多部门协调管理机制和提出针对性的设计指引。

1.2.3.2 – Suzhou
苏州

Core Issue
核心议题

Suzhou waterfront space design is aimed at rejuvenating "life of water town" with "hydrophilic space". At the ecological level, through identifying ecological environment landscape, protect natural ecology and agricultural environment of Suzhou, and repair and restore fragmented blue network system; in terms of distribution of urban space, highlight key waterfront space with "exempolary waterfront space and landscape area" as backdrop, restore water-oriented urban space order with key waterfront regions and chronic system besides water as the focus; on microscale, expand characters of water city, restore the water space and the life of water town, through the design of the imagery elements of the water town of Suzhou.

Based on native characteristics of Suzhou water network, analysing the existed problems, this research extends its design surrounding on three main focuses— improve public accesibility of waterfront space in Suzhou, striving to make it open to the public; (the subject is missing) fulfill the basic concept of "natural accumulation, natural penetration, and natural purification", promote water resources capacity of accumulation and purification; restore and maintain natural connectivity and fluidity of river and lake systems, and restore water functional system of traditional three-level water network.

苏州滨水空间设计以"亲水空间"复兴"水城生活"为目标。在生态层面通过识别生态环境格局，保护苏州自然生态、水乡农耕环境，修复、重构破碎的蓝网系统；在城市空间布局上，以"滨水空间景观风貌引导区"勾勒背景，识别重点滨水空间，以重点滨水地区和滨水慢行系统为着力点重塑依水而建的城市空间秩序；在微观上，通过苏州水城意象要素设计扩展水城气质、归还亲水空间、复兴水城生活。

依据苏州水网本体特点，基于现状问题研判梳理，本次研究围绕三个焦点问题对苏州滨水空间展开设计——提高苏州滨水空间公共性，努力实现苏州滨水空间的公共开放；实现"自然积存、自然渗透、自然净化"的基本理念，促进苏州水资源积蓄、自净化能力；恢复和保持河湖水系的自然连通和流动性，恢复传统三级水网的水功能系统。

Technological Roadmap and Method
技术路线和方法

(1) Ecological environment perspective. At macroscopic level, it is proposed to protect overall ecological environment pattern of low mountains and flat lakes in fertile places, to design strategies aimed at different types of urban and rural areas; at microscopic level, given basic conditions of long flood period, large precipitation, uneven water quality in Suzhou is proposed a design strategy of "inter-connectivity, following nature, reducing pollution and increasing capacity".

(2)Cultural perspective. Reviewhistorical development process, and reveal structural features of water system. Extract images of different types of water network, create waterfront space with water town features, through protection, restoration, and representation. It is important to pay attention to agricultural environment of water town in the Yangtze River from the perspective of cultural heritage, protecting and using water town, wetland, and village as a pattern of combination of protection and development combined with planning of historical and cultural city protection.

(3) Site construction. Suzhou is featured by inter- connected river channels, abundant lakes, and various types of water network. Clarify the inter-dependent relation between urban space and water network in the city. The plan integrates various functions of rivers and water systems, namely, ecological accommodation, flood control and drainage, landscape culture, and navigation and tourism, etc.; put forward different design strategies towards large and medium-sized lakes, rivers, and small lakes and other various water space; and satisfy the need for space for various avtivites, with a human-oriented design principle.

(1) 生态环境视角。宏观层面保护低山平湖、鱼米之乡的整体生态环境格局，对城乡不同的空间类型提出设计策略；微观层面针对苏州汛期长、降雨量大、水质良莠不齐的基本条件，提出"相互连通、顺应自然、减污增容"的设计策略。

(2) 人文视角。追溯历史发展脉络，揭示水系的结构特征。提取不同类型水网空间的意象要素，通过保护、修复、彰显的手法，复兴体现江南水乡特质的滨水空间。从文化遗产的角度关注江南水乡农耕环境，结合历史文化名城保护规划，以保护和发展相结合的模式保护和利用好江南水乡、湿地、乡村。

(3) 场所营造。苏州河道纵横，湖泊众多，水网类型多样。梳理城市空间脉络，恢复水城相依的城市意象。统筹兼顾河网水系的生态调节、防洪排涝、景观文化及航运旅游等多种功能；对大中型湖泊、河流、小型湖淀等多类水网空间提出不同的设计策略；满足人的行为需求，体现人性关怀。

1.2.3.3 – Yinchuan—Waterfront Design and Research Method for the Arid Northwest
银川——适于西北干旱地区的滨水空间设计研究方法

Core Issue
核心议题

Yinchuan plain is characterized by drought with little rainfall, strong evaporation, long sunshine duration, strong solar radiation, great day-night temperature difference, cold in winter and hot in summer without extreme temporature, windy in spring, dense rain in autumn, late spring, short summer, early autumn, long winter, and short frost-free season.

In contrast with Beijing and Suzhou, Yinchuan has the most delicate ecological features. Therefore, the core issue of Yinchuan's part is to understand its specific ecology, emphasize drought climate with plentiful wind and sand, continues the structure of Chinese character "川" (the character represents parallel rivers), and conduct site design by means of overall planning and design concept and method of "territorial landscape".

银川平原气候的基本特征是干旱少雨，蒸发强烈，日照时间长，太阳辐射强，昼夜温差大，但冬寒无奇冷，夏热无酷暑，春季多风沙，秋季雨集中，春迟、夏短、秋早、冬长，无霜期短而多变。

相较于北京与苏州，银川具有最为敏感的生态特征，因此银川部分的核心议题围绕生态规律进行研究，着重考虑当地干旱多风沙的气候特征，重点关注与延续"川"字型结构的问题，运用"大景观"的整体性规划设计理念和方法进行场所设计。

Research Method
研究方法

The framework of research includes four parts "constitution of site space", "three levels of thinking", "seven principles", "landscape design system".

(1) Constitution of site space—reinterpret waterfront space from the perspective of urban environment, people's perception, space configuration and ecology.

(2) Three levels of thinking—on the basis of recognizing the specificity in the waterfront space in Yinchuan,the research approaches the design objectives from three levels of thinking, namely overall landscape at the macro-scale level, urban projects and surrounding environment at the medium-scale level, spaces at the micro-scale level.

(3) Seven principles—Set seven principles: sense of direction and scenography, proportion and scale, place and circulation, climate and physical environment, variety of activities, sustainability and ecological environmental design, adaptable technology and materials.

(4) Urban design element system—Conduct urban design analysis and guidance with focus on elements such as water front, vertical topography, road andpavement, bridge and other structures, greening,waterfront buildings, and facilities.

研究工作框架包含"场地空间构成"、"三个思考层面"、"七个原则"、"景观设计系统"四个部分。

(1) 场地空间构成——从城市环境、人的感知、空间形态以及生态角度对滨水空间再认知。

(2) 三个思考层面——在对银川特色滨水空间认知的基础上，将城市设计的对象大致分为三个思考层面，即宏观尺度的城市整体风貌，中观尺度的场地空间及周边环境，微观尺度的空间及其场所。

(3) 七个原则——以方向感和景象、比例和尺度、站点与动线、气候与物理环境、活动的多样性、可持续与生境设计、适宜性的技术与材料为研究的七个设计原则。

(4) 城市设计要素系统——重点聚焦水体岸线、竖向地形、道路与铺地、桥梁等构筑物、植物绿化、滨水建筑、服务设施等要素进行城市设计分析和引导。

1.2.4 – **Summary - Five Dimensions for Urban Design of Waterfront Spaces**
总结——滨水空间城市设计的五个维度

1.2.4.1 – Ecological Environment Dimension
生态环境维度

From the origin of overall water system of three cities, Beijing is based on multiple rivers, Yinchuan is based on irrigation, and Suzhou combines both of them. From the perspective of ecological environment, the problem that needs to be addressed in Beijing is the rainfall and runoff and canalization of water channels. Suzhou needs to effectively preserve and rejuvenate river network space, restrict construction area of waterfront space, while Yinchuan needs to dredge water systems, strengthen water circulation and improve overall water environment.

The research starts with evolution of urban water systems, network of water bodies, analyzes its ecological features and design principles, focuses on restoration, protection and ecological enhancement, puts forward solutions which match water system to neighboring ecological environment, all of which create better visual experience, express regional and ecological features and improve comprehensive benefits of waterfront space.

从三个城市整体水系的成因而言，北京属于多河汇水，银川是基于农业灌溉，而苏州则是两者兼有。从生态环境维度，北京亟需解决的是雨洪径流、河道的渠化问题；苏州需要有效保留和恢复河网空间，限制城市滨河区域建设；而银川则需要沟通水系，加强水循环，改善整体水环境。

滨水空间作为城市空间和生态系统的重要组成部分，对城市生态环境和市民休闲游憩有着重要作用。研究从城市的水系形成变迁、水体网络构成等方面入手，分析其生态特点与设计原则，关注对原有水体的恢复、保护和生态提升，提出与水体系统与周围生态环境相适应的方法，在营造良好视觉和空间体验的同时，展现地域性和生态性，并提升滨水空间的综合效益。

1.2.4.2 – Historical and Cultural Dimension
历史人文维度

Beijing, Suzhou, and Yinchuan play different roles in the history, with their own distinctive features in establishing relationship of "water city". As the capital of five feudal dynasties, Beijing once built inter-connected urban water system through draining channels and irrigation channels with the purpose of navigation and defense. As a water town of Yangtze River, Suzhou enables citizens to develop activities, like residence, shopping, recreation along the water. The relationship of city and water is featured by "The city is adjacent to the water, the streets are adjacent to the river", and the farmland is featured by "embankments as large as a castle, or as small as a yard" with gates as the center. As an ancient oasis city in the frontier area, Yinchuan diverts water from Yellow River into a dry landscape, establishing water retention facilities, forming an irrigation system hailed as "the town of fish and rice at the northen frontier of China" . Through the investigation of history of "water city", the research enriches the following design of waterfront space of three cities with more historical and cultural value.

北京、苏州、银川三个城市在历史上扮演着不同的角色，在"水城"关系塑造上也各有特点。北京作为五代封建王朝的都城，曾以通航、防御为主要目的，利用引水干渠、排水灌渠构筑了相互连通的城市水系格局；苏州作为江南水乡，市民的居住、消费、休憩等活动均以水展开，城市与水的关系具有"水陆相邻、街河并临"的空间特征，耕地以堰闸为核心形成"大圩如城垣，小戗如院落"的特色景观；银川作为历史悠久的边塞绿洲古城，通过在干旱地区引黄河水，建设水利设施，得到了"塞上鱼米之乡"的美誉。本次研究通过对"水城"建设史的挖掘，为后续三个城市滨水空间的设计赋予了更多历史和人文价值。

1.2.4.3 – Urban Function Dimension
城市机能维度

Material function of water.

Rivers and lakes of Beijing, Suzhou, and Yinchuan undertake integrate functions as follows: waters supply, flood discharge, drainage, navigation, while waterfront spaces on the land, in accordance with position of rivers and lakes, functions and resources of hinder land next to the the river, undertake ecological preservation, services and production functions.

Adaptability of urban space under economic transformation.

水的物质功能。

综述北京、苏州、银川三个城市河湖水系承担的功能，水域承担引水、行洪、排涝和通航等功能，陆侧滨水空间根据河湖所处区位、两侧腹地的功能、资源禀赋等，承担生态保育、生活服务、生产等功能。

经济发展转型下城市空间的适应性。

Over the past few years, Beijing, Suzhou, Yinchuan has listed waterfront space, city center, and historic blocks as main part of construction coincidently. Waterfront regions are abundant in historic heritage, which is an important resources for development of city. With the transformation of urban space structure, waterfront space begins to experience transformation and re-generation, where industrial embankment in the past turns into post-industrial site in combination with residence, office, and recreation. Landscape of rivers, lakes and waterfront land areas, and space for recreation and activities rejuvenate the city.

近年来，北京、苏州、银川等城市在建设中，不约而同的将滨水地区与城市中心、历史街区列为主要建设板块。滨水地区多拥有丰富的历史遗产，是城市的重要发展资源。随着城市经济结构的转型，滨水空间开始经历转型和再生过程，昔日工业化的河道两岸开始转变为居住、工作、休闲一体化的后工业场所，河湖及滨水陆侧的生态景观以及休憩活动等空间，使城市焕发独特魅力。

Urban spatial structure, operating model and pattern evolution.

城市空间结构、运行模式和形态变迁。

River and lake system can be obstacles to land transportation, urban function and connections of public spaces. Since the beginning of the 20th century, the waterfront space, which is usually constructed as the border of the city, is lack of activities. With most cities of China shifting from production society to consumption society, values of waterfront space are re-understood as important driver of urban culture and landscape image. In order to adapt to the changes of urban spatial structure and configuration, the design of waterfront space is integrated into the regeneration,renovation and redevelopment. It is suggested that waterfront space design focus on integrity,systematicity, integration with overall framework, present a clear waterfront landscape, a link among urban systems.

由于河湖水系容易造成陆路交通、城市功能和公共空间的联系不便，近现代滨水空间多作为城市的边界粗放发展、缺乏活力。随着中国各城市从生产型社会逐步向消费型社会转变，滨水空间作为城市文化、风貌特色的重要载体，其价值逐渐被重新认知。为了适应城市空间结构、形态的改变，滨水空间迎来了改造与再开发的复兴过程。滨水空间设计建议聚焦于城市空间的整体性、系统性，融入整体空间框架，形成清晰的滨水空间格局，并注重与城市各系统相耦合。

1.2.4.4 – Behavioral Requirements Dimension 行为需求维度

Based on research of waterfront space design of Beijing, Suzhou, and Yinchuan, waterfront space design can be extended from structural control and design guidance.In terms of design guidance, it should focus on the accessibility to the water, the variety of waterfront activities, strengthen the construction of unique waterfront landscape sites.

基于北京、苏州、银川三城的研究，滨水空间设计应聚焦于人的亲水性、滨水活动的多样性，强化独特的滨水景观场所营造。

Start from requirements of users, make appropriate arrangements of functions, and guide the design elements of waterfront space,e.g. buildings, roads, bridges, squares and facilities, etc.

从使用者的需求出发，对各类功能作出合理安排，对滨水空间的设计要素，如建筑、道路、桥梁、广场、设施等进行引导。

1.2.4.5 – Implementation and Management Dimension 管理实施维度

Management and protection of rivers and lakes are complex and systematic projects, which is related to upper and lower reaches, left and right embankment, different administrative districts and activities. Planning and construction management of waterfront space is a cooperative action involving multiple actors that requires to connect waters and land space, and coordinate relationship of waterbody and its hinder land. In the planning design, we should concentrate on comprehensive coordination and management under refined specialization, specify design goal, and propose pertinent control and guidance for waterfront space in terms of its ecological, secure and historical features respectively.

河湖管理保护是一项复杂的系统工程，涉及上下游、左右岸、不同行政区域和部门。滨水空间的规划建设管理更需要联系驳岸与陆侧空间，协调河湖与腹地关系，是多方参与的协调性行动。在规划设计中，要着力于专业分工细化下的综合协调与管理，明确设计目标，对滨水空间生态性、安全性、历史性等方面分别提出适宜的控制指引内容。

PART 2

Beijing: Construct Recognition of the Capital Water System

第2部分

北京：都城水系的意象认知

Introduction

引言

This research was completed by Harbin Institute of Technology and China Architecture Design & Research Group. Through field research in Beijing, our team clearly defined the waterfront space from the aspects of geographical location, historical evolution and cultural value, and deeply analyzed the urban intentions of various water systems in Beijing, and studied the value of several aspects. Based on this, a conceptual plan for urban design guidelines, strategies and different spatial types of Beijing waterfront space is proposed. We hope that these results will be helpful in promoting existing research and inspiring new research and thinking in the direction of the city's water system.

本研究由哈尔滨工业大学与中国建筑设计研究院有限公司合作完成。通过在北京进行实地调研，我们的团队从地理区位、历史沿革、文化价值等方面，对各类滨水空间进行界定划分，深入剖析水城意向，研判了数个方面的滨水空间利用价值，并以此为依据提出了北京滨水空间的城市设计引导、策略与概念性方案。我们希望这些成果能够在都城水系意向认知与应用方面，对推进已有研究、激发新的研究思考有所帮助。

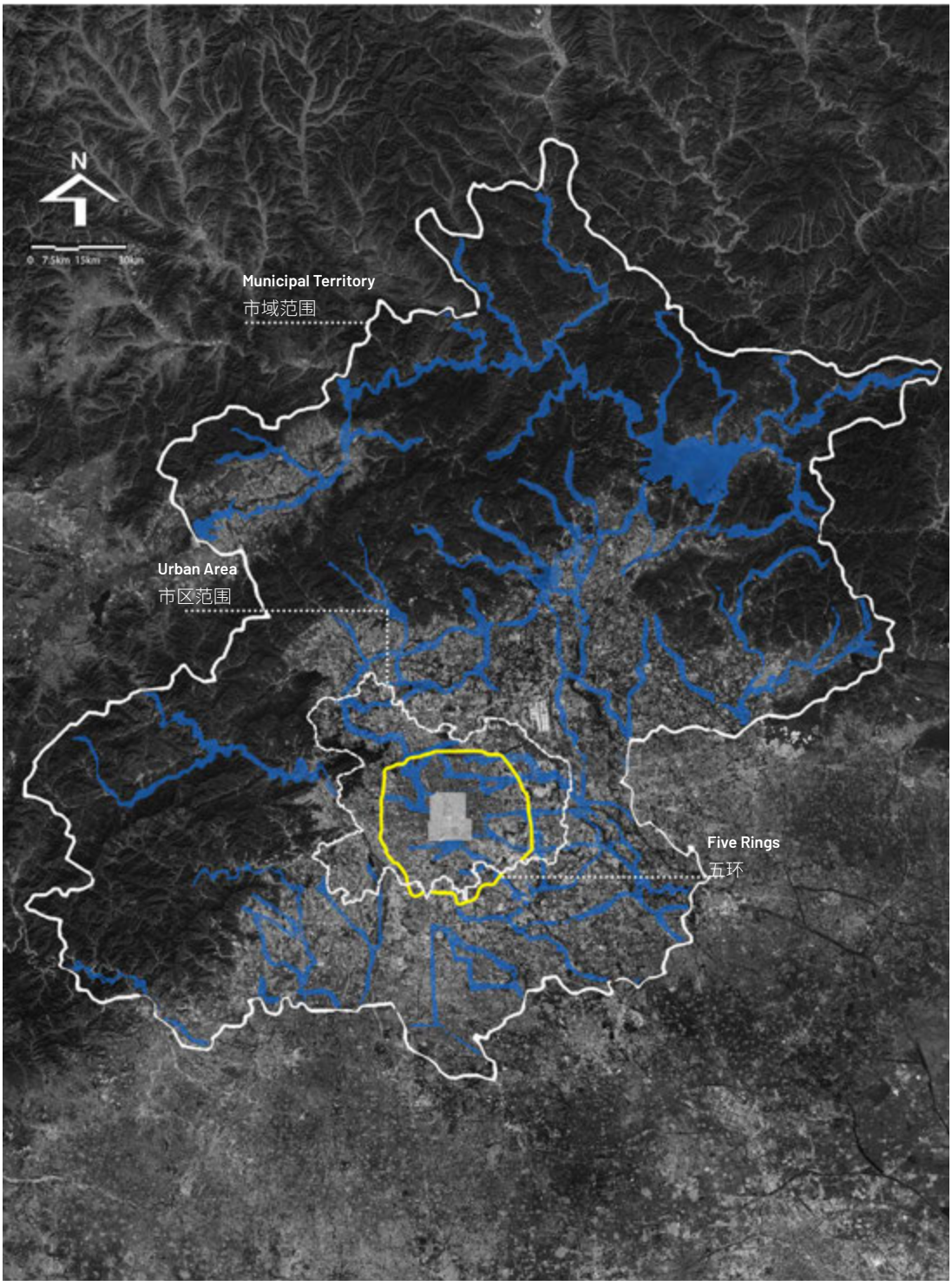


FIG. 2.1 A Map of the Municipal Territory of Beijing
北京市域地图

2.1 – Research

2.1 – 研

2.1.1 – **Water System in Beijing**
北京水系

Water-based capital establishment: Cities may continue changing, but the landscape pattern is permanent.

Beijing is a capital that established on the basis of water. The formation of its water system was led by the supply water development of canal transport. As urban domestic water projects and landscaping water projects for the royal palaces and gardens started and historically influenced by Yongding River and the North Canal, a basic water system pattern, which consisted of irrigation for temples, farmland and forests in Western Hills, drainage of floods from royal gardens and for city defense in the plain area, and building of bridges and dams in the east.

After the founding of the People's Republic of China, plenty of water systems in Beijing no longer served for transportation, military defense, farmland irrigation, etc. Seventy percent of the waterfront space was occupied by industrial, transportation and municipal land, and there were conflicts between water system functions and waterfront characterized by landscaping, water loving and ecological needs.

以水定都：城市不断更替，山水格局永恒存在。

北京以水定都，其水系的形成以发展漕运的供水为先导，随着解决城市生活用水、补充皇家宫廷苑囿用水等工程展开，在永定河和北运河的影响下，逐步形成了今日京城水系西山庙宇祠堂、农林灌溉，平原皇家园林、护城排涝，东部筑桥建坝的基本格局。

新中国成立后，北京大量水系失去了原有的漕运、军事防御、农田灌溉等功能，七成滨水空间被工业、交通、市政类用地占据，水系功能与滨水景观性、亲水性、生态性需求存在一定矛盾。

At present, the water surface of river courses in Beijing had relative stability but poor continuity. Restricted by the functions and management of river channels, lake waterfront space with larger water volumes were used more frequently than rivers. There were more activities such as boat rowing and skating in the lakes and lakeside recreation was diverse, while the role of rivers in the overall water system is gradually weakened and water networks of rivers and lakes around the city gradually disappeared.

On the whole, different water network systems in Beijing were built in different historical periods of urban formation and development for different purposes. The existing water systems in Beijing extend vertically and horizontally and the pattern of water systems was slightly visible. Artificial rivers and lakes dominate built-up areas, and the river courses are mainly used for drainage. Most of the water sources in built-up areas are manually allocated, with wet and dry periods being greatly affected by human factors. With severe water resource problem, insufficient precipitation and reduction of groundwater resources year by year contribute to gradual disappearance of lake system pattern during Ming and Qing dynasties.

目前，北京市的河道水面相对稳定，但连续性较弱。受河道水渠功能和管理的限制，水量较大的湖泊滨水空间利用率比河流高。湖中游船滑冰、湖边纳凉等消遣的活动较多，而河流在整体水系中所承担的作用逐步减弱，绕城连通的河湖水网逐渐消失。

总体上，出于不同的目的，北京的水网系统修建于城市形成和发展的不同历史时期。北京现存水系纵横，整体水系格局依稀可见。建成区大部分为人工河湖，河道以排水功能为主，水源由人工调配，丰枯受人为影响较大。现状水资源问题严峻，在降水不足、地下水资源逐年减少的背景下，明清时期的湖泊水系格局逐渐消失。

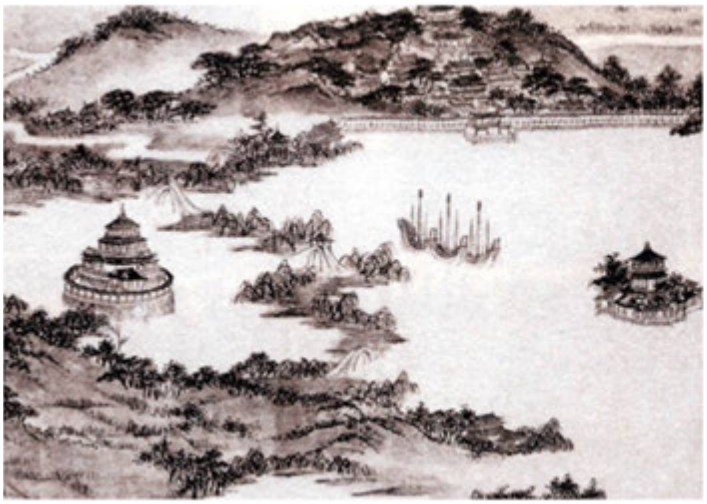


FIG. 2.2 Gyeonggi Water Scroll (Part)
京畿水利图卷（局部）

FIG. 2.3 Landscape Pattern of Ancient Capital
古代都城山水格局图

Research Scope
研究范围

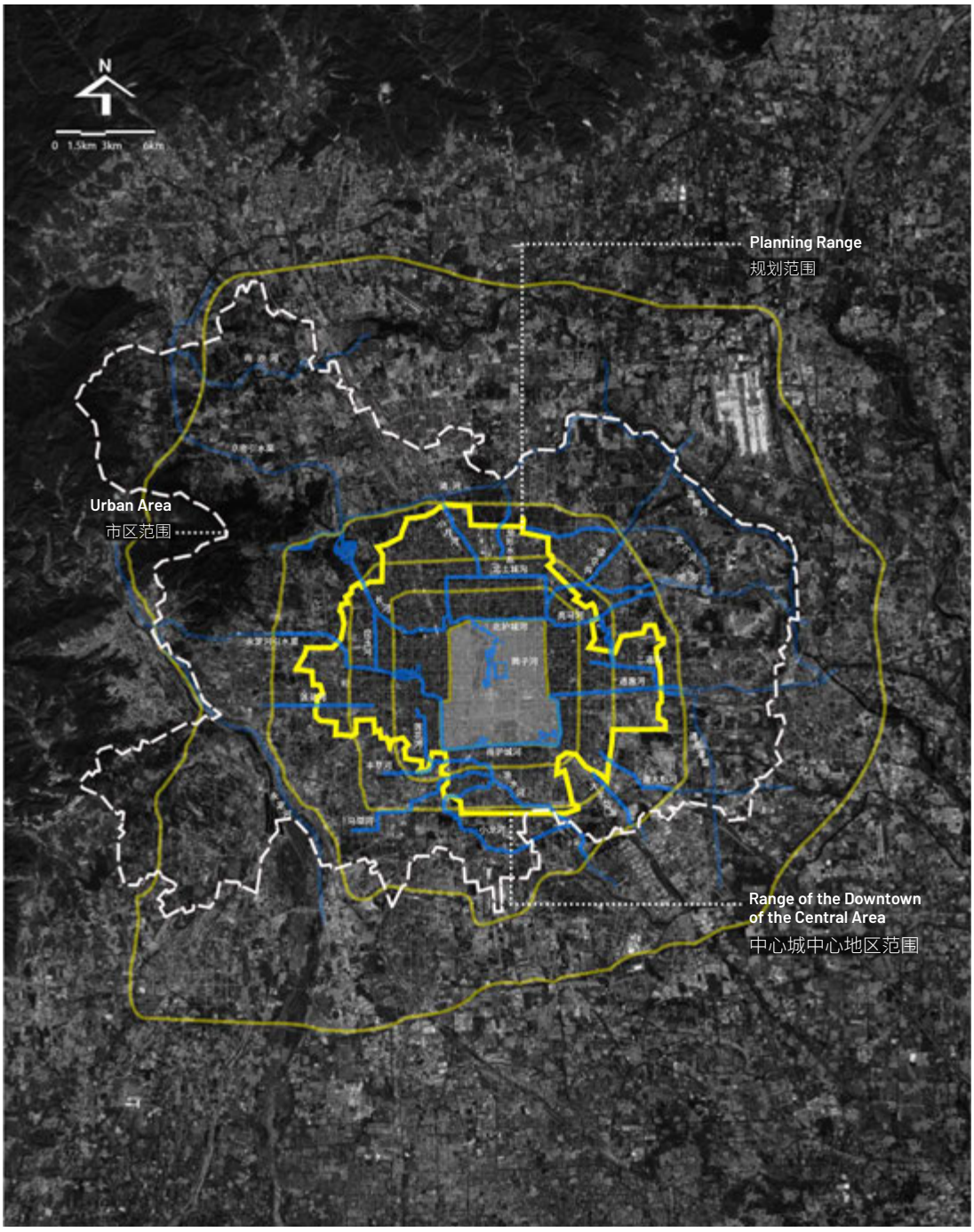


FIG. 2.4 A Map of of the Central Area of Beijing
北京中心城区地图

2.1.2 – **Beijing City & Beijing Water System**
北京城与北京水系

2.1.2.1 – **Beijing City in Ming and Qing Dynasties & Modern Beijing Water System**
明清北京城与现代北京水系

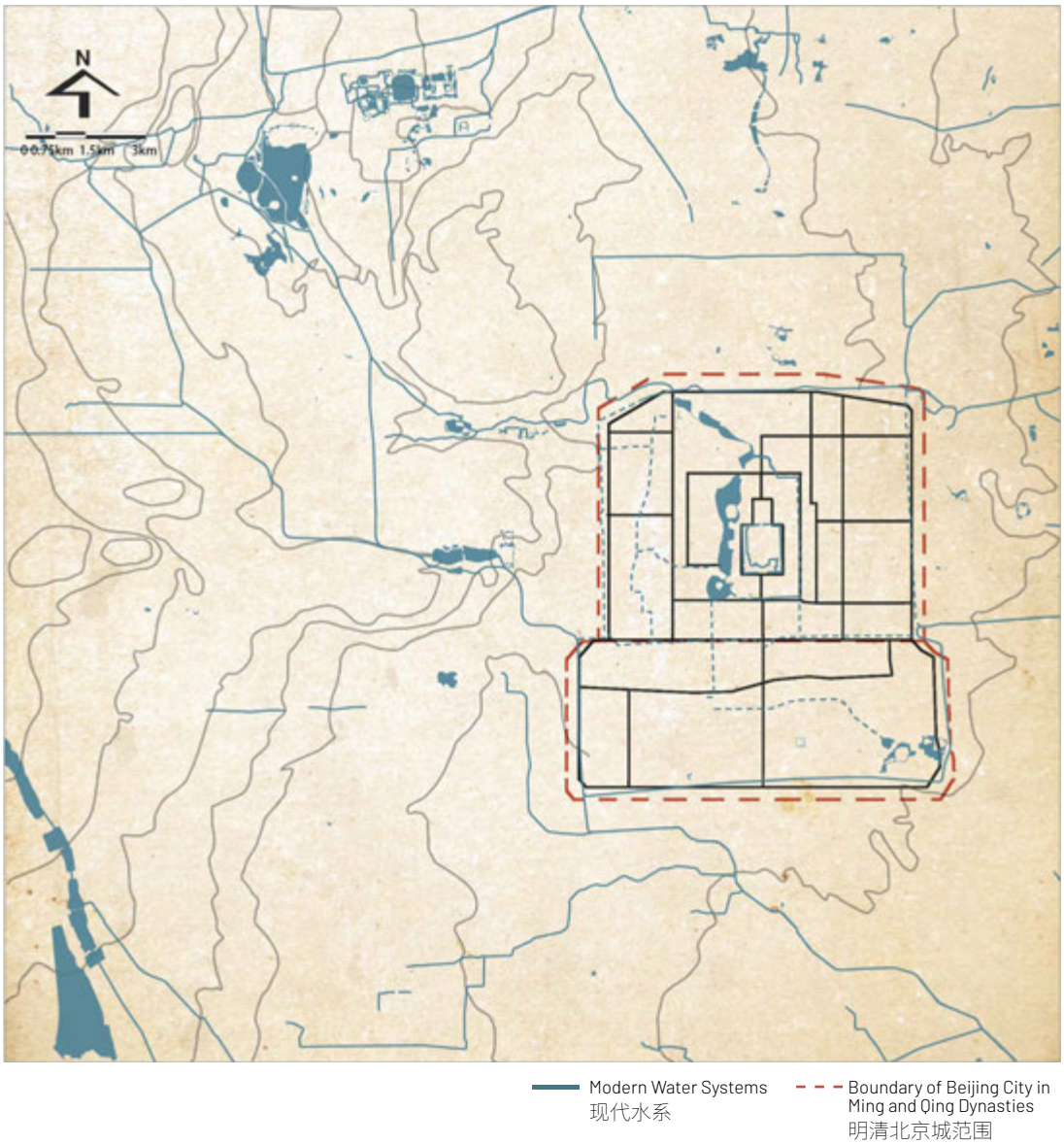


FIG. 2.5 Modern Beijing Water Systems + A Map of Beijing City in Ming and Qing Dynasties
现代北京水系+明清北京城地图

2.1.2.2 – **Modern Beijing & Water System in Beijing in Ming and Qing Dynasties**
现代北京与明清北京水系

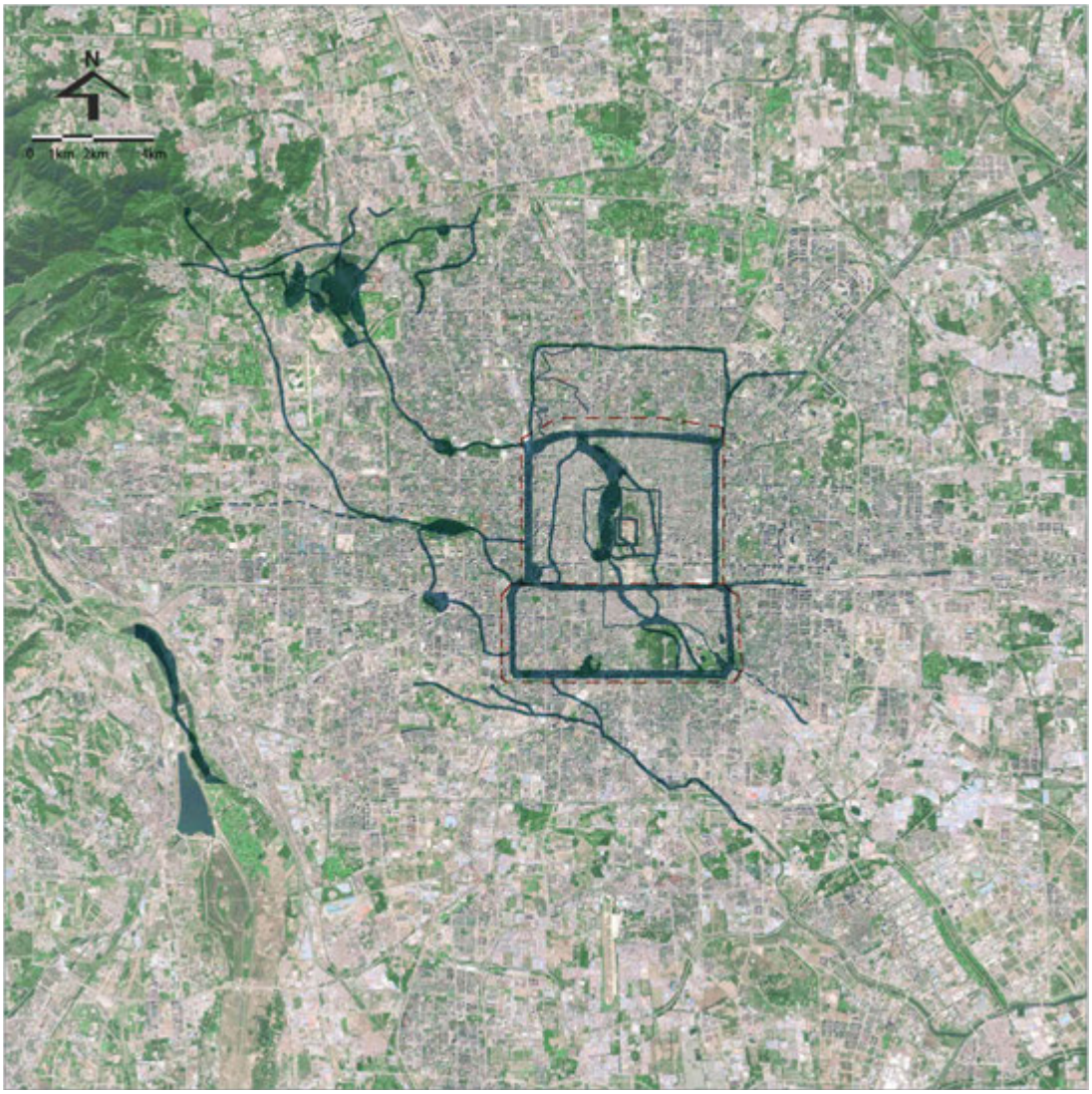


FIG. 2.6 Aerial Photo of Modern Beijing + Water Systems in Beijing in Ming and Qing Dynasties
现代北京卫星影像+明清北京水系

2.1.2.3 – **Development and Evolution of Water System in Beijing**
北京水系发展变革

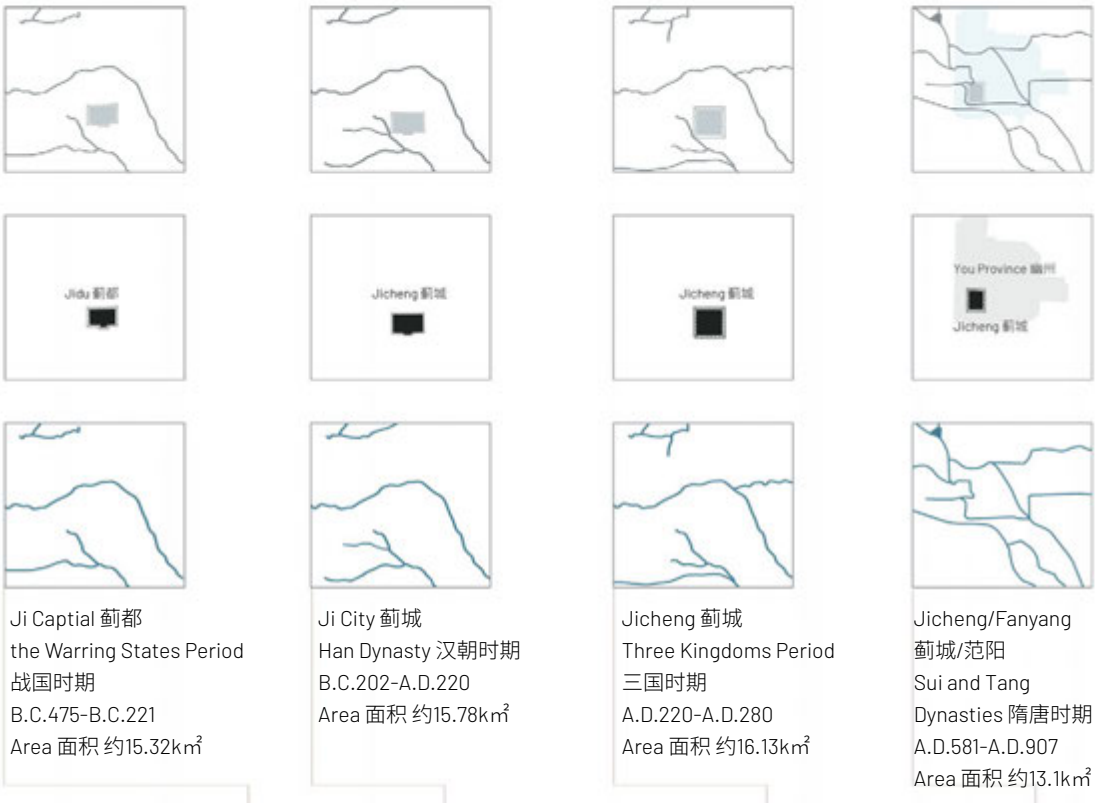
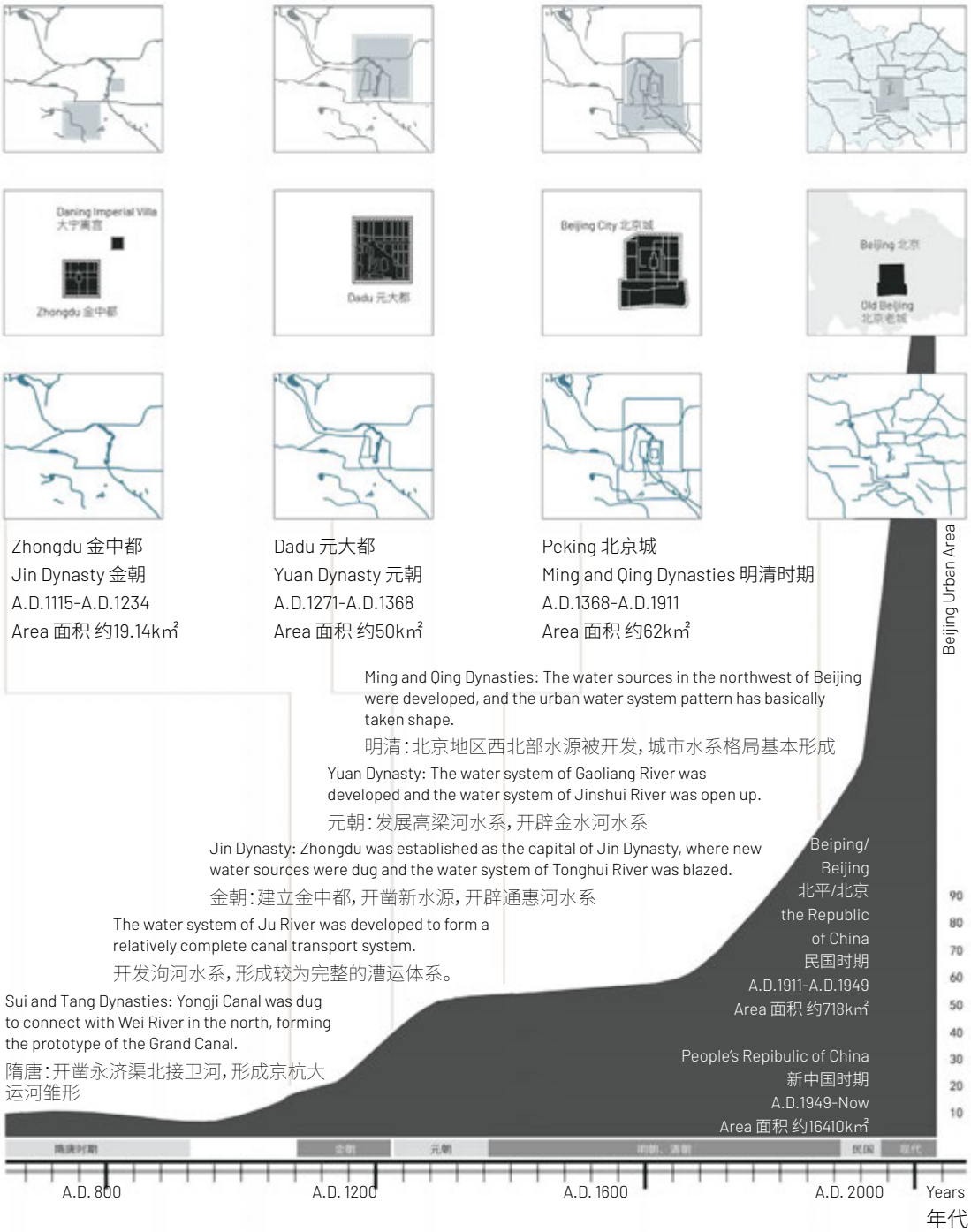


FIG. 2.7 A Map of Modern Beijing + Water Systems in Beijing in Ming and Qing Dynasties
现代北京地图+明清北京水系


Daning Imperial Villa
大宁离宫
Zhongdu 金中都
Dadu 元大都
Beijing City 北京城
Beijing 北京
Old Beijing
北京老城
Zhongdu 金中都
Jin Dynasty 金朝
A.D.1115-A.D.1234
Area 面积 约19.14km²
Dadu 元大都
Yuan Dynasty 元朝
A.D.1271-A.D.1368
Area 面积 约50km²
Peking 北京城
Ming and Qing Dynasties 明清时期
A.D.1368-A.D.1911
Area 面积 约62km²
Ming and Qing Dynasties: The water sources in the northwest of Beijing were developed, and the urban water system pattern has basically taken shape.
明清：北京地区西北部水源被开发，城市水系格局基本形成
Yuan Dynasty: The water system of Gaoliang River was developed and the water system of Jinshui River was open up.
元朝：发展高梁河水系，开辟金水河水系
Jin Dynasty: Zhongdu was established as the capital of Jin Dynasty, where new water sources were dug and the water system of Tonghui River was blazed.
金朝：建立金中都，开凿新水源，开辟通惠河水系
The water system of Ju River was developed to form a relatively complete canal transport system.
开发沟河水系，形成较为完整的漕运体系。
Sui and Tang Dynasties: Yongji Canal was dug to connect with Wei River in the north, forming the prototype of the Grand Canal.
隋唐：开凿永济渠北接卫河，形成京杭大运河雏形
Beiping/ Beijing
北平/北京
the Republic of China
民国时期
A.D.1911-A.D.1949
Area 面积 约718km²
People's Repibulic of China
新中国时期
A.D.1949-Now
Area 面积 约16410km²
Beijing Urban Area
北京城面积(㎢)
90
80
70
60
50
40
30
20
10
隋唐时期
金朝
元朝
明朝、清朝
民国
现代
A.D. 800
A.D. 1200
A.D. 1600
A.D. 2000
Years
年代

2.1.2.4 – **Detail Introduction about the Development and Evolution of Water System in Beijing**
北京水系发展变革详细介绍

Three Kingdoms Period: For the first time, Ji Region received large-scale irrigation to open up farmland, divert water from Yongding River and built Liling Weir as commanded by the Cao Wei regime in the purpose of consolidating defense in the northern border during the. Also, Chexiang Canal was dug for the first time to connect the upper stream of Gaoliang River.

Jin Dynasty: Jin Dynasty set capital in the region of Jicheng to make it become a political center. In order to build the imperial palace and introduce water sources, more water sources around the city were opened up and Tonghui River was developed. These efforts contributed to the initial shape of the water system pattern in the urban area of Beijing today.

三国时期：曹魏政权为巩固北部疆域边防，首次在蓟地区进行大规模灌溉以开垦农田，分流永定河构筑戾陵堰，并首次开凿车厢渠以连接高粱河上源。

金朝：金朝在蓟城地区设置国都，使其逐渐转变为政治中心。为建设宫城、引进水源，在城区周边开辟更多水源地并且开发通惠河，初步形成了现今北京城区的水系格局。

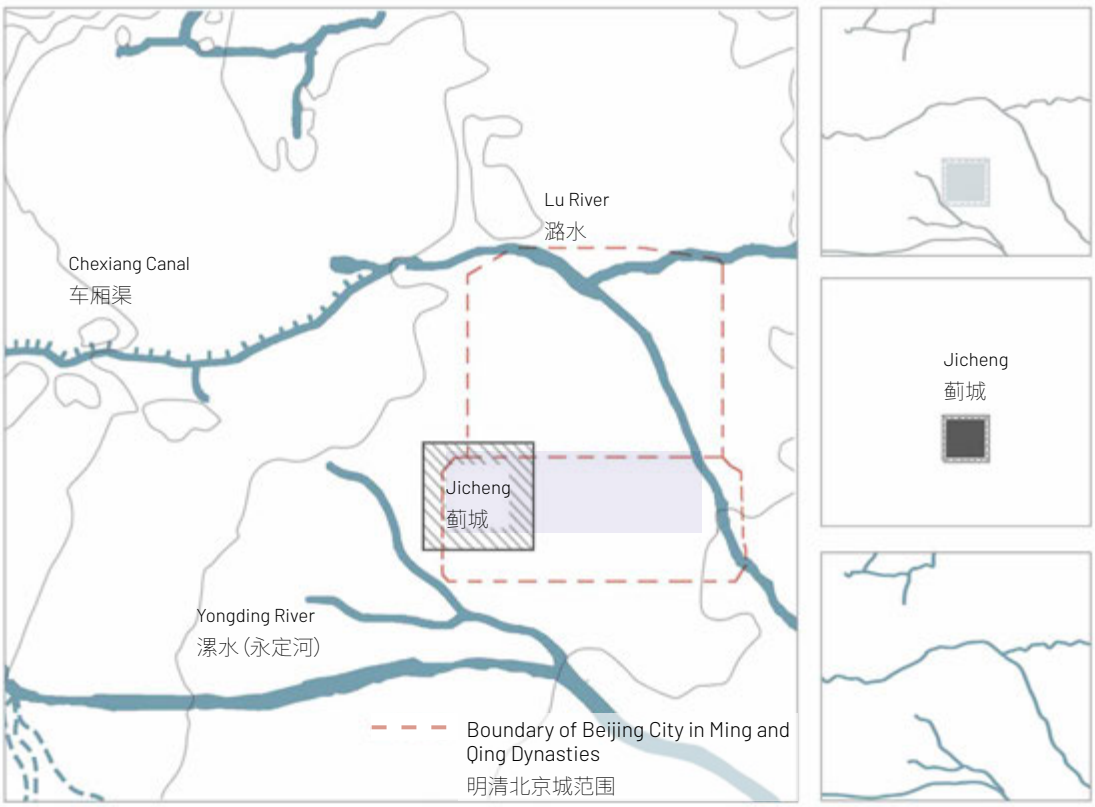


FIG. 2.8 Relationship between Beijing City and the Water System during theThree Kingdoms Period
三国时期北京城与水系关系图

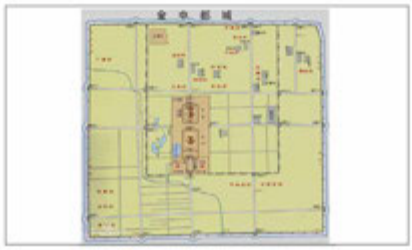


FIG. 2.10 Layout of Zhongdu in Jin Dynasty, in 1154
金中都平面图，1154年

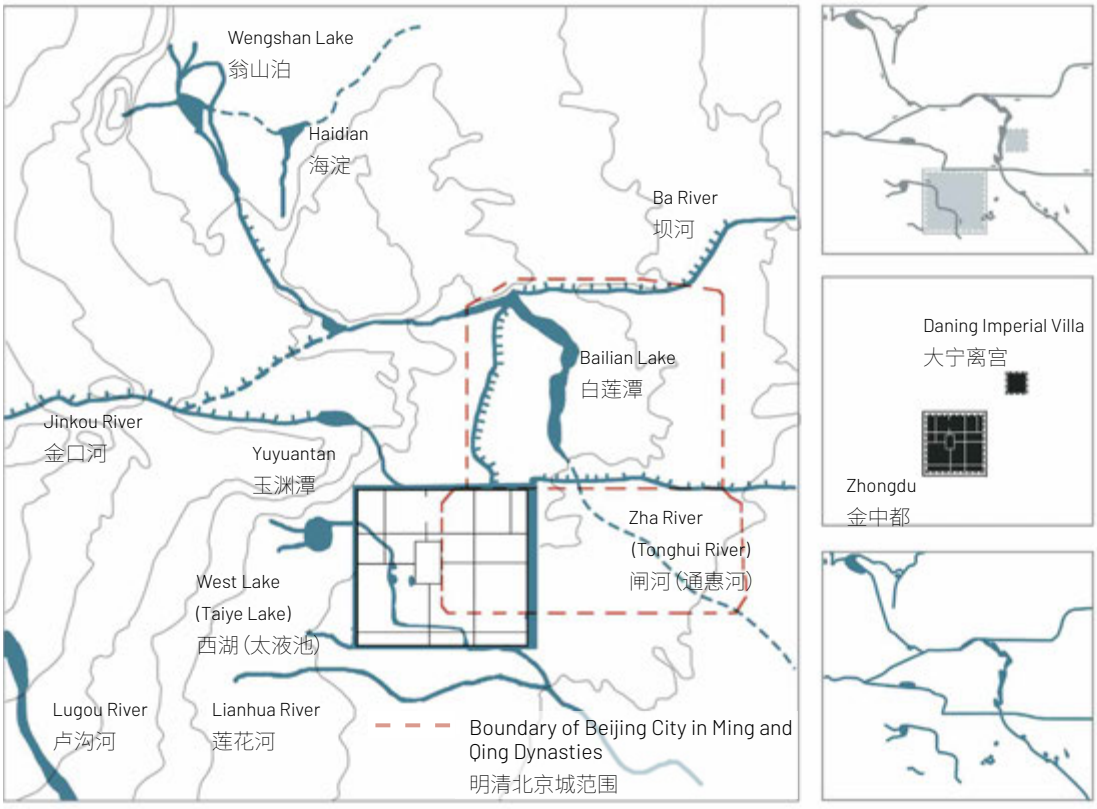


FIG. 2.9 Relationship between Beijing City and the Water System during the Jin Dynasty
金代时期北京城与水系关系图

Yuan Dynasty: The capital was farther north than Zhongdu (capital of Jin Dynasty) during the rule of Kublai Khan in Yuan Dynasty, and with its scale expanded, it required more utilization of the water system of Gaoliang River as a water source. The water system of Jinshui River was dug both inside and outside the city at the same period.

元朝：元世祖时期，都城位置相较于金中都北移，扩大了规模格局，需要更多的利用高梁河水系作为水源。同时期，在城区内外开凿金水河水系。

FIG. 2.12 Layout of Dadu in Yuan Dynasty, in 1268
元大都平面图，1268年

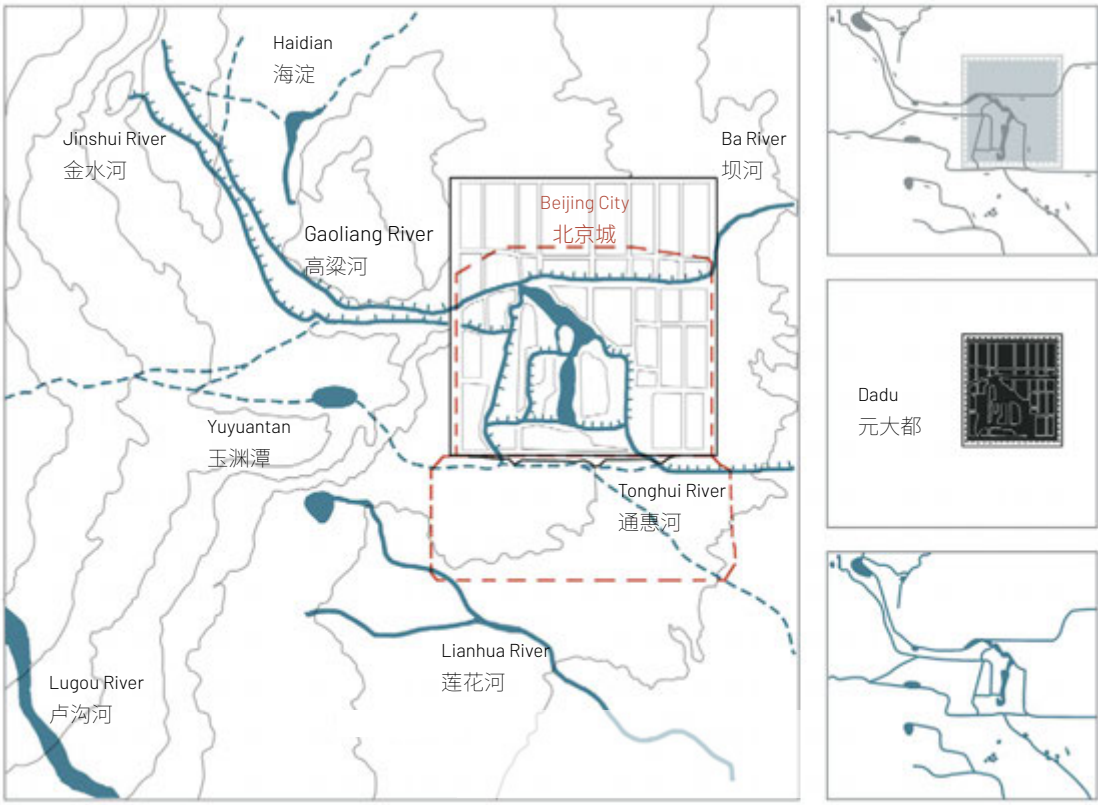


FIG. 2.11 Relationship between Beijing City and the Water System during the Yuan Dynasty
元代时期北京城与水系关系图

Ming and Qing Dynasties: A water system pattern basically took shape in Ming and Qing Dynasties, and the water systems on the west side of the urban area were built as water sources for landscaping in the Imperial City. Water gardens such as the Old Summer Palace and the Summer Palace were built.

明清时期：京城地区水系格局基本形成，并且建设城区西侧的各处水系作为营造皇城景观的水源，设置圆明园、颐和园等水景园林。

FIG. 2.14 Layout of Beijing City in Qing Dynasty, in 1890
清朝北京城平面图，1890年

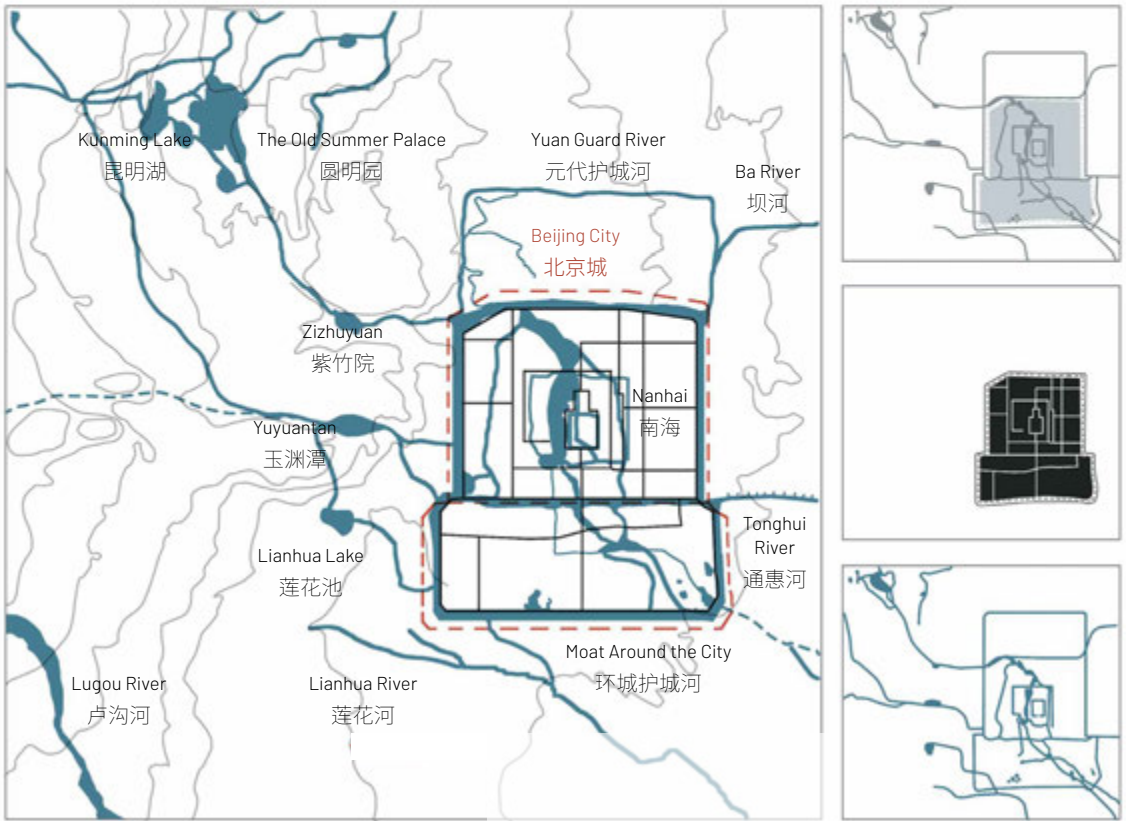


FIG. 2.13 Relationship between Beijing City and the Water System during the Qing Dynasty
清朝时期北京城与水系关系图

2.1.2.5 – **Beijing VS. Modern Metropolises**
北京与现代大都市对比

Beijing
北京

Beijing. Rivers take on a circular distribution pattern due to human activities. Lake clusters are linked in series and are connected to the downtown through diversion canals. The river courses of water systems are in line with the urban texture and show a tendency of decline due to urban development.

北京。河流因人类活动呈环状分布，以成群的湖泊相互串联，并通过引水渠与中心城区相联系。水系河道顺应城市肌理，但却因城市的发展而面临衰退的趋势。

London
伦敦

London. With the River Thames running through the city, the main developmental direction is vertical to the river direction. The river and the city meet in a tortuous boundary, which increases the contact surface between the waterfront green space and the city, and strengthens the radiation effect range of waterfront area to the city.

伦敦。泰晤士河从中穿越，城市中心区直接滨水，城区主要发展方向与河流走向相垂直。河流与城市的接触边界曲折，使得滨水绿地与城市的接触面增加，扩大滨水区对城市的辐射影响范围。

Tokyo
东京

Tokyo. The water system of Sumida River that connected Tokyo Bay with water courses inside the city starts from the port of Tokyo Bay and surrounds the core metropolitan area via Kita-Senju and the Prince area. There are few river branches and the boundaries between them and the urban area are clear.

东京。城内河道连接东京湾的隅田川水系，从东京湾港口开始，途径北千住和王子地区，环绕着东京都市圈的核心地区，河流分支较少，与城市区域的边界界定分明。

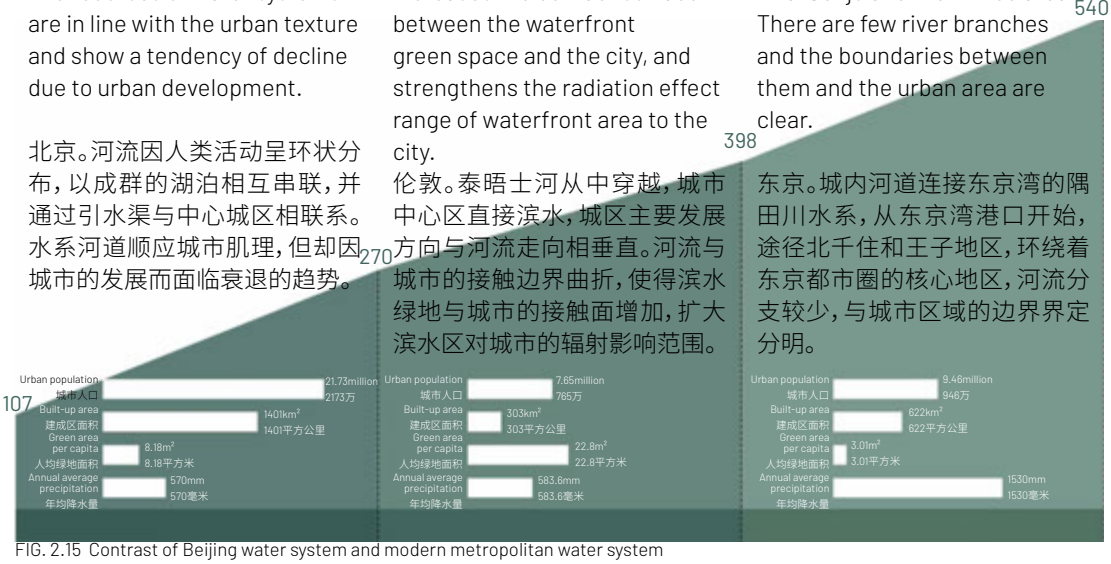


FIG. 2.15 Contrast of Beijing water system and modern metropolitan water system
北京水系与现代大都市水系对比

Washington
华盛顿

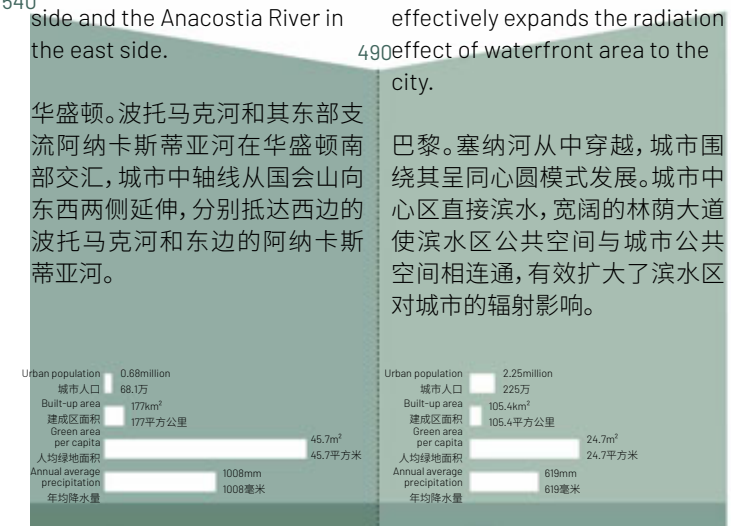
Washington, D. C. The Potomac River and its eastern tributary, the Anacostia River, meet in the south of Washington, D. C. The urban central axis of the city extends from the Capitol Hill to the Potomac River in the west side and the Anacostia River in the east side.

华盛顿。波托马克河和其东部支流阿纳卡斯蒂亚河在华盛顿南部交汇，城市中轴线从国会山向东西两侧延伸，分别抵达西边的波托马克河和东边的阿纳卡斯蒂亚河。

Paris
巴黎

Paris. The Seine runs through the city which develops in a concentric pattern. The downtown is directly waterfront, and the connection of public waterfront space with urban public space by wide boulevards effectively expands the radiation effect of waterfront area to the city.

巴黎。塞纳河从中穿越，城市围绕其呈同心圆模式发展。城市中心区直接滨水，宽阔的林荫大道使滨水区公共空间与城市公共空间相连通，有效扩大了滨水区对城市的辐射影响。



The comparisons between Beijing and other international metropolises in terms of water system patterns and urban spatial structure show that river systems dominate the development directions of cities and decide their overall spatial structures as cities come into being and develop. Rivers are the veins of cities, and areas along rivers become centers of urban life.

通过北京与其他国际大都市的水系格局与城市空间结构对比可以看出，在城市形成和发展时期，河流水系主导了城市的发展方向，决定城市整体空间结构。城市以河流水系为脉络，城市将河流沿岸作为中心生活区域。

After the Industrial Revolution, concentric urban spatial structure became universal. That is, the roads extended from the city center in the form of circle layer. Cities shifted from axial development along river systems to monocentric expansion, and river systems were detached from urban spatial structures.

工业革命后，城市空间结构普遍表现为同心圆模式，即以城市中心为基点，沿道路以圈层形式向外拓展。城市由沿河流水系轴向发展转变为单中心扩张，河流水系与城市空间结构脱离。

Nowadays, water system of rivers in cities come back to the spotlight.

而今，城市河流水系再度受到人类的重视。

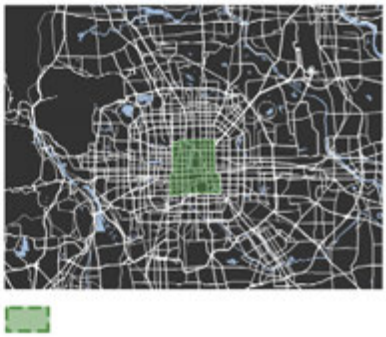
2.1.2.6 – **A Comparison of Water Systems in Ancient Capitals**
古代都城水系对比

Beijing
北京

Beijing, once the capital of the Ming and Qing Dynasties, has urban water systems that are basically preserved from history, but some rivers have been destroyed and some have disappeared, gradually thinning the historical and cultural atmosphere.

北京，明、清北京，北京城市水系肌理基本承袭历史脉络，但部分河流遭到破坏消失，历史文化氛围逐渐衰微。

Beijing in Ming and Qing Dynasties
明、清北京



Boundary of Beijing in Ming and Qing Dynasties
明、清北京范围

Nanjing
南京

Nanjing, once the capital of the Ming Dynasty, is backed by the water system of the Yangtze River and has a profound historical and cultural background. However, the river network has been divided step by step due to urban development, presenting a fragmented pattern.

南京，明代南京，城市背靠长江水系，有着深厚的历史文化背景。然而由于城市发展河流网络逐渐被分割，呈现碎片化趋势。

Nanjing in Ming Dynasty
明代南京

Boundary of Nanjing in Ming Dynasty
明南京范围

Hangzhou
杭州

Hangzhou, also known as Lin'an in Southern Song Dynasty, is attached to the water system of Qiantang River. Its texture of urban water system, historical and cultural atmosphere, and water ecological environment have been well preserved and suffer little damage in the urban development process.

杭州，南宋临安，城市依附于钱塘江水系，其水系肌理、历史文化氛围和水域生态环境均得到了较好的保护，在城市发展过程中受到的破坏较小。

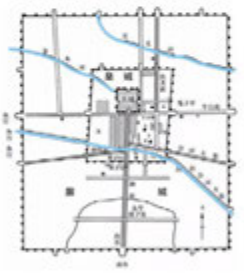
Lin'an in Southern Song Dynasty
南宋临安

Boundary of Lin'an in Southern Song Dynasty
南宋临安范围

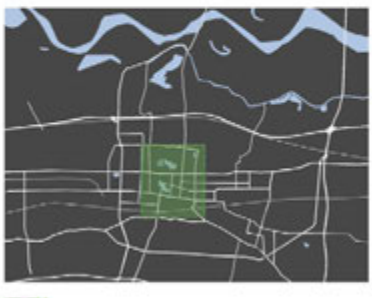
Kaifeng
开封

Kaifeng, also known as Dongjing in Northern Song Dynasty, mainly relies on the water system of the Imperial River which connects many historical relics inside and outside the city and makes the city immersed in a thick historical atmosphere. However, problems brought by urban development such as fragmentation are emerged and the water culture has a tendency to decline.

开封，北宋东京，城市水系以御河水系为主，连接城内外诸多历史遗迹景观，整体历史文化氛围较浓厚，也面临着城市发展带来的碎片化等问题，水文化存在衰退的趋势。



Dongjing in Northern Song Dynasty
北宋东京



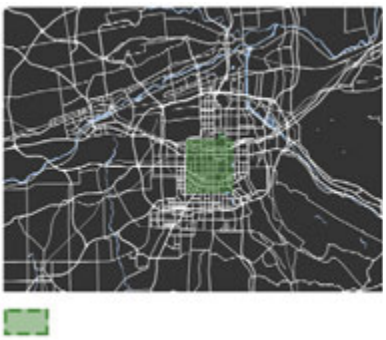
Boundary of Dongjing in Northern Song Dynasty
北宋东京范围

Xi'an
西安

Xi'an, also known as Chang'an in Tang Dynasty, is part of the water system of Wei River. Changes mainly occurred to the downstream section during the development and evolution of the river course. The urban water systems are mainly faced with such problems as historical and cultural protection, flood control, and erosion prevention.

西安，唐长安，城市处于渭河水系，河道发展变迁主要集中于下游段，其水系主要面临历史文化保护和防洪防侵蚀等方面问题。

Chang'an in Tang Dynasty
唐长安



Range of Chang'an in Tang Dynasty
唐长安范围

The ancient capitals of China were mostly built near the mountain and by the river, and cities were born, beautiful and prosperous thanks to water. They were inseparable from river systems. River systems met various needs of cities for water: drinking, sewage disposal, landscaping, transportation, defense, and other basic needs. During the development process of ancient capitals, water environment and urban development were interactive mutually .

中国古代都城几乎都是依山傍水而建，城市因水而生、因水而美、因水而兴，城市的发展与河流水系有着密不可分的联系。河流水系满足了城市对水的各种需求：基本的饮水、排污、园林美化、运输和防御等，在古代都城的发展过程中，水环境变迁对城市发展有显著影响，同时城市发展对水环境也有相应的影响，二者之间存在耦合关系。

Regard to the interaction of ancient capitals and river systems in China, cities are in the positive status. The ancient people were active to improve the urban water environment, while the alteration of water systems also had profound influence on urban construction. The interaction between city and water was thus upgraded to the cultural level. The experience of adapting to, utilizing, and transforming nature in the construction of ancient cities in China met with the philosophical thought of "unity of heaven and man" in ancient urban planning, the holistic thinking of unity of opposites, the construction method towards local conditions, and the concept of sustainable development.

在中国古代都城与河流水系的互动中，城市处于积极地位。古人有意识地主动改善城市水环境，同时城市水系的变更也对城市建设有着深远影响，城市与水之间的相互作用被提升到文化层面的高度。古代城市建设中有关适应、利用、改造自然的经验，体现出中国古代城市规划"天人合一"的哲学思想、对立统一的整体思维、因地制宜的建设方法和可持续发展等理念。

2.1.2.7 – **Overall Positioning of Beijing Waterfront Space**
总体北京滨水空间定位

Create a waterfront space shared by all
塑造全民共享的滨水空间

Ensure that different parts of the city can enjoy the blue network system of Beijing waterways.

确保城市的不同部分均能够享受北京水路横贯的蓝网系统。

Create a well-defined waterfront space
塑造分级明确的滨水空间

Interpret the different roles that each water system plays in the city and play its different roles in the city.

解读各水系在城市中所扮演的不同角色，发挥其在城市中的不同作用。

Create a waterfront space that inherits history
塑造传承历史的滨水空间

Give the waterfront space the historical value it contains.

为滨水空间赋予水系所蕴含的历史价值。

Create a waterfront space that is both cozy and dry
塑造丰枯兼容的滨水空间

Pay attention to the seasonal changes in the water system, and incorporate landscape treatment, public use and flood control measures into the design of different seasons.

重视水系的季节变化，将景观处理、公共使用和防洪措施纳入不同季节的设计中。

Creating a waterfront space that conserves water resources
塑造涵养水资源的滨水空间

Improve the ecological and landscape performance of the network and link the waterfront space design with the improvement of environmental conditions.

提高网络的生态和景观性能，将滨水空间设计与环境条件的改善联系起来。

FIG. 2.16 Current situation of some waterfront areas in Beijing
北京部分滨水地区现状

2.2 – Judge

2.2 – 判

2.2.1 – **Research Overview**
调研概述

The research is consist of four phases. Firstly, by visiting 60 rivers and lakes in Beijing, we evaluate all the visited river channel and summarize the existing problems into three types: land use, ecological environment and infrastructure, and behavior and activities, which are then further divided into sixteen sub-types, such as the conflict between land use and urban upgrades, too unitary river ecological restoration method, etc.; secondly, the research perspective is determined, and the characteristics of the relationships among functional orientation, ecological landscape, road traffic, history and culture, and behavior and activities in water system and waterfront areas are summarized; thirdly, the four research principles of ecology first, ecological revival, morphological analysis, and location shaping are proposed; finally, a value analysis is made to determine research strategies.

整个研判过程分为四个阶段。首先，通过走访北京市内60条河流及湖泊，对每条调研河道进行评价，将其现状存在的问题概括为三大类：土地利用层面、生态环境及基础设施层面、行为活动层面，并将其详细的分为土地利用与城市更新相矛盾、河道生态恢复手段过于单一等十六小类问题。其次，确定研究视角，总结了水系与滨水区功能定位、生态景观、道路交通、历史文化、行为活动五个方面特征之间的关系。再次，提出了“生态优先、生态复兴、形态梳理、场所塑造”四个研究原则。最后进行价值研判，确定研究策略。

2.2.1.1 – Summary of Current Problems
现状问题总结

TABLE 1.1 Table of Summary of Current Problems

现状问题总结表

Category 类别	Current Problems 现状问题
Land Use 土地利用层面	The conflict between land use and urban renewal is serious. 土地利用与城市更新冲突较大 The development intensity around the waterfront space is not reasonable. 滨水空间周边开发强度不合理 Traffic isolation is serious.. 交通隔离情况严重，土地利用出现问题 The waterfront lacks of overall planning. 滨水空间缺乏统筹性，线性衔接不够紧密 Lack of place spirit and historical sense. 要素提取不够明确，削弱了场所感和历史感 The gray space around the water system is not handled properly. 水系周边灰空间处理不恰当
Ecological Environment and Infrastructure Level 生态环境及基础设施层面	The method of ecological restoration is too simple. 河道生态恢复手段过于单一 Poor water quality. 水质问题严重 The connection between gray infrastructure and green infrastructure is not enough. 灰绿基础设施没有结合 Water system network haven't formed due to the beheaded rivers. 断头河较多，总体未形成网络 The conflict between historical rivers and traffic is serious. 历史水系与交通枢纽交叉处处理手法过于简单
Behavior and Activity Level 行为活动层面	Spatial form and activity form do not match. 空间形式与使用活动不匹配 Waterfront space continuity is weak. 滨水空间连续性较弱 Poor hydrophilicity, poor accessibility. 亲水性差，无法进入滨水空间 Little view for the leisure water tour course. 休闲游览水系的游览路线无景可游 Lack of public participation channels. 缺少公众参与的渠道

2.2.1.2 – Summary of Current Characteristics
现状特征总结

TABLE 2.2 Table of Summary of Current Characteristics

现状特征总结表

Category 类别	Current Characteristics 现状特征
Characteristic 1—— Water system and function 特征1——水与功能区位	Unable to meet the needs of contemporary society 时代需求的匹配性差 The water body takes multiple functions. 水体承载功能较多
Characteristic 2—— Water system and ecology landscape 特征2——水与生态景观	Water body and greening separate seriously. 水体与绿化分离严重 Water body orginated from gardens. 水体成因与园林关系密切 The city is surrounded by attractive sceneries of mountains and rivers. 山环水绕的画面感强
Characteristic 3——Water system and traffic system 特征3——水与道路交通	The water system is divided by transportation and has poor continuity. 支离破碎，连续性差 People couldn't enjoy the sceneries while traveling on the water. 水上交通无景可游 Water system conflicts with traffic system seriously. 水网与交通网冲突大
Characteristic 4——Water system and history culture 特征4——水与历史文化	The sense of history fades gradually. 历史感消退 Planty of culture possessions have been accumulated in water-front system. 文化积淀仍在
Characteristic 5——Water system and activities 特征5——水与行为活动	Public spaces are of poor cuality and low quantity. 场所质量差，数量少 The layout of the waterfront activity space could hardly reflect the aesthetic characteristics. 滨水活动空间节奏感差 Some of the waterfront space is not open to the public. 滨水空间“围墙化” Different types of water systems show different iated activity features. 不同功能水系活动具有极强的典型性

2.2.2 – **Current Value Evaluation**
现状价值评价

First Class 一级	Second Class 二级	Synthetic Weight 综合权重	Index Level 指标层	Weight 权重
Ecological Value 生 态 价 值	Water 水体	0.368	Water Quailty水质	0.318
			Water Quantity水量	0.417
			Groundwater地下水	0.285
	Green 绿化	0.510	Category种类	0.059
			Ratio Of Green Space绿地率	0.392
			Corridor Width廊道宽度	0.305
			Degree Of Fragmentation破碎度	0.124
			Ratio Of Water To Green水绿比	0.120
	Creature 生物	0.120	Diversity多样性	0.580
			Habitat栖息地	0.419
Space Value 空 间 价 值	Interface 界面	0.490	Water Quailty天际线韵律	0.130
			Building Facade建筑立面	0.130
			Building Scale建筑尺度	0.155
			Water Front滨水界面	0.280
			Open Space开放空间	0.307
	Water Front 岸线	0.282	Style Of Water岸线形式	0.331
			Gradient Of Water Front岸线梯度	0.136
			Material Of Water Front岸线材质	0.531
	Transportation 交通	0.286	External Transport外部交通	0.410
			Internal Transport内部步道	0.427
			Water Transport水上交通	0.161
Demand Value 需 求 价 值	Usage Needs 使用需求	0.547	Accessibility可达性	0.220
			Involvement参与度	0.160
			Bearing Capacity活动承载力	0.280
			Richness丰富性	0.161
			Convenience便利性	0.180
	Emotional Needs 情感需求	0.450	Sense Of Security安全感	0.250
			Belonging归属感	0.348
			Privacy私密性	0.140
			Sense Of Place场所感	0.270
History Value历史价值		0.120	History历史	0.120
Economic Value 经 济 价 值	Supply 供给	0.343	Industry Water Supply工业供水	0.280
			Domestic Water生活用水	0.430
			Agriculture Water农业灌溉	0.318
	Service 服务	0.288	Store Floodwater蓄洪防灾	0.427
			Purify净化调节	0.573
	Addition 附加	0.370	Land Price地价	0.170
			Building Density建筑密度	0.340
			Collocated Function功能配置	0.380
			Labor劳动力	0.110
Aesthetic Value 美 学 价 值	Culture 文化	0.580	Geographical Feature地域特征	0.384
			Historical Memory历史记忆	0.289
			Symbol符号	0.237
	Nightscape 夜景	0.120	Systematic系统性	0.453
			Identification可识别性	0.550
	Landscape 景观	0.318	Optic Center视觉中心	0.399
			Color Matching色彩搭配	0.240
			Facility Characteristic设施特色	0.380

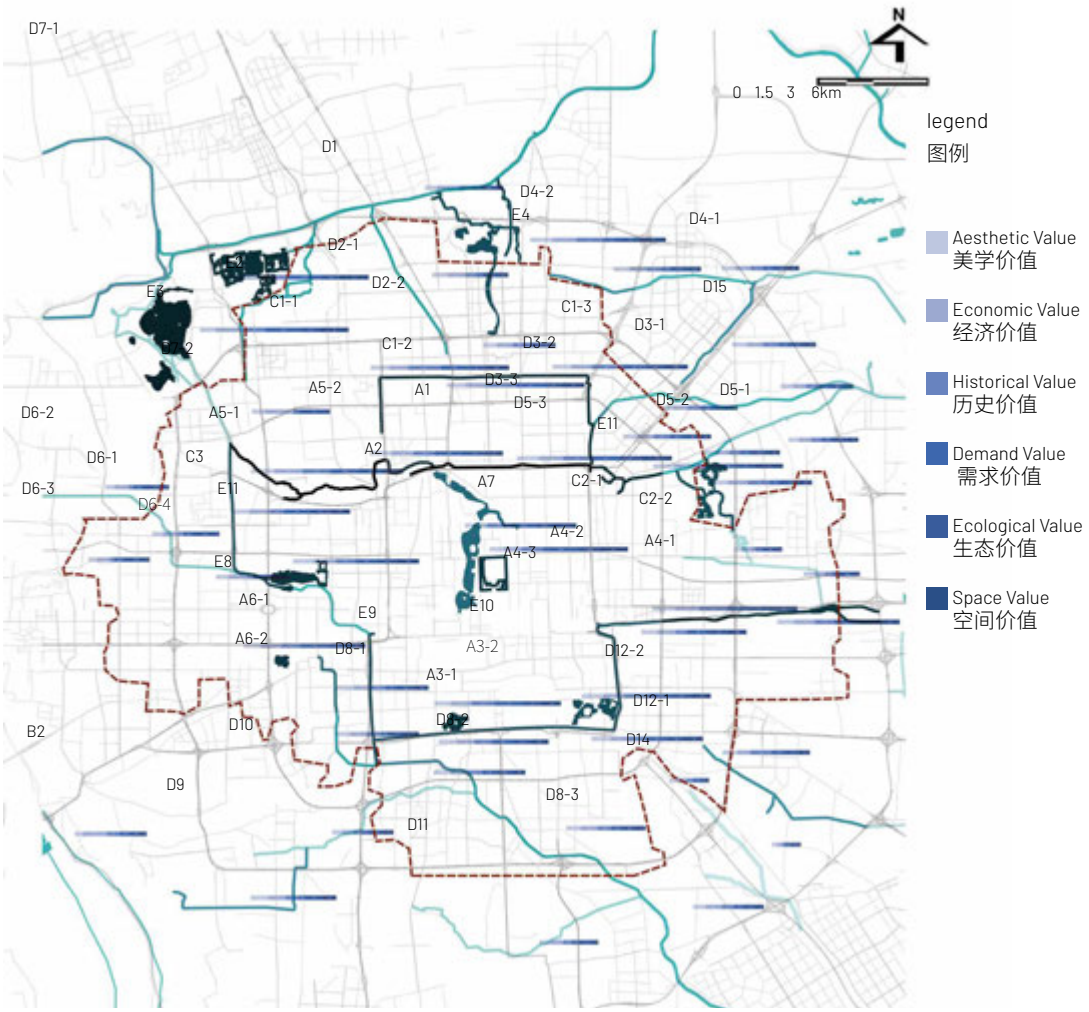


FIG. 2.17 A Map of Current Status Value
现状总价值评价图

2.2.3 – **Slow -Traffic System**
水系代码

Water Systems 水系	River Name 河名	Code Name 代号	River Section 水系分段	Code Name 代号
Six Seas And Eight Rivers A 六海八水A	North Moat北护城河	A1	North Moat北护城河	A1
	Six Seas (Shichahai) 六海 (什刹海)	A2	Six Seas (Shichahai)六海 (什刹海)	A2
	South Moat 南护城河	A3	Guang'an Menwai Street-Yongding Menwai Street Section 广安门外大街-永定门外大街段	A3-1
			Yongding Menwai Street-Tonghui Hebei Section 永定门外大街-通惠河北路段	A3-2
	Ronghui River 通惠河	A4	East Five-East Fourth Ring Section东五环-东四环段	A4-1
			East Fourth Ring-East Third Ring Section东四环-东三环段	A4-2
			East Third Ring-East Second Ring Section东三环-东二环段	A4-3
	Nanchang River 南长河	A5	Kunyuhe-Xizhimen Waijie Street Section昆玉河-西直门外大街段	A5-1
			Xizhimen Wai Street - Deshengmen Wai Street Section 西直门外大街-德胜门外大街段	A5-2
	Lianhua River 莲花河	A6	North Section of Honglian South Road红莲南路以北段	A6-1
			South Section of Honglian South Road红莲南路以南段	A6-2
	Tongzi River筒子河	A7	Tongzi River筒子河	A7
Two Corrdors B 两廊B	Wenyu River温榆河	B1	Wenyu River温榆河	B1
	Yongding River永定河	B2	Yongding River永定河	B2
Two Rings C 两环C	Tucheng River 土城沟	C1	College Road-Beijing-Tibet Expressway Section学院路-京藏高速段	C1-1
			Beijing-Tibet Expressway-Anding Section京藏高速-安定路段	C1-2
			Anding Road-Jingcheng Expressway Section安定路-京承高速段	C1-3
	Erdao River 二道沟	C2	East Five-East Fourth Ring Section东五环-东四环段	C2-1
			East Fourth Ring-East Third Ring Section东四环-东三环段	C2-2
	Kunyu River昆玉河	C3	Kunyu River昆玉河	C3
Multiple Branches D 多支线D	Qing River清河	D1	Qing River清河	D1
	Xiaoyue River 小月河	D2	North Five-North Fourth Ring Section北五环-北四环段	D2-1
			North Fourth Ring-North Third Ring Section北四环-北三环段	D2-2
	Bei River 坝河	D3	East Five Ring-North Fourth Ring Section东五环-北四环段	D3-1
			North Fourth Ring-North Third Ring Section北四环-北三环段	D3-2
			North Third Ring-North Second Ring Section北三环-北二环段	D3-3
	Beixiao River 北小河	D4	Beiwuhuan-Jingcheng Expressway Section北五环-京承高速段	D4-1
			Beijing-Chengdu Expressway-Beiyuan Section京承高速-北苑路段	D4-2
	Liangma River 亮马河	D5	East Five-East Fourth Ring Section东五环-东四环段	D5-1
			East Fourth Ring-East Third Ring Section东四环-东三环段	D5-2
			East Third Ring-East Second Ring Section东三环-东二环段	D5-3
	Yongding River 永定河引水渠	D6	External Segment of The Western Fifth Ring西五环外段	D6-1
			West Five-West Fourth Ring Section西五环-西四环段	D6-2
			West Fourth Ring-West Third Ring Section西四环-西三环段	D6-3
			West Sanhuan-Kunyu Reach西三环-昆玉河段	D6-4
	Jingmi River 京密引水渠	D7	North Five Ring-Kunming Lake Section北五环-昆明湖段	D7-1
			Outer Segment of The North Fifth Ring北五环外段	D7-2
	Liangshui River 凉水河	D8	Lianhuahe-Nansanhuan Sectiont莲花河-南三环段	D8-1
			South Third-South Fourth Ring Section南三环-南四环段	D8-2
			Outer Segment of South Fourth Ring南四环外段	D8-3

Water Systems 水系	River Name 河名	Code Name 代号	River Section 水系分段	Code Name 代号
Multiple Branches D 多支线D	Macao River马草河	D9	Macao River马草河	D9
	Fengcao River丰草河	D10	Fengcao River丰草河	D10
	Xiaolong River小龙河	D11	Xiaolong River小龙河	D11
	Xiaotaihou River 萧太后河	D12	West of East Fourth Ring东四环以西段	D12-1
			Dayangfang River东四环以东段	D12-2
	Tonghuibei River 通惠北干渠	D13	South Section of East Fourth Ring东五环以西段	D13-1
			The Eastern Section of The Eastern Fifth Ring东五环以东段	D13-2
	Dayangfang River大羊坊沟	D14	Dayangfang River大羊坊沟	D14
Lakes And Parks E 湖泊公园E	Cuihu Wetland Park 翠湖湿地公园	E1	Cuihu Wetland Park翠湖湿地公园	E1
	Old Summer Palace圆明园	E2	Old Summer Palace圆明园	E2
	Summer Palace颐和园	E3	Summer Palace颐和园	E3
	Olympic Forest Park 奥林匹克森林公园	E4	Olympic Forest Park奥林匹克森林公园	E4
	Yuyuantan Park玉渊潭公园	E5	Olympic Forest Park玉渊潭公园	E5
	Six Seas (Shichahai) 六海 (什刹海)	E6	Six Seas (Shichahai)六海 (什刹海)	E6
	Wenyuhe Park温榆河公园	E7	Wenyuhe Park温榆河公园	E7
	Lianhuachi Park莲花池公园	E8	Lianhuachi Park莲花池公园	E8
	Taoranting Park陶然亭公园	E9	Taoranting Park陶然亭公园	E9
	Longtanhu Park龙潭湖公园	E10	Longtanhu Park龙潭湖公园	E10
	Chaoyang Park朝阳公园	E11	Chaoyang Park朝阳公园	E11
	Beijing Garden Expo Garden 北京园博园	E12	Beijing Garden Expo Garden北京园博园	E12

2.2.4 – **Ecological Value** 生态价值

Water-greenness ratio. The relation and characteristics between the water body of Beijing and waterfront green space are analyzed. The water-greenness ratios of near-water space and waterfront space in typical river channels are shown in the right figure.

水绿比：对北京市的水体及邻水绿地之间的关系及特征进行分析，典型河道近水空间及邻水空间的水绿比如下图所示。

FIG. 2.18 Xiaotaihou River:East Forth Ring South Road — River Section in Wuji Road

萧太后河：东四环南路——武基路段

FIG. 2.19 Kunyu River:Cuiwei Road — River Section in Yuanda Road

昆玉河：翠微路——远大路段

FIG. 2.20 Chang River:xizhimen North Street — River Section In The Acoustic Screen Tunnel

长河：西直门北大街——隔音屏隧道段

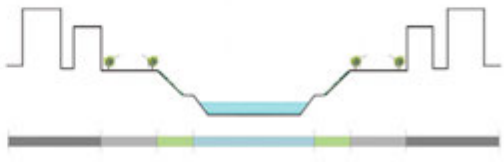


FIG. 2.21 South Moat:West Second Ring Road — River Section in Caishikou Street

南护城河：西二环——菜市口大街段

Water bodies. According to the measurements on multiple indicators, the surface water quality in Beijing can be roughly divided into five types. In 2017, the average groundwater depth in the city was 24.97m. Affected by water quality and water volume, the water environment can be classified into 3 patterns: catchment in shallow mountains, dry-ups in suburbs, and polluted water in urban.

Greening. The existing green space distribution and green corridor boundaries of the water systems in Beijing are shown in the figure. The landscape pattern in the city is greatly influenced by urban construction and should be reshaped through the network construction of water system coordinating the construction of urban water bodies, green spaces and waterfront spaces.

水体：根据对多项指标的测定，北京市地表水水质大体分为五类。2017年，全市地下水平均埋深为24.97m。受水质及水量影响，水环境形成了浅山集水，郊区断流，城区黑臭的三段格局。

绿化：北京市现有绿地分布及水系绿化廊道边界如图所示。城市山水格局受城市建设影响较大，应通过构建水系网络，统筹城市水体、绿地及滨水空间建设，重塑城市山水格局。

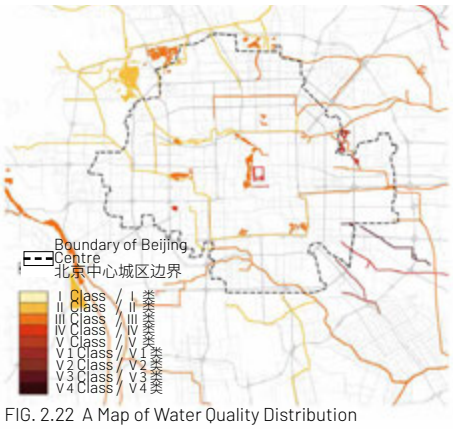


FIG. 2.22 A Map of Water Quality Distribution
水质分布图

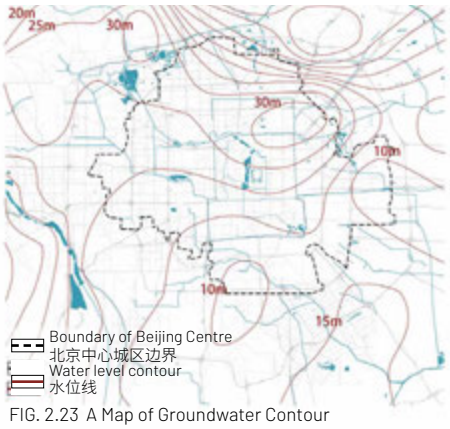


FIG. 2.23 A Map of Groundwater Contour
地下水位等质分布图

FIG. 2.24 A Map of Green Space Distribution
绿地分布图

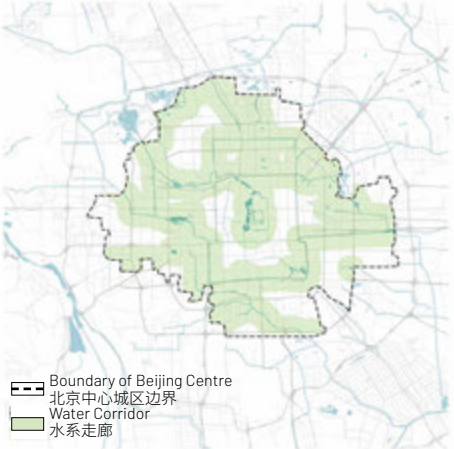


FIG. 2.25 A Map of Corridor Boundaries of Water Systems
水系廊道边界图

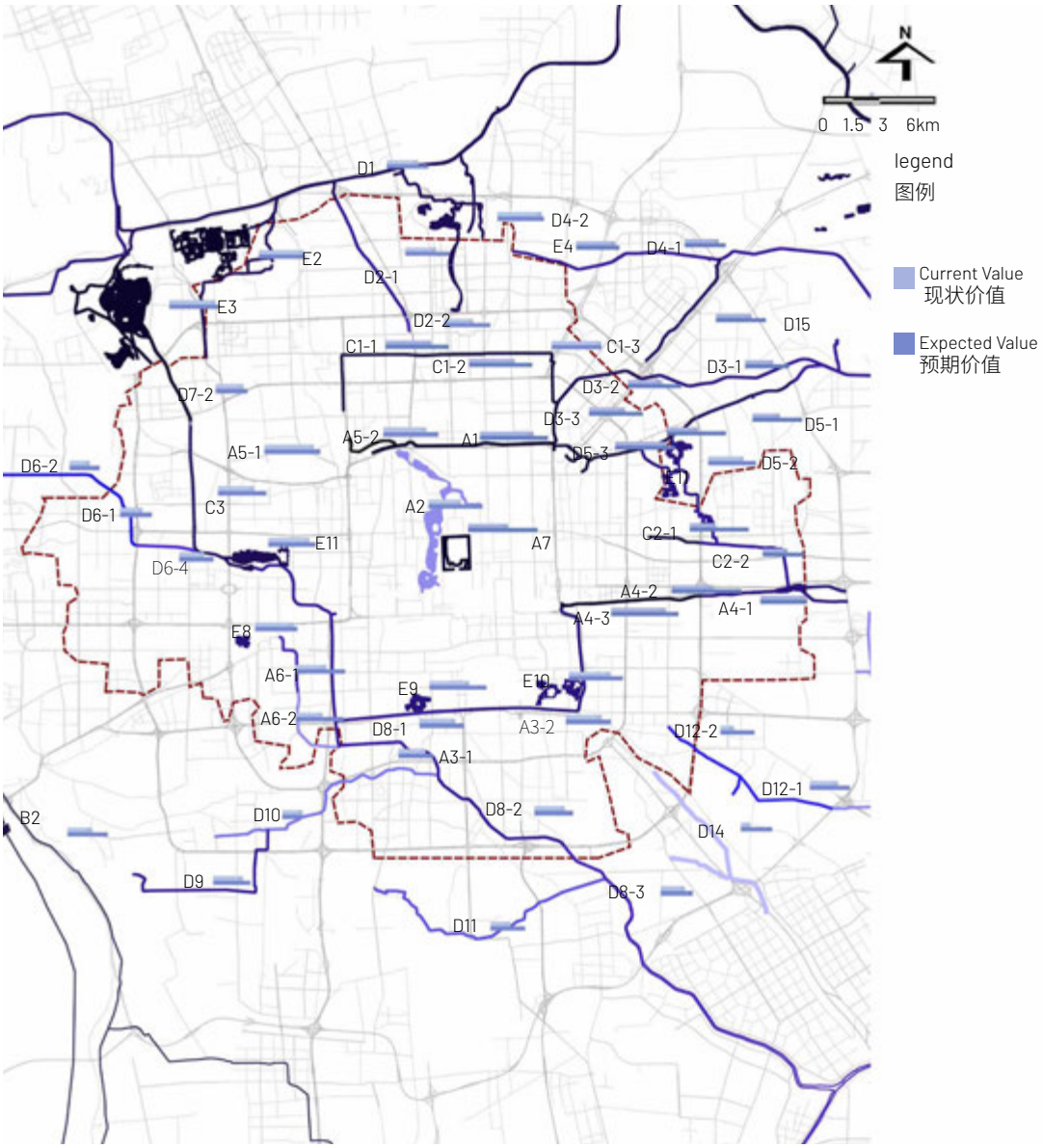


FIG. 2.26 A Map of Space Value Evaluation
生态价值评价图

2.2.5 – **Space Value**
空间价值

2.2.5.1 – Interface Value Evaluation
界面价值评价

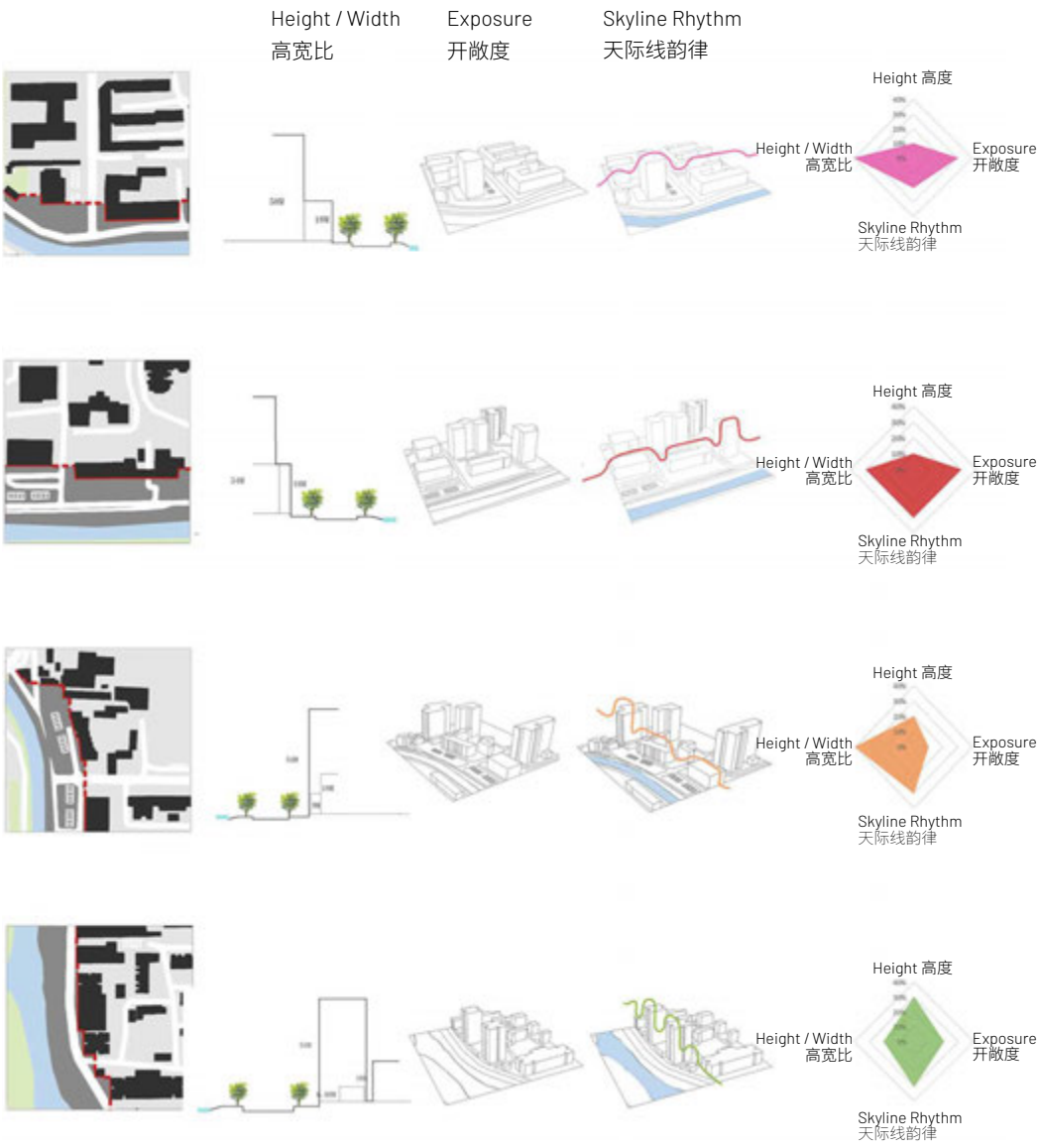
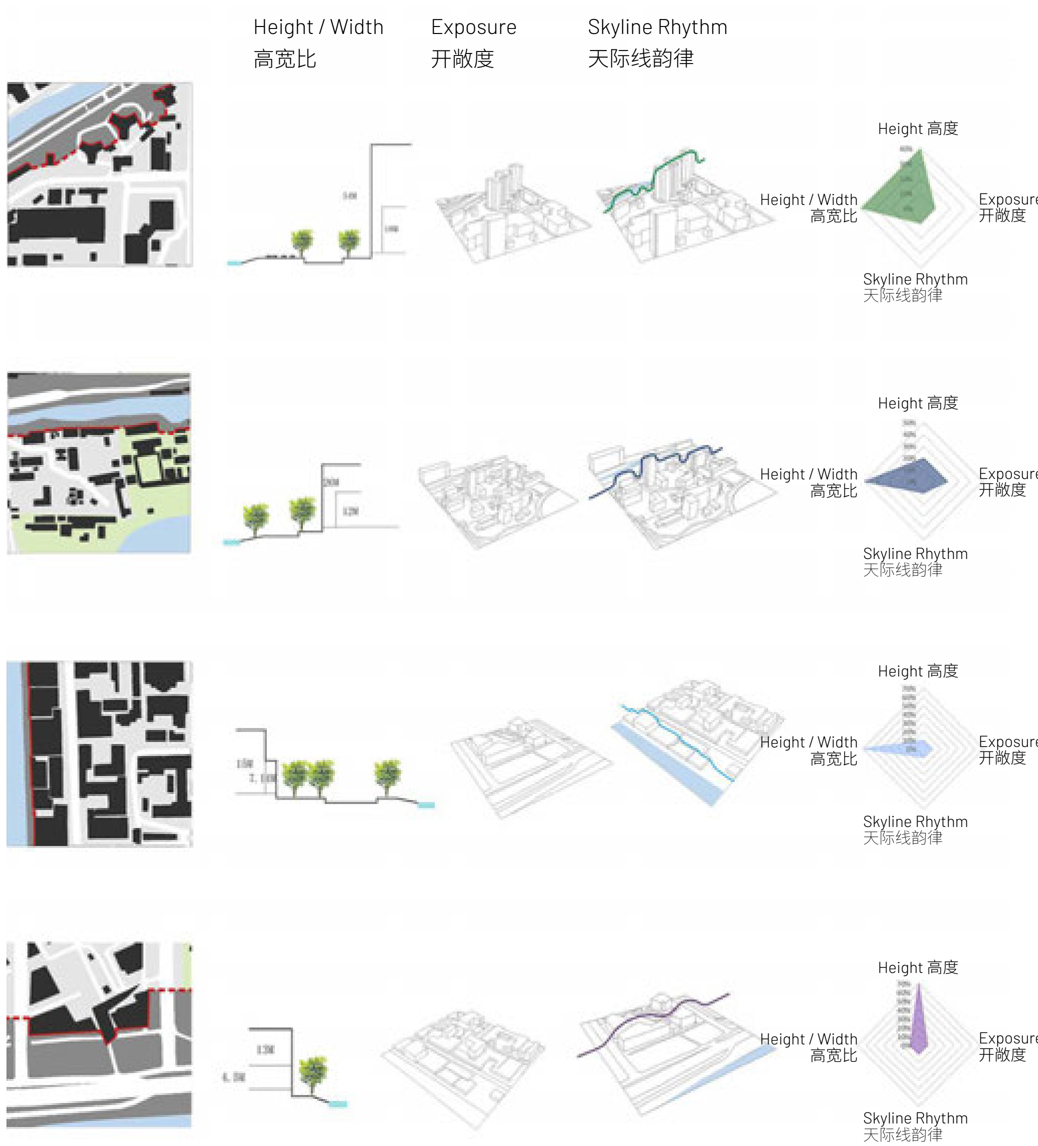


FIG. 2.27 Schematic diagram of interface value evaluation
界面价值评价示意图


Height / Width
高宽比
Exposure
开敞度
Skyline Rhythm
天际线韵律
Height 高度
Height / Width
高宽比
Exposure
开敞度
Skyline Rhythm
天际线韵律

2.2.5.2 – Shoreline Value Evaluation
岸线价值评价

Based on value orientation of landscape science, waterfront shoreline modes in Beijing can be divided into 15 types. The form of waterfront shoreline takes shape in long-term development of the city and water systems with the local, cultural, and long-term evolving characteristics. It is a fragment in the revolution of water system history. As the symbol of a region and a heritage of history, the shoreline should possess the characteristics of attraction, networking, smoothness, walking friendliness, vitality, etc.

滨水岸线，基于景观学的价值取向，可以将北京市的滨水岸线模式分为15种类型。滨水岸线形态是城市及水系长期发展所形成的，具有地方性、文化性、长远性，是水系历史变革中的一个片段。作为地域的标志和历史的传承，岸线应具有吸引力、网络化、流畅性、步行友好和动感活力等特征。

X1 Concrete Canal
X1类混凝土河道

X1Y1 Green Buffer
X1Y1类防护绿地

X1Y2 Sloped Green Flood Protection Buffer
X1Y2类防洪绿坡

X1Y3 Sloped Green Flood Protection Buffer With Linear Path
X1Y3类防洪绿坡和线性路径

X2 Concrete U Shape Canal
X2类混凝土U型河道

X2Y1 Green Buffer
X2Y1类防护绿地

X2Y2 Sloped Green Flood Protection Buffer
X2Y2类防洪绿坡

X2Y3 Sloped Green Flood Protection Buffer With Linear Path
X2Y3类防洪绿坡和线性路径

X2Y6 Green Buffer
X2Y6类防护绿地

X3Y4 Natural Waterline
X3Y4类自然水线

X4Y5 Landscape Covered Concrete U Shape Canal
X4Y5类景观覆盖混凝土U形河道

X4Y7 Natural Flood Protection Buffer
X4Y7类自然防护绿地

X5 Terrain Formed Canal
X5类地形形成的河道

FIG. 2.28 Waterfront Shoreline Modes
滨水岸线模式图

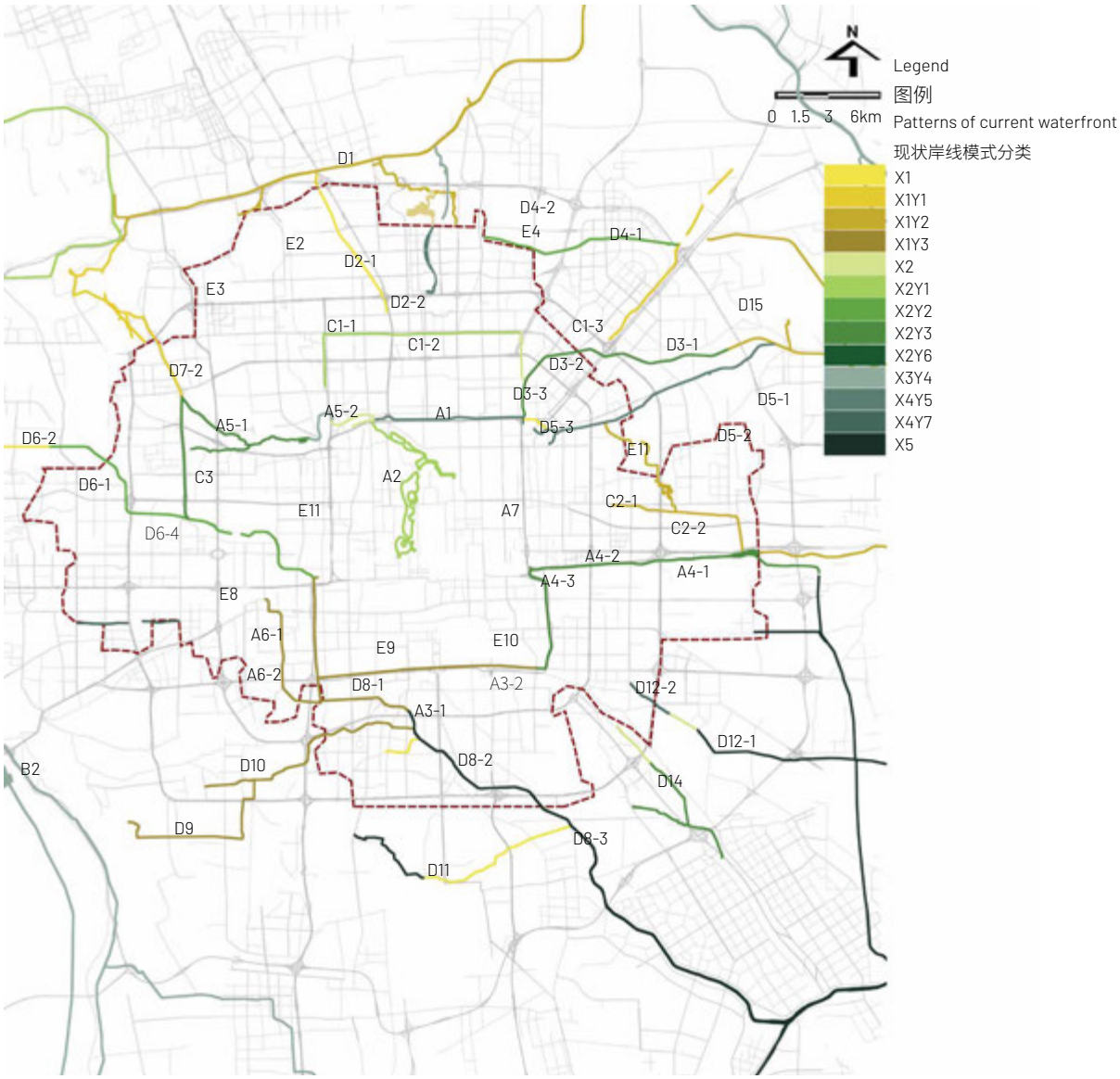


FIG. 2.29 A Map of Shoreline Category

岸线断面分类图

2.2.5.3 – Traffic Value Evaluation
交通价值评价

Transportation systems of road, rail transit, cruise and slow traffic and their important nodes can be extracted by layer, and then superimposed and compared with the water systems in Beijing to obtain traffic accessibility, sightseeing value, network feature and other characteristics of each water system, respectively.

将道路、轨道交通、游船、慢行等交通系统及重要节点分层提取，与北京水系叠加比对，可分别得出各水系的交通可达性、游览性、网络性等特征。

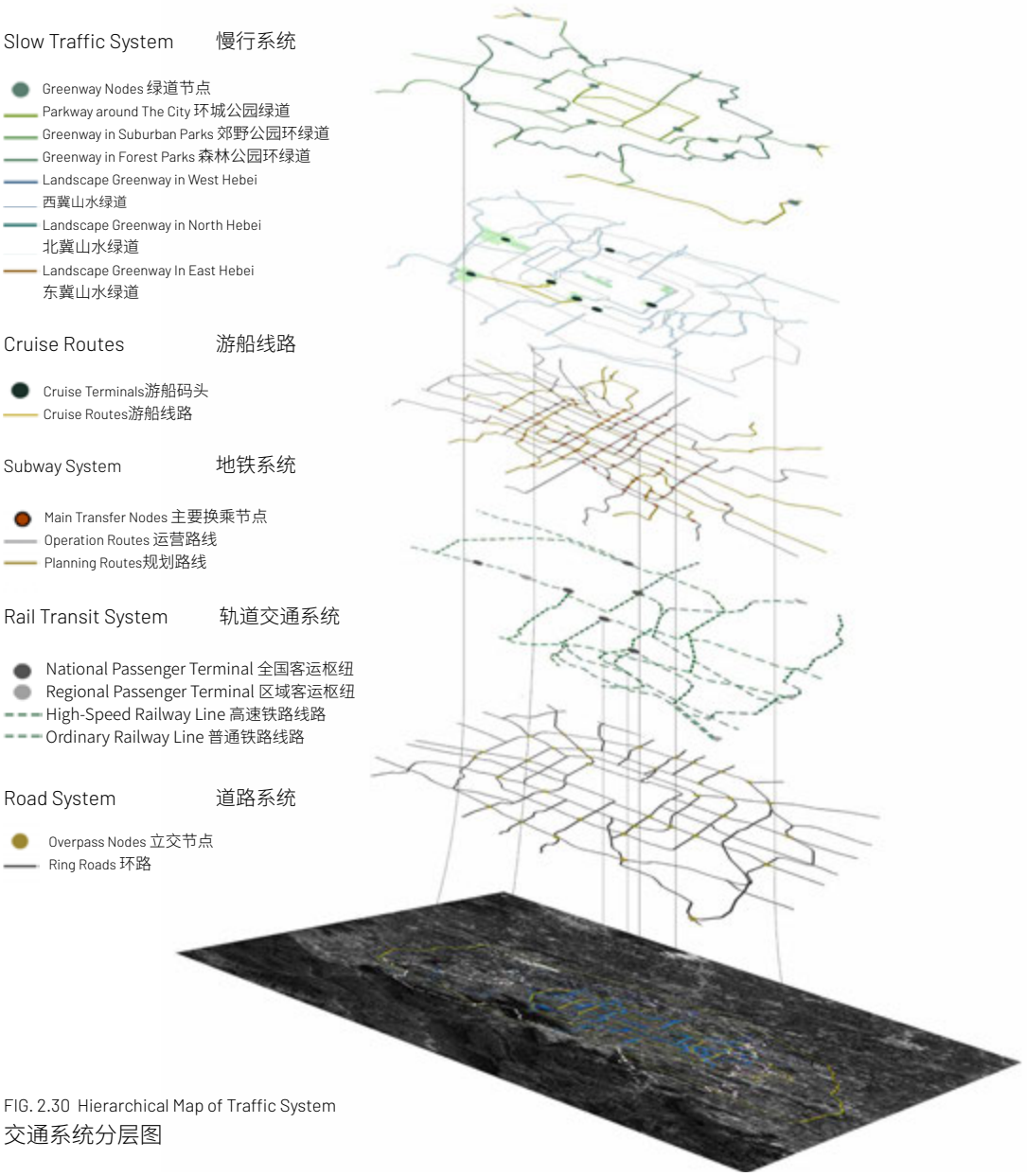


FIG. 2.30 Hierarchical Map of Traffic System
交通系统分层图

2.2.5.4 – Space Value Evaluation
空间价值评价

The spatial value evaluated by interface, coastline and traffic is shown in the figure below.

由界面、岸线、交通价值加权评定的空间价值如下图所示。

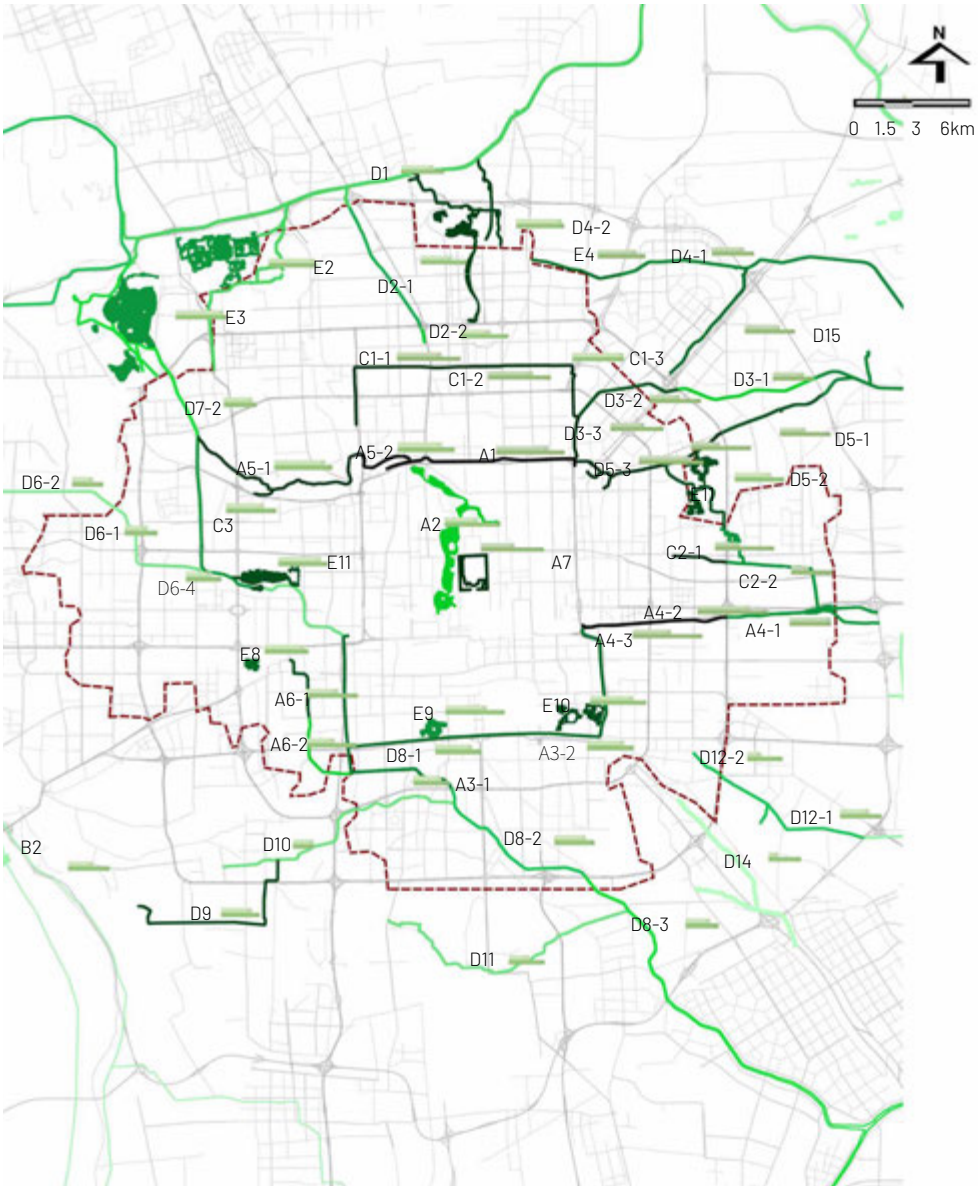


FIG. 2.31 A Map of Space Value Evaluation
空间价值评价图

2.2.6 – **Demand Value**
需求价值

Based on the relationship between activities and water systems, water-related activities in the downtown can be divided into three types: water-centered regional activities, activities along river banks, and water activities. In the Beijing urban areas, the water-centered activities, which are planar activities in parks, etc., interact the most with water systems. They have the most diverse and freest activities types, including sightseeing , sports , leisure activities . Water-centered linear activities also have strong interactions with water systems, but such interactions are significantly restricted by the space and environment design along river banks. These activities include sports and recreations . Water activities relying on water systems mainly include sightseeing tours along cruise routes in urban area. However, scenery along river banks is scarce and simple, which needs more organizations and optimizations. The activity content, bearing capacity, and target population of typical water systems are elaborated as follows.

按照活动与水系的关系分类，中心城区内与水相关的活动可分为三类：以水为中心的区域性活动、沿河两岸的活动以及水上活动。北京市区内，以水系为中心组织的活动，多为在公园等区域中发生的面状活动。其与水系互动最为密切，活动类型最为丰富和自由，如游览（旅行观光、游船游憩）、运动（慢跑、散步）、休闲（露营、阅读、唱歌）等。以水系为中心发生的线性活动，与水系互动较强，但互动程度受沿河两岸空间及环境设计影响较大，活动包括运动（如慢跑、骑行、散步）、休闲（垂钓、唱歌、演奏）等。依托水系组织的水上活动，在市区内主要为通过游船线路组织的观光游览，但沿河两岸景色较为匮乏和单调，活动有待进一步组织优化。典型水系的活动内容、活动承载力、活动人群等方面如下图所示。

FIG. 2.32 Distribution map of activities
活动分布图

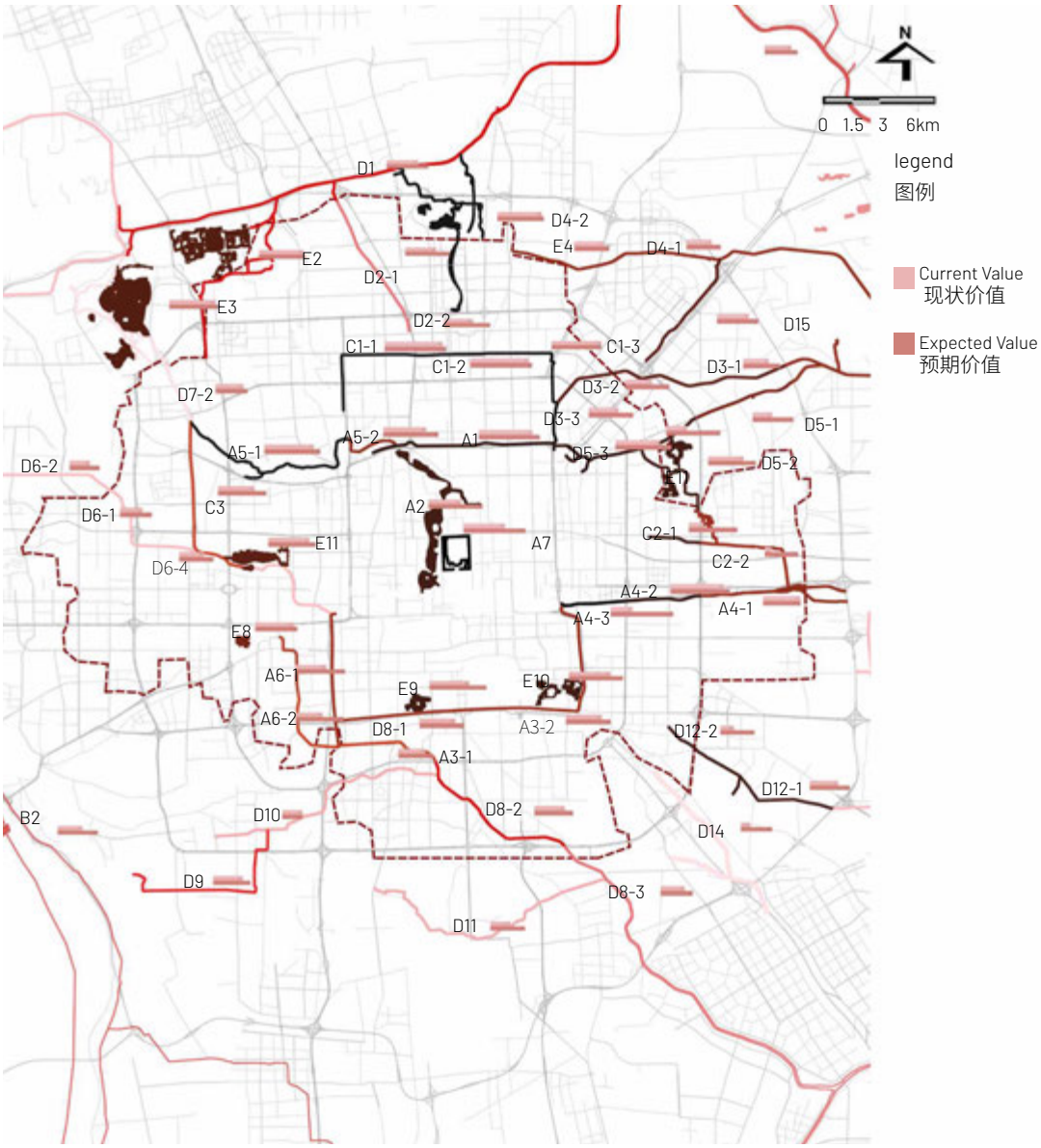


FIG. 2.33 A Map of Demand Value Evaluation
需求价值评价图

2.2.7 – **Historical Value**
历史价值

There are 48 main protected historical districts in Beijing city centre. By studying the relationship between these protected sites and historic water systems as well as spatial distribution characteristics, the water systems for which the design needs to mainly consider historical and cultural elements should be determined.

Through comparison and analysis of the connections among various types of protected historic sites and the areas where historical buildings are concentrated, as well as all protected historical water systems in the central urban area of Beijing. Research shows that most of the historical sites and buildings were built along the trend of water system, the study of water culture in the history is vital in terms of inheriting the urban culture.

北京中心城区主要历史保护片区共有48处，绝大部分有人居住。通过研究其与历史水系之间的关系与其空间分布特征，来确定需重点利用历史文化元素进行城市设计的水系。

比对分析各类历史保护片区，与其所处的历史建筑集中区域，以及其与北京中心城区各条历史保护水系间的联系。研究发现大部分历史片区与建筑建设都顺应水系走向，对水系历史文化价值的发掘是延续和发展城市文脉的重要研究方向。

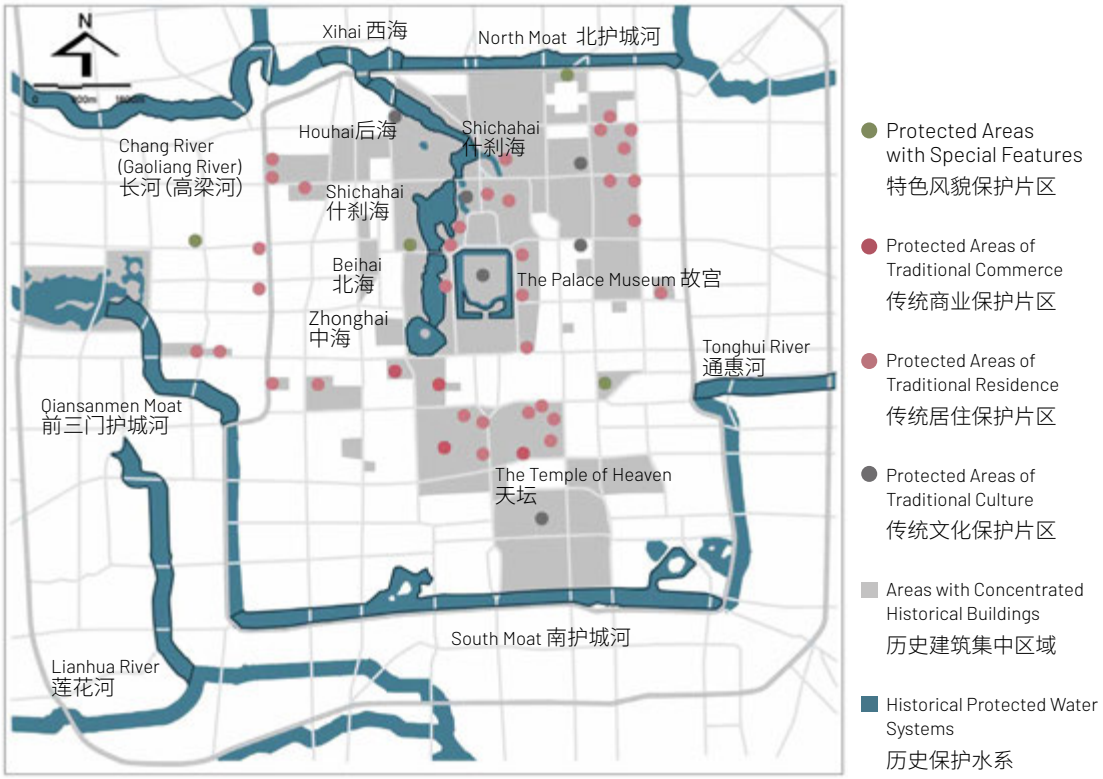


FIG. 2.34 A Map of Historical Value Evaluation
历史价值评价图

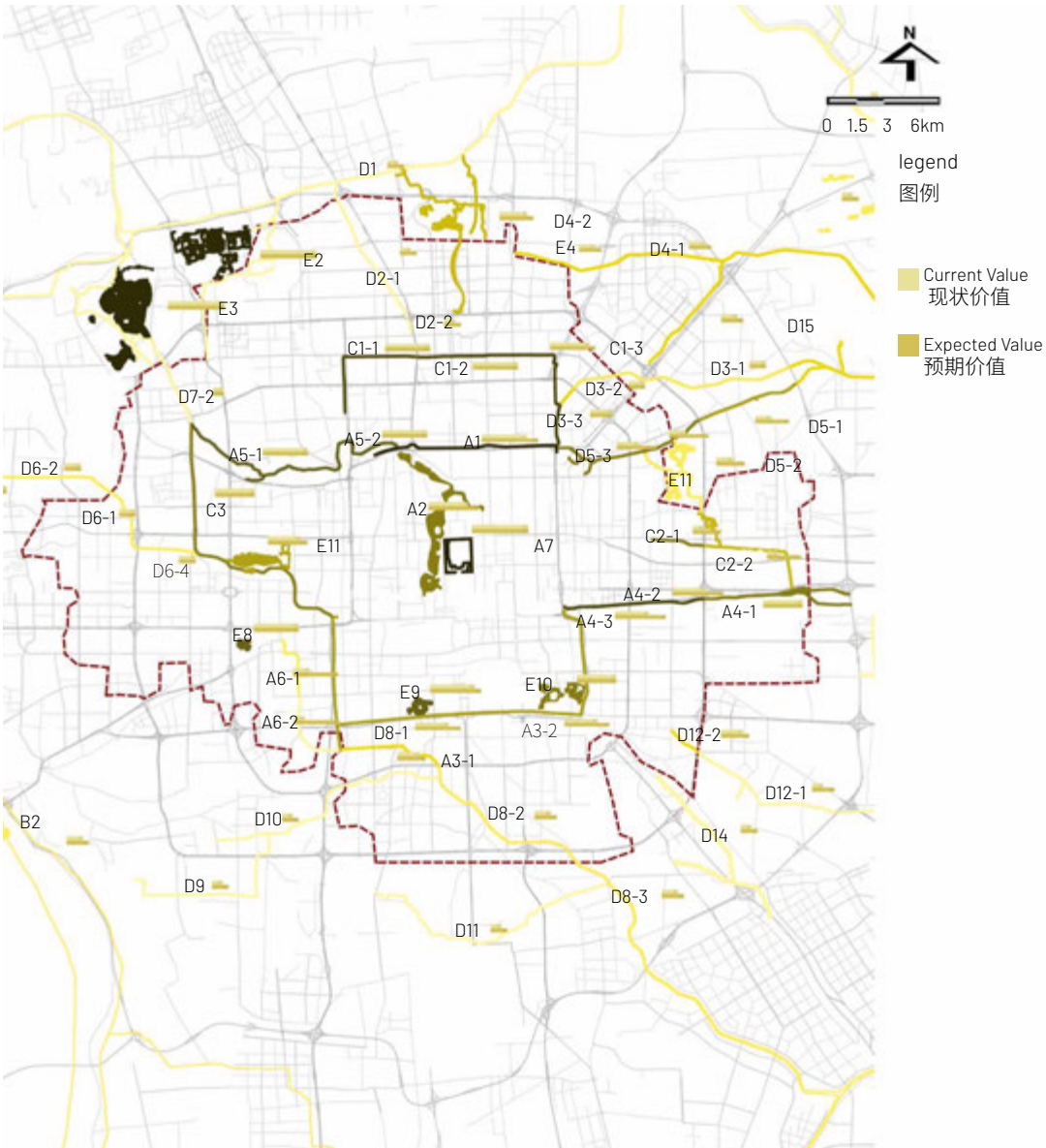


FIG. 2.35 A Map of Historical Value Evaluation
历史价值评价图

2.2.8 – **Economic Value**
经济价值

The economic value of water systems comes from the value-added benefits of raw water per unit while being used in economic production and living areas and the economic value of natural water resources that are converted by the basic water conservancy sector into commercial water resources by means of development and utilization in order to meet the water demand of economy and society. By 2020, the total water consumption in Beijing will be controlled at 4.3 billion cubic meters, including 3.1 billion cubic meters of new water and 1.2 billion cubic meters of reclaimed water. The water consumption control in each administrative district is shown in the following figure.

水系的经济价值体现在每单位原水进入经济生产生活领域所产生的利益增值效用，及水利基础产业部门为满足经济社会用水需求，通过开发利用将天然水资源转化为商品水资源，并进而产生的经济价值。根据2017年北京市水资源公报，2017年北京市城镇公共售水总量11.06亿立方米，城镇自建设施供水总量5.58亿立方米，农村供水总量6.11亿立方米，渠系直供水供水总量2.11亿立方米。2020年，北京市全市用水总量控制目标为43亿立方米，其中新水31亿立方米，再生水12亿立方米。各行政区用水控制情况如下图所示。

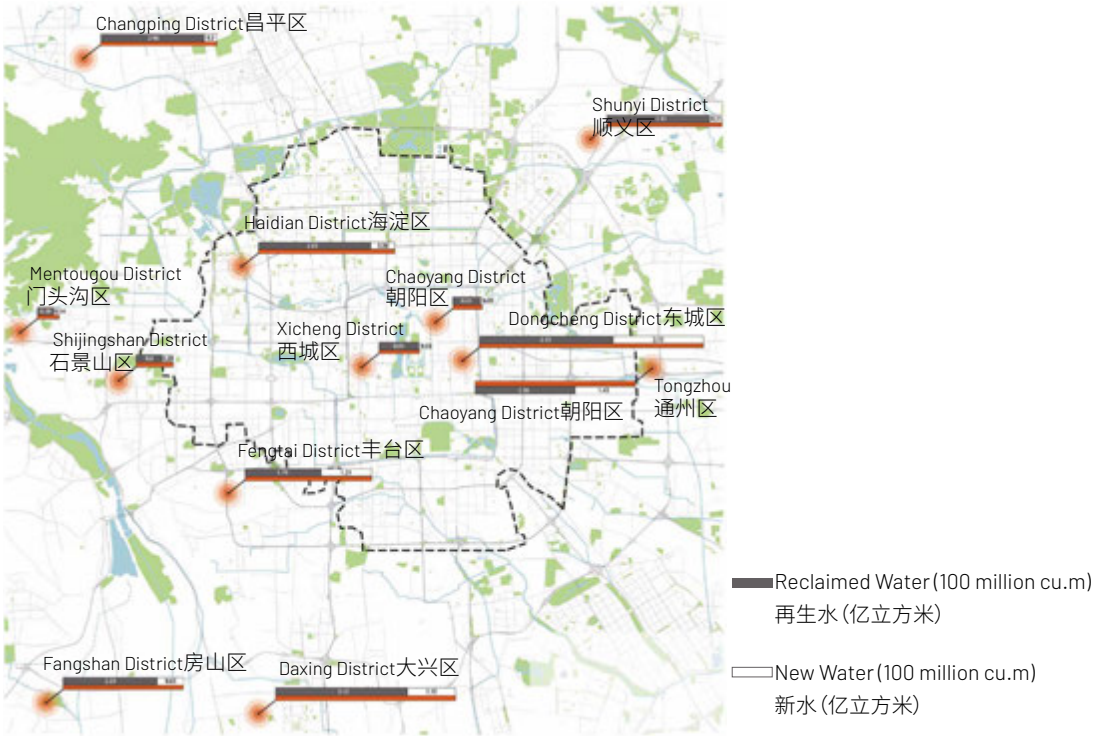


FIG. 2.36 A Map of Water Consumption Control in Each Administrative District
各行政区用水情况控制图

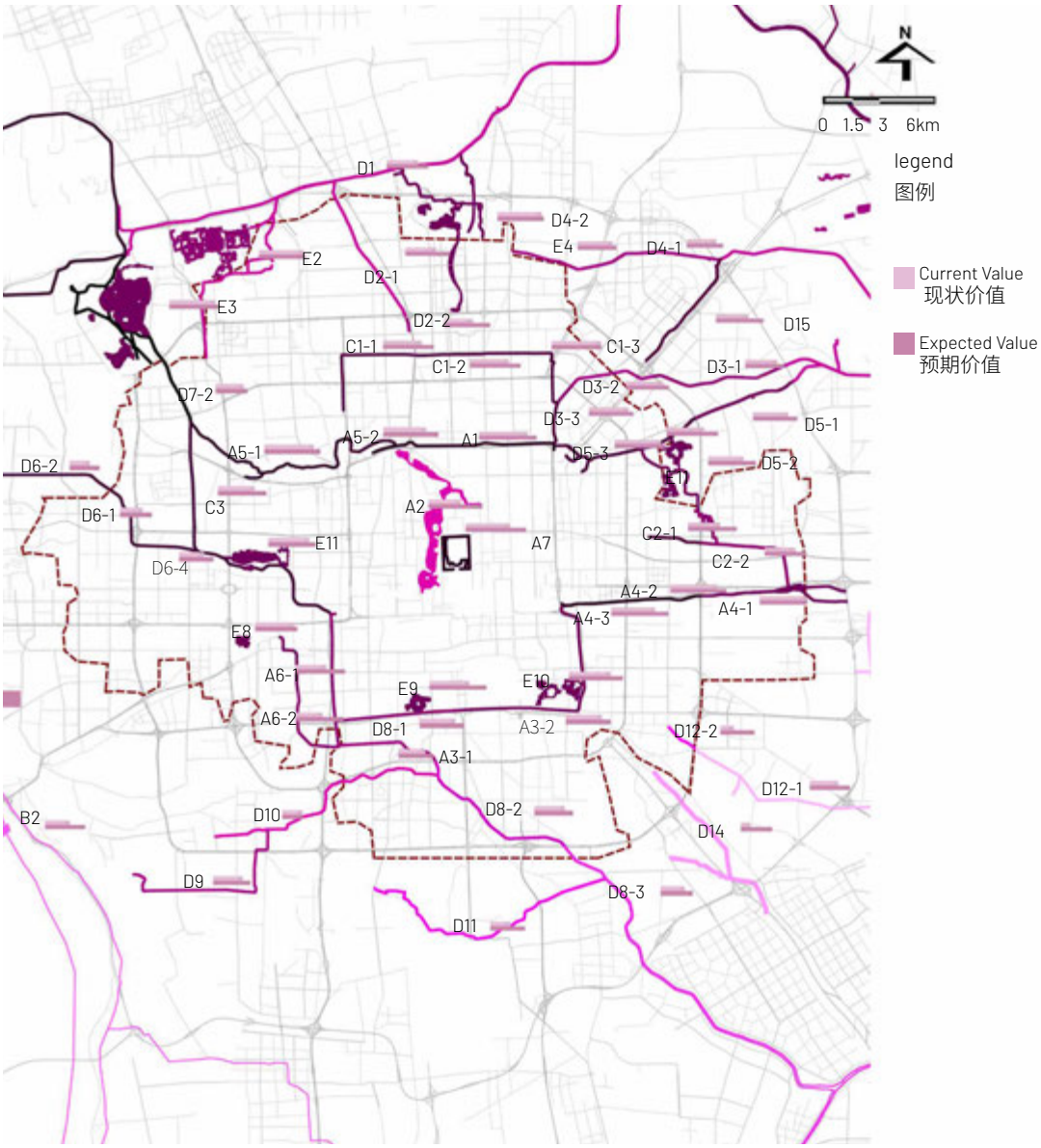


FIG. 2.37 Map of Economic Value Evaluation
经济价值评价图

2.2.9 – **Aesthetic Value**
美学价值

2.2.9.1 – Landscape Value
景观价值

Aesthetic value—Landscape value water system, an important function of which is landscape design. With unique natural environment and rich emotional features, the landscape of water system is a fundamental element to maintain the ecological system structure of earth landscape. The waterfront bank space of water system in Beijing can be classified into 7 categories according to the landscape types.

美学价值——景观水系的一项重要功能是景观塑造。水景观拥有独特的自然环境和丰富的情感特征，是维持大地景观生态系统的基本要素。北京水系的近水堤岸空间按照景观类型可归纳为7类。

B1 Green BufferB1
B1 绿色缓冲带

B2 Sloped Green Flood Protection Buffer
B2 倾斜绿色防洪缓冲带

B3 Sloped Green Flood Protection Buffer with linear path
B3 含线性路径的倾斜绿色防洪缓冲带

B4 Natural Flood Protection Buffer
B4 自然防洪缓冲带

B5 Landscaped Flood Protection Buffer
B5 景观防洪缓冲带

B6 Stepped Flood Protection Buffer
B6 阶梯式防洪缓冲带

B7 Terraced Park Flood Protection Buffer
B7 阶梯公园防洪缓冲带

FIG. 2.38 A Map of Water System Landscape
水系景观类型

2.2.9.2 – Nightscape Value
夜景价值

The water bodies have defined the main shape of waterfront nightscapes in Beijing as belt and the shapes of some parks and lakes as dot and block. The major waterfront nightscapes include those of Northern Moat, Xiaolong River, Tonghui River, Liangshui River, Yongding River, Jingmi Diversion Canal, Yongding River Diversion Canal, Xiaotaihou River, etc., among which, nightscapes of the first four have relatively sound planning at present and higher degree of facility maintenance and citizen engagement, forming relatively complete nightscape belts. The nightscape planning of other waterfront areas still needs to be improved so that a complete nightscape network of waterfront areas in Beijing will be formed, with both the landscape value and safety at night in these areas enhanced.

依据水体形状，北京市滨水区夜景形态主要为带状，部分公园、湖泊为点状或片状。主要的滨水空间夜景有北护城河夜景、小龙河夜景、通惠河夜景、凉水河夜景、永定河夜景、京密引水渠夜景、永定河引水渠夜景、萧太后河夜景等。其中，前四者现状规划较为完善，设施维护与公民参与度较高，形成了较为完整的夜景带。其他滨水空间的夜景有待规划完善，使其形成完整的北京市滨水区夜景观网络，提升滨水区景观价值的同时，也提高了滨水区夜间的安全性。

FIG. 2.39 A Map of Nightscape Value
夜景价值图

2.2.9.3 – Cultural Value
文化价值

Cultural value—Cultural value is embodied in two aspects, "Water and Function" and "Water and Symbol". "Water and Function" contains the functional regeneration of ancient water system and the functional integration of modern water system; "Water and Symbol" includes the courtyard culture, modern CBD culture, international diversified culture, exhibition culture and symbols for sightseeing in Beijing.

文化价值——文化价值体现在“水与功能”和“水与符号”两个方面。其中，“水与功能”包含古代水系功能复兴与现代水系功能整合；“水与符号”则包含北京的院落文化、现代CBD文化、国际多元化文化、展示文化以及可供观赏的符号等。

Functions of Water System Now

现代水系功能

Functions of Water System in Ancient Times

古代水系功能

FIG. 2.40 A Map of Beijing Water System Function Evolution
北京水系功能演变图

2.2.9.4 – **Aesthetic Value Evaluation**
美学价值评价

Scores are to be given on each indicator level of each water system and then work out the current and expected value of each water system according to its weight. Compare the difference between the two values to make targeted landscape improvement with clear objects.

为每条水系的各项指标层进行打分，并依据权重计算各水系现状及预期价值得分，比较二者之间的差距，可以更为目标明确且有针对性地进行景观完善。

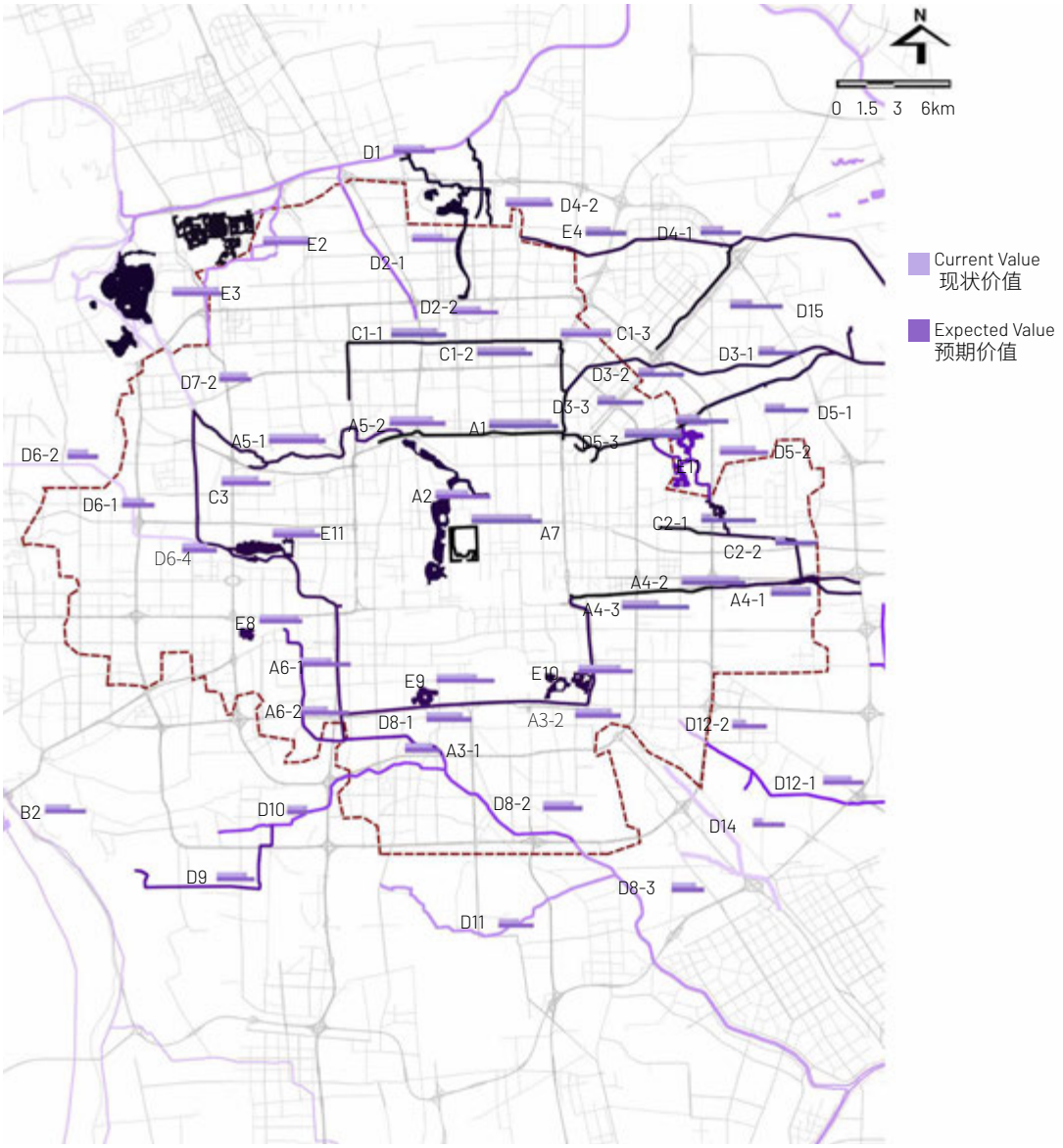


FIG. 2.41 A Map of Aesthetic Value Evaluation
美学价值评价图

2.2.10 – **Expected Value Evaluation**
预期总评价

TABLE 2.3 Table of Expected Value Evaluation (Excerpt)

预期价值评分表(节选)

Water Systems 水系	River 河名	Water System Segmentation 水系分段	Ecological 生态价值		Space 空间价值		Demand 需求价值		History 历史价值		Economic 经济价值		Aesthetic 美学价值	
			score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重
Chaobai River system 潮白河水系	Hucheng 北护城河	Hucheng River北护城河	8.54	0.225	8.17	0.286	8.97	0.134	10	0.122	7.30	0.12	9.46	0.113
	Qing River 清河	Qinghe Rive清河	6.95	0.225	5.13	0.286	5.17	0.134	3	0.122	4.95	0.12	3.94	0.113
	Xiaoyue River 小月河	North Five-North Fourth Ring 北五环-北四环段	6.39	0.225	6.21	0.286	5.66	0.134	3	0.122	4.91	0.12	4.89	0.113
		North Fourth -North Third Ring 北四环-北三环段	6.34	0.225	6.61	0.286	6.17	0.134	3	0.122	4.85	0.12	5.50	0.113
	Bei River 坝河	East Five -North Fourth Ring 东五环-北四环段	5.52	0.225	4.82	0.286	5.43	0.134	3	0.122	4.98	0.12	5.43	0.113
		North Fourth-North Third Ring 北四环-北三环段	6.73	0.225	6.15	0.286	6.48	0.134	3	0.122	5.43	0.12	6.27	0.113
		North Third-North Second Ring 北三环-北二环段	6.76	0.225	6.28	0.286	6.51	0.134	4	0.122	5.63	0.12	6.27	0.113
	Tucheng River 土城沟	College Road-Beijing-Tibet Highway 学院路-京藏高速段	7.48	0.225	6.27	0.286	9.24	0.134	8	0.122	5.49	0.12	7.89	0.113
		Beijing-Tibet Highway-Anding Road 京藏高速-安定路段	7.93	0.225	7.57	0.286	9.02	0.134	8	0.122	6.42	0.12	7.53	0.113
		Anding Road-Jingcheng Highway 安定路-京承高速段	7.93	0.225	7.43	0.286	9.02	0.134	8	0.122	6.42	0.12	7.53	0.113
	Beixiao River 北小河	North Five Ring-Jingcheng Highway 北五环-京承高速段	5.13	0.225	5.01	0.286	5.02	0.134	4	0.122	4.65	0.12	5.57	0.113
		Beijing-Chengdu Highway-Beiyuan Road 京承高速-北苑路段	5.42	0.225	5.65	0.286	5.12	0.134	4	0.122	4.93	0.12	5.57	0.113
	Liangma River 亮马河	East Five-East Fourth Ring 东五环-东四环段	6.23	0.225	6.03	0.286	5.97	0.134	6	0.122	5.61	0.12	5.94	0.113
		East Fourth-East Third Ring 东四环-东三环段	7.40	0.225	7.11	0.286	7.91	0.134	7	0.122	6.50	0.12	7.17	0.113
		East Third-East Second Ring 东三环-东二环段	7.53	0.225	7.68	0.286	8.21	0.134	7	0.122	6.50	0.12	7.89	0.113
	Tonghui River 通惠河	East Five-East Fourth Ring 东五环-东四环段	5.79	0.225	4.93	0.286	5.50	0.134	7	0.122	5.89	0.12	5.47	0.113
		East Fourth-East Third Ring 东四环-东三环段	8.45	0.225	8.38	0.286	8.69	0.134	9	0.122	7.03	0.12	8.69	0.113
		East Third-East Second Ring 东三环-东二环段	8.76	0.225	8.25	0.286	9.12	0.134	9	0.122	7.22	0.12	9.18	0.113
	Nangchang River 南护城河	Guang'an Menwai - Yongding Menwai Street 广安门外大街-永定门外大街段	6.40	0.225	5.75	0.286	6.48	0.134	8	0.122	6.42	0.12	6.82	0.113
		Yongding Menwai Street - Tonghui Hebei Road 永定门外大街-通惠河北路段	6.40	0.225	5.91	0.286	6.48	0.134	8	0.122	6.42	0.12	6.82	0.113
	Nanchang River南长河	Kunyuhe-Xizhimen Wai Street 昆玉河-西直门外大街段	8.30	0.225	8.00	0.286	8.36	0.134	8	0.122	7.19	0.12	8.67	0.113
		Xizhimen Wai Street - Deshengmen Wai Street 西直门外大街-德胜门外大街段	7.78	0.225	7.91	0.286	8.36	0.134	8	0.122	6.99	0.12	8.67	0.113
	Yongding River Diversion Canal 永定河引水渠	Outside the Western Fifth Ring 西五环外段	5.52	0.225	4.00	0.286	2.83	0.134	3	0.122	6.63	0.12	2.76	0.113
		West Five-West Four Rings 西五环-西四环段	5.90	0.225	4.14	0.286	2.96	0.134	3	0.122	6.69	0.12	2.76	0.113
		West Four-West Three Ring 西四环-西三环段	6.31	0.225	4.50	0.286	3.11	0.134	3	0.122	6.75	0.12	2.76	0.113
		West Sanhuan-Kunyu River 西三环-昆玉河段	6.84	0.225	5.20	0.286	3.33	0.134	3	0.122	6.82	0.12	2.76	0.113
	Jingmi Diversion Canal 京密引水渠	North Five Ring-Kunming Lake 北五环-昆明湖段	7.30	0.225	5.36	0.286	3.41	0.134	2	0.122	7.16	0.12	2.76	0.113
		Beyond the North Fifth Ring 北五环外段	8.38	0.225	3.70	0.286	0.91	0.134	2	0.122	8.03	0.12	2.76	0.113
	Kunyu 昆玉河	Kunyu River昆玉河	7.25	0.225	6.93	0.286	7.94	0.134	7	0.122	6.65	0.12	5.75	0.113

Water Systems 水系	River 河名	Water System Segmentation 水系分段	Ecological 生态价值		Space 空间价值		Demand 需求价值		History 历史价值		Economic 经济价值		Aesthetic 美学价值	
			score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重	score 分数	weight 权重
Chaobai River system 潮白河水系	Erdao 二道沟	East Five-East Fourth Ring东五环-东四环段	5.20	0.225	4.91	0.286	4.89	0.134	5	0.122	5.31	0.12	5.64	0.113
		East Fourth-East Third Ring东四环-东三环段	7.38	0.225	7.00	0.286	7.10	0.134	6	0.122	6.16	0.12	7.46	0.113
	Liangshui 凉水河	Lianhua River-South Sanhuan 莲花河-南三环段	5.95	0.225	5.92	0.286	5.57	0.134	5	0.122	5.67	0.12	4.59	0.113
		South Three-South Four Rings 南三环-南四环段	5.70	0.225	5.35	0.286	5.02	0.134	4	0.122	4.87	0.12	3.86	0.113
		Outside the South Fourth Ring南四环外段	5.64	0.225	4.89	0.286	4.25	0.134	4	0.122	4.83	0.12	3.21	0.113
	Lianhua River 莲花河	North of Honglian South Road红莲南路以北段	6.97	0.225	7.69	0.286	7.88	0.134	8	0.122	6.29	0.12	6.32	0.113
		South of Honglian South Road红莲南路以南段	6.93	0.225	7.35	0.286	6.88	0.134	8	0.122	5.76	0.12	5.81	0.113
	Macao马草河	Macao River马草河	6.16	0.225	6.04	0.286	5.50	0.134	3	0.122	5.68	0.12	4.33	0.113
	Fengcao丰草河	Fengcao River丰草河	3.20	0.225	3.15	0.286	2.34	0.134	3	0.122	4.27	0.12	2.52	0.113
	Xiaolong 小龙河	Xiaolong River小龙河	5.60	0.225	5.47	0.286	5.39	0.134	3	0.122	5.12	0.12	4.34	0.113
	Tongzi 筒子河	Tongzi River筒子河	8.73	0.225	7.42	0.286	9.03	0.134	10	0.122	7.64	0.12	9.56	0.113
	Wangging River 望京沟	Wangging River望京沟	6.26	0.225	5.95	0.286	6.05	0.134	4	0.122	6.02	0.12	7.14	0.113
North Canal System 北运河水系	Xiaotaihou River 萧太后河	North of East Fourth Ring东四环以北段	5.91	0.225	6.27	0.286	6.84	0.134	5	0.122	5.16	0.12	4.33	0.113
		South of East Fourth Ring东四环以南段	5.24	0.225	5.33	0.286	5.36	0.134	4	0.122	4.50	0.12	4.09	0.113
	Tonghui North Main Canal 通惠北干渠	West of the Eastern Fifth Ring东五环以西段	5.87	0.225	5.62	0.286	7.96	0.134	8	0.122	5.94	0.12	4.64	0.113
		East of the East Fifth Ring东五环以东段	5.73	0.225	5.08	0.286	5.74	0.134	4	0.122	5.29	0.12	3.77	0.113
	Dayang River 大羊坊沟	Dayang River大羊坊沟	5.36	0.225	4.66	0.286	4.76	0.134	3	0.122	4.52	0.12	4.01	0.113
Lakes & Parks 湖泊公园	Cui lake翠湖湿地	Cui Lake 翠湖湿地公园	8.38	0.225	5.30	0.286	5.62	0.134	7	0.122	6.94	0.12	4.01	0.113
	Old Summer Palace圆明园	Old Summer Palace圆明园	7.36	0.225	5.58	0.286	6.37	0.134	10	0.122	5.29	0.12	5.76	0.113
	Summer Palace 颐和园	Summer Palace颐和园	8.10	0.225	6.43	0.286	6.98	0.134	10	0.122	5.72	0.12	6.03	0.113
	Olympic Park 奥林匹克森林公园	Olympic Forest Park奥林匹克森林公园	7.12	0.225	6.68	0.286	7.69	0.134	6	0.122	6.12	0.12	6.03	0.113
	Yutanyuan Park 玉渊潭公园	Yutanyuan Park玉渊潭公园	7.37	0.225	6.76	0.286	6.95	0.134	7	0.122	6.21	0.12	5.88	0.113
	Six Seas六海	Six Seas六海 (什刹海)	7.04	0.225	8.03	0.286	9.30	0.134	9	0.122	6.51	0.12	6.71	0.113
	WenyuPark 温榆河公园	Wenyu Park温榆河公园	7.26	0.225	4.03	0.286	4.78	0.134	4	0.122	5.84	0.12	2.33	0.113
	Lianhua Park 莲花池公园	Lianhua Park莲花池公园	6.43	0.225	6.16	0.286	5.87	0.134	8	0.122	5.54	0.12	4.19	0.113
	Taoran Park 陶然亭公园	Taoran Park陶然亭公园	7.87	0.225	8.63	0.286	9.25	0.134	9	0.122	6.84	0.12	6.69	0.113
	Longtan Park 龙潭湖公园	Longtan Park龙潭湖公园	7.55	0.225	8.64	0.286	8.91	0.134	7	0.122	6.53	0.12	6.77	0.113
	Chaoyang Park 朝阳公园	Chaoyang Park朝阳公园	7.07	0.225	7.64	0.286	7.97	0.134	5	0.122	6.37	0.12	5.70	0.113
	Yongding River Leisure Forest Park 永定河森林公园	Yongding River Leisure Forest Park 永定河休闲森林公园	8.04	0.225	5.48	0.286	6.35	0.134	4	0.122	4.95	0.12	4.39	0.113
	Beijing Garden Expo Garden 北京园博园	Beijing Garden Expo Garden 北京园博园	7.47	0.225	5.38	0.286	5.22	0.134	3	0.122	5.06	0.12	5.08	0.113

Scores on the ecological value, spatial value, demand value, historical value, economic value and aesthetic value of each water system in Beijing can be obtained respectively by calculating and comparing the above items. A horizontal comparison of the data would reveal aspects of each water system that need to be further improved; while a vertical comparison can reflect the layered type of hierarchical protection characteristics of Beijing water systems.

通过上述分项计算比较，可分别得出北京每条水系生态价值、空间价值、需求价值、历史价值、经济价值、美学价值的得分情况。通过各项数据的横向比较可得出各水系需要着重完善之处，纵向比较可得出北京水系圈层式分级保护特征。

FIG. 2.42 A Map of Current Status Value
预期总价值评价图

2.3 – Design

2.3 – 设

2.3.1 – **Ecological Value Strategy**
生态价值策略

Flexible Ecological Strategy - Case: Sanlihe Greenway Design in Qian'an
弹性生态策略 - 案例：迁安三里河绿道设计

Flexible ecological corridors are built, the existing cement canals of the river channels are abandoned, and ecological wetlands are built on the banks of the main waterways to control floods, as well as dredge and manage the rainwater runoff in the city, which create diverse wildlife habitat.

-"Sponge City" Design
-Consider Seasonal Landscape Changes
-Maintain All-season Vitality

打造弹性的生态廊道，取消河道现存的水泥水渠，在主水道的岸边建造生态湿地，以便控制洪水、疏导治理城市里的雨水径流，创造多样的野生生物栖息地。

– 海绵城市设计
– 考虑季相景观变化
– 保持全季候活力

Material Ecological Strategy - Case: Puyang River Ecological Corridor Design in Jinhua
材料生态化策略 - 案例：金华浦阳江生态廊道设计

The case uses a low-intervention landscape strategy with minimal input to maximize the preservation of native vegetation. Considering the corridor surrounding land use and the analysis of future usage, the acupuncture-type landscape intervention technique is used to subtly integrate the artificial landscape into the nature.

-Plant Low-maintenance Vegetation
-Adopt Sustainable Paving
-Utilize Natural Landscape Rationally

案例采用最小投入的低干预景观策略，最大限度地保留乡土植被，并结合廊道周边用地情况及未来使用状况分析，应用针灸式景观介入手法将人工景观巧妙地融入自然当中。

– 栽种低维护植被
– 采用可持续性铺装
– 合理利用自然景观

The use of a large number of native vegetation and rebuilding of diverse vegetation communities within the full scale of the corridor attract native wildlife to return to the territory. The riverside buffer zone cleans up the pollutants in canals and rainwater runoffs, as well as forms diverse habitats and species communities.

-Improve River Water Quality
-Create a Riverside Buffer Zone
-Diversify Plant Communities

大量使用本土植被，在生态走廊全尺度重建多样化的植被群落，吸引本土的野生动物重回领地。滨水缓冲带既净化了运河及雨水径流中的污染物，也形成了多样化的栖息环境和物种群落。

– 改善河流水质
– 打造滨河缓冲带
– 植物群落多样化

Diagrams of Ecological Value Strategy
生态价值策略图示

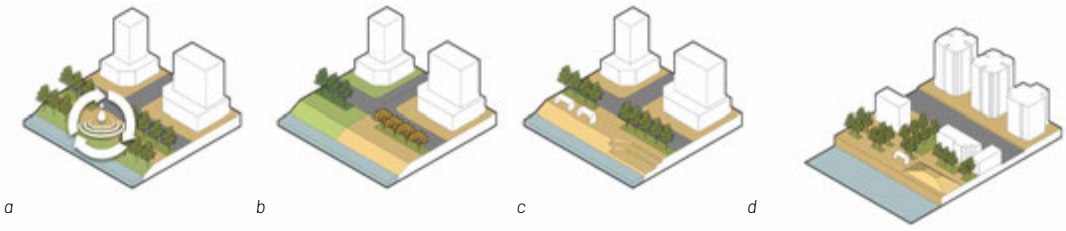


FIG. 2.43 Flexible Ecological Strategy
弹性生态策略
(a) Install the rainwater collection system and use permeable. (b) Enhance the viewing experience by varying the effects of plant and space in different seasons. (c) Adapt to seasonal changes by micro-topography and building shading space.
(a) 设置雨水收集系统和路面透水 (b) 把握不同季节植物变化 (c) 借助微地形，建造遮蔽空间，适应季节变化。

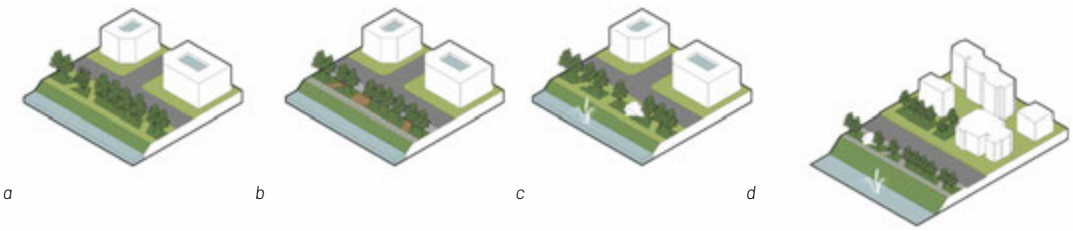


FIG. 2.44 Material Ecological Strategy
材料生态化策略
(a) Mainly based on the native plants with low-maintenance demands, and multi-level ecological plant configuration is adopted. (b) The main paving material is composed of concrete and brick. The plain soil is partially used.(c)Take advantage of local water bodies and whole stones to simulate the state of nature.
(a) 以低维护需求的植物为主，配置多层次的生态性植物、减少维护成本 (b) 铺装以混凝土与砖为主要材料，局部采用素土 (c) 巧妙利用本地的水体和整石，模拟自然状态。

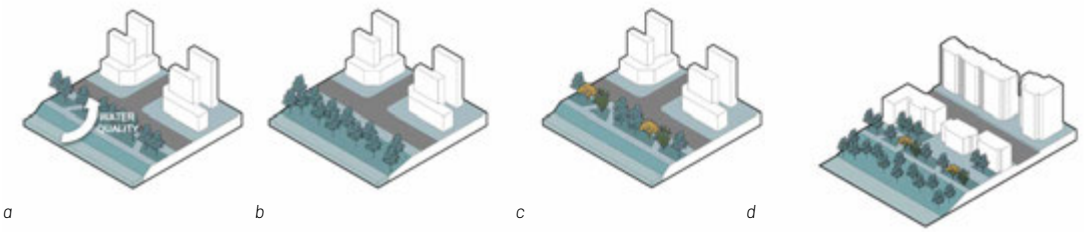


FIG. 2.45 Biodiversity Scheme
生物多样性策略
(a) Clean up the pollutants in river channels and rainwater runoffs.(b) Gentle river bank for planting is used to replace the vertical impermeable river bank.(c) Construct a diverse range of native vegetation communities .
(a) 净化河道以及雨水径流中的污染物 (b) 以平缓种植河岸取代垂直不透水河岸 (c) 构建多样化的本土植被群落。

2.3.2 – **Space Evaluation Strategy**
空间价值策略

Shoreline – Case:Chicago River Walk Design
岸线 - 案例：芝加哥滨河步道设计

The promenade is regarded as a relatively independent space system—a series of new functional connections with the water system through its own morphological changes.

-Waterborne Platform along the Artificial Shorelines
-Artificial Shorelines are Combined with Natural Shorelines

将步道视为相对独立的空间系统——通过自身形态的变化，形成一系列与水系相连的全新功能联系。

– 人工岸线亲水平台
– 人工岸线与自然岸线相结合

Interface – Case: Urban Design of Suzhou River in Shanghai
界面 - 案例：上海苏州河城市设计

The recreational river bank and special water-facing urban interface elevate the regional vitality after integrated development, making Suzhou River a brand new urban cultural watershed.

-High-density development of commercial office area improves the land value.
-Make park nodes and create rhythmic spatial order.
-Integrity protection of the interface of historic uilding blocks.

经过综合开发后，休闲河岸和特色临水城市界面提升了地区活力，使苏州河成为全新的都市文化区域。

– 商业办公区高密度开发，提升地块价值
– 打造公园节点，营造富有韵律的空间秩序
– 历史遗存建筑街区界面的完整性保护

Transportation – Case: Qinjiang Old River Channel and Wetland Cultural Park
交通 - 案例：琴江老河道湿地文化公园

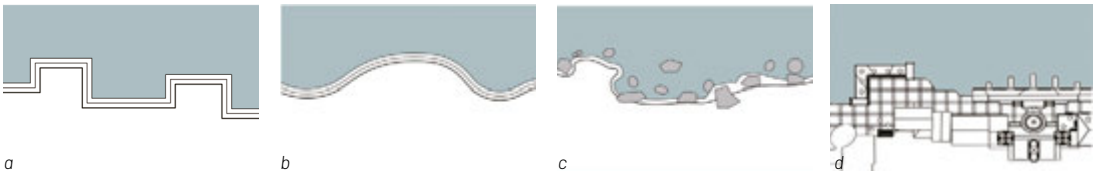
By the design techniques of restoring ecological diversity for rivers, natural flowing place and gathering space are created to achieve the effect of organic integration of urban wetland ecological protection, urban leisure and other functions.

-Provide local transport to increase water activities.
-Create waterfront commercial pedestrian street to enhance regional vitality.

通过恢复河道生态多样性的设计手法，创造自然的流动空间和聚会场所，达到城市湿地生态保护、文化记忆传承和城市休闲等功能有机结合的效果。

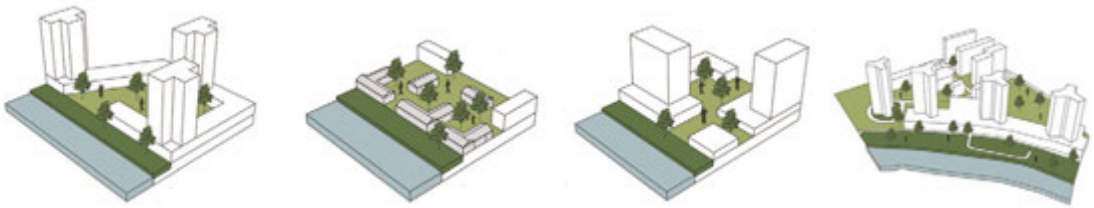
– 局部设置水上交通，增加水上活动
– 打造滨水商业步行街，增强地区活力

Diagrams of Space Evaluation Strategy
空间价值策略图示



a *b* *c* *d*

FIG. 2.46 Shoreline
岸线
(a) The bank line of concave and convex type has the characteristics of variation and fluctuation and can carry out a variety of water loving activities.(b) Curvilinear shoreline has the characteristics of streamlining and can keep the water flowing naturally. (c) The natural shoreline is suitable for the areas with higher requirements for ecological protection. (d) Concave and convex shoreline is suitable for concentrated areas of water loving space in Beijing.
(a) 凹凸式岸线具有变化与起伏的特点，可以开展多种亲水活动 (b) 曲线式岸线具有流线型的特征，能够保持水体的自然流畅 (c) 自然式岸线适合于对生态保护要求较高的地段 (d) 凹凸式岸线，适合北京亲水空间集中的地段。



a *b* *c* *d*

FIG. 2.47 Interface
界面
(a) Hybrid development mode of commerce and residence creates a continuous riverside interface.(b)Protect the integrity of the interfaces of historic building blocks. (c) High-density development of commercial office area improves the land value.(d) Add ground floor business, which is suitable for waterfront point type high-rise section.
(a) 商住混合的开发模式,营造连续的滨河界面 (b) 保护历史遗存建筑街区的完整界面 (c) 商业办公区高密度开发，提升地块价值 (d) 增设底层商业，适合于滨水点式高层地段。

a *b* *c* *d*

FIG. 2.48 Transportation
交通
(a)Combine landside space with pedestrian street to provide diverse activity space.(b)Combine landside space with public transport station to improve the accessibility of riverside area.(c) Provide water transportation to increase the connections between two sides of the river.(d) Waterfront pedestrian street is suitable for Beijing riverside commercial section.
(a) 陆侧空间结合步行街，提供多样的活动场所 (b) 陆侧空间结合公共交通场站设置，提高滨河地带的可达性 (c) 设置水上交通，增加河流两岸联系 (d) 滨水步行街，适合于北京滨河商业地段。

2.3.3 – **Demand Value Strategy**
需求价值策略

Waterfront Activity Strategy - Case: Chicago Riverwalk Design
滨水活动策略 - 案例：芝加哥滨河步道设计

As a brand-new integrated trail system, Chicago Riverwalk provides an uninterrupted walking experience for park visitors. Due to the different functions and forms of various types of space, it can offer diversified riverside experiences, from catering, recreation, large-scale public events, to activities close to water, such as rowing project.

-Create Stepped Space for Stay
-Set Out-extended Platforms
-Enrich Waterfront Leisure Facilities

作为全新的综合步道系统，芝加哥滨河步道为游客提供不间断的步行体验。各类空间的不同功能与形态，使它们可以提供从餐饮、游憩、大规模公众活动到皮划艇等亲水活动的多样化滨水体验。

– 营造阶梯式停留空间
– 设置外挑平台
– 丰富滨水休闲设施

Accessibility Strategy - Case: Minneapolis Waterfront Greenway Design
可达性策略 - 案例：明尼阿布利斯滨水绿道设计

The city's waterfront greenway horizontally extends the dendritic ecological infrastructure further to connect surrounding residential and commercial areas. People can obviously feel the presence of waterfront space while heading to the greenway. The waterfront accessibility is improved through the active extension of greenway space.

-Perfect the Slow Mobility System
-Actively Extend the Greenway
-Open up the Corridor for the Sight

城市滨水绿道将树枝状的生态基础设施进一步横向延伸，连接周边的居住区和商业区。人群在前往滨水绿道的过程中，已经可以明显感知到绿色滨水空间的存在。案例通过主动延伸绿道空间的方式，提高了滨水空间可达性。

– 完善慢行系统
– 主动延伸绿道
– 打通视觉廊道

Place Sense Strategy - Case: Landscape Renovation of Cheonggyecheon in Seoul
场所感策略 - 案例：首尔清溪川景观改造

The case positioned the theme of "culture + city" to create a feature of city and nature integration, and reshape the cultural space along urban riverside, aiming to completely change the city's appearance, build riverside urban culture, and provide a historical and cultural place for citizens.

-Enhance the Identifiability of Place
-Enhance the Regional Sense of Place
-Enhance the Historical Sense of Place

以"文化+城市"为主题，打造城市与自然融合的特色，重塑城市滨江文化空间，彻底改变城市面貌，打造滨江城市文化，为市民提供历史文化场所。

– 增强场所识别性
– 增强场所地域感
– 增强场所历史感

Diagrams of Demand Value Strategy
需求价值策略图示

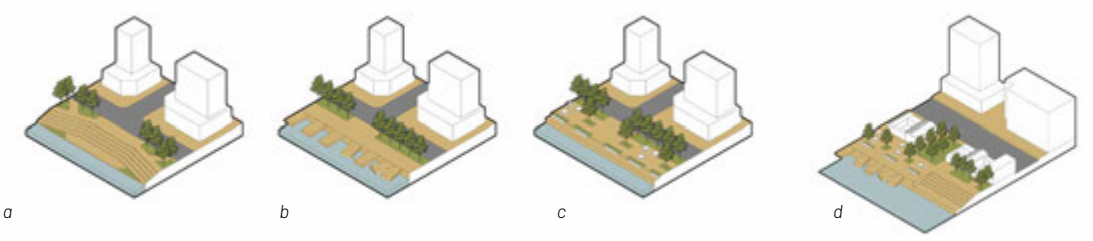


FIG. 2.49 Waterfront Activity Strategy
滨水活动策略
(a) The sculptural steps provide a walking connection for people to reach the riverside.(b) The new waterfront edge creates a continuous sensory experience that leads to the river.(c) The open-air seats allow people to rest and enjoy the space sights of river.
(a) 雕塑般的阶梯为人们到达河滨提供了步行联系(b) 全新的滨水边缘创造出通向河流的连续感官体验(c) 露天座椅可供人们休憩并观赏河流上的空间景观。

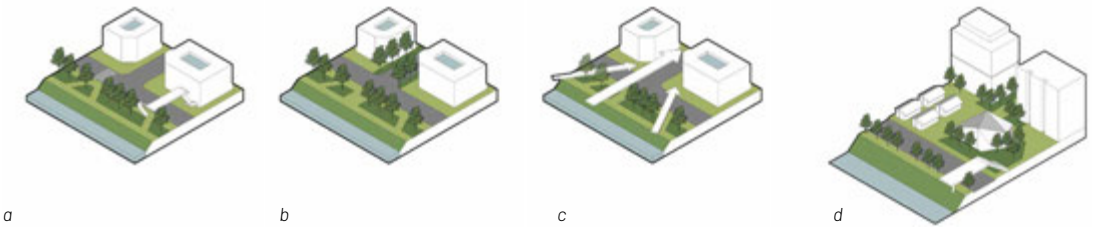


FIG. 2.50 Accessibility Strategy
可达性策略
(a) Closely connect to the city to minimize the interference to the city's traffic.(b) Easily dock with the surrounding city plots to improve convenient accessibility for citizens.(c) Reduce obstructions on the line of sight to attract the maximum crowd.
(a) 与城市紧密相连，将城市的车行交通干扰控制到最小 (b) 与周边城市地块方便对接，提高人群出行的便利性 (c) 减少视线上的阻隔，最大程度吸引人群。

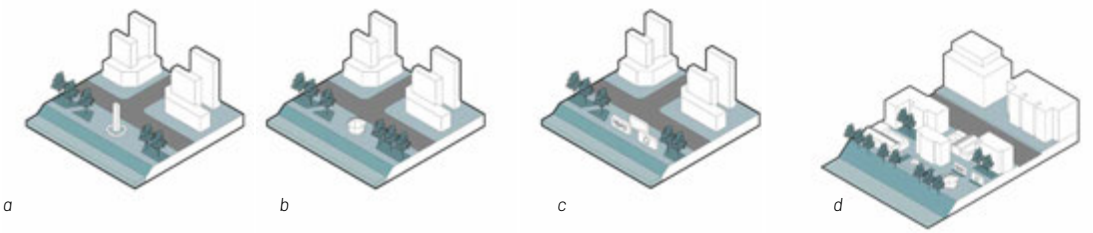


FIG. 2.51 Place Sense Strategy
场所感策略
(a) Further interpret urban culture and spirit by creating the place sense of landmark space.(b) Express and continue the local urban spirit through the landscape design.(c) Present the important historical fragments of the city by means of different landscapes.
(a) 通过塑造地标空间的场所感进一步诠释城市文化与精神 (b) 通过景观设计的手段对当地城市精神加以表达与延续 (c) 对城市重要历史片段以不同的景观手段进行表达。

2.3.4 – **Historical Value Strategy**
历史价值策略

Case: The Historical Protection and Utilization of the Waterfront Area in Wuhu Ancient City
案例：芜湖滨水区历史保护利用

The major feature is to abstract different types of typical cultural characteristics. The water system is used to recall the history memories of the ancient city, so as to revive historical urban context, integrate characteristic industry and coordinate with modern production and life.

-Fragmentation distribution of historical sites
-Integrity protection of
historical sites in building blocks
-Adjust the space to meet the needs of modern life

项目主要特点为提炼不同类型的典型文化特质，利用水系凸显古城的历史文化记忆，以达到复兴历史文脉，融入特色产业，并与现代生产生活相协调的目的。

– 水系历史遗迹片段化分布
– 建筑街区历史遗存的完整性保护
– 空间调整，适应现代化生活需求

Case: The Historical Protection and Utilization of the Waterfront Area in Liverpool Ancient City
案例：利物浦滨水区历史保护利用

The preservation and utilization take the modes of market investment and government supervision. The contractor carries out protection and renewal in phases, emphasizing the relationship between the historical waterfront area and downtown in the city, and its catalyst effect on the whole city.

-Sort out the pedestrian flow lines and nodes.
-Build public buildings to improve vitality.
-Set boundaries to protect historical buildings.

利物浦滨水区的历史保护利用采取市场投资、政府监管的模式，由承包商分期进行保护更新，强调增进历史滨水城区与市中心的联系，以及对整个城市的触媒效应。

– 梳理人行流线和节点
– 增进活力，引入公共建筑
– 划定明确界限对历史建筑进行保护

Case: The Historical Protection and Utilization of the Waterfront Area in Fuzhou Ancient City
案例：福州滨水区历史保护利用

Pay full attentions to the role of community and the extensive popularization of science activities, and explore new values while protecting urban context, under the premise of protecting and developing the historical and cultural environment.

-Adjust the space to meet the needs of modern life.
- Popularize the concepts and
functions of history museums.
-The integrity protection of historical sites in building blocks.

福州滨水区历史保护利用在历史文化环境氛围的保护与发展前提下，充分重视社区的作用和科普活动的深入普及，在保护文脉的过程中发掘新的价值。

– 空间调整，适应现代化生活需求
– 普及历史博物馆概念及功能
– 建筑街区历史遗存的完整性保护

Diagrams of Historical Value Strategy

历史价值策略图示

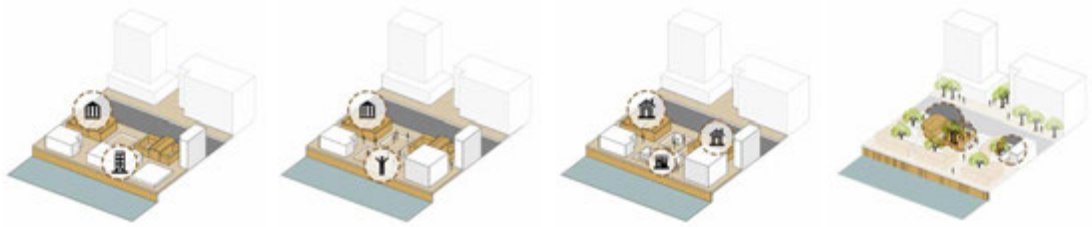


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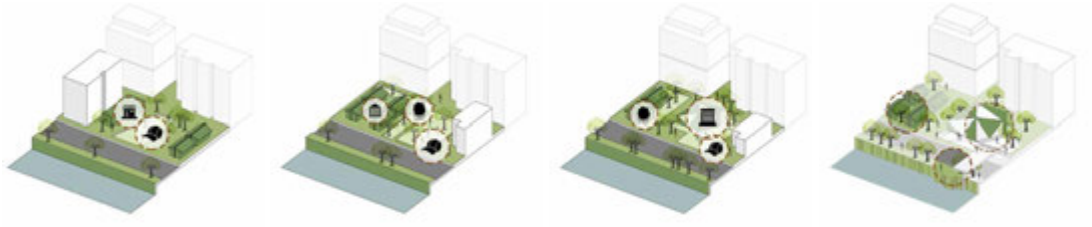
FIG. 2.52 Wuhu Case

芜湖案例

(a) Remain the historical sites and combine with new sites to show the replacement and continuation of urban context .(b) Keep regional characteristics while enhancing the vitality of blocks.(c) Protect the spirit of the place in order to highlight the culture and preserve the living atmosphere of blocks.(d) Applicable to the historical sections of the waterfront space, where architectures are concentrated.

(a) 历史保留遗存，新旧拼贴，展示文脉的更替与延续(b) 保留地域特色的同时增进街区活力(c) 保护场所精神使其凸显文化性，并保留街区生活气氛(d) 适用于滨水空间建筑院落较集中的历史地段。



a *b* *c* *d*

FIG. 2.53 Liverpool Case

利物浦案例

(a) Use unoccupied lands in corners to develop public space, create catalysts and guarantee residential services.(b) Make regulations and delimit protected areas and surrounding buffer zones.(c) Strengthen the protection and utilization design of the overall shoreline, renovate and invest on business districts to enhance vitality.(d) Applicable to the junction areas between the historical sections of waterfront space and built-up areas .

(a) 利用边角空地发展公共空间，创造触媒并保障居住服务(b) 制定法规，划定保护区域和周边缓冲区(c) 加强整体岸线的保护利用设计，投资更新商务区增进活力(d) 适用于滨水空间历史地段与其他城市建成区的交界地段。

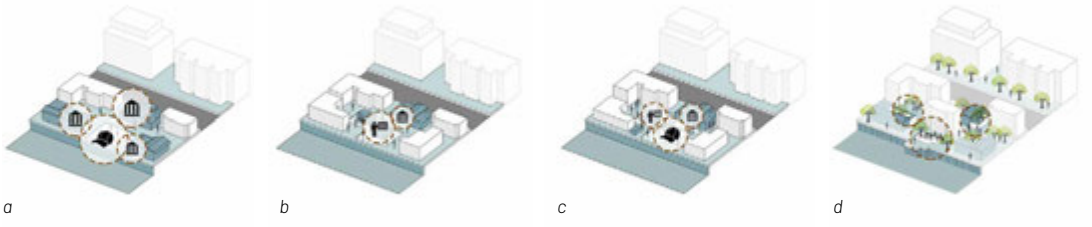


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FIG. 2.54 Fuzhou Case

福州案例

(a) Take appropriate open measures in historical protection building blocks to achieve integrated preservation.(b) Popularize the science education about historical urban context and build related facilities and places.(c) Enhance public participation and strengthen residents' understanding and protection awareness of the culture in historical building blocks.(d) Applicable to the compound sections of historical building blocks of the waterfront space in Beijing and existing residential blocks.

(a) 整体性保护，在历史保护建筑街区采取适当的开放措施(b) 普及历史文脉的科普教育，修建相关设施场所(c) 增强公众参与，加强居民对历史街区文化的了解和保护意识(d) 适用于北京滨水空间历史建筑街区和现状居住街区混合的地段。

2.3.5 – **Economic Value Strategy**
经济价值策略

Land Use Strategy – Case: Riverside Landscape Belt Planning of Hedong New District in Suining
土地利用策略 - 案例：遂宁河东新区滨江景观带规划

By means of business integration, culture inheritance and ecological regression, and by designing a complex urban with multiple functions, such as experience space and tourism, the planning has set up sports and leisure, ecological experience, fashion business, green theme and other functions in the waterfront space.

-Layout Integration of Land Use
-Function Compound of Land Use
-Form Diversification of Land Use

通过融合商业、传承文化、回归生态的方式，设计适应市民休闲与旅游度假的多功能复合型城市，设置运动休闲、生态体验、时尚商业、绿色科普等多种功能。

– 用地布局一体化
– 用地功能复合化
– 用地形式多样化

Business Development Strategy – Case: Riverside Reconstruction Design of Clarke Quay in Singapore
商业开发策略 - 案例：新加坡克拉码头滨河改造

The commercial development along the river makes full use of the advantages of waterfront resources, increases the characteristic types of business, integrates more complex commercial functions, and fuses with the regions to meet the leisure and entertainment needs of the native and non-native population, and become a tourist destination.

-Create Hydrophilic Business Space
-Introduce Characteristic Business
-Reasonably Divide the Business Space

沿河的商业开发充分利用了水岸资源的优势，增加特色业态，融入更加复合的商业功能，与区域相融，满足本地人口与外来人口的休闲娱乐需求，成为旅游目的地。

– 打造亲水商业空间
– 引入特色业态
– 合理划分商业空间

Catalyst Effect Strategy – Case: Waterfront City Design of New District in the North of Chongqing
触媒效应策略 - 案例：重庆北部新区滨水城市设计

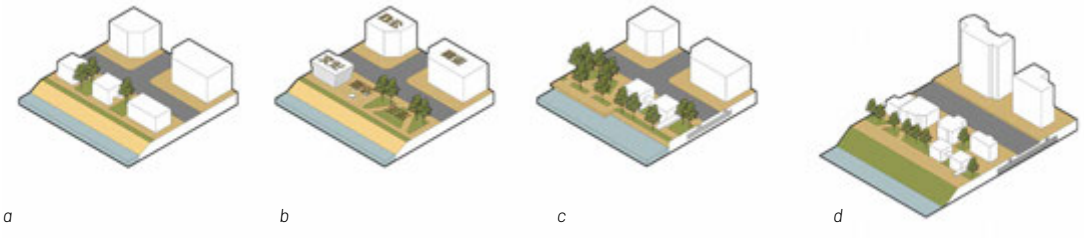
By planning service catalyst projects such as commerce, hotels, exhibitions, etc., the function agglomeration effect of the riverside area is formed; create waterfront vitality through introducing the functions of small and medium-sized industries and characteristic industries.

-Inject Service Function Catalyst
-Match and Balance Diverse Catalysts
-Organize Walking Space Catalyst

重庆北部新区滨水设计通过策划商贸、酒店、会展等服务触媒项目，形成滨江地区的功能集聚效应，引入创意产业、特色产业功能等中小型产业以创造滨水活力。

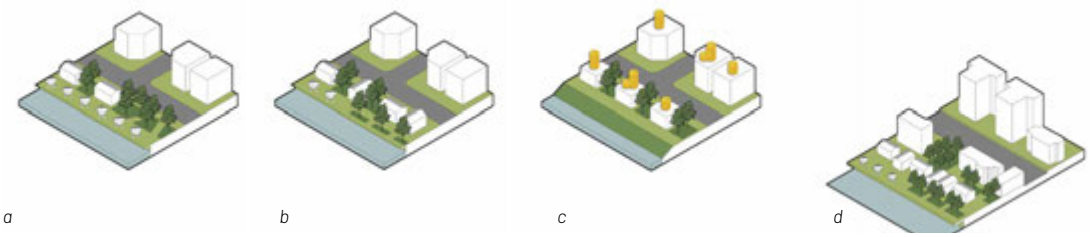
– 注入服务功能触媒
– 均衡搭配多样触媒
– 组织步行空间触媒

Diagrams of Economic Value Strategy
经济价值策略图示



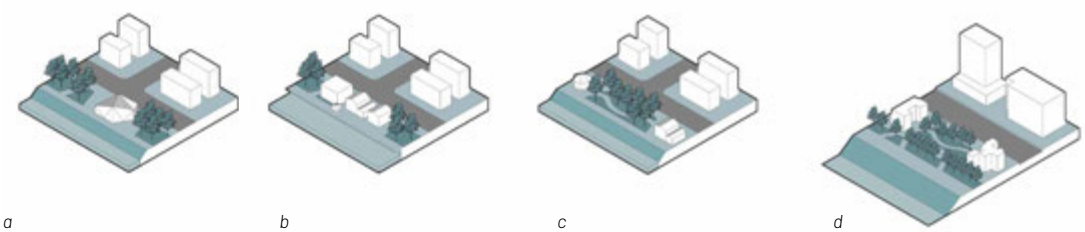
a *b* *c* *d*

FIG. 2.55 Land Use Strategy
土地利用策略
(a) Considering the functional continuity of urban land use, the open space and the urban construction land should be integrated as a whole.(b) Create a multi-function compound waterfront area mainly for public activities to enhance the appeal of waterfront area.(c) Land use is combined with the development and utilization of natural water body resources for three-dimensional development.
(a) 考虑城市用地功能的延续性，使开敞空间部分和城市建设用地成为一个整体(b) 打造公共活动主导的功能复合型滨水区，增强滨水区的吸引力(c) 土地利用与天然水体资源的开发利用相结合，进行立体化开发。



a *b* *c* *d*

FIG. 2.56 Business Development Strategy
商业开发策略
(a) Change the limitation of inaccessible water, and create the hydrophilic and open-style space for recreation and dining.(b) Diversify the types of business, so that experiential consumption and targeted consumption take dominant.(c) Different types of business are assigned to different lands according to their economic values, thus achieve effective complementarity of various commercial resources.
(a) 改变邻水不亲水的局限，打造亲水开放式休憩餐饮空间(b) 增加业态丰富度，使体验式消费和目的性消费占主导(c) 依据地块经济价值分配不同业态，实现各商业资源的有效互补。



a *b* *c* *d*

FIG. 2.57 Catalyst Effect Strategy
触媒效应策略
(a) Increase public facilities, expand consumption space, and boost function transformation of waterfront areas.(b) Match and arrange in balance and implement diversified catalyst projects in space.(c) Open up and expand the open space connections in vertical waterfront shoreline to enhance economic value.
(a) 增加公共活动设施，拓展消费空间，助推滨水地区功能转型(b) 在空间上均衡搭配布置，实施多元化触媒项目(c) 开辟拓展垂直滨水岸线的开放空间联系，从而提升经济价值。

2.3.6 – **Aesthetic Value Strategy**
美学价值策略

City Colour Design Strategy-Case: The urban design of Hangzhou section of the Grand Canal
城市色彩设计策略-案例：京杭运河杭州段城市设计

Considerations of architectural color are particularly important for the aesthetic value. The Case uses the main color zoning, functional color positioning, and the logo color system design for the urban architectural color design of the waterfront area, so that the overall architectural color of the waterfront urban area including the historical sections is more catalytic.

-Master color planning for different functional area.
-Continuous urban color planning along the river.
-Orientation of urban color harmony.

建筑色彩方面的考量在美学价值体现中尤为重要。滨水区的城市建筑色彩设计进行主色调分区、确定功能色彩定位、设计标识色彩体系等手段，使包含历史区段在内的滨水区整体建筑色彩更具触媒效果。

– 按功能分区进行整体主要色彩规划
– 沿河进行连续性城市色彩规划
– 城市色彩调和导向

Public Facility Design Strategy-Case:The urban design of the Darwin Waterfront in Australia
公共设施设计策略-案例：澳大利亚达尔文滨水区城市设计

When designing the service facility system of public space in waterfront area, the combination of function and aesthetic system should be considered. This case combines with the surrounding environment and carries on the urban cultural characteristics, which raises its aesthetic value while ensuring the service quality.

-Reasonable layout and artistic design of facilities.
-Cultural elements are integrated into the design of signage system.

公共空间的服务设施体系设计应当考虑功能与美学体系的结合。通过与周边环境结合、沿袭城市文化特色等手段，在保证服务质量的同时提升美学价值。

– 休息设施进行合理布局与艺术设计
– 标志标牌体系设计融合文化元素

Night Lighting Strategy-Case:The urban design of the Jinji Lake waterfront in Suzhou
夜景照明策略-案例：苏州金鸡湖滨水区城市设计

The design of night landscape lighting reflects the aesthetic needs for time and space changes in urban waterfront area. The night scene design in this case is based on the construction logic of dot, line & surface, which enhances the sequence sense while satisfying illumination function and highlights the effect of night scene in nodes.

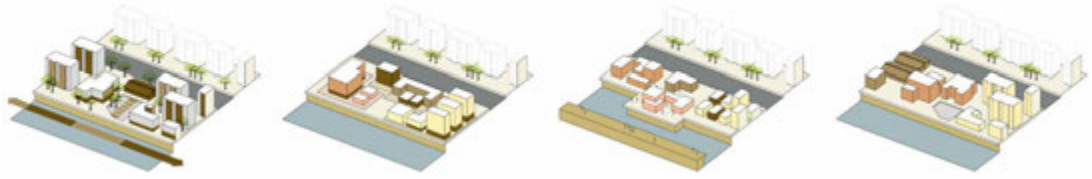
-Emphasize the sense of sequence of the light source on road and shoreline.
-Highlight urban culture and living atmosphere.

夜景照明的设计体现了城市滨水区时空变化的审美需求。夜景设计基于点线面的构造逻辑，在满足照明功能的基础上增强序列感，突出节点夜景效果。

– 强调道路与岸线的光源序列感
– 凸显城市文化与生活氛围

Diagrams of Aesthetic Value Strategy

美学价值策略图示



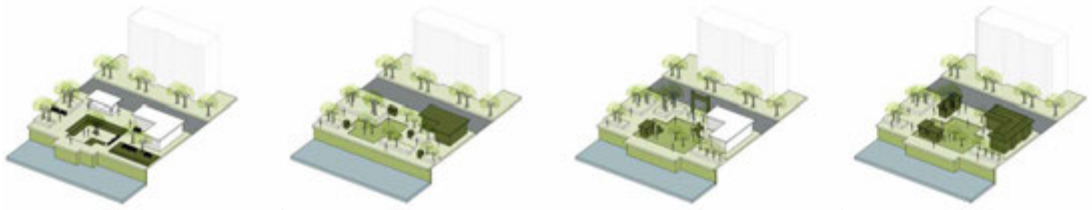
a *b* *c* *d*

FIG. 2.58 City Colour Design Strategy

城市色彩设计策略

(a) Define the orientation of overall waterfront color and shape memorable city intentions.(b) Differentiate the relationships between different functional regions to achieve overall coordination.(c) Consider the visual impact of different water surface widths on the color of waterfront architectural complex.(d) Reasonable partition the color design to highlight the identifiability of the area.

(a) 确定整体滨水色彩定位，塑造可记忆城市意向(b) 区分不同功能区块的从属关系，达到整体协调(c) 考虑不同水面宽度对滨水建筑群色彩感受的影响(d) 合理进行色彩规划设计的分区，凸显功能区域的可识别性。



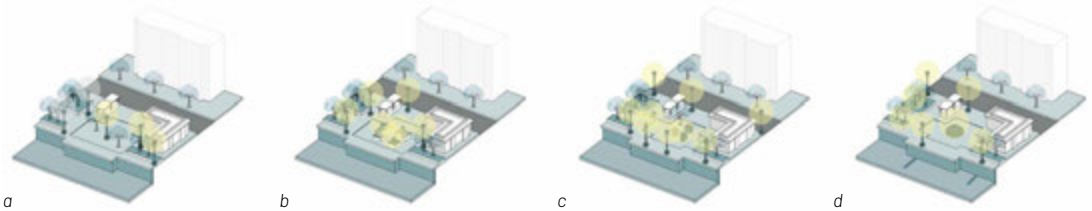
a *b* *c* *d*

FIG. 2.59 Public Facility Design Strategy

公共设施设计策略

(a) The humanized design of the rest facilities makes them parts of the waterfront landscape.(b) Layout & shape design of the sanitation facilities are in harmony with the surroundings.(c) Design a signage system that integrates the historical and cultural elements of the city and indicates clear and definite information.(d) Set different commercial service facilities according to different types of public space and people flow.

(a) 对休息设施进行人性化设计，使之成为滨水景观的一部分(b) 卫生设施的布局与造型设计与周边环境相协调(c) 设计融合城市历史文化元素、信息表达清晰明确的标志标牌体系(d) 根据不同类型公共空间和人流量设置不同商业服务设施。



a *b* *c* *d*

FIG. 2.60 Night Lighting Strategy

夜景照明策略

(a) Night lighting humanized design is based on urban climate characteristics and seasonal changes.(b) Combine with the green landscape of the urban waterfront to create different style night view of the city.(c) Be designed in combination with roads and shorelines, so as to make the night view diversified partially.(d) Integrate various characteristics of water bodies to enhance the artistry of the scape lighting design.

(a) 考虑城市气候特点与季节变化，进行人性化夜景照明设计(b) 与城市滨水区绿色景观相结合，营造不同风格城市夜景(c) 与道路、岸线等结合设计，使城市夜景丰富多样(d) 结合水体的各种特性，增强夜景照明设计的艺术性。

2.3.7 – **Node Design**
节点设计

Node 1
节点1

FIG. 2.61 Base Situation
基地状况

Description of design: Located at the confluence of Yongding River and Kunyu River, the site now has a cruise ship hotel with few tourists. By making full use of the value strategies for ecology, space, aesthetics, etc. mentioned above, the design aims to make the waterfront activity space more interesting by reserving the main building space and connecting the nodes through skywalk corridors.

设计说明：地块位于永定河与昆玉河的交汇处，现状有一游轮饭店，但游客偏少。本设计充分运用前文所提出的生态、空间、美学等价值策略，通过保留主要建筑空间，并采用空中步行廊道连接各节点，增加滨水活动空间趣味性。

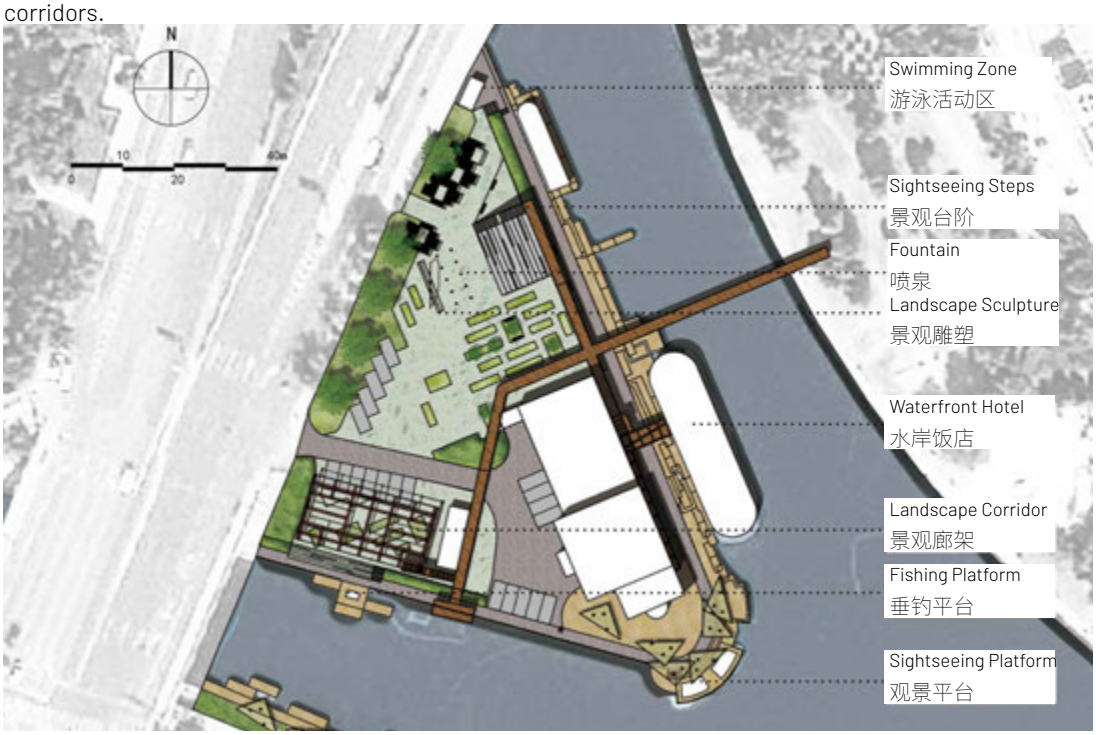


FIG. 2.62 Plan
平面图

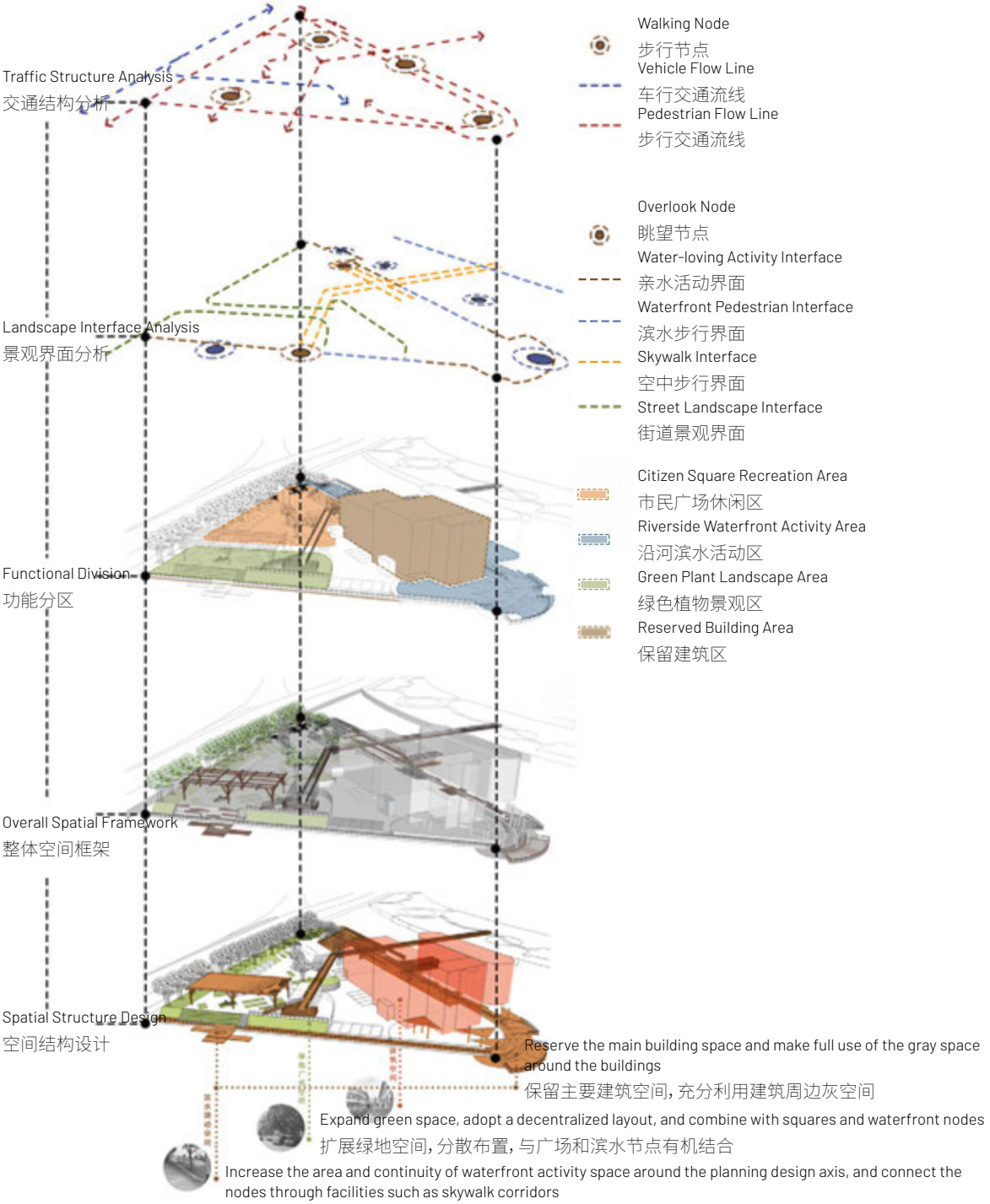
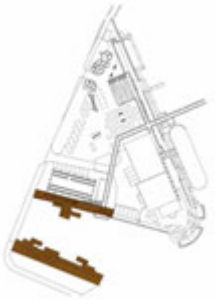


FIG. 2.63 Overall Spatial Structure
整体空间结构

FIG. 2.64 Local Node Perspective
局部节点透视



Fisherman's Wharf Waterfront
渔人码头水岸

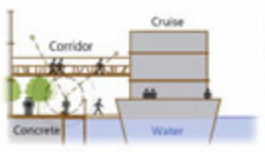
Sightseeing Platform Waterfront
眺望台水岸

Cruise Hotel Waterfront
游艇 旅馆水岸

Water Sports Waterfront
水上运动水岸

Fishing and walking
Sit and viewing
Suitable space ,narrow field of vision
垂钓，空间尺度适宜，保证行人和停留者互不干扰

Rest, large space
Rest and sit, wide field of vision Fishing and drink
Watch the boats
驻足休息，视野宽阔



Connect the hotel
Walking space enlarge
Hydrophilic feeling
连接游轮和旅馆建筑主体，拓宽人行空间的尺度

Revetment service for swimming and boating
Suitable space
为游泳和划船的市民提供驳岸服务，空间尺度适宜

FIG. 2.65 Function Bank Analysis
功能水岸分析

FIG. 2.66 Local Node Perspective
局部节点透视

Transform the internal space of the base into a citizen square which attracts people to the riverside while also serves as a pedestrian node for both banks of the river crossing.

将基地的内部空间改建市民广场，吸引人们前往河滨，同时作为河道交叉口两岸的人行交通集散节点。

The waterfront activity space is the focus of urban design, and it should be transformed in a way that improves traffic continuity and diversity of waterfront activities.

滨水活动空间作为城市设计的重点，改造主要体现在增加交通连续性和滨水活动多样性方面。

Introduce a core green landscape design in the base, reach for the green landscape of the surrounding waterfront, and create an ecological environment that encourages public participation.

在基地内引入绿色景观核心，承接周边滨水区域绿色景观，营造鼓励市民参与的生态环境。

FIG. 2.67 Activity Planning for Functional Zone
功能区活动策划

Walking nodes are built with anti-corrosive wood and stone materials. The design idea focuses more on expanding the width of pedestrian space and providing more comfortable waterfront walking and rest experience. At the same time, they can also accommodate crowds and absorb them into the base.

步行节点采用防腐木质及石质材料构建，其设计思路多偏重于扩大步行空间的宽度，给予人群更加舒适的滨水步行体验及驻足感受，同时起到容纳集散人群的作用，以达到吸引人群进入基地的目的。

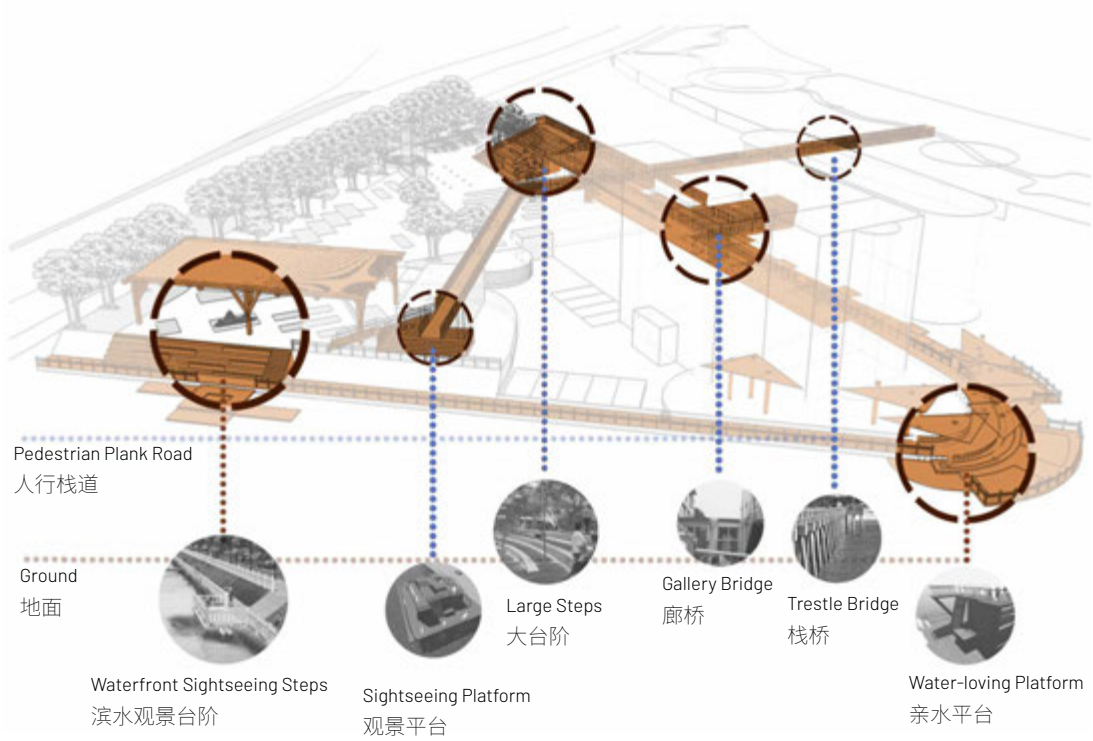


FIG. 2.68 Walking Node Analysis
步行节点分析

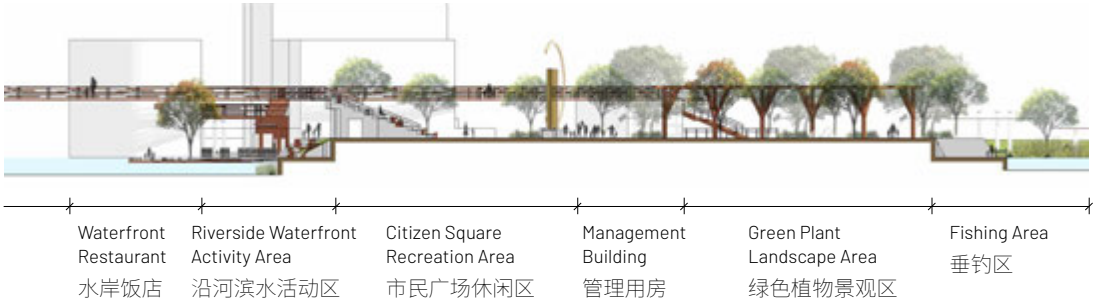


FIG. 269 Profile
剖面图

Node 2
节点2

FIG. 2.70 Base Area
基地区位

Description of design: The area of Gaobeidian Industrial Park on both sides of the Beijing part of Tonghui River is selected for the design. With reference to the surrounding urban environment, the design aims to provide the surrounding community residents and students with water loving space and the places for daily exercise and cultural leisure with an area of 1400 square meters.

设计说明：本设计选取北京通惠河河段两岸的高碑店产业园区域，结合周边城市环境进行设计，旨在为周边社区居民和学生提供亲水空间及日常生活中的锻炼、文化休闲场所。设计面积约为1400平方米。

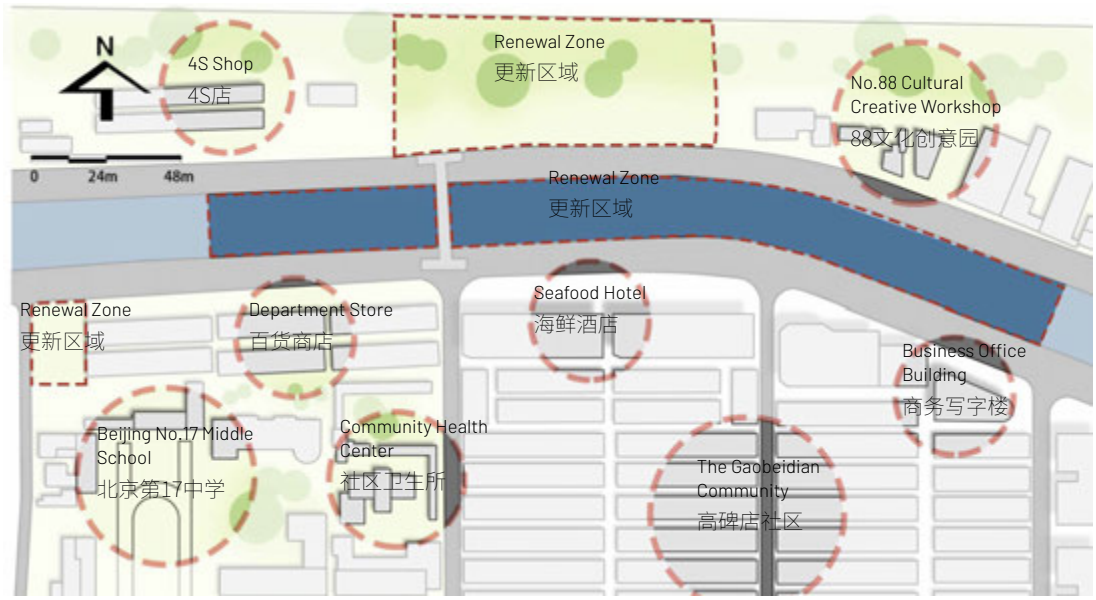


FIG. 2.71 Base Situation
基地状况

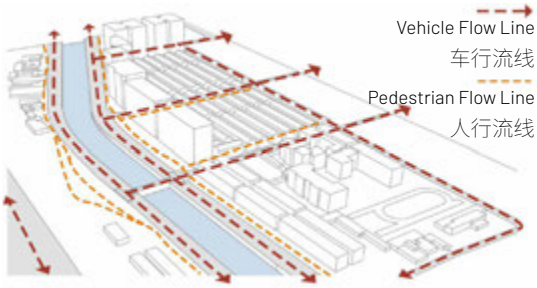


FIG. 2.72 Traffic Flow Line
交通流线

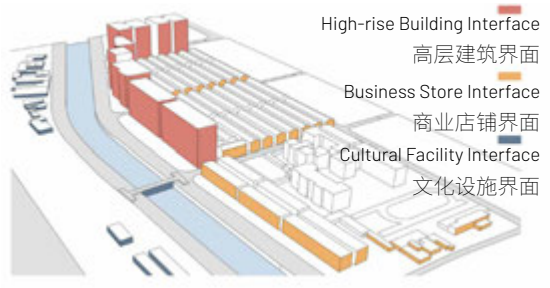
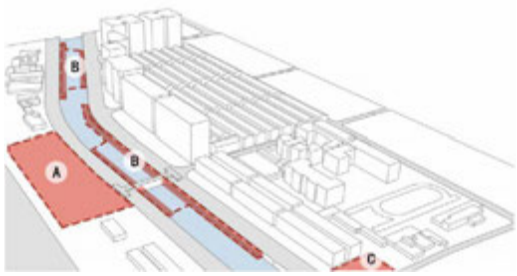


FIG. 2.73 Waterfront Interface
滨水界面

People activities in the south bank are more clearly partitioned. Activities in the north bank are scarce and there is a lack of sufficient urban catalyst.

南岸人群活动分区较明确。北岸活动稀少，缺乏足够城市触媒。

FIG. 2.73 People Activities
人群活动



A. Improve and enhance the public green space, set up cultural parks to enhance the catalyst effect and attract people to carry out activities. B. Renovate and utilize the waterfront revetment to build more water loving places and waterfront sightseeing platforms.C. Build a cultural square that echoes the north bank on the axis of the landscape and in terms of urban context.

A.改善提升公共绿地，设置文化公园增强触媒效应，吸引人群活动。B.改造利用滨水驳岸，增加亲水活动场所和滨水观景平台。C.设置文化广场，在景观轴线和城市文脉上与北岸相呼应。

FIG. 2.74 Nodes Function Positioning
节点功能定位

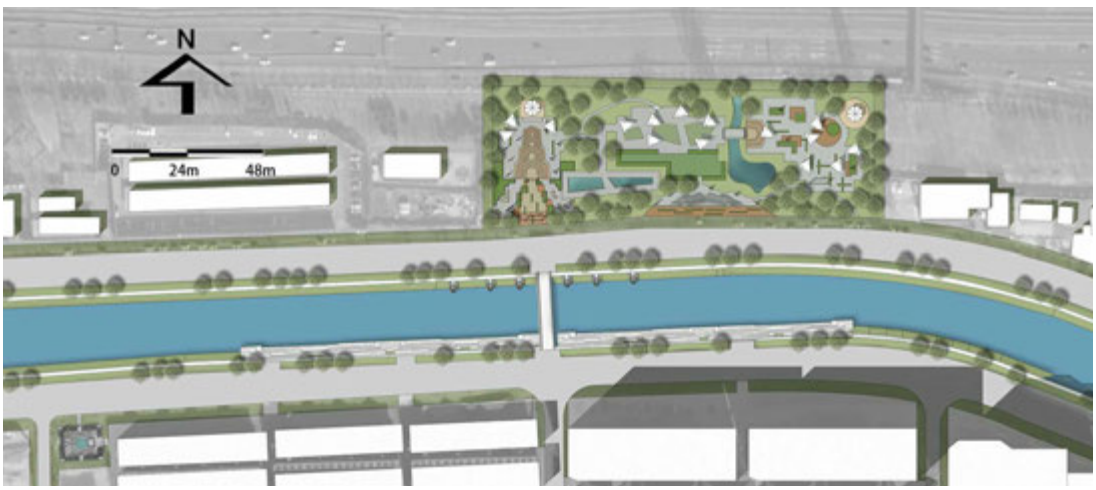


FIG. 2.75 Plan
平面图

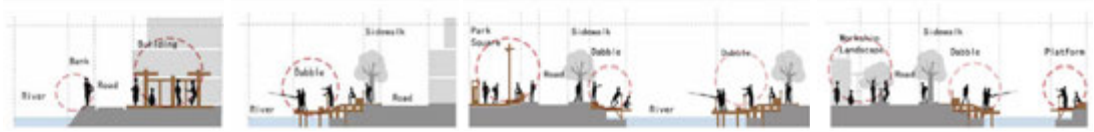
FIG. 2.76 Local Node Perspective
局部节点透视

A. Corner Square
A.街角小广场

B. Waterfront Promenade
B.滨水交通步道

C. Waterfront Culture Park & Landscape Square
C.滨水文化公园与景观广场

D. Waterfront Sightseeing Platform
D.滨水观景平台



The cultural, recreational and interactive space for community residents along the river channel.
社区居民的文娱交往空间，以河道为背景。

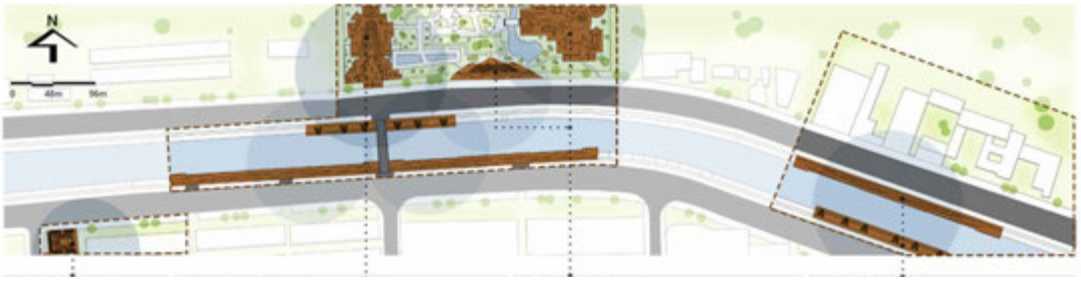
Provide linear locations for riverside walking, rest, waterfront activities, etc.
提供沿水步行、休憩静坐和滨水活动等功能的线性场所。

Pay attention to the interactions and levels between the waterfront public space on both banks and the riverside walking shoreline, and provide comprehensive functions such as recreations, popularization of culture and sciences, etc.
重视两岸滨水公共空间和沿水步行岸线间互动和层次区分，具有休闲游憩、文化科普等综合功能。

Provide waterfront sightseeing platforms in the Cultural Creative Park for business workers and community residents.
主要为商务工作者和社区居民提供文化产业园区域滨水景观的观赏平台。

FIG. 2.77 Function Bank Analysis
功能水岸分析

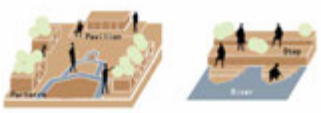
FIG. 2.78 Local Node Perspective
局部节点透视



Corner Square
街角小广场

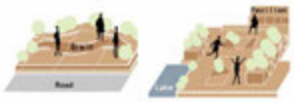
The traditional stage of Peking Opera inspires a design of enclosed space with sunken steps.
借鉴传统京剧戏台的元素，采用围合空间阶梯式下沉的设计。

Culture Square & Waterborne Platform
文化广场与亲水平台



The square is designed as a semi-enclosed site by utilizing the flower beds of varying heights integrated with local traditional elements to create varied public space for recreation.
使用带有当地传统元素的不同高差的景观花坛对广场进行半围合式设计，以创造丰富的公共休闲空间。

Landscape Square & Sports Square
景观广场与市民运动广场



The inclusion of traditional elements in their path designs will provide guidance and fun for the activities carried out in the spaces.
利用传统元素设计平面以增加空间活动的引导性与趣味性。

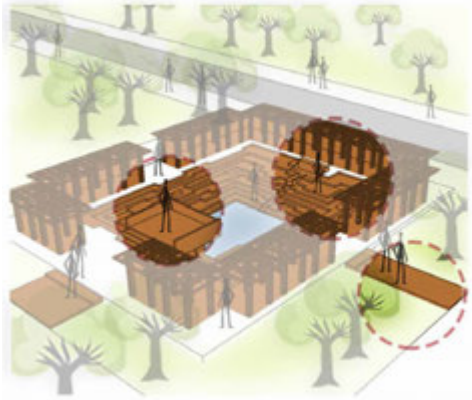
Waterfront Walking Landscape Corridor
滨水步行观景廊道

The designs of walking corridor and sightseeing platform use vertical steps.
步行廊道的设计形式采取竖向阶梯布置步行廊道和观景平台。

FIG. 2.79 Place Space Analysis
场所空间分析

A. Corner Square

A.街角小广场

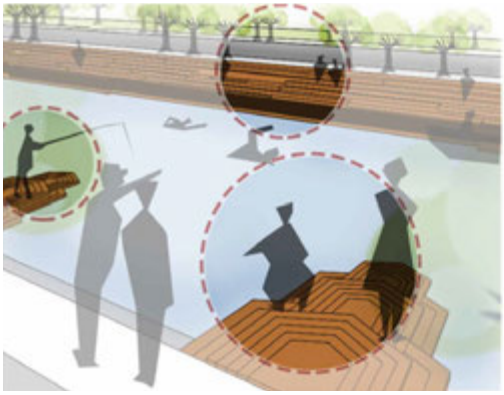


The corner square is a pedestrian stop node on the waterfront landscape corridor. It adopts the method of small gray space renovation and renewal to provide residents of the south bank with a place for water loving and recreational activities, enriching the life of the waterfront pedestrian zone.

街角广场是滨水景观廊道上的步行停留节点，采取小型灰空间改造更新的手法为南岸居民提供亲水文娱活动场所，增添滨水步行区的生活情趣。

B. Waterfront Promenade

B.滨水交通步道



The nodes of the waterfront promenade are mainly embodied in public spaces such as connective corridors with handrails, waterfront steps and waterborne platforms. They are mainly served for people to have a rest and enjoy the sceneries while walking, and for activities such as fishing.

滨水步道的节点设计为栏杆连廊、滨水台阶和亲水缓台等公共空间，主要服务于步行活动中的休憩、观望及垂钓等亲水活动。

C. Waterfront Culture Park & Landscape Square

C.滨水文化公园与景观广场

As the main walking node in the design area, the Waterfront Cultural Park is a cultural and leisure place in the non-waterside area and an important public space in Gaobeidian Cultural Area.

滨水文化公园作为设计区域内的主要步行节点，是非邻水区域的文化休闲场所，也是高碑店文化区的重要公共空间。

FIG. 2.80 Walking Node Design

步行节点设计

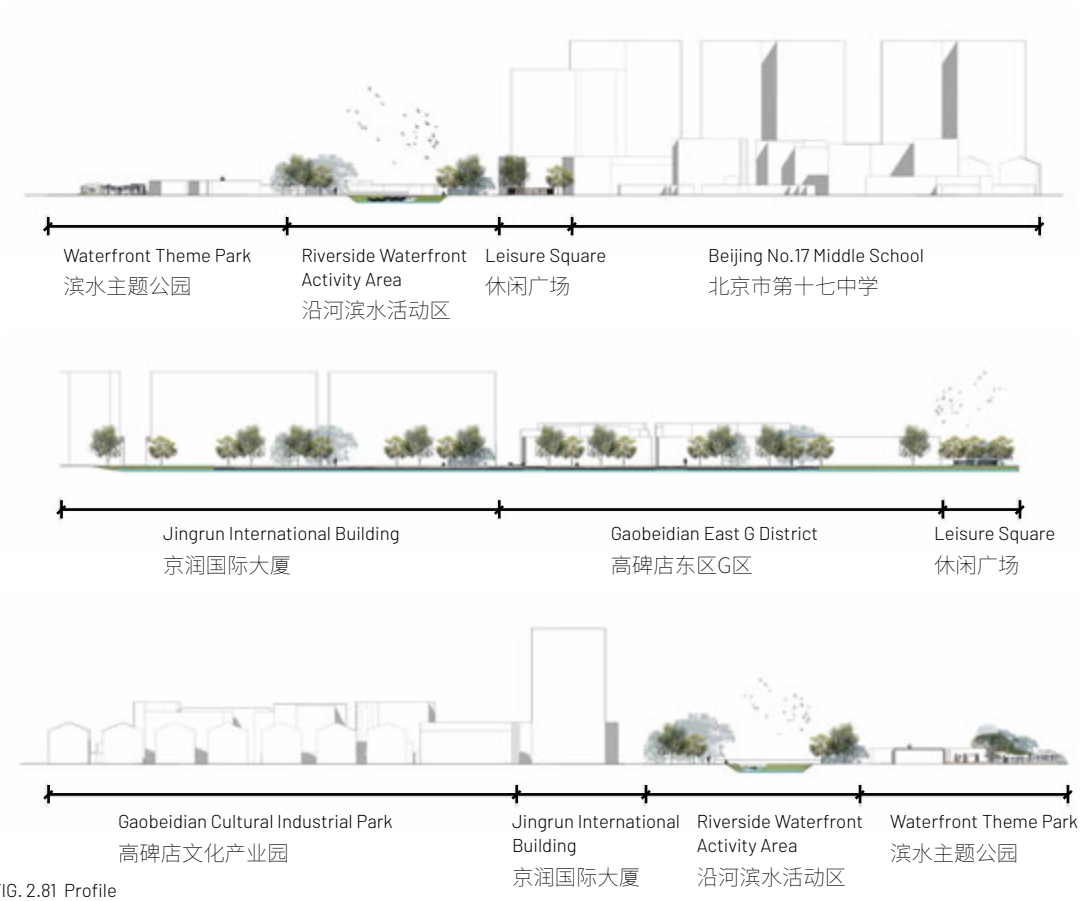


FIG. 2.81 Profile

剖面图

FIG. 2.82 Activity Planning for Functional Zone

功能区活动策划

Node 3
节点3

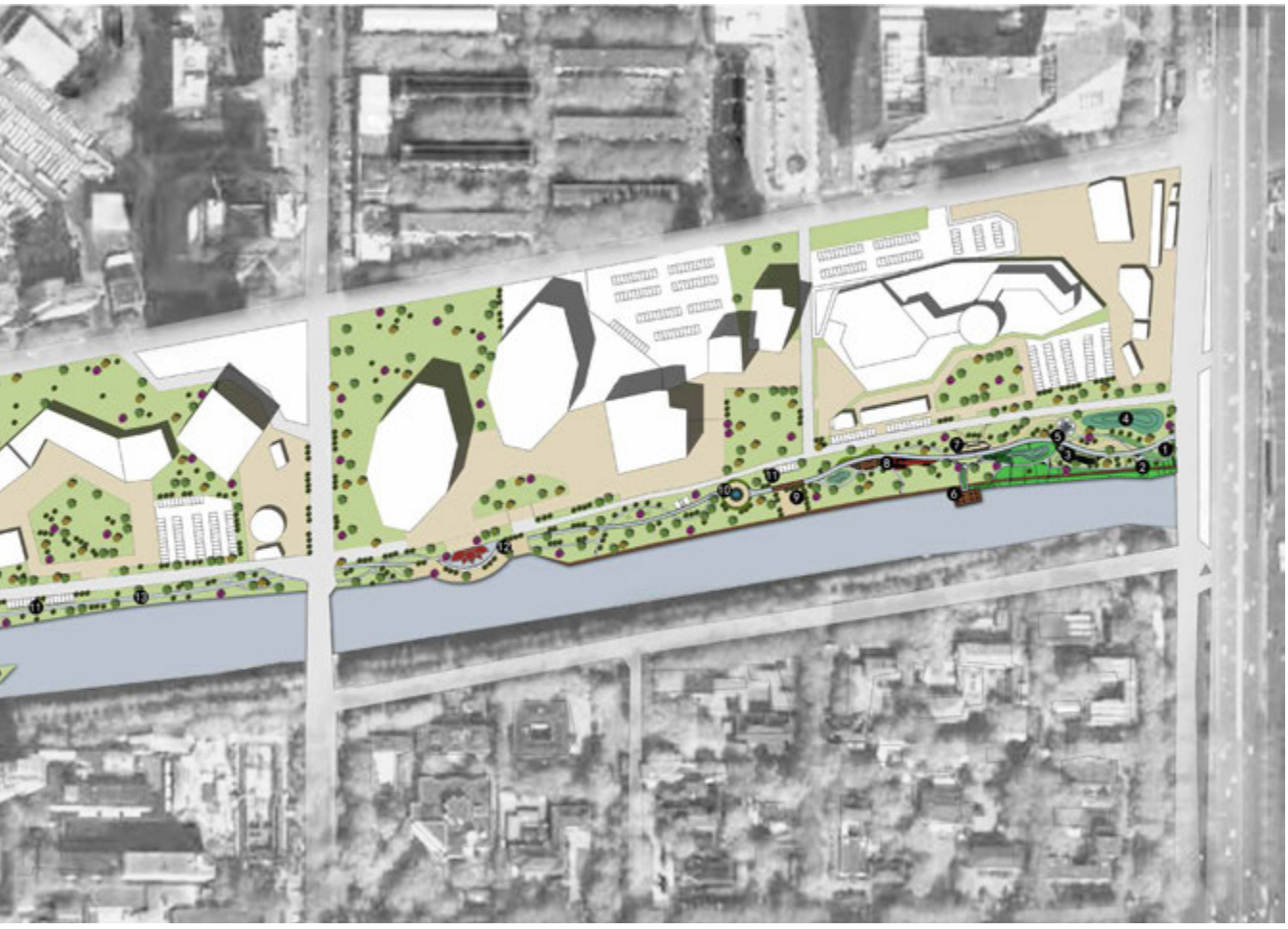
FIG. 2.83 Base Area
基地区位

FIG. 2.84 Base Situation
基地状况

FIG. 2.85 Plan
平面图

Description of design: The design is for the Binhe Park located in the north of Liangma River and with a total length of 1.5 kilometers. The site is situated at the intersection of Liangma River and East Third Ring, with the hotel of The Kunlun Beijing, Capital Mansion and other commercial buildings in the north, and the UN Building and embassies in the south. By making full use of the relevant value strategies mentioned above, the design aims to build the site into a waterfront leisure park with integrated functions of entertainment, leisure, joint performance and fishing.

设计说明：本设计为一条位于亮马河北侧、总长约1.5公里的滨河公园。基地位于亮马河与东三环的相交处，北侧为昆仑饭店、京城大厦等商业建筑，南侧为联合国大楼以及各国大使馆。设计充分运用前文所提出的相关价值策略，将地块打造成集娱乐、休闲、汇演、垂钓等多功能混合的滨水休闲公园。



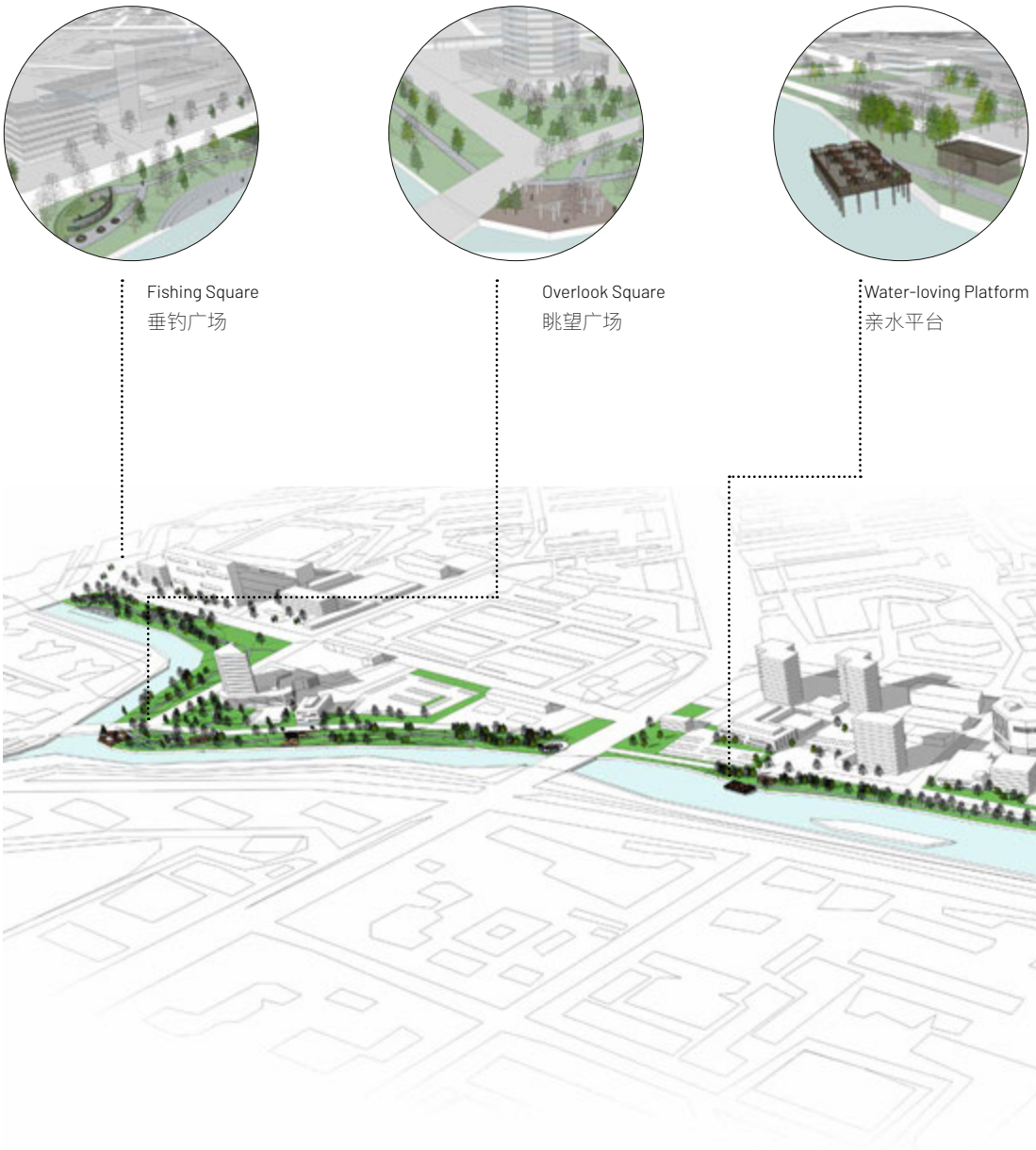
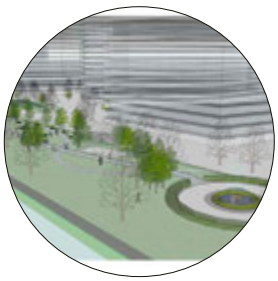


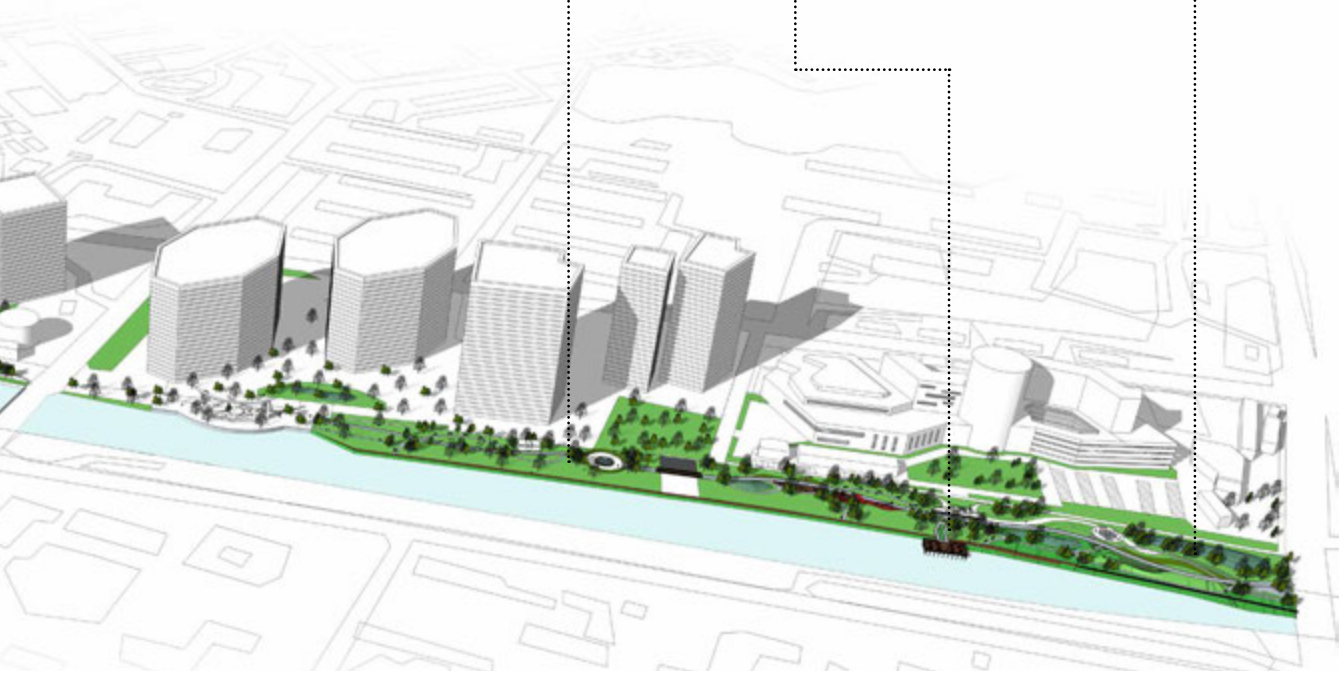
FIG. 2.86 Local Node Perspective
局部节点透视



Buried Fountain Square
汗喷广场

Water-loving Platform
亲水平台

Thin Forest and Gentle Slope
疏林缓坡



Considering the crowd clustering around the Embassy and the Commercial Center, the waterfront activities are mainly leisure activities, sports, cultural performances and so on.

考虑到大使馆与商业中心的人流聚集性，滨水活动以休闲娱乐、运动、文艺表演等为主。

Static human activities should prevail near large areas of business buildings.

毗邻大片商务办公区，人群以静态活动为主。

FIG. 2.87 Activity Planning for Functional Zone

功能区活动策划

FIG. 2.88 Profile

剖面图

Located in the south of Yuyang Hotel and the turning point of the rivers, a sightseeing platform is set up to enjoy the beautiful scenery.

位于渔阳饭店南侧，且地处河流流向转化点，风景优美，设置景观眺望台。

Residents are the main crowd; a recreational square and a fishing area are designed for them.

人群类型以住区居民为主，设置休闲娱乐广场与垂钓区。

PART 3

Suzhou Garden: Design of a Water City

第3部分

苏州园林：设计一个水上城市

Introduction

引言

What follows is the result of two intense on-site workshops in Suzhou where two European schools, EPFL Lausanne (CH) and IUAV Venice (IT), together with two Chinese school, Tianjin University and Xi'an Jiaotong-Liverpool University, and the team of CADRG, came together and worked jointly with on the water city of Suzhou. This was the result of extensive preparatory work, while our vision "Suzhou Garden" was later finalized in a set of guidelines with frequent exchanges among the groups. This rich research-by-design experience has produced an amazing number of ideas and suggestions to tackle the fragile balance between water and the city. We hope that they will not be lost and that new research opportunities will arise from these first steps.

本次研究是由两所欧洲大学（瑞士洛桑联邦理工大学和意大利威尼斯建筑大学）和两所中国大学（天津大学和苏州西安交通利物浦大学）以及中建院组成的大型联合研究团队，经过三次在水城苏州进行的高强度在地工作营，对苏州滨水地区设计进行的一次研究。在几个月的时间里，苏州团队开展了重要而广泛的研究，与其他相关专业团队及专家进行了频繁的沟通，最终提出了苏州的规划愿景——“苏州园林”。同时,在研究的最后阶段，通过一组设计导则探讨了此规划目标的实现途径。本次研究是一次“从设计出发的研究”，通过高强度的设计和研究工作，针对如何平衡在城市发展中脆弱的“水-城”关系这一问题产生了大量创新性建议。我们希望这些创意和建议能够激发新的研究和设计工作，并为苏州后续的规划管理工作提供基础。

A Research Protocol
设计程序

The waterfront of Suzhou is not simple to define: the presence of water bodies (lakes, rivers, canals, wetlands...) is very important in the urban space and has traditionally shaped cities and territories in the Yangtze river delta. To investigate the potentials of such a relation, today and in the future, a research protocol has been implemented: to compare, experience, design "Suzhou Garden".

要给苏州的滨水空间划定一个精确的范围并不容易：历史赋予了长三角整个地域以独特的水体形态。多样化的水体（湖泊、河流、运河水渠、湿地等）是苏州城市空间的重要元素，为了探索这种多样化的水体形态在今天和未来为苏州带来的可能性，我们在本次研究中遵循了一个精确的研究程序：比较、体验和设计“苏州园林”。

Suzhou Atlas.

An atlas is a collection of maps and representations which show the urban territory of Suzhou at different scales and compare it with Venice, probably the most well-known water city in the

苏州图册

该图册是整个苏州市域空间及滨水空间规划的相关图纸和信息的汇总。图册中的这些图纸和信息包含了苏州滨水地区宏观、中观、微观多尺度的内容，并且提供了另一座世界知名的水城威尼斯的规划设计策略以供借鉴。这种探索重点指出苏州整个地域在

challenges the territory will have to face in the future: flooding, lack of fresh water resources, pollution and ecological degradation are not only risks, but inspiration for design explorations on water as an ecological body, the water machine and water as a social space.

Suzhou Walking: Learning from Suzhou

Listening to the places and making exchanges with people is a fundamental way to apprehend the city. Being there, making a direct and corporal experience reveals other, often hidden dimensions of the urban space. We encountered places and people and learned from Suzhou's ancient and modern water and city typologies.

Water Designs I: Scenarios

The scenarios explore sequences of hypotheses about the future of the water city of Suzhou: the consequences of a hypothetical chain of events, actions, decisions, positioned differently in time. What...if the waterfront were 100% public? What...if all the run-off water were purified?

What...if Suzhou were a zero-discharge storm rainwater city? The scenarios design a new relation between the city and the different water bodies able to cope in a systemic way with future urban and environmental challenges. They unveil potential for the design of Suzhou Garden.

Water Designs II: the Scroll Prototypes

The "Prosperous Suzhou" scroll, the exceptional mix of Chinese and Western representations (the traditional Chinese axe degrading perspective) has guided our design explorations. Detailed transformations, as well as the more widespread change in the urban landscape are represented in a new Suzhou scroll. Each part of the scroll develops a case study, an urban prototype of Suzhou Garden: along the Grand Canal, the Grid of the dense network of canals and the lakes, the four bodies of the wide deltaic Suzhou water system.

未来面临的主要挑战——防洪排涝、水生态、水环境等方面的问题。水环境污染和水生态退化是风险，也是对本次设计主题的启发：如何将水体当作一个生态系统去设计?如何将水体当作一个功能机器去设计?如何将水体当作一个社会空间去设计?

漫步苏州：向苏州学习

聆听场地和场地上的人是学习和了解一座城市的基本方法。当我们在城市中生活时，可以获得一种直接的感触，经常能够发现城市空间中其他的，通常是隐藏着的维度。我们在苏州遇见了不同的场所和人群，并向苏州现代和古代两种不同的水城原型进行了学习和剖析。

水的设计一：情景设想

本次研究中采用了情景设想的方法来探索苏州"水-城"关系在未来的可能性。该研究方法以一连串不同时间点的事件、行动为假设，模拟其所带来的结果，推导这种结果对苏州"水-城"关系的影响。例如假设100%的滨水空间都是公共的，将会带来什么样的结果?假设所有的降水径流都被净化，并且在暴雨时所有的雨水都被储蓄，将会带来什么样的结果?这样的情景设想能够激发对城市和各种水体之间关系的重新设计，从而以一个系统性的方式应对苏州城市空间和生态空间在未来面临的挑战，实现"苏州园林"的规划愿景。

水的设计二：长卷和原型

《姑苏繁华图》长卷成功地将中国传统的轴测表现和西方渐变的透视画法结合在一起，这种独特的表现方法指导着我们本次的设计探索。通过长卷的表达方式，局部的城市更新能够和广阔的城市景观变化同时展现并互相联系。从太湖的山水，到大运河的沿岸风光，从城市中密集的水陆双棋盘网格，再到城乡密布的大小塘、圩、湖、荡，长卷中的每一部分都是一个局部采样的研究设计，是一个"苏州园林"的城市空间原型，展现了长江三角洲中苏州这四种水体独特的滨水空间设计策略。

Water Designs III: Suzhou Garden, Guidelines for the Future

All previous investigations depict a vision for future, "Suzhou Garden", where water management, ecological systemic thinking and urban design are allied in the production of a different space to live in. The guidelines translate both vision and design explorations into a set of concrete rules which renew the relations between mobility infrastructure, housing, activities, green and Suzhou water bodies. They are the starting point of a new project for the city.

水的设计三：苏州园林：面向未来的导则

所有以上的研究和探索勾勒了未来"苏州园林"的规划愿景。围绕这个愿景，将对滨水空间的规划管理、对城市生态系统优化和对"水-城"关系设计等的思考，统一整合在新的生态、生产和生活空间设计中。导则同时将愿景和设计方法落实在具体可实施的设计原则里，这些设计原则以水功能为出发点，重新定义了交通设施、居住、生产、生态空间和苏州不同水体之间的各种关系。

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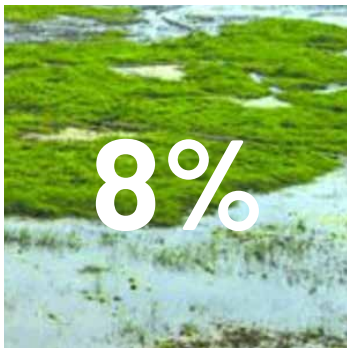

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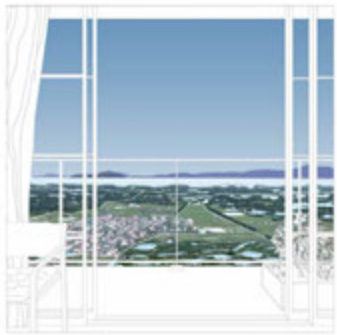

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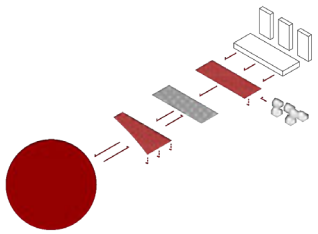

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FIG. 3.1 Atlas: rationalities/comparisons
图册：理性和比较

FIG. 3.2 Fieldwork: Interview/photos/drone videos
实地调研：采访/照片/航拍

FIG. 3.3 Scenario construction
情景设想

FIG. 3.4 The scroll: interpretation/project of the territory
画卷：对地域的解读和设计

FIG. 3.5 "Room with a view"
窗景

FIG. 3.6 Guidelines: diagrams/prototypes
导则：图示和设计原型

3.1 – Atlas

3.1 – 图集

A territorial perspective is needed to understand the spatial and water structure of Suzhou. Located in the Taihu Lake Basin, which is part of the larger alluvial plain formed by the Yangtze River, Suzhou is subject to the dynamic conditions and challenges specific to urbanized deltas. In the form of an atlas, the following pages briefly describe Suzhou's water-city relations from a historical, geographical and thematic point of view.

苏州地处的太湖流域本属长江三角洲冲积平原的一部分，特殊的经济与地理环境使得苏州拥有了独特的城市化发展机遇和挑战，因此要充分理解苏州的城市空间结构和水系结构，我们必须站在区域的视角对其进行研究。在现有的条件下，城市建设相关的信息资料常常分散在各政府部门和书籍档案中，本次研究收集、绘制和整合了一系列历史、地理、人文、交通和城市其他方面相关的地图和信息，试图在一个统一的区域尺度上通过一个整体图册的形式呈现苏州的水城关系。

FIG. 3.7 China from the East (Richard Edes Harrison, 1941)
中国东部鸟瞰图（Richard Edes Harrison, 1941）

3.1.1 – **The Historical Evolution of the Water Network in Suzhou**
苏州水系的历史变迁

Suzhou is located in the lower reaches of the Taihu Lake basin. During early 6th century B.C., Wu Zixu excavated Xujiang River to connect with Taihu Lake (Chen Yong, 2006). Xujiang River is the first artificial canal originated from Suzhou. The eight gates and the moats formed the initial water network. During the Sui and Tang Dynasties (581-907 A.D.), the North-South Canal was opened and the skeleton of chessboard with rivers and road networks started to take form and matured in the Song and Yuan Dynasties (1960-1368 A.D.)(Chen, 2006). At the end of the 14th century, the length of Suzhou's water system was +/- 50,000 meters, with stone revetment and fence. In early 18th century, Suzhou became an important water city. Since the end of 19th century, the rivers in the ancient city experienced a chronic attenuation. The framework of the three-horizontal and four-straight water network has remained, but most of the capillary rivers had been filled or blocked.

苏州位于太湖流域下游，春秋时期（公元前6世纪初）伍子胥采用象天法地的规划理念，开挖胥江以沟通城市与太湖（陈泳，2006）。胥江是第一条源起于苏州的人工运河。苏州古城外围有护城河，古城内的河道和城外的护城河形成了最初的水网骨架。隋唐时期（公元581年-公元907年），开通京杭大运河，兴修外围水利；苏州城内以水系为脉络，河道为骨架，道路相依附的水陆“双棋盘”城市格局基本形成。宋元时期（公元960年-1368年）城市布局主要按功能划分，水陆“双棋盘”格局成熟。明末（17世纪末）苏州水系全长约达50公里，临河部分增设了石驳岸、石栏等防护措施，街河的两侧布置民居，设有码头、水埠（陈泳，2006）。清代时（18世纪初）苏州已成为重要的水上都会，阊门一带成为江南地区的水路要冲和物资集散地。晚清（19世纪末）到本世纪初苏州古城河道经历了一个慢性衰减时期，三横四直的水网骨架一直没变，但是大部分毛细血管型的河流已经堵塞或者填埋。

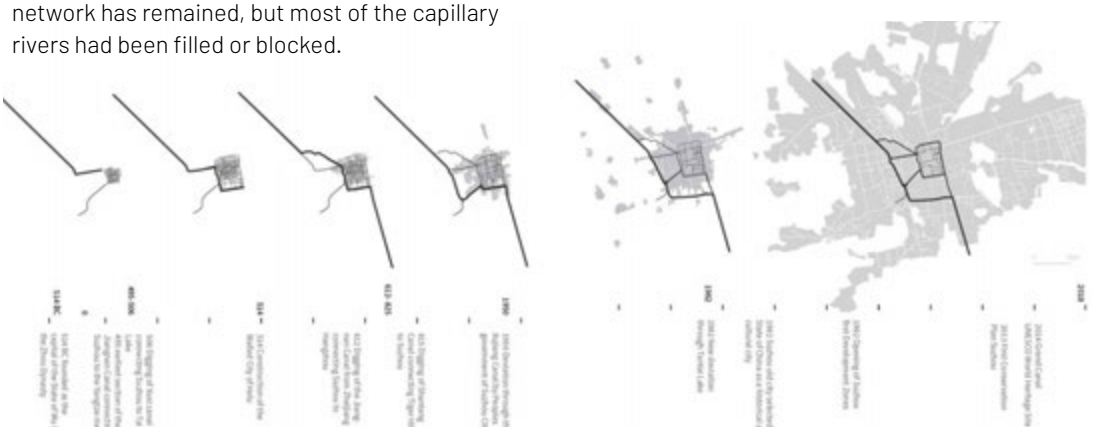


FIG. 3.8 Changes of drainage system pattern in Suzhou in different historical periods (Vannoorbeeck, Nolf, Wang, 2019)
不同历史时期苏州水系格局的变化（Vannoorbeeck, Nolf, Wang, 2019）

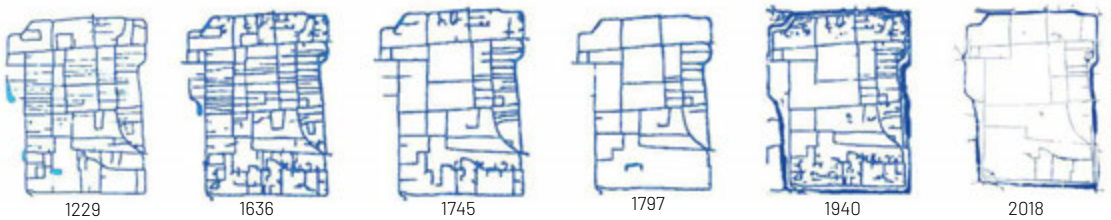


FIG. 3.9 Changes of water system in the ancient city of Suzhou in various years (Qin Zhongpei. Study on the historical form of the waterway in the ancient city of Suzhou [D]. Shanghai Normal University, 2015)
各个年代苏州古城内水系变迁（秦钟沛. 苏州古城水道历史形态研究[D].上海师范大学,2015）

3.1.2– **The 100X100km Frame**
100x100km 研究范围

The bigger frame - 250 km by 250 km - involves the Yangtze Delta metropolitan region, one of the most densely populated areas of the world. Suzhou and the Taihu Lake have been placed in the middle of this frame in order to understand and underline synergies and conflicts with this very broad metropolitan area. This scale is also very relevant to measure the threats due to climate change: the rise in sea levels, extensive flooding of land area, flood disasters, production and energy inefficiency. The 100 by 100 frame contains the metropolitan area of Suzhou at its centre. This frame contains: the Shanghai suburbs to the right, the Taihu Lake to the left, the agricultural lands with ponds and lakes to the right and to the north - towards the yellow river - the metropolitan sprawl.

水系统和城市发展的研究范围常常超越行政区划的限制，这使得研究需要从一个更加广泛和客观的范围来进行。本次研究首先限定了一个250×250公里的区域作为研究范围，它包含了整个长三角城市群。长三角城市群是世界上人口最密集以及城市化最发达的地区之一，但同时也面临着海平面上升、洪涝灾害、能源危机和气候变化等挑战。对整个长三角城市群系统的研究将有助于更好的理解苏州和太湖流域这个子系统中存在的各种问题。研究还限定了一个以苏州都市圈为中心的100×100公里的范围作为本次研究的核心对象——西起太湖，东至上海西郊，北起长江，南至苏州南部特有的江南圩区水乡——包含了各种苏州特有的水体类型及其水城关系。

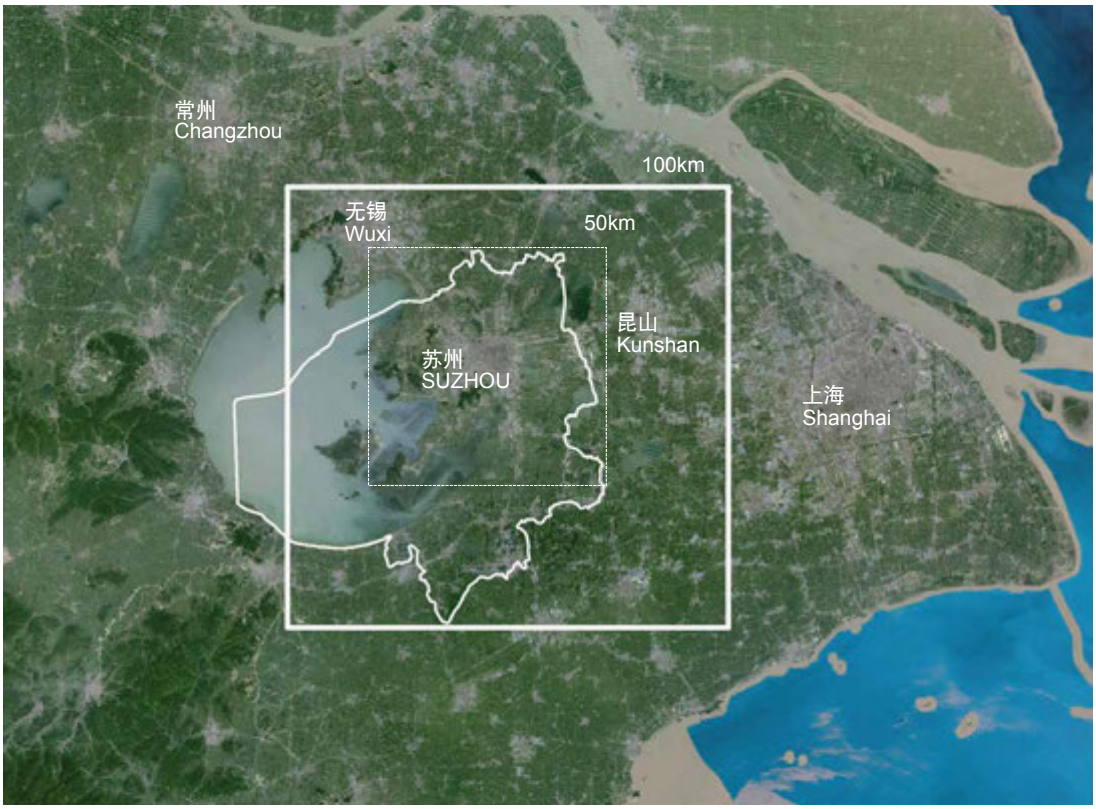


FIG. 3.10 The 100 by 100 and 50 by 50 kilometers in the Yangtze Delta Region
长江三角洲100x100公里及50x50公里研究范围

3.1.3– **The Three Rationalities of Water in Suzhou**
水在苏州的三种存在属性

Each territory is a palimpsest of traces - waterways, infrastructures, buildings, natural spaces. All these traces have different logics that respond to the rationalization processes - natural or artificial - that these traces have undergone. Every rationality is the bearer of a design that imposes or proposes rules on the territory.

In Suzhou the water system is a space relevant for three main aspects: for its working system, possible thanks to a rich presence of works related to the management of water -dykes, ditches, pumping stations, for its ecological and environmental role and for its capacity to convey identity for society as a whole.

每一处地域都不是空白的画布，而是一张展示城市风貌的图片：　水系、交通、基础设施、建筑和自然环境等都在历史的变迁中留下了自己的痕迹。不论是人工还是自然，所有要素的发展过程都遵循着不同的存在逻辑。空间设计需要理解和吸收每一处地域特有的规则，而这些理性系统性的解释了这些规则。

苏州水系的理性可以通过三个主要的方面去理解和归纳：一是它的自然和生态属性；二是它的功能属性，包括了航运、防洪排涝、用水供应以及水利灌溉功能；三是它在社会中激发各种活动、创造独特的生活环境和归属感的社会属性。通过对水的不同存在逻辑的整理可以发现水的不同属性之间的关系及矛盾。

FIG. 3.11 Water as a natural and ecological space: historical polders (micro scale)

水的自然和生态属性：传统圩田结构（微观尺度）

FIG. 3.12 Water as a machine: historical water-land chessboard (medium scale)

水的功能属性：传统水陆双棋盘格局（中观尺度）

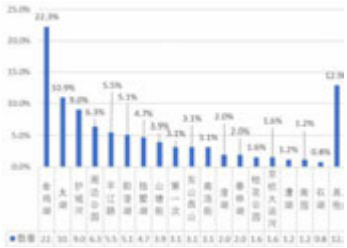


FIG. 3.13 Water as a social space: survey of activities at waterfront (micro scale)

水的社会属性：滨水空间活动调查（微观尺度）

FIG. 3.14 Water as a natural and ecological space: historical form (medium scale)

水的自然和生态属性：历史水系形态（中观尺度）

FIG. 3.15 Water as a machine: planning of flooding control (territorial scale)

水的功能属性：防洪规划(宏观尺度）

FIG. 3.16 Water as a social space: Conservation plan (Macro scale)

水的社会属性：苏州历史文化名城保护规划（宏观尺度）

FIG. 3.17 Water as a natural and ecological space: water protection (territorial scale)

水的自然和生态属性：水系保护（宏观尺度）

FIG. 3.18 Water as a machine: planning of water transport (territorial scale)

水的功能属性：航运规划（宏观尺度）

FIG. 3.19 Water as a social space: the attractiveness (territorial scale)

水的社会属性：滨水空间吸引力研究(宏观尺度）

3.1.3.1 – **Water as a Natural and Ecological Object**
水的自然和生态属性

The water ecology has been observed from two points of view: the first concerns the edges, where the water touches the land. A simple concrete wall holds less biodiversity than a wetland, which is useful both for its ecologic role and for its scenographic aspect. This contact space becomes strategic to enrich the biodiversity becoming, on a territorial scale, a backbone of the ecological structure. The second aspect concerns the mass of water, which in this territory flows north to south and east to west; it above all represents the habitat of a rich flora and fauna, threatened by the risk of pollution. An analysis of the maps implies a high level of pollutants in the waters: all the projects of environmental requalification must be carried on with the greatest commitment. In the more urbanized parts, where some sections of canals have been closed over, limiting oxygenation and water circulation, the pollutants stagnate. The historical model of the polder, which has historically strongly characterized the construction of this territory, is still an important measure for the management of biotic equilibrium, featuring pisciculture and wetlands in a combination capable of successfully supporting biodiversity.

本次研究对水的生态属性主要从两个方面进行考察分析。一是在微观层面对岸线进行研究，包括其材料、尺寸以及空间的组织方式。这一尺度的滨水空间不但是生态价值最高、生物多样性最丰富、对生态和景观都有积极作用的地区，同时也是区域生态系统的重要组成部分。二是在宏观层面对这个区域水系进行研究，水系从北向南、从西向东穿过整个都市区域，极大地丰富了区域的生态多样性。但是由于城市的发展，整个水系统和它所经过的区域都受到了不同程度的污染，所以从区域的尺度对整个水生态系统进行保护和规划设计显得愈发重要。在局部，特别是城市化程度高的地区，断头水道使得水循环和氧化中断，导致了污染物的聚集和滞留。苏州历史上发展出的圩田系统至今仍是管理生态平衡的重要手段，并且赋予了苏州独特的景观特征。而以稻田、湿地以及桑基、果基等鱼塘为代表的苏州农业是生态多样性的重要支撑。

FIG. 3.20 The polder system (territorial scale)
长三角圩区分布图（区域宏观尺度）

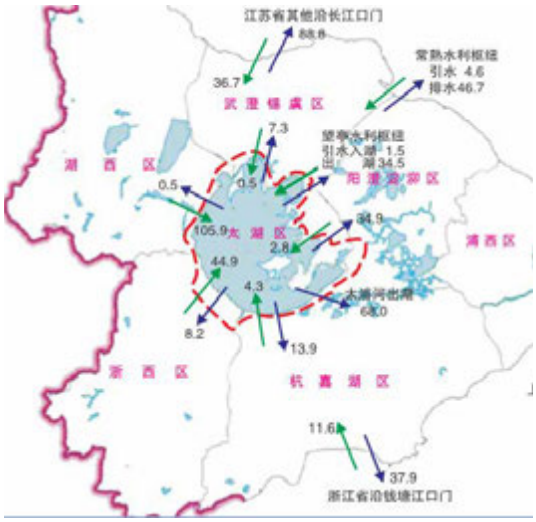


FIG. 3.21 Schematic Diagram of Water Exchange in Important Areas of Taihu Lake Basin in 2017
2017年太湖流域重要区域水量交换情况示意图

3.1.3.2 – **Water as a Machine**
水的功能属性

Observing the water system as a machine is a metaphorical approach which re-conceptualizes all the spatial capital made in order to control the water flows. Like a machine, the water system is the output of a long process of rationalization and amelioration, where the spatial capital is made of hydroelectric dams, polders and regional irrigation systems. The functioning system of this complex machine is on the one hand responsible for avoiding the risk of flooding and the stagnation of water, and on the other the task of bringing water for irrigation.

The water system as a machine can also be used to understand how the network is used for transportation; the major waterline is the Grand Canal, the longest and oldest canal in the world; it is still a very strategic infrastructure able to connect Beijing with Hangzhou and with the smaller network, providing a great opportunity for a greener transportation space.

苏州水系格局的形成是人类对自然规律长期的遵循、斗争以及和谐共处的结果。大量的人力物力被投入到水系统建设中，包括在整个地域上广泛分布的水坝、圩田、灌溉系统、水闸水泵以及各种尺寸及高度的水渠水道。整个水系像一台精密设计和建造的机器，通过每时每刻的调控和管理保障着苏州各种生活、生产活动的正常进行。

航运也是苏州水系的主要功能之一，在历史上对苏州发达的工农业生产起到了决定性的作用。京杭大运河作为人类历史上最长和最古老的运河连接了北京、苏州、杭州等中国最重要的城市，至今仍发挥着重要的航运作用。而对于苏州来说，运河系统及其子系统中包含的密集水道及码头设施等，在未来将是绿色交通发展的一个重要组成部分。

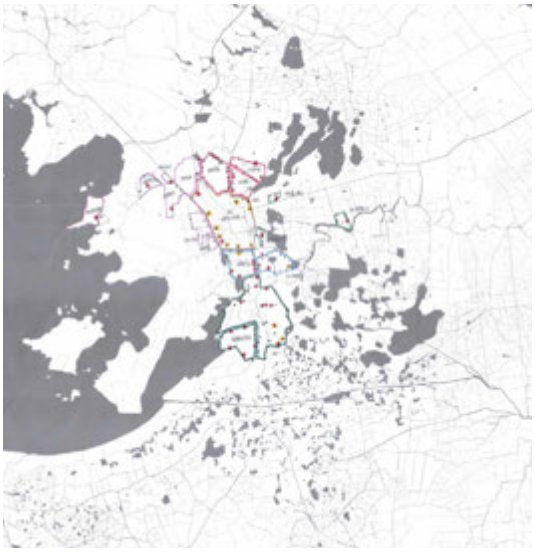


FIG. 3.22 Planning of flooding control by polders (territorial scale)
防洪规划：包圩、水闸及水泵建设（区域宏观尺度）

FIG. 3.23 Salvage garbage and remove silt manually
人工打捞垃圾、清除淤泥

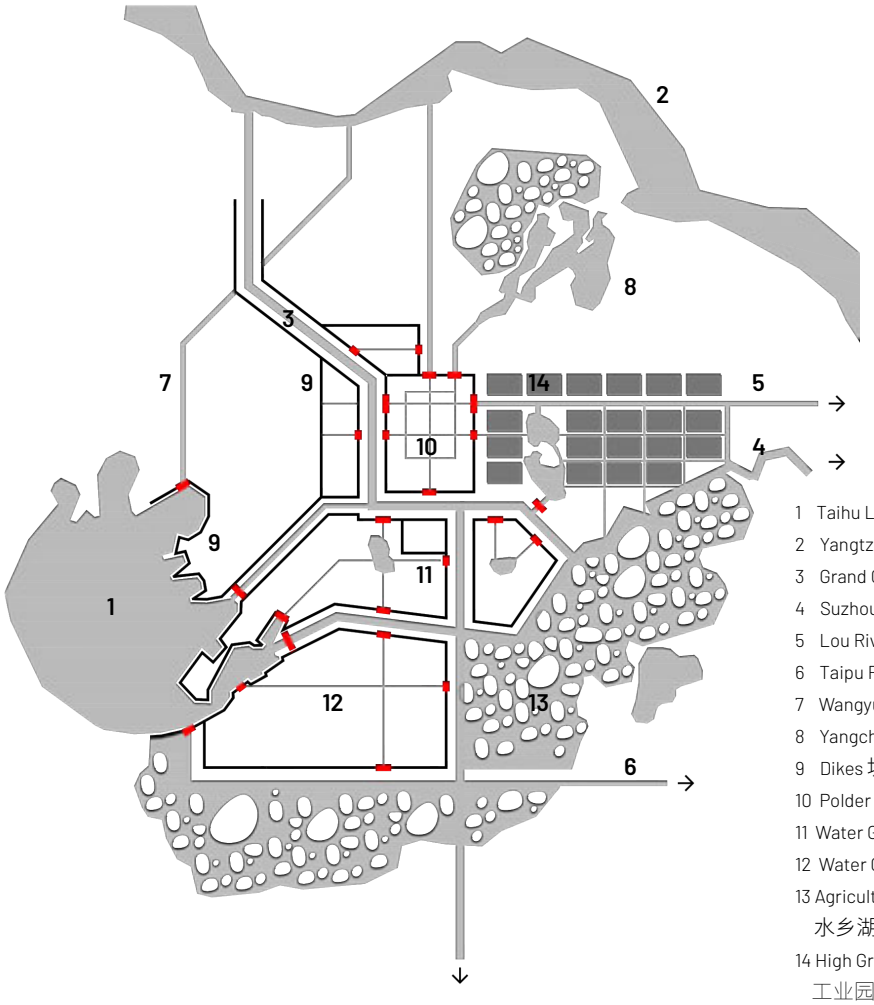
Raining Season:

The surplus water is sent away via the Grand Canal to the south, and via the Lou River and the Suzhou Creek to the east. The water gates are closed. Each polder has to pump out the water beyond the dike. The water surface/lakes in each polder functions as buffers. Sometimes the Taihu Lake has a higher water, and the water is sent to the north via Wangyu River, and to the east via Suzhou Creek and Taipu River. Besides, depending on the situation , the agricultural polder / ponds can be closed or function as buffer.

丰水期

多余的雨水从大运河向南排出，以及从娄江和吴淞江向东排出。在外部河流和湖泊的水位高于包圩内水位的情况下，每一个包圩的水闸关闭，多余的雨水通过水泵向外排出。每一个包圩内的水面起到暂时蓄洪的作用。当太湖出现高水位情况时，多余的雨水从望虞河向北、从吴淞江和太浦河向东排出。

同时，根据不同的情况，农业的圩田可封闭也可当做暂时泄滞洪的空间使用。



1 Taihu Lake 太湖
2 Yangtze River 长江
3 Grand Canal 大运河
4 Suzhou Creek 吴淞江
5 Lou River 娄江
6 Taipu River 太浦河
7 Wangyu River 望虞河
8 Yangcheng Lake 阳澄湖
9 Dikes 堤坝
10 Polder 防洪大包圩
11 Water Gates 水闸
12 Water Channel Grid 网格水系
13 Agricultural Polder / Ponds / Lakes
水乡湖淀
14 High Ground of Industrial Park
工业园区高地区

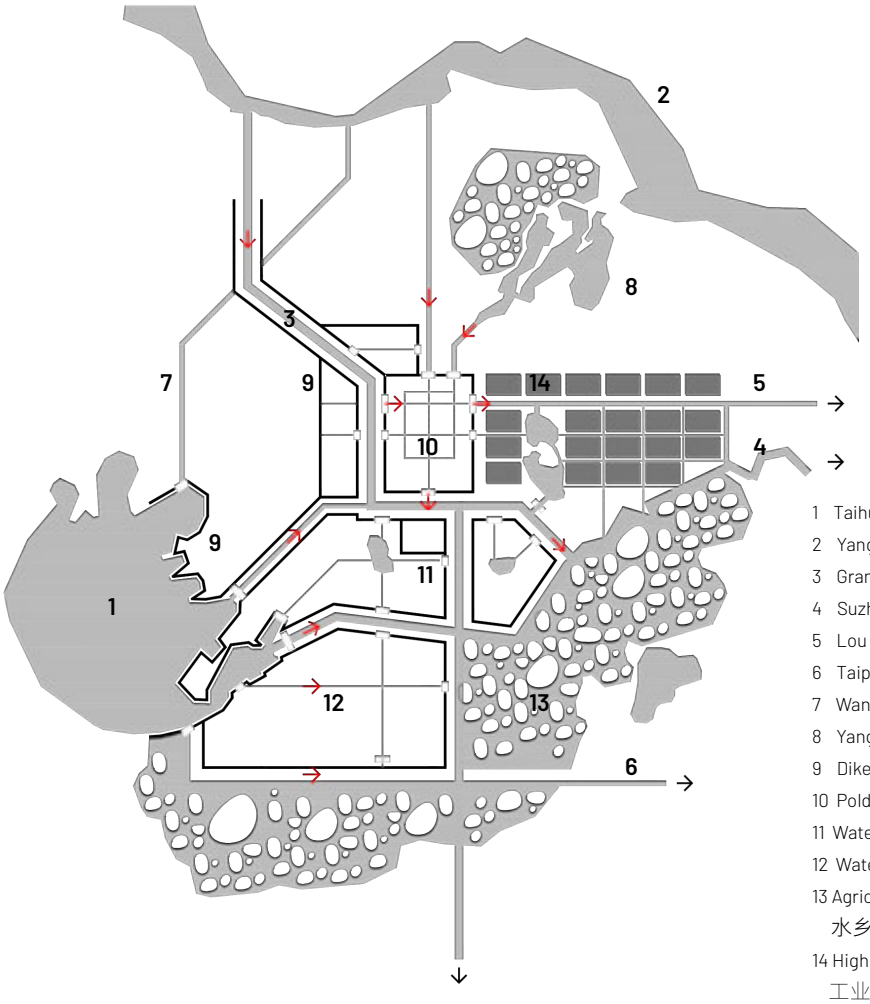
FIG. 3.24 Analytic Diagram Of Existing Water Management——Raining Season
概念图：现有雨洪管理——丰水期

Dry Season:

During the dry season, the water gates are open. great amount of water is pumped through the historical city centre to flash the pollutants towards east and south.

枯水期

在水位相对较低的枯水季，包圩的水闸呈开放状态，大量的水从外部河流和湖泊被水泵泵入历史老城区的包圩中，以保证水的流通，以及向东和向南排出污染物。



1 Taihu Lake 太湖
2 Yangtze River 长江
3 Grand Canal 大运河
4 Suzhou Creek 吴淞江
5 Lou River 娄江
6 Taipu River 太浦河
7 Wangyu River 望虞河
8 Yangcheng Lake 阳澄湖
9 Dikes 堤坝
10 Polder 防洪大包圩
11 Water Gates 水闸
12 Water Channel Grid 网格水系
13 Agricultural Polder / Ponds / Lakes
水乡湖淀
14 High Ground of Industrial Park
工业园区高地区

FIG. 3.25 Analytic diagram of existing water management—— dry season
概念图：现有雨洪管理——枯水期

3.1.3.3 – **Water as a Social Space**
水的社会属性

By overlapping seven types of POI data points - parks, shopping malls, residential areas, restaurants, leisure and entertainment centers, historical and cultural buildings, and important transportation facilities- in GIS and assigning the weights of these elements using the analytic hierarchy process (AHP), the distribution of attraction of Suzhou's waterfront is mapped. The highly attractive waterfronts are the historical and protected districts of Shantang Street and Pingj iang Road in the old city, and the Jinji Lake, Dushu Lake and the Grand Canal in the new city. The surrounding area of Taihu Lake which possesses extremely high ecological , historical, and cultural value with few development and constructions is limieted in the attractiveness of human activities.

The popular waterfront space survey in Suzhou shows that the waterfront space around Jinji Lake in Suzhou New Town was the most popular place, followed by the Taihu Lake and the ancient city of Suzhou, Pingj iang Road and Shantang River. These artistic waterfront activity spaces of high accessibility are equipped with various activity facilities. The more ecological water systems like Yangcheng Lake and Cheng Lake are less popular.

将苏州市内的公园、购物中心、居住区、餐饮点、休闲娱乐中心、历史文化建筑、重要交通设施等七大类POI数据点和苏州水系地图在GIS软件里面进行重叠分析，用层次分析法（AHP）对这几类要素进行权重赋值，然后综合所有的要素进行叠加分析得出苏州滨水空间的吸引力分布。结果显示苏州古城内的滨水空间吸引力要高于新城区的滨水空间。老城内滨水空间吸引力较高的是山塘街和平江路历史文化保护街区，各类要素比较集中，与调研结果也比较一致。新城区滨水活动空间吸引力比较高的是金鸡湖、独墅湖周边以及京杭大运河沿线。由于太湖周边具有极高的自然生态保护价值和历史文化保护价值，开发建设活动较少，所以滨水空间吸引力有限。

在苏州最受欢迎的滨水空间调查中发现，苏州新城金鸡湖周围的滨水空间最受欢迎，超过30%的调查者经常去金鸡湖周边进行休闲活动。其次是太湖和苏州古城的护城河、平江路和山塘河沿岸。这些滨水活动空间都植入了丰富的活动设施，滨水空间的可达性、美观性等都较高。阳澄湖、澄湖等生态性比较高的水系湖泊则不太受人们欢迎。

FIG. 3.26 Spatial Attraction Distribution of Suzhou Waterfront
苏州滨水空间吸引力分布

FIG. 3.27 Spatial Survey of the Most Popular Waterfront in Suzhou
苏州最受欢迎滨水空间调查

3.1.4 – **The Spatial Characteristics of the Waterfront in Suzhou**
苏州滨水空间现状特点

Sparse and well-spaced waterfront space — The landscape of Suzhou can be summarized as: "Facing the mountain on one side, surrounded by lakes on seven sides; the ancient city in the middle, and the green wedge inside the city." The shallow lakes of the "Four-Corner Landscape" are the main parts of the landscape. The lakes and mountains are bound together to enclose the city. The Grand Canal and Suzhou Creek connects large and small river channels, which connects the four-corner landscapes and Taihu Lake. Together, a general landscape of "Watery Town in Southern China" is presented. With a history of more than 2,000 years, the ancient city of Suzhou is located in the center of the surrounding landscape pattern. The surrounding natural landscape penetrates into the city layer by layer through the river network and the green corridor, forming an overall ecosystem of integrated urban and rural areas.

疏朗有致的滨水空间——苏州山水格局可概括为:"一面望山，七面环湖;古城居中，绿楔入城。""四角山水"的四角湖荡仍然是苏州山水格局的主要部分，与西部山体配合，湖山环映，共同形成了围合城市的重要山水格局。以京杭大运河、吴淞江为主，大小河道相互沟通形成的密集河网，联系了四角山水和西部太湖，形成"江南水乡"的基本大地景观。具有两千多年历史的苏州古城居于周边山水格局围绕的中心，周边自然景观通过河网、绿廊向城市逐层渗透，形成城乡结合的 整体生态系统。

FIG. 3.28 The Restoration of Suzhou's Spatial Structure (Masterplan of Suzhou 2035, Work in Progress)

重建空间格局：苏州总体规划 2035（过程文件）

FIG. 3.29 The Restoration of Suzhou's Spatial Structure (Masterplan of Suzhou 2035, Work in Progress)

重建空间格局：苏州总体规划 2035（过程文件）

3.1.5 – **Challenge**
挑战

Because of its deltaic condition and high degree of urbanization, the Taihu basin faces four main water challenges (Nolf, Vannoorbeeck, Liu, 2017):

1) The risk of flooding, due to the naturally flat and low topography, further aggravated by the subsidence and reduced storage capacity induced by urbanisation;

2) A lack of fresh water resources that cannot respond to a growing demand;

3) The pollution of water due to industrial and agricultural activities and the fragmentation of the canal network;

4) Ecological degradation of the hydrological network;

In response, significant efforts have been made in the form of strict land use regulations, policies, infrastructure and restoration projects. Their implementation remains nevertheless challenging, as they require coordination between different administrative levels and sectors.

由于其独特的三角洲地形及其超高的城市化程度，苏州地处的太湖流域主要面临着四大挑战(Nolf, Vannoorbeeck, Liu, 2017)：

1）防洪排涝的挑战：较低的海拔和平坦的地形以及城市中地表的过度硬化使苏州面临着洪涝的威胁。

2）供水不足的挑战：不断增加的城市人口使得安全可靠的生活生产供水不足的问题日益凸显。

3）水质污染的挑战：城市发展对水网体系的破坏使得城市生产所带来的污染难以通过完善的水网系统向外排出，水质不断恶化。

4）生态降级挑战：水体提供各种生态功能的能力不断下降。

要应对这些问题，不但需要在用地规范与管理政策的制定、基础设施建设和生态修复项目等方面作出大量的努力，还需要政府各级部门、参与方的共同努力与合作协调。本次研究旨在构建一个统一协调的规划体系框架。

FIG. 3.30 Water Challenges in the Delta (Nolf, Vannoorbeeck 2017)
长三角与水有关的挑战(Nolf, Vannoorbeeck 2017)

FIG. 3.31 Territorial Section: Suzhou (Nolf, Vannoorbeeck 2017)
苏州地域尺度剖面 (Nolf, Vannoorbeeck 2017)

3.1.6 – **Comparison: Suzhou and Venice**
比较：苏州和威尼斯

Venice and Suzhou are two territories that could learn a lot from each other through comparison. The two cities have a twinning protocol signed in 1980 "with the aim of contributing to the growth of friendship between the populations of the cities of the two countries, of increasing friendly relations and to develop the collaboration between the two cities in different sectors: cultural, artistic, technical, scientific, economic, tourism and administrative and urban management " (webpage of the Municipality of Venice). Venice can teach about its experience of safeguarding and protecting the Lagoon, an important water body surrounding the historic city. The Lagoon in the 1970s was very polluted due to the industry of Porto Marghera. Over last 40 years, all parties have worked together and made great effort to purify the Lagoon. Venice can be an important case study for the management of mass tourism and the protection of the historical and artistic heritage against the effects of climate change. Moreover, the working group has worked on the Venetian territory for many years: these studies could offer a reference for a study for Suzhou area.

通过比较可以发现，威尼斯和苏州这两个城市及其所在的地域有许多可以互相借鉴之处。这两个城市在1980年3月20日签署了姐妹城市条约。条约旨在"为了两个城市所在的两国人民之间不断增长的友谊做出贡献"，旨在"为两个城市之间的友好关系，以及两个城市之间在文化、艺术、技术、科学、经济、旅游、市政管理等领域的发展和合作做出贡献。"（威尼斯政府网站）。威尼斯可以向苏州分享其在水洪安全、对其内湖作为有史以来环绕城市的重要水体的保护等方面的经验。威尼斯的内湖在19世纪70年代由于在马格拉港的工业生产而遭到严重的污染，经过了在40多年里，各方协力合作为内湖的净化做出了巨大的努力。威尼斯也可以作为苏州在大规模旅游业管理、历史和艺术遗产的保护以及应对气候变化等方面的学习借鉴案例。值得一提的是，本次研究的境外工作组（瑞士洛桑理工以及威尼斯建筑大学）在威尼斯及其所在的广大地区已经进行了长期的工作和研究，可以为苏州提供值得研究的案例和材料。同时威尼斯能够向苏州学习在基础设施建设、经济发展、以及大都市各部分如何协调与互相促进方面的经验。

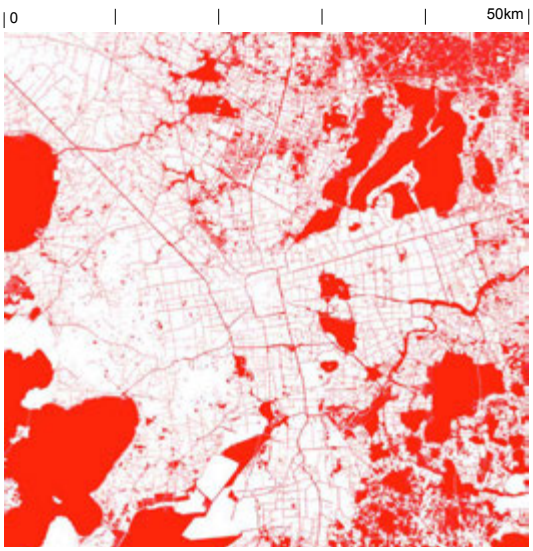


FIG. 3.32 50 km: in Red the Water System, Suzhou.
50x50公里范围内苏州水系图

FIG. 3.33 50 km: In Red the Water System, Veneto Region.
50x50公里范围内威尼斯地区水系图

3.2 – Learning from Suzhou: Water-City Typologies

3.2 – 向苏州学习：水-城范例

The identity of Suzhou is inseparable from water. Historically associated with the inner-city canals, the relationship between Suzhou and water has, however, greatly diversified with the expansion of the city, as the FIG. 3.34 below shows. A reading of the contemporary urban landscape of Suzhou enables the definition of five characteristic water-city typologies.

苏州的个性和水是不可分割的。苏州和水的紧密关系在历史上体现在它的城内水道和水陆双棋盘格局，但是这种水-城关系在今天城市不断扩张的过程中被大规模的多样化了。对现代城市景观的详细考察和解读使得我们能够定义五种苏州最主要的水-城原型。

FIG. 3.34 Historical City-water Relationship, Tongli, Suzhou (https://travel.qunar.com/youji/7020768)
传统水-城关系，苏州，同里 (https://travel.qunar.com/youji/7020768)

3.2.1 – **The Fieldwork and Zooms**
实地调查和采样研究

The narrative strategy adopted to portray the characters of the metropolitan area is double: the wide territorial scale – a 50x50km square frames the Suzhou metropolitan area and a 100x100km reaches the Shanghai borders – and the sampling, that identifies areas which can represent the main issues of the city-water relation and challenges. A progressive selection of zooms – areas of 2.2 x 2.2

研究从两个尺度出发，阐述和总结整个苏州都市圈水城关系的特征：一是广阔的区域尺度，包含50×50公里框架内的苏州都市圈的核心区和100×100公里框架内远至上海郊区的大苏州范围；二是多个小范围的局部采样，从局部出发发掘代表苏州水城关系的具体场所。苏州都市圈的广阔范围使得从局部出发去发掘具体的能够代表苏州水城关系的具体场所成为了一个非常重要的研究方法。

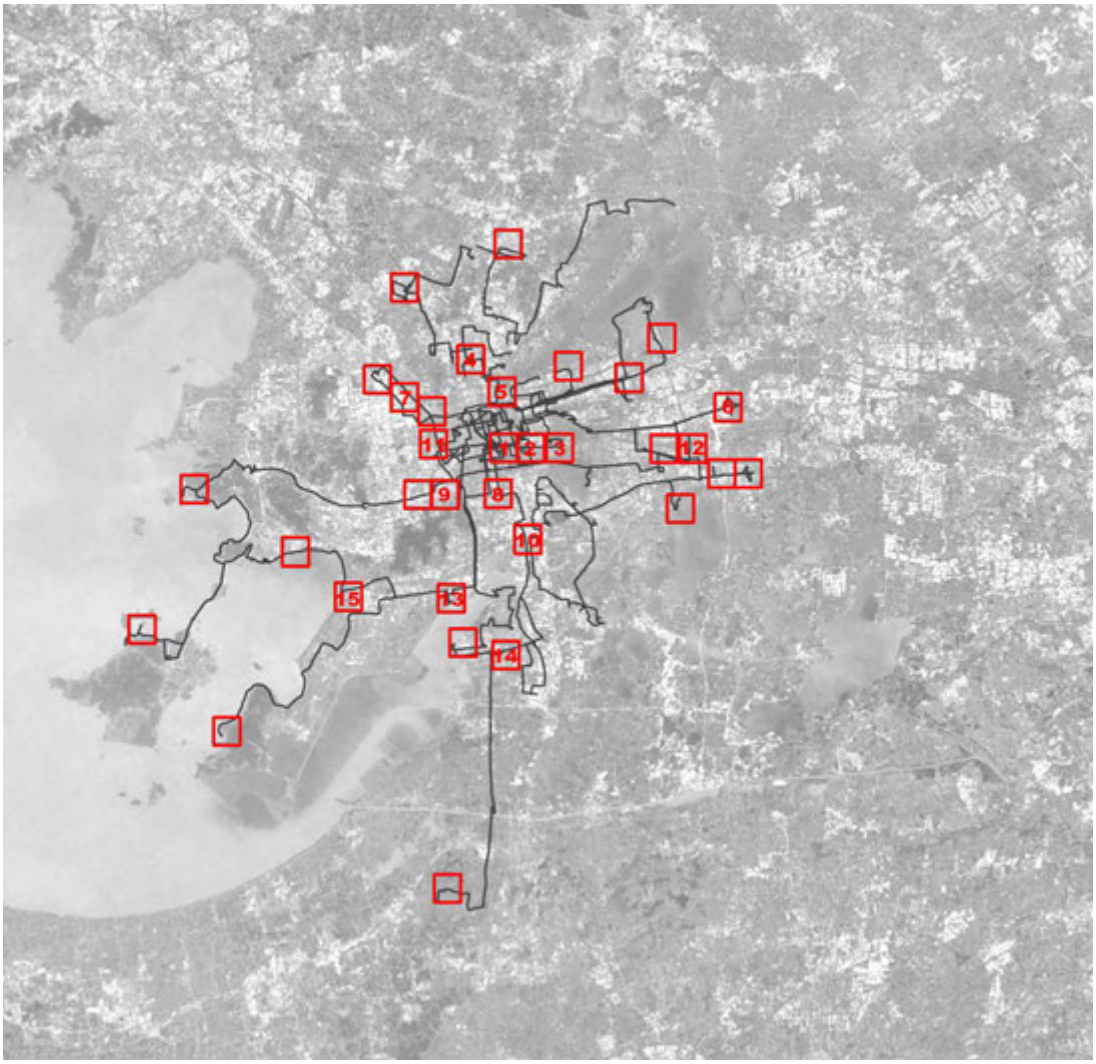


FIG. 3.35 Fieldwork: Itinerary (Black Lines), Draft (Red) and Final Zooms (Numbers).
实地调查：路线（黑线），初步（红框）以及讨论后的最终采样地点（数字）

km – was drafted: 15 areas were selected for the relevance of their urban elements and the challenges they raise in relation to the water system. The zooms are organized in 4 geographic areas: between the Suzhou creek and Yuanhetang canal, between the Moat and Dushu lake, the Grand Canal, by Taihu lake. Long walks along the waters and the connected urban space with photos, interviews with local inhabitants, drone videos enabled the compilation of careful descriptions of each zoom.

通过和苏州相关政府部门、专家的讨论，研究确定了15个2.4×2.4公里大小的采样地块，分别位于城市四个典型区位：吴淞江和元和塘之间、苏州古城和独墅湖之间、京杭大运河沿岸以及太湖沿岸。研究团队对每一个采样地块的滨水空间都进行了详细调查，包括实地考察、摄影、对当地居民的采访以及无人机航拍等。

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FIG. 3.36 Fieldwork:historical city center.
实地调查: 苏州老城中心

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FIG. 3.37 Fieldwork:the Grand Canal: industrial site.
实地调查: 大运河工业区

9

FIG. 3.38 Fieldwork:Fengmen historical district
实地调查: 葑门历史街区

FIG. 3.39 Fieldwork:the residential new town around Jinji Lake.
实地调查: 金鸡湖新城住宅区

FIG. 3.40 Fieldwork:villages around Taihu Lake.
实地调查: 太湖周边村庄

FIG. 3.41 Fieldwork: agricultural land around Taihu Lake.
实地调查: 太湖周边农田

FIG. 3.42 Fieldwork:the Grand Canal: logistic site.
实地调查: 大运河物流区

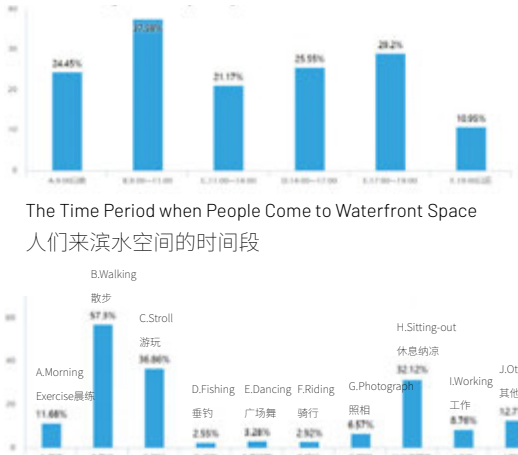
FIG. 3.43 Fieldwork:the Grand Canal: Wulongqiao Park
实地调查: 大运河五龙桥公园

FIG. 3.44 Fieldwork:the residential new town.
实地调查: 新城住宅区

The fieldwork is a constant exchange with the site and the people. Questionnaires on various topics were answered by the local inhabitants, as a base for the survey of activities at the waterfront. During the fieldwork, the research team recorded their understanding of the space through a great number of sketches on site, which function later as the starting point of a project.

实地调查是一项不断和场地以及居民进行交流的活动。通过和当地居民面对面的交流和问卷调查，我们获得了大量关于苏州滨水空间研究的第一手资料。同时在实地调研的过程中，研究团队绘制了大量的草图，记录了对各种滨水空间的理解，为之后的研究奠定了坚实的基础。

FIG. 3.45 Sketches by The Research Team during The Fieldwork.
实地调查中研究团队绘制的草图



The Time Period when People Come to Waterfront Space
人们来滨水空间的时间段

Types of Activities in Waterfront Space
滨水空间内的活动类型

FIG. 3.46 The Statistic Summary of The Questionaires.
对问卷调查的数据分析

3.2.2 – **Typology 1: Ancient City**
典型模式一：苏州古城

The ancient city of Suzhou is based on a network of canals lined by narrow alleys. Playing a role for drainage and transport (Yin, 2016), the orthogonal canal system also defined Suzhou's urban structure and fabric, characterized by rectangular-shaped, east-west oriented blocks and narrow north-south plots stretching from canal to canal (Xu, 2000). Of the dense network of canals with over 300 bridges that structured the entire city in the 17th century, only a fraction subsists today (Breitung, Lu,2017). The remaining canal-streets come in a variety of widths and profiles, generally asymmetrical. Depending on their orientation, the canal-streets are alternately bordered by the rear-, frontal or blind sidewall of the deep courtyard houses.

In all cases, the canal-streets are based on the same plinth of yellow stone, incorporating steps, a balustrade, bridges and sidewalks. Planted with trees at regular distances to provide shade, these canal streets offer unique spatial quality. An ambitious plan is underway to reopen some of the old filled canals and restore the network continuity.

苏州古城的建立以狭窄的街道和水道组成的网络为基础。作为取水、排水和航运的通道（Yin，2016），相互垂直的水道网格赋予了苏州独特的网格式城市结构和形态。密集的水网构建了苏州网格式街区结构，街区的长边多以东西朝向为主（Xu，2000）。300余座大小桥梁曾经是城市交通的重要结构，但今天只有一小部分得以保存（Breitung，Lu,2017）。现存的滨水空间结构在宽度和截面上大小各异，大致上以非对称的情况为主。根据朝向的不同，水-路空间在不同方向上被住宅合院的前后以及侧边的围墙所包围。

整个水-路结构中的台阶、栏杆、桥梁和人行道铺地等多以黄石作为基础材料。树木等植被等距排列，为行人提供必要的乘凉空间，构建了独特的滨水空间环境。如何基于现存的水网结构，恢复部分被填埋的水体以达到恢复水网连续性的目的，是苏州市目前重要的城市规划问题之一。

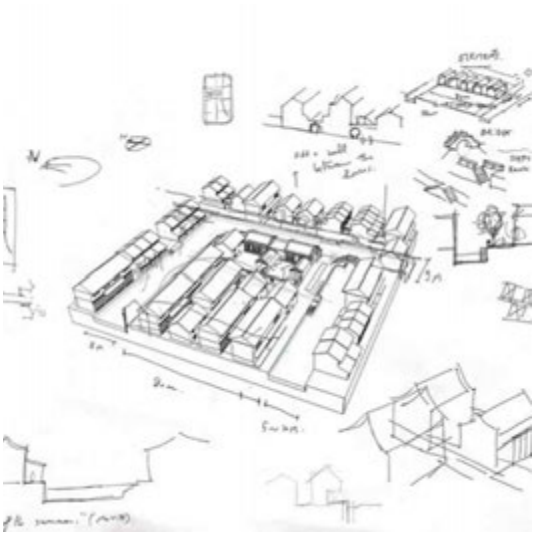


FIG. 3.47 Sketch: Typology 1—Ancient City.
草图：典型模式一——苏州古城

FIG. 3.48 Photo: Typology 1—Ancient City.
实景：典型模式一——苏州古城

3.2.3 – **Typology 2: Polders**
典型模式二：圩田/包圩

Located in the lower part of the Taihu Basin, the rural landscape of Suzhou is entirely structured by polders. Known for centuries in the region as "wei-tian" (including "dike" and "terrain"), the Suzhou polders have demonstrated throughout history a remarkable ability to adapt to changes, such as population growth or the transition from rice to fish farming (Xie, 2017). Of variable size and shape, the wei-tian structure also explains the linear shape of the villages, whose houses are concentrated on the perimeter dike of two polders facing each other (Huang, 2017).

Recently, the establishment of a road network serving the villages from the outside has reversed the role of the canal: from the central access and public space of villages, to the collective backyard dedicated to domestic agriculture (Nolf, Vannoorbeeck, Pellegrini, 2019). Another challenge is related to the current agricultural modernization plan. In the frame of land consolidation programs, important parts of this millennial polder landscape have been destroyed without any consideration of its historical and cultural value.

苏州的农业景观位于太湖流域的低海拔区域，并且全部以圩田为核心结构。几个世纪以来，在这个被称为“圩田”（以“堤防”和“田地”组成）的农业地区，在苏州体现了其惊人的适应和发展能力，包括人口的增长和从稻田向鱼塘的大规模转型（Xie，2017）。尽管大小和形状不同，圩田的结构解释了传统村庄线性分布的空间形态：村庄中的住宅建筑总是在圩田边缘的堤岸上，尤其集中于两个相互对向的圩田周围（Huang, 2017）。

然而近年来，随着那些穿过圩田中心，用来连接各个村庄的道路的建设，原有水道的作用逐渐被弱化。最初作为村庄的主要入口以及公共空间的滨水空间逐渐变成了集体的背向空间，只是作为圩田内部的农业设施而存在（Nolf，Vannoorbeeck，Pellegrini，2019）。

另外一个主要挑战是关于目前的农业现代化转型问题。随着城市的发展，最初密集而细碎的圩田景观的历史和文化价值正在被逐渐摧毁。

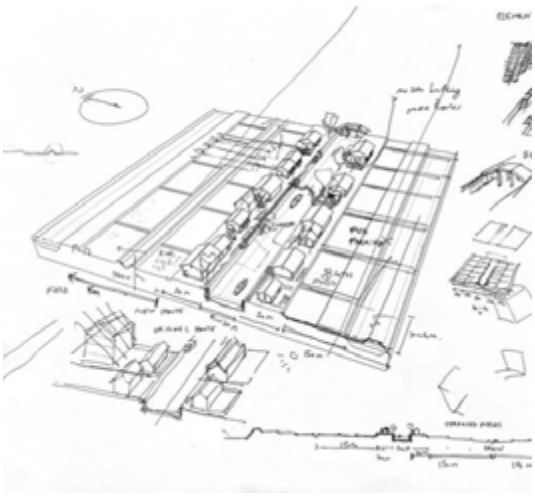


FIG. 3.49 Sketch: Typology 2—Polders.
草图：典型模式二——圩田/包圩

FIG. 3.50 Photo: Typology 2—Polders.
实景：典型模式二——圩田/包圩

3.2.3 – **Typology 3: Gardens**
典型模式三：园林

Suzhou is world famous for its gardens. A symbol of wealth and social status, the gardens were mostly created by notables returning to serve the imperial court. Inspired by hermit culture, Taoism and 'water and mountain' paintings and poetry, private gardens were designed to create an environment conducive to seclusion, introspection, and contemplation of nature (Cheng, 2012). The construction of gardens in Suzhou flourished with the densification of the city from the 8th C. As a result, the design of gardens evolved from the art of reproducing natural sceneries to the art of creating a feeling of openness in increasingly confined spaces, using contrasting scales or "borrowing views" (Ji, 1582) beyond the garden's limits.

Water plays a fundamental role in the composition of gardens. Ideally occupying one third of the total area, different water bodies with tortuous layouts symbolize the natural elements - fountains, lakes, rivers. Covered by floating pavilions and winding bridges, water surfaces also magnify the sense of space through reflection and a multiplication of perspectives.

苏州以其古典园林举世闻名。作为财富和社会地位的象征，苏州古典园林大部分由朝廷的贵族统治阶层所营建。以隐士文化、道教和"山水"绘画和诗歌为灵感，私人园林的设计旨在创造一个有利于隐居、反省和沉思自然的环境（Cheng, 2012）。苏州古典园林的建设在公元8世纪的城市化过程中逐渐繁荣起来。伴随着这个过程，古典园林的设计主题也从对自然景观进行艺术化的再现，向在不断拥挤的环境中创造出一片开放空间的转变，并且使用"借景（Ji, 1582）"的方法来创造戏剧化的尺度效果，从而突破园林本身的空间限制。

水在苏州古典园林中起到了基础性的作用。在理想情况下水面占到整个园林面积的三分之一，不同类型的水体在园林中蜿蜒曲折，象征着自然界的泉、湖、河、溪、瀑等不同类型的水景。水面之上建立的房屋以及曲折的桥梁常常通过倒影的形式，起到增强景深及空间感的作用。

FIG. 3.51 Sketch: Typology 3—Gardens.
草图：典型模式三——园林

FIG. 3.52 Photo: Typology 3—Gardens.
实景：典型模式三——园林

3.2.4 – **Typology 4: Boulevards**
典型模式四：林荫大道

A new type of boulevard canal has been developed with the expansion of Suzhou in the 21st century. Suzhou's modern urban layout is based on a zoning and car-based model, structured by a 400mx400m double grid of wide roads paralleled by canals delineating urban blocks. The role of water in the new boulevard canal differs radically from that in the ancient city and rural landscape. Traditionally water in Suzhou was a linking element, integrating different activities and articulating various forms of urbanization. In contrast, canals in the modern parts of Suzhou are essentially used as a technical device to divide and separate urban functions (Nolf, Vannoorbeeck, 2018).

Although hardly accessible and subject to very strict usage regulations, the boulevard canals offer important opportunities for improvement. Bordered by a generous fringe of greenery and connecting most parts of the city, their waterfront can potentially be reclaimed as a vast natural and civic system supporting new forms of soft mobility and ecologies.

随着21世纪苏州城市建成区的扩张，一种新的与林荫大道相结合的人工水道发展了起来。苏州的现代城市形态是以功能分区和私人汽车交通为基础的，400×400米的宽阔的路网结构以及与路网结构平行的水网结构是苏州现代城市形态的主要骨架。这些与林荫大道平行的水渠在城市中的作用和苏州传统水系有着本质的区别。苏州的传统水系是一种联系城市各种功能的媒介，滨水空间整合了各种不同的活动并且孕育出了各种不同的城市空间类型；而对于苏州的现代水系，水面本质上成为了分割和分离城市各种不同地块和功能的技术工具（Nolf, Vannoorbeeck, 2018）。

虽然这种现代化滨水空间的可达性不佳并且使用的方法受到严格限制，但林荫大道为现代滨水空间的改善提供了巨大的可能性。水道周围大片的绿地可以被重新利用，成为联系城市结构以及自然和人文体系的空间，同时也可以被用来构建城市慢行交通体系和生态廊道。

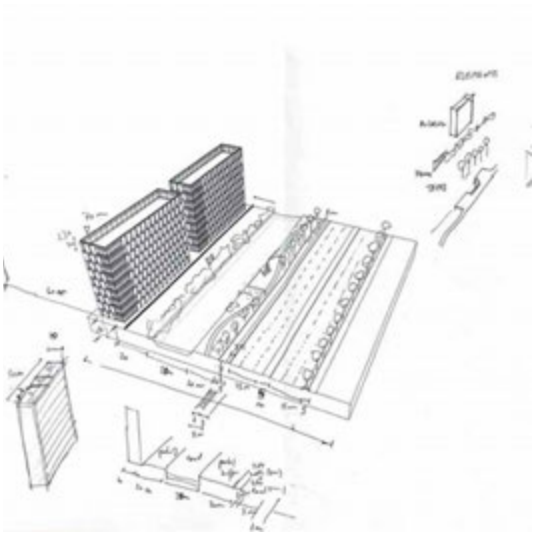


FIG. 3.53 Sketch: Typology 4—Boulevards.
草图：典型模式四——林荫大道

FIG. 3.54 Photo: Typology 4—Boulevards.
实景：典型模式四——林荫大道

3.2.5 – **Typology 5: Park System**
典型模式五：公园系统

Suzhou has transformed radically over the last 30 years. Due to the expansion of industrial and urban development, a compact urban core surrounded by open villages and towns turns into a metropolitan interlocking region which gradually borders the surrounding urban construction area, Suzhou saw its built-up area multiplied by more than 11 between 1980 and 2010 (Wang,Shen, Chung,2015). Driven mainly by industrialization and framed by road and rail infrastructure, the extensive urbanization of Suzhou has greatly damaged the integrity and ecological functionality of the natural landscape.

Today, as urban expansion comes to an end and gives way to densification and intensification, there is a growing ambition to repair the ecological functionality of Suzhou's landscape. The network of lakes interconnected by canals is considered, along with the mountains in the east, as a robust support for the development of a new metropolitan park system. Yet, the protection of the shores of lakes and canals as ecological corridors has to face the reality in terms of land use, a growing pressure for new urban developments along the waterfronts.

苏州在过去的三十年经历了剧烈的变迁。从一个被开放的乡村和小镇环绕着的紧密的城市核心向外扩张变为因大面积工业开发区和城镇建设区拓展，而与周边城市建设区逐渐接壤的城市连绵区，苏州的城市面积在1980年到2010年之间扩大了超过11倍 (Wang,Shen, Chung,2015)。苏州这样大规模的城市化过程主要被工业化所驱动，被公路和铁路网所架构，却在很大程度上破坏了自然环境的生态功能和完整性。

随着城市发展进入存量时代，粗放的城市发展模式必将被高效密集的发展模式所取代。正是在这样的背景下，我们逐渐确立了旨在修复苏州自然景观和生态功能的目标。虽然湖泊和河流的滨水空间作为生态廊道需要和现实的城市化过程相协调，各种滨水空间也不断面临城市发展的巨大压力，但是我们还是期望能够以苏州水系网络和山体等自然资源为基础，构建一个囊括整个苏州大都市圈的山水生态格局。

FIG. 3.55 Sketch: TYPOLOGY 5—park system.
草图：典型模式五——公园系统

FIG. 3.56 Photo: TYPOLOGY 5—park system.
实景：典型模式五——公园系统

Water Designs I: Scenarios
Students Group:
苏州水之设计一：情景设想
学生团队：

Hongxia Pu蒲红霞, Ricardo Avella, Yuqing Miao苗钰青

3.3 – Water Designs I: Scenarios

3.3 – 苏州水之设计一：情景设想

The scenarios explore sequences of hypotheses about the future of the water city of Suzhou: the consequences of a hypothetical chain of events, actions, decisions, positioned differently in time.

What...if the waterfront were 100% public?

What...if all the run-off water were purified? What... if Suzhou were a zero-discharge stormwater city?

What... if the city is re-interpreted and learns from the old system of canals and dikes?

The scenarios design a new relation between the city and the different water bodies that is able to cope systemically the future urban and environmental challenges, and unveil potential for the design of Suzhou Garden.

情景设想用来探索一系列苏州水城未来可能的假设所带来的结果。这些结果是一条假设由不同时间上的不同的事件、行动和决定所组成的链条所带来的。比如：

假设100%的滨水空间都是公共的，会带来什么样的结果？

假设所有的降水径流都被净化，并且在暴雨时所有的雨水都被储蓄，会带来什么样的结果？

假设将城市重新解读并且向古代河渠体系和堤防体系学习，会带来什么样的结果？

这样的情景设想能够激发对城市和各种水体之间关系的重新设计，从而以一个系统性的方式应对城市和环境在未来的挑战，并揭示“苏州园林”的设计可能性。

FIG. 3.57 Currently 56% of Suzhou Waterfront is Private
目前，苏州56%的滨水空间是私有化的

3.3.1 – **Scenarios**
情景设想

Scenario is an often used term, to which different meanings are often attributed. It can suggest possible futures, be a mere representation of current trends or what the community desires or it can even propose ways to withdraw from an unpleasant present. In this project the term "scenario" attempts to inquire "what would happen if…" (Secchi, 2005). This way the scenario is a research-by-design tool to investigate some essential topics of the built environment and the consequences of some related transformations. Traditional deductive procedures – from general to detail and forecasting skills to the drafting of the project, in fact, are not effective for the contemporary city, which is determined by a large number of variables. Scenario thinking enables one to deal with these variables – such as the impact of climate change – on different scales, from a regional level to that of the urban public garden, and opens to a collective discussion about the necessary transformation. Scenarios are about the future as much as they are about the present, because actions must be implemented in the present in order that their future goal may be attained.

情景设想是一个经常使用的术语，但在不同的语境中有着不同的意义。它可以表达一种可能的未来，可以表达正在发生的趋势，可以表达整个社会的一种期望，甚至可以表达对目前现实的一种批判。在设计中，与以上各种意义不同的是，情景设想是一种对"如果…那么…?" 问题的探索(Secchi, 2005)。在这个意义上，情景设想是"从设计出发的研究"中的重要工具，来探索一些关键因素在城市转型中能造成的潜在后果。在当今充满各种不确定因素的城市实践中，运用传统演绎法和预测的方法去完成一个方案设计已被证明不够有效。比如，它无法解决气候变化这种需要从都市圈到城市设计等需要从各种尺度一起考虑的问题，以及其它一些需要社会各方协调参与的问题。而情景设计不但考虑了未来的目标，更注重当下所面临的问题。

3.3.1.1 – **Scenario 1: What... If the Waterfront Is 100% Public?**
设想 1:...如果100%的滨水空间都是公共的?

The strongest image of Suzhou is "a city of water". 42.7% of the metropolitan area is covered by water: the Suzhou creek, an infinite number of connected lakes and fish ponds, the Grand Canal interlaced to a network of several canals. Every traditional garden has a water system amidst pavilions and greenery.

This great system was built over the centuries for agricultural production and mobility, but in recent years it has come to clash with the fast and massive development, and the realization of the metropolitan areas has substantially reduced the surface covered by water and diminished its role as a shared infrastructure: 56% of the waterfront in Suzhou is private, gated into residential compounds, commercial areas or industrial zones. Many fast roads now run along the waterfront.
In the 50x50 km territory there are 4200 km of waterfront: if the borders of the compounds are slightly redefined and some asphalted surfaces are removed or reduced, a broad capillary system of public spaces for leisure and sports activities as well as green areas can be created.

苏州以水城闻名于世。吴淞江、大运河所在的运河网络以及无数连通的大小湖泊所组成的水面,覆盖42.7%的苏州都市圈区域。每一座传统的苏州园林在建筑与园林之间都设计了水系。历经几个世纪,出于农业生产及航运需要,苏州建造起了这样一个大规模的水系统。

而在最近几十年中,由于城市的快速发展和大都市圈的形成,苏州水系正处于迅速衰退过程中:56%的滨水空间如今已经被私有化,大部分被封闭的住宅小区、商业区、工业区或者高速公路以及快速路所占据。在我们50×50公里的研究范围内,假设部分住宅小区可以进行开放式管理,一些硬质地面可以被移除或是缩减,那么一个长达4200公里的庞大的滨水公共空间系统将会被建立起来——为城市的休闲、体育运动以及绿色空间服务。

FIG. 3.58 4200km of Waterfont in the Territory of Suzhou.
苏州都市圈内4200公里长的滨水空间

FIG. 3.59 Sketch: Opening of the Private Waterfront.
草图:将私有滨水空间开放和公共化

3.3.1.2 – **Scenario 2: What... If All the Run-Off Water Is Naturally Purified? What... If We Go for A Zero-Discharge of Storm Rainwater?**
设想 2:...如果所有的雨水径流量都被自然净化? ... 如果在暴雨的时候所有雨水都被储蓄?

The water in Suzhou is polluted. In recent years the local government has adopted strict measures to control and reduce pollutants and find a balance between the pressure of economic development and the protection of the environment and people's health. A "clean water act" was enforced and conditions have improved, but nitrogen, nitrite, phosphorus, ammonium and fecal coliform are often beyond the maximum threshold established in China and a large percentage of pollution is still due to the discharge of rain water. In the Suzhou area 80% of the 1100 mm of rain per year evaporates, the remaining 20% with its pollutants usually ends up in the water bodies and the sewage system (70%) or infiltrate the ground (30%). The 20% of total precipitations, instead of being discharged, can be stored and purified in wetlands thanks to the biodegradation of pollutants.

For the purification of the run-off water and the

苏州的水系遭到了不同程度的污染。近年来当地政府采取了严格的措施来监控和减少污染物,并试图在经济发展、环境保护和居民健康之间寻找一种平衡。同时苏州启动了"净水专项行动"来改善水污染情况,然而氮、亚硝酸盐、磷、铵和大肠菌群等水污染指标还是经常超过国家标准,并且大部分的污染物依然能够通过雨水进入水体。苏州全年的降水量在1100毫升左右,其中80%蒸发到大气中,剩下的20%通过污水管道(70%)或者地面渗透(30%)进入到水体之中。我们设想一种情景:如果这20%的降水通过湿地暂时的储存、净化,再循环利用或者进入水体,而不是直接排入水体,那么情况会怎么样?同时在气候变化的大环境下,苏州的极端气候会更加频繁。强降雨不断地给现有的堤岸高度以及雨水管线的容量增加压力。如果在城市中,短暂强降雨的降水量能够就地被由储水屋顶、水塘、湿地等空间组成的互通系统所100%吸纳和暂时储存,而没有任何雨水直接排入管线,那么情况会怎么样?

经过粗略的计算,如果在现有的50x50公里范围内

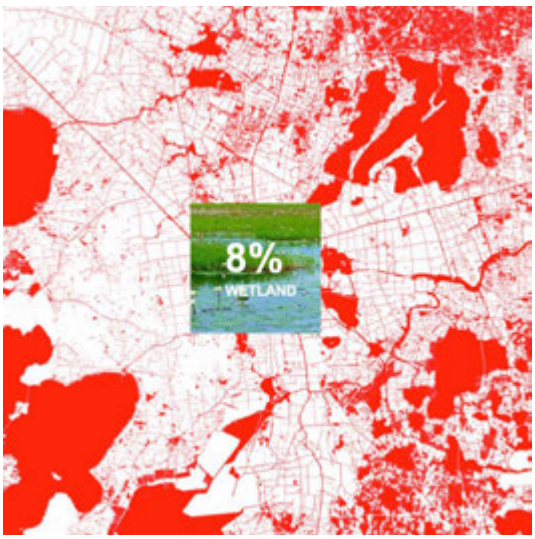


FIG. 3.60 8% of the land (excluding water surfaces) being wetland can both purify the run-off rainwater, and stock the storm water
规模为8%的陆地面积的湿地能够净化所有的雨水径流,同时在暴雨期承担蓄洪的作用

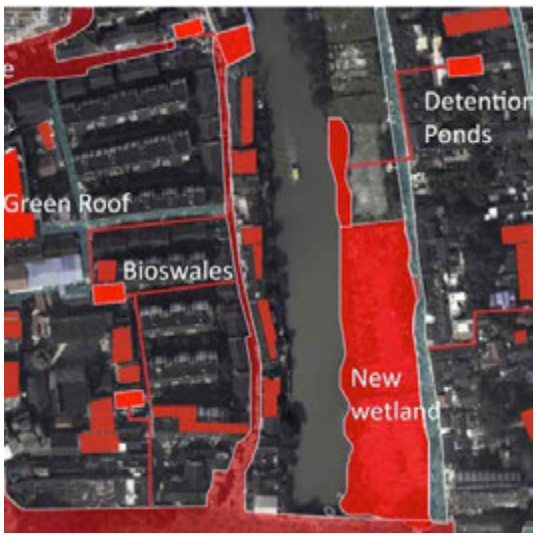


FIG. 3.61 Sketch: wetland space at waterfront.
草图:滨水空间的湿地

reduction to zero of the discharge – even during a storm – a system of interconnected green roofs, detention ponds, bioswales, permeable surfaces and wetlands is to be created. If 8% of the land in the 50x50 km metropolitan territory is transformed into a system of wetlands it can purify the run-off water and stock the storm water, greatly increasing the water quality and reducing the flooding risk. This 8% can be either concentrated in one 140 ha area or spread over many smaller areas, adapting to the different urban or rural conditions. If this 8% of wetland is imagined as 50 m wide strips along the water courses and lake shores, it would involve 2800 km of the existing 4200 km waterfront.

The creation of wetlands and the extension of the water surfaces is competing among uses. The built area planned by the master plans of Suzhou increased dramatically: in 1986 it was 42 sqkm, in 1996 186 sqkm, in 2007 360 sqkm, today 500 sqkm. 47.3% of the Suzhou municipality is already built and the majority of the remaining buildable land are marshlands whose use is limited. The increase of wetland and water surface conflicts drastically with the need for develpment land.

的苏州都市圈能够布置陆地面积8%面积的湿地，那那么以上所设定的两个情景——100%的雨水都经过净化以及在暴雨中100%的雨水都被吸纳和储存 ——就能够有足够的实现空间。这8%的湿地可以被集中在一个140平方公里的广大地区中，也可以被分散在许多较小的地块内，以便于和不同的城乡环境相结合。如果这8%面积的湿地能够被分布在水域岸线50米的范围内，那么它将覆盖2800公里的岸线，占所有4200公里岸线的三分之二。

但是这样大面积的湿地和水面建设有可能和其他的城市用地功能相矛盾。苏州规划的建设用地在不断的增加：从1986年的42平方公里，到1996年的186平方公里，到2007年的360平方公里，再到今天的大约500平方公里。整个行政区划内47.3%的土地面积已经被利用开发，剩余的大部分可建设土地由于具有沼泽地的特征而被限制建设使用，苏州已难以应对快速增加的城市人口和地产开发对于土地的需求，这大大增加了建设大面积湿地和水面的难度。

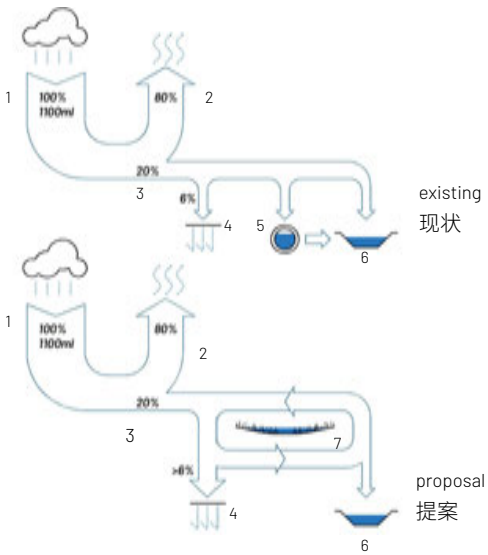


FIG. 3.62 Wetland at waterfront as water purification machine.
滨水湿地作为净水空间

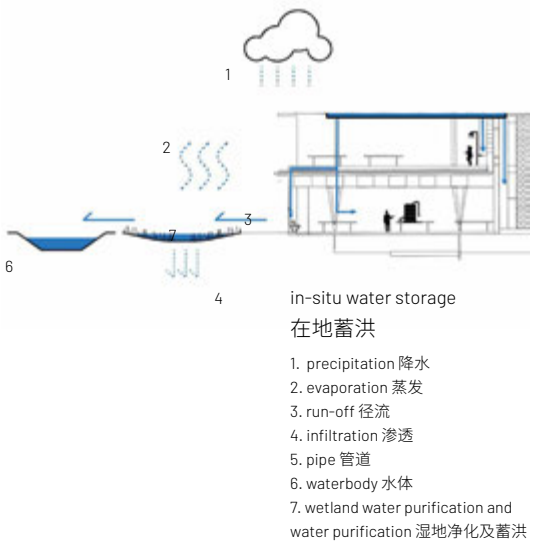


FIG. 3.63 In-situ water storage through a sequence of waterfront space.
通过一系列的滨水空间实现在地蓄洪

3.3.1.3– **Scenario 3: What... If the City Is Re-Interpreted And Learns From The Old System Of Canals And Dikes?**
设想 3：如果将城市重新解读并且向古代河渠体系和堤防体系学习？

Water is a fundamental element in the infrastructure of Suzhou and in its image both on a territorial and on a block scale, but it has been largely deprived of its value in the process of modernization and rationalization which is transforming China. The comparison of the water system at the beginning of the twentieth century with that of today strikes for the simplification implemented: the new network remains continuous and uniform but in an enlarged grid, where the variety of elements disappears and the water surface diminishes. Water management and the role of water is one of the main challenges of the contemporary city and the design of the city must re-think the role of water and its related spaces for its ecological, cultural and economic value.
If the ancient model of territorial organization is reconsidered and the ancient water system is re-mashed, re-opened and re-used wherever possible, part of the original richness can be restored as well as the link between water and people.

水是苏州的基本组成要素，它赋予苏州从整个地域尺度到街区尺度独特的景观。但这些价值在随着中国城市发展的现代化和理性化而逐步丧失。将现有的水网系统和20世纪初的水网系统相比较，可以发现水网的丰富性在不断减少：虽然新的水网系统在区域的尺度上保持着整体的连续性和统一性，但是许多区域内细微而多样的水系在不断的消失，水域面积也不断减少。水管理是现代城市面临的最主要的挑战之一，城市设计必须要重新思考水以及与水有关的滨水空间在生态、文化和经济上的价值。如果古代的地域组织模型在今天仍然被纳入考量，并且古代的水管理系统在条件允许的地区能够重新布局、重新开放以及重新使用，那么部分原始水网的丰富性就能够重新被发掘和恢复，人和水之间的联系也能够被重新建立。

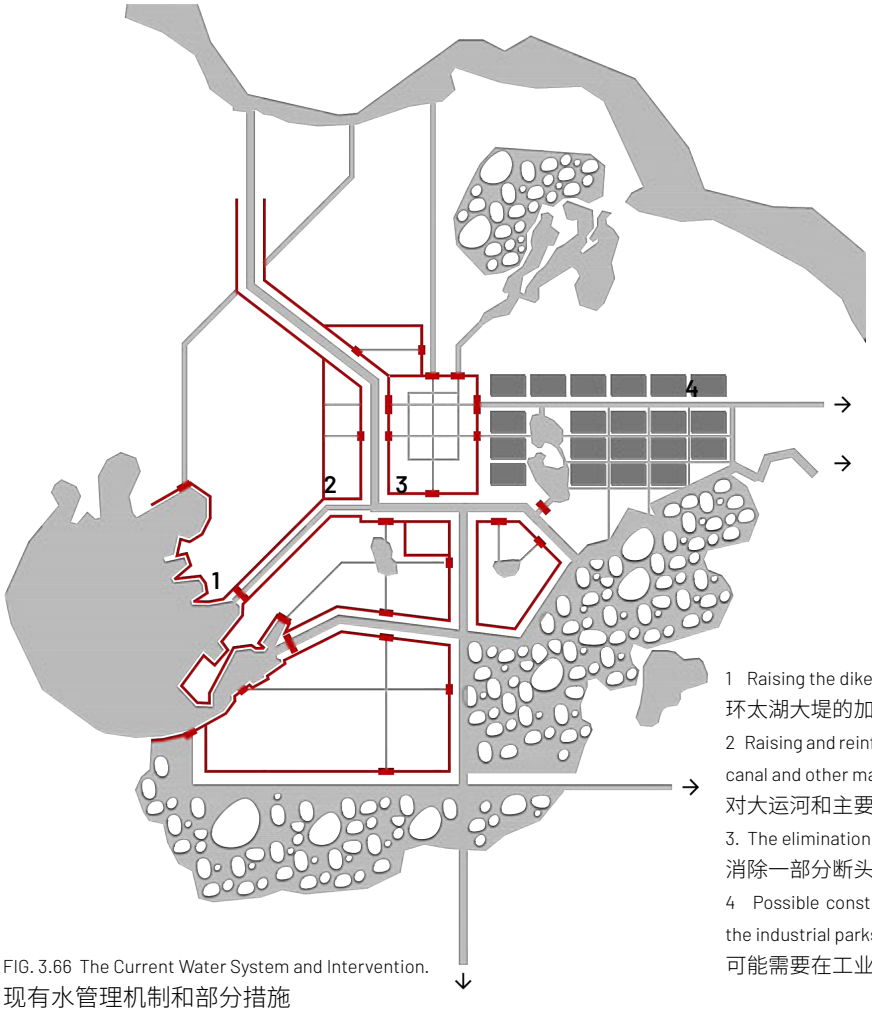
FIG. 3.64 Superposition (Suzhou Map , Land Measure Bureau Guangdong, 1931, and Open Street Map, 2018)
历史地图对比（苏州地图，广东省土地管理局，1931；公开地图，2018）

FIG. 3.65 Re-mashing The Ancient Water System.
对古代水系统的再啮合

3.3.2 – **Conclusion: a New Social, Ecological Machine**
总结：一个新的社会和生态的机制

Suzhou is special. It is deeply rooted in a man-made territory whose functionality relies on a historical and constant struggle with nature. Its hydraulic machine not only provides condition for transitional and modern living and activities, but also produces unique characteristics of the urban space of Suzhou. Today, confronting the challenges of climate change, demographic growth, and environmental crisis, this machine is still valuable and to be repaired and upgraded. At the same time, this machine is reaching its limit, regarding to the space it takes, the energy it consumes, and the increasing difficulty to improve its capacity.

苏州是独特的：它深深的根植于一个人工化的地域之中，而这个地域的存在和功能建立在有史以来人和自然不断斗争的基础上。苏州的水管理机制不仅为传统和现代的生活生产空间提供支撑，同时也创造了苏州特有的城市空间。在我们面对气候变化、人口扩张和环境危机等挑战的今天，这个系统仍然有重要的价值，且需要被修复和升级。然而，现有的机制从其占有的空间、消耗的能源、和越来越困难的容量升级等角度来看，也即将达到极限。

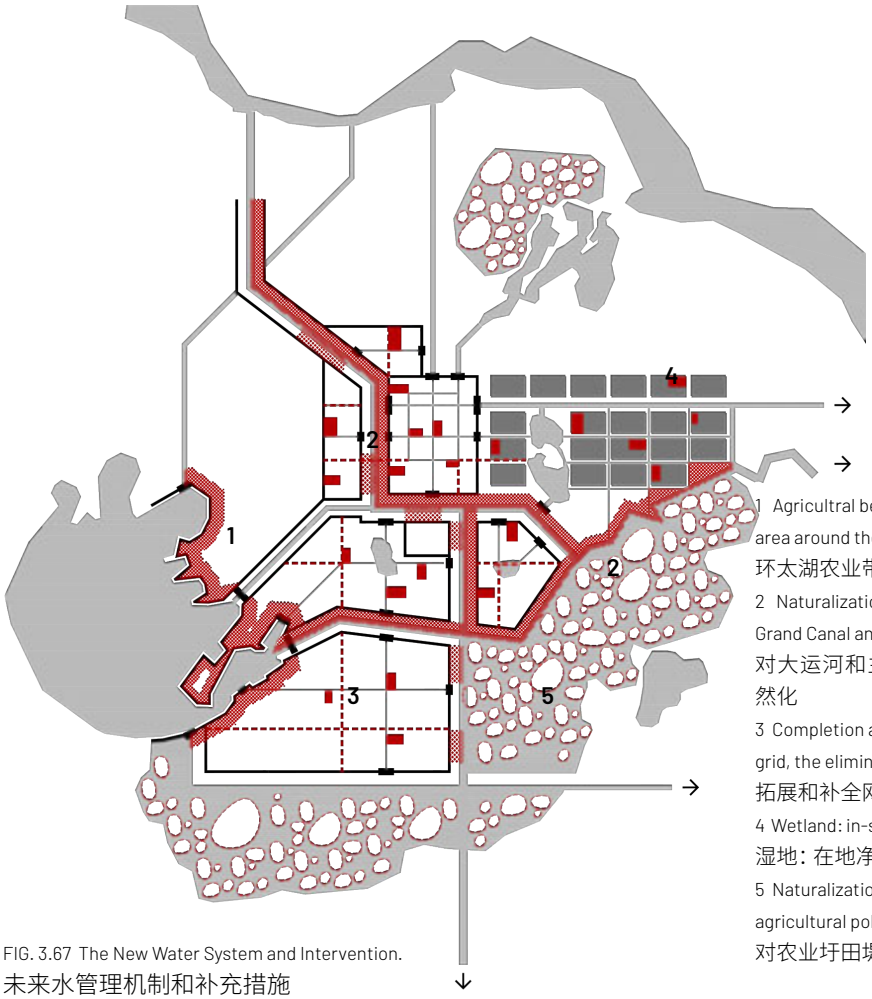


1 Raising the dike around the taihu lake
环太湖大堤的加高和加固
2 Raising and reinforcing the dike of the grand canal and other main waterways
对大运河和主要河流堤岸加高加固
3. The elimination of the dead-ends
消除一部分断头水体
4 Possible construction of polder system in the industrial parks
可能需要在工业园区建设包圩

FIG. 3.66 The Current Water System and Intervention.
现有水管理机制和部分措施

A new and complementary machine is thus needed for the future: a machine that learns from Suzhou itself, a machine that constructs a new relation between the city and its water, between the urban growth and the environmental degradation, between the historical image of the city and the future one. Therefore, the machine should function beyond an ecological one, which manages through a more natural way; it should also function as a social one, which reconnect the people with the water, the historical with the contemporary, the creation with reservation, through its space.

所以，我们在未来需要一个新的能与现有系统互补的机制，一个向苏州本身学习的机制，一个能够建立新的水-城关系，新的城市发展和环境退化之间的关系，以及新的历史传统和现代性之间的关系的机制。因此，这个新的机制不仅是一个能够将水更加自然化的管理的生态机制，而且是一个社会机制，通过它所创造的空间，去重新连接人和水，连接历史和现代，以及保护和创新。



1 Agricultral belt: purification/storage area around the Taihu Lake
环太湖农业带：环湖净水蓄洪空间
2 Naturalization / enlargement of the Grand Canal and other main waterways
对大运河和主要河流拓宽和堤岸自然化
3 Completion and extension of the water grid, the elimination of the dead-ends
拓展和补全网格，消除断头水体
4 Wetland: in-situ purification and storage
湿地：在地净水及蓄洪空间
5 Naturalization and reinforcement of the agricultural polders
对农业圩田堤岸的加固及自然化

FIG. 3.67 The New Water System and Intervention.
未来水管理机制和补充措施

Water Designs II: the Scroll Prototypes
Students' Group
苏州水之设计二：画卷和原型
学生团队：

Macro Group 1: the Grid - New Part of The City
研究小组一：网格水体新城部分

Martin Jarmann, Lijun Pan 潘丽君, Jiaming Rao 饶珈名, Julie Crot, Yuan Xu 徐元, Simon Etienne André Cerf-Carpentier , Pengyang Luo 罗鹏阳, Baokun Wei, 魏宝琨

Macro Group 2: the Grid - Historical City Center
研究小组二：网格水体老城区部分

Ting He 何婷, Ruoyu Min 闵若雨, Andre Bernard Ignace Marie Dib, Xuelin Tian 田雪临, Zixuan Zhao 赵紫璇, Gilles Caron, Ziqing Li 李紫卿, Yuyao Xu 徐语遥

Macro Group 2: the Grand Canal
研究小组三：重要河流: 大运河

Francois Bernard Loison, Yurou Li 李雨柔, Yun Qing 卿昀, Andreia Sofia Marrucho Nunes, Ran Bi 毕然, Po-Yi Sung 宋柏毅, Messaouda Rima Bounemer , Wulong Mo 莫武龙, Killian Flavien Worreth, Dian Yu 余典

Macro Group 4: the Taihu Lake
研究小组四：太湖水体

Gabriela Jeanrenaud, Jing Li 李静, Tong Li 李桐, Noelie Marion Charlotte Lecoanet, Huijing Zhu 朱慧婧, Yuying Sun 孙玉莹, Lena Huber, Mark Kats

Macro Group 5: the Lakes and Polders
研究小组五：塘圩湖荡

Mathias Roger Lamberts, Meilin Chen 陈美霖, Lan Qin 覃兰

Macro Group 6：Tianjin University
研究小组六: 天津大学组

Jinyao Liu 刘瑾瑶, Siqi Zhan 詹思琦, Hanghua Zhang 张杭华, Junnan Gao 高俊楠, Long Ma 马龙, Hanyu Xiao肖晗宇

3.4 – Water Designs II: the Scroll Prototypes

3.4 – 苏州水之设计二：画卷和原型

The “Prosperous Suzhou” scroll, the exceptional mix of Chinese and Western representations (the traditional Chinese axonometric view and the degrading perspective) has guided our design explorations. Detailed transformations, as well as the more widespread change in the urban landscape are represented in a new Suzhou scroll. Each part of the scroll develops a case study, an urban prototype of Suzhou Garden: along the Grand Canal, the Grid of the dense network of canals and the lakes, the four bodies of the wide deltaic Suzhou water system.

《姑苏繁华图》长卷作为一种将中国传统的轴测表现和西方渐变的透视画法结合在一起的独特表现方法，指导着我们的设计探索。通过长卷的方式，局部的城市转型和变化能够和整个广阔城市景观上的变化同时展现并互相联系。从太湖的山水到大运河的沿岸风光，从城市中密集的水陆双棋盘网格到城乡密布的大小湖荡塘圩，长卷中的每一部分都是一个局部采样的研究设计，是一个“苏州园林”的城市原型，展现了长江三角洲中苏州水系四种独特的水体空间。

FIG. 3.68 The “Prosperous Suzhou” Scroll (Part).
《姑苏繁华图》画卷（局部）

3.4.1 – **The Reading of the System in Current Planning**
现有规划中苏州滨水空间整体格局

Based on the standard of the department of hydrology and the different classifications according to features like water area, breadth of water surface, etc., the water network body is recognized as circles. Based on its history and planning, the water system is constructed into a "1+1+3+11+11" structure, with the historical center at its core.

依据水利部门标准，按照水域面积、水面宽度等不同分类方法，水网水体形态呈圈层式布局。基于苏州河网水系规划，结合历史水网格局，滨水空间呈现以古城为核心，构建"1+1+3+11+11"的特色空间结构。

FIG. 3.69 3 Circlar Layers
三大圈层

FIG. 3.70 1 Circle (Center) + 1 Belt (The Grand Canal) + 3 Arteries
一环一带三脉

FIG. 3.71 The Eleven Important Rivers at The City Level.
城市级"十一河"

FIG. 3.72 The Eleven Lakes.
重点滨湖地区 "十一湖"

3.4.2 – **One System, Four Water Bodies**
一个系统，四种水体

The differnt water bodies in Suzhou has been organized into one intensively connected system, which has to be reflected, improved, even redesigned confronting the current challenge of climate change, pollution and water scarcity.

苏州的水系是一个各水体紧密连接的系统，长期以来发挥着航运、防洪排涝、用水供应等作用。今天面临气候变化、污染以及供水紧缺的挑战，这个系统需要反思、改善甚至重新设计，这就要求我们理解各个组成部分的不同特性以及它们在整体中的作用。

FIG. 3.73 Water Body I: the Taihu Lake.
水体一：太湖

FIG. 3.74 Water Body II: The Grand Canal (and Other Main Rivers).
水体二：京杭大运河（及其他主干河流）

FIG. 3.75 Water Body III: the Grid.
水体三：网格水体

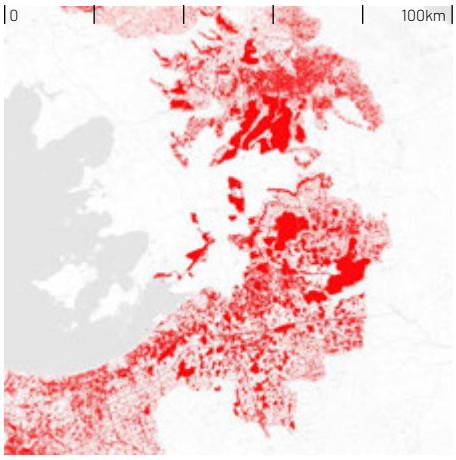


FIG. 3.76 Water Body IV: the Lakes.
水体四：湖荡塘圩

The research provides a new reading of the water system in Suzhou. Within the system, various water morphologies, or water bodies, can be recognized, and elaborated further into six Scenic Areas:

1. The Taihu Lake, the lowest part and the central element of the Taihu Lake Basin, surrounded by agricultural fields and small hills.

2. The main rivers, including the nine rivers and the Grand Canal.

3. The Grid, including chessboard water network in the historical city centre, and the new grid of waterways along boulevards in the new city.

4. The lakes, including the numerous lakes and water ponds among the traditional agricultural polders both on the northern and southern sides of the city. Together they form a continuous and dense network of water surfaces.

本次研究提供了解读苏州水系的一个新角度。从形态和景观出发，苏州的水系统由四种主要的水体构成，并进一步分为六种风貌区：

1. 太湖，中国最大的淡水湖之一，处于太湖流域的最低处，被传统农业区和苏州周边小型丘陵环绕，承担着供水、养殖、航运、防洪、旅游等多种功能。

2. 主要河流，包括大运河和九条主要的河流，承担着航运动脉的作用，并且是泄洪的主要通道。

3. 网格水体；包括了著名的老城内棋盘状的水网（古城中心水巷风貌区），以及在新城中与林荫大道平行的人工水道系统（中部城镇河网风貌区）。

4. 湖、荡、塘、圩，各种湖泊状的大小水面，包括阳澄湖（阳澄湖生态湖淀风貌区）在内的苏州“十湖”，以及在苏州的北部及南部传统圩田区域内星罗棋布、相连成片的大小水面（北部城镇湖淀风貌区，南部水乡湖淀风貌区）。

3.4.3 – **The Scroll: Prosperous Suzhou**
画卷: 姑苏繁华图

The Prosperous Suzhou scroll is a combination of linear perspective with traditional Chinese compositional devices (Chung, 2004). The entire drawings are organized in axonometries in general, but gradually scale down from the front scene to the back scene, which enables it to depict a tremendously detailed vibrant urban life in the front scene and situate the same in the territorial landscape – the mountains, the lakes, the agricultural polders, and the villages.

《姑苏繁华图》的绘制结合了透视法与中国传统的绘画方法(Chung, 2004)。整个绘画以轴侧画法为基本原则，但是从近景到远景采用了一定程度的尺度上的缩减，以起到透视的效果。这种方法使得绘画在一方面能够在近景通过惊人的大量的细节来描绘充满活力的城市生活，另一方面通过远景的描绘将这种生活放置在整个苏州周边以及太湖流域的山水、农田、村庄的景观之中。

FIG. 3.77 The "Prosperous Suzhou" Scroll: The Combination of Axonometires and Perspectives.
《姑苏繁华图》画卷: 轴侧画法与透视画法的结合

The scroll, that is horizontal to the extreme (36.5cm high but 1280.8cm long) can be viewed as a territorial section following a zigzag itinerary, from the Taihu Lake and Lingyan Hill, the typical water town of Mudu, the situation inside and outside of the city wall, the commercial street in the city center, and finally to the Huqiu Hill (Xu, Zhao, Cui, 2016, Wang, 2008). Rather than a limited prosperity inside the city wall, the section presents an incredibly extended diversity, quality, and activeness spreading over the territory, a Suzhou that is rooted in its dense network of water and agricultural villages. The continuity between the city and its territory is not just presented by the water courses but by a continuation of vegetation, activities, architecture, and the standard of life: the buildings in the villages often have hard tiles and gables instead of thatched roofs; the types and the richness of vegetation is prevalent from the hills, to the villages and towns and to the city, from wild nature to the private garden; the urban components, including the commercial street along the water with trees, the treatment of the banks and the type of bridges, and the variety of activities in the Mudu town are comparable if not identical with the ones in Suzhou city.

整个姑苏繁华图的长卷非常的长(36.5厘米高却有1280.8厘米长),因此可以被看成是沿着一条曲折的剖断线绘制的地域尺度的剖面图。这条剖断线从太湖灵岩山出发,途径典型水乡小镇木渎、苏州城墙内外的市井景观、市中心繁华的商业街,最终到达虎丘(Xu, Zhao, Cui, 2016, Wang, 2008)。这样大尺度的一张剖面图不仅展现了姑苏城墙内的繁华,更是表现了整个地域范围内—— 或者说是大苏州都市圈——惊人的多样性、生活品质及城市活力,展现了一个宽广地域上布满水乡和水系的繁华的苏州。这种城乡的连续性不仅表现在水系的贯通上,更表现在植被、业态、建筑及生活上的连续性。比如在乡村的建筑常常采用城市里的硬质瓦片和山墙,而不是农村典型的草质斜顶;品种丰富的植被从群山向村庄和城市蔓延,从自然向私家花园渗透;城外小镇木渎中各种城市元素如种植着树木的滨水商业空间、堤岸和桥梁的设计以及丰富的业态,与苏州城区相比也毫不逊色。

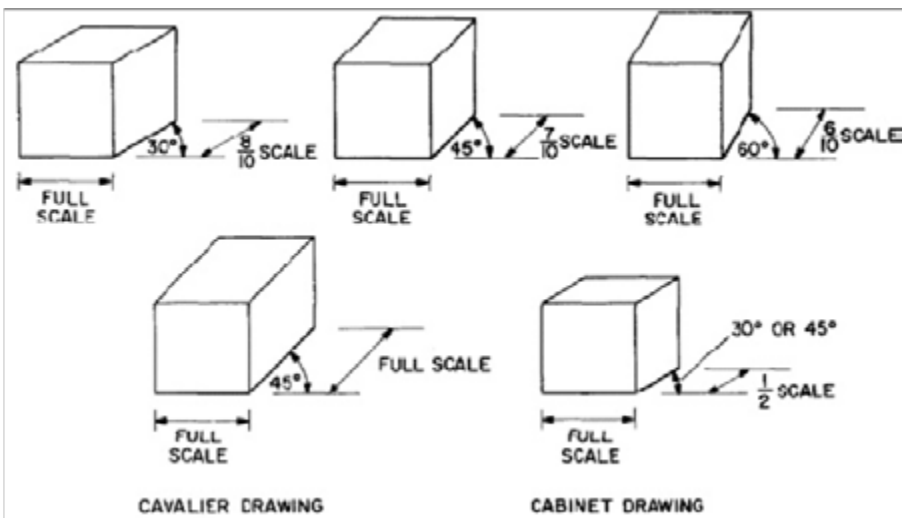


FIG. 3.78 The Diversity of Axonometry.
不同轴测题的组合

Compared to the classic axonometric drawing as a currently reviving fashion of architectural representation, such as the work of the DRAWING ARCHITECTURE STUDIO, the drawing of scroll is deformed and imprecise (Wang, 2008). However, a true Suzhou is described, or even retroactively and implicitly designed, attributable to this specific way of representation, or more precisely a way of observing and conceiving each space within its territorial context.

The workshop attempts to paint a new scroll, not only using beautiful elements from the original scroll, but also trying to imagine a new project which is built with the traditional Suzhou and its landscape, a re-discovering of the prosperous Suzhou.

对传统经典轴测图的热衷是目前建筑表现的一种新趋势，以DRAWING　ARCHITECTURE工作室的项目实践为代表。和这样经典而严格的轴测图相比，姑苏繁华图的绘制是局部变形而不精确的 (Wang,2008)。但是通过这样一种非常独特的表达方法，姑苏繁华图能够对苏州有一个真正的描述，或者更进一步说，仿佛成为了一张苏州在被建设之前的设计图。在设计中精确的诠释了苏州每一处空间与之所在的地理地域之间的紧密关系，仿佛这就是当时建设苏州时的初衷。

本次研究尝试绘制一张新的姑苏长卷，不但要使用原有姑苏繁华图长卷中精美绝伦的细节元素，同时也尝试对苏州进行新的设计，在传统苏州和她所在的广大地域景观的基础上建设一个新的苏州——一张新的姑苏繁华图。

FIG. 3.79 Detail: The Origional "Prosperous Suzhou" Scroll.
细节：《姑苏繁华图》原版

FIG. 3.80 Detail: The New Scroll: Research by Design.
细节：苏州新画卷：从设计出发的研究

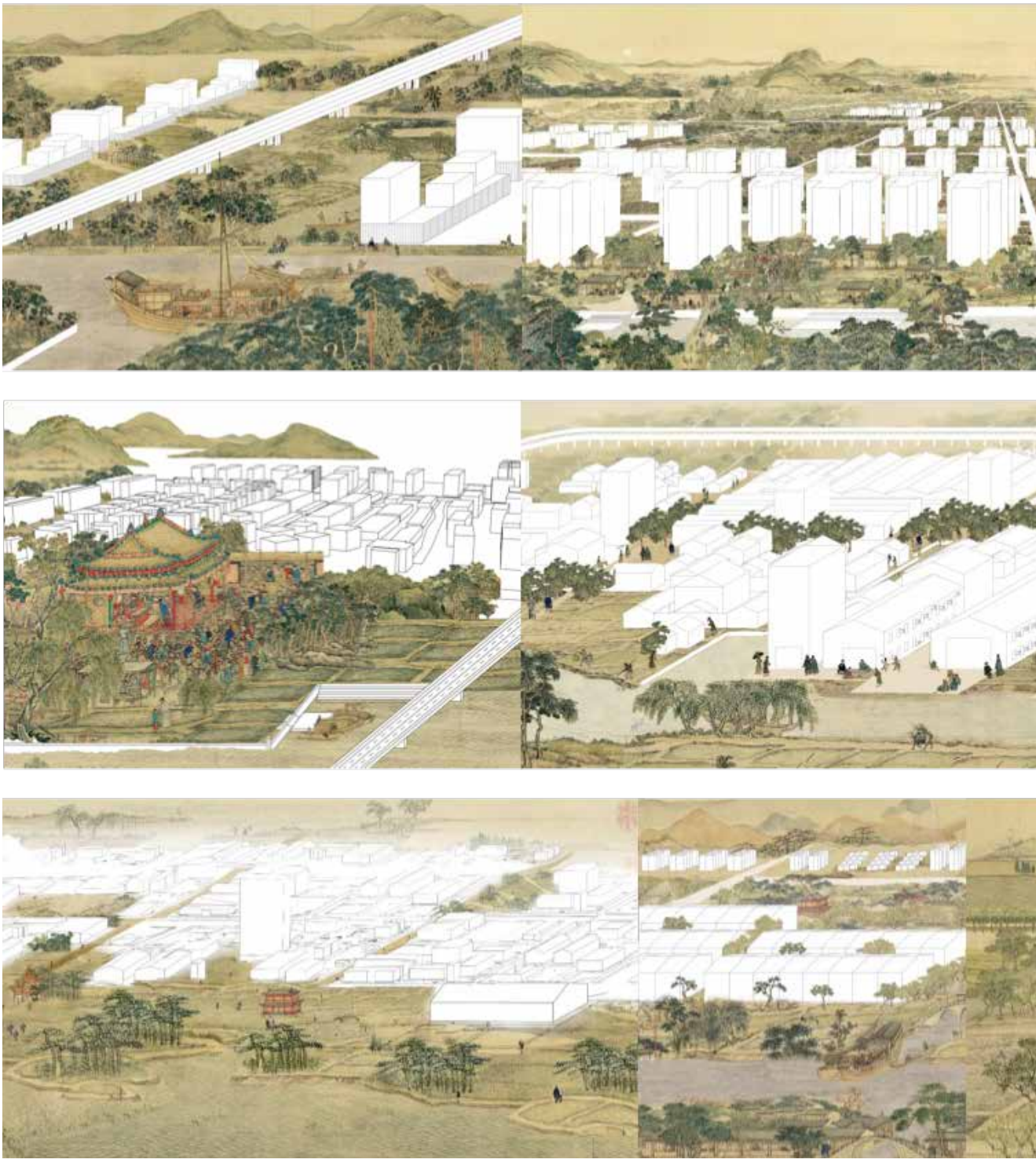
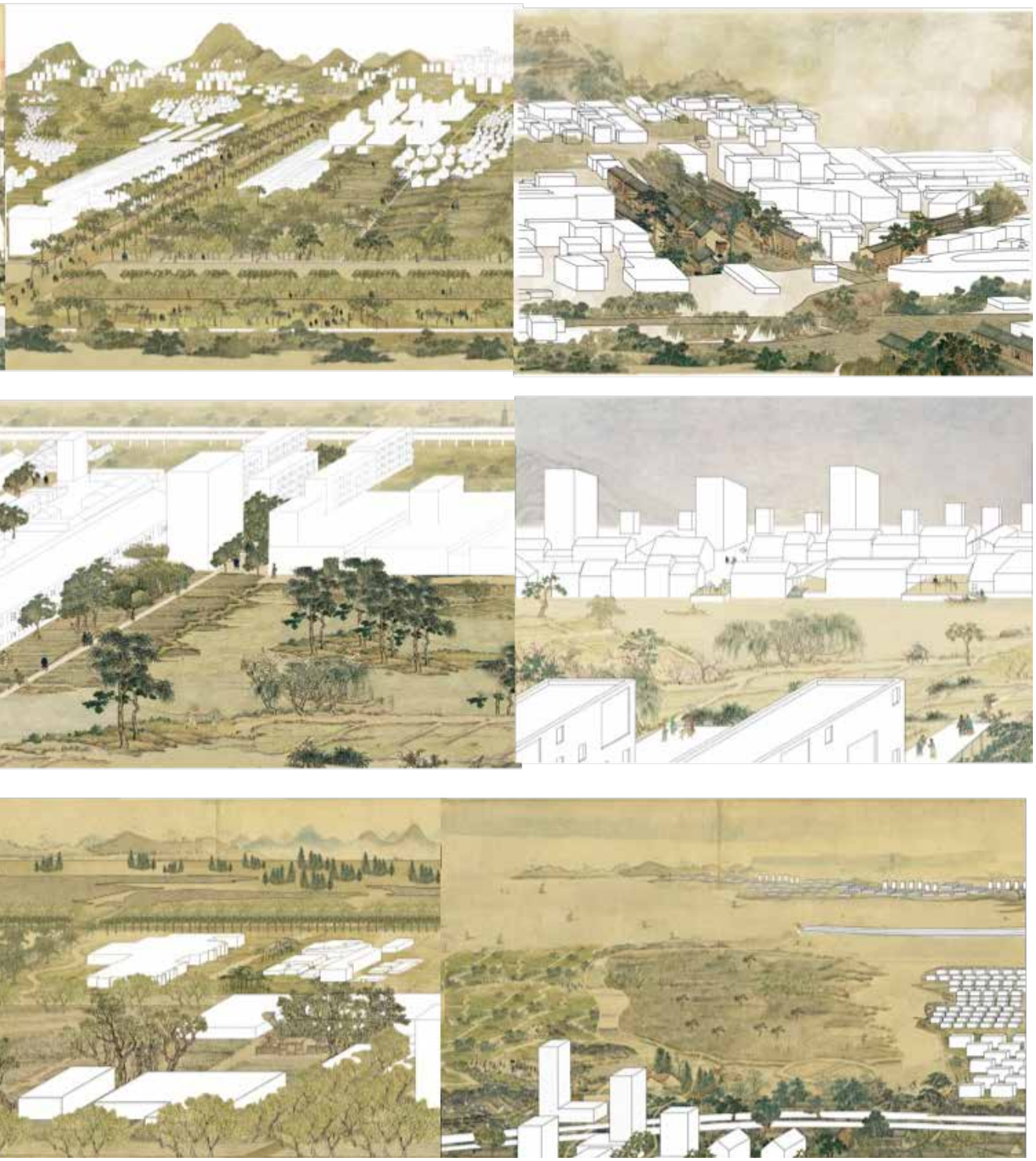


FIG. 3.81 The New "Prosperous Suzhou" Scroll (Work In Progress).
新苏州繁华图画卷 (过程文件)



3.4.3.1 – **The Taihu Lake**
山水太湖滨湖风貌区

The Taihu Lake as an eco-system significantly provides valuable eco-services, among which water supply, climate regulation, water purification and flooding control. However, due to water pollution, the quality of these services has been declining (Jia, Luo, Du, Li, Lü, 2015). The agriculture in the areas pertaining to and surrounding the lake, is of a great productivity yet one of the main sources of the pollution (Gao, Yan, Jiang, Ti, 2014).

太湖作为一个生态系统对大苏州都市圈起着重要的生态服务作用，包括供水、气候调控、水质净化、蓄洪等。近年来由于污染影响，太湖的生态作用不断的退化(Jia, Luo, Du, Li, Lü, 2015)。太湖周边的农业区是长期以来人类不断介入并精心改造自然的结果，是农业产量最高的区域之一，同时也是水污染的主要来源之一(Gao, Yan, Jiang, Ti, 2014)。

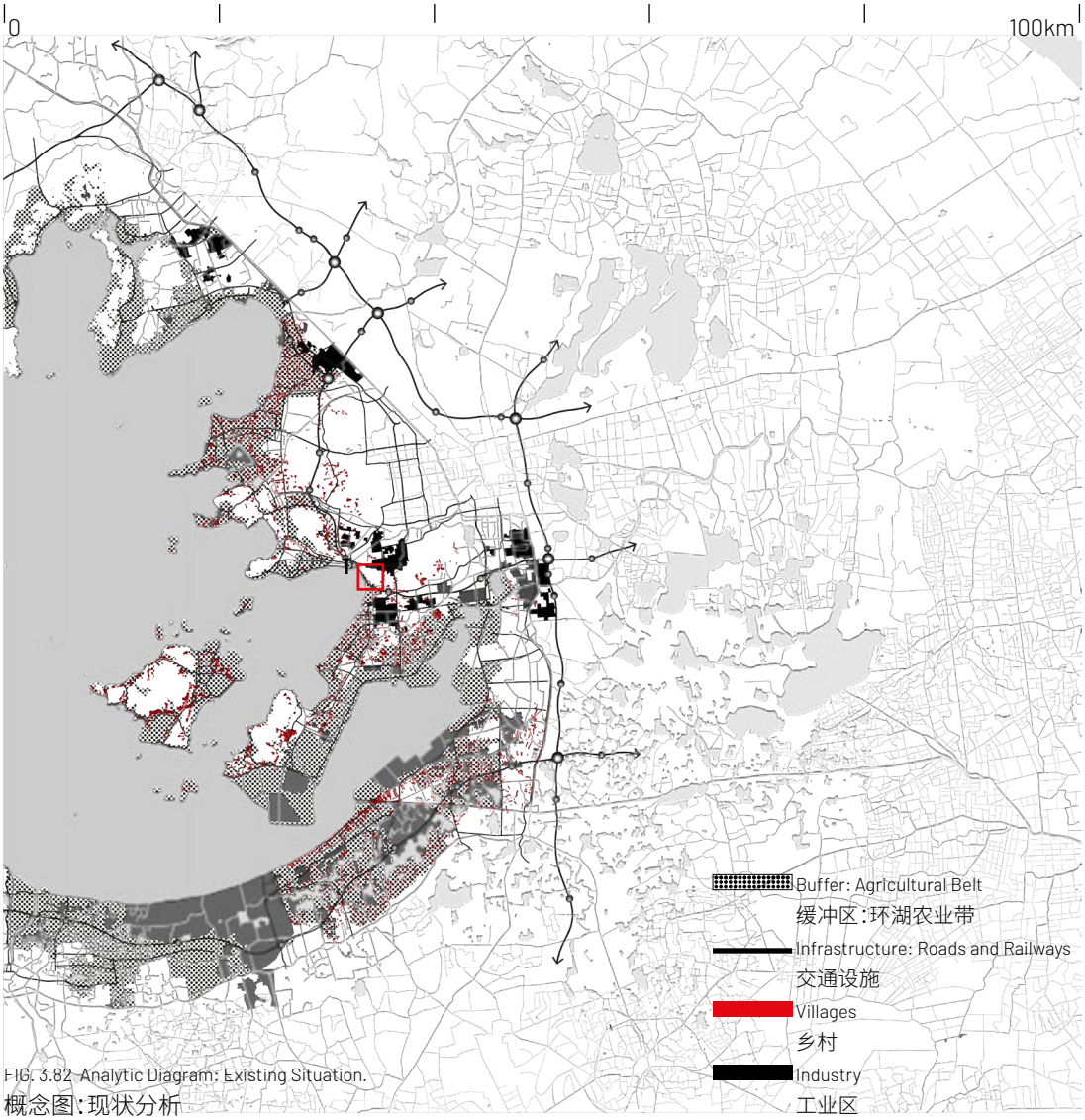


FIG. 3.82 Analytic Diagram: Existing Situation.
概念图：现状分析

In the current regulations (The water treatment masterplan of Taihu Basin, 2013; Regulation of urban and rural planning of Suzhou, 2013; The water treatment masterplan of Taihu Lake in Suzhou, 2008), apart from the control of waste and construction, the transformation of the agricultural villages into an ecological, cycling, and green productive environment has been a crucial aim. Projects (e.g. Landscape Design of the east Taihu dike, MOD, 2013) have been designed addressing the water pollution using wetlands.

在目前的规范以及治理下(太湖流域水环境综合治理总体方案, 2013; 苏州市城乡规划若干强制性内容的规定, 2013; 江苏省太湖流域水环境综合治理实施方案, 2008), 除了对排污的严格控制, 对城市建设的严格限制以及对工业区的不断优化之外, 对现有农业和农村的改造并向生态农业、循环农业以及绿色农业方向的发展成为了当前重要的措施。同时太湖周边新的景观设计项目(比如苏州东太湖滨湖新城沿湖大堤景观设计, MOD, 2013)也把利用湿地解决污染问题作为主题之一。

FIG. 3.83 Birdview: the Dike and the Agricultural Belt.
基地鸟瞰: 环湖大堤以及环湖农业带

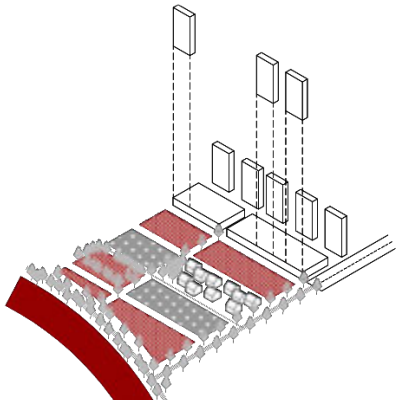


FIG. 3.84 Diagram: the Sequence of Waterfront Space.
概念图: 滨水空间序列

FIG. 3.85 Satellite Image of the Zoom: 2002.
基地卫星照片: 2002

FIG. 3.86 Satellite Image of the Zoom: 2018.
基地卫星照片: 2018

The current surroundings of the Taihu Lake are constituted by the following spatial elements: a dike immediately bordering the lake and supporting a raised autoroad; an agricultural belt formed by high-density small villages, small dikes, road networks and productive agricultural land, with small hills in-between; a grid of new roads and industrial platforms and new housing development characterized by gated community and high-rises. The grid has penetrated the agricultural belt and is reaching the lake.

目前太湖的周边空间由几种不同的要素组成：

1. 环太湖大堤以及快速路；

2. 环湖大堤之外的一个由高密度的小型农村、小型堤坝和丰富的道路网络以及高产量的农业用地组成的环湖农业带，其中还分布着小型的丘陵。

3. 在农业带之外是网格状的新城建设区。以高密度的高层住宅和大型的工业园区为代表。目前这种网格在一些地区正在向太湖方向渗透。

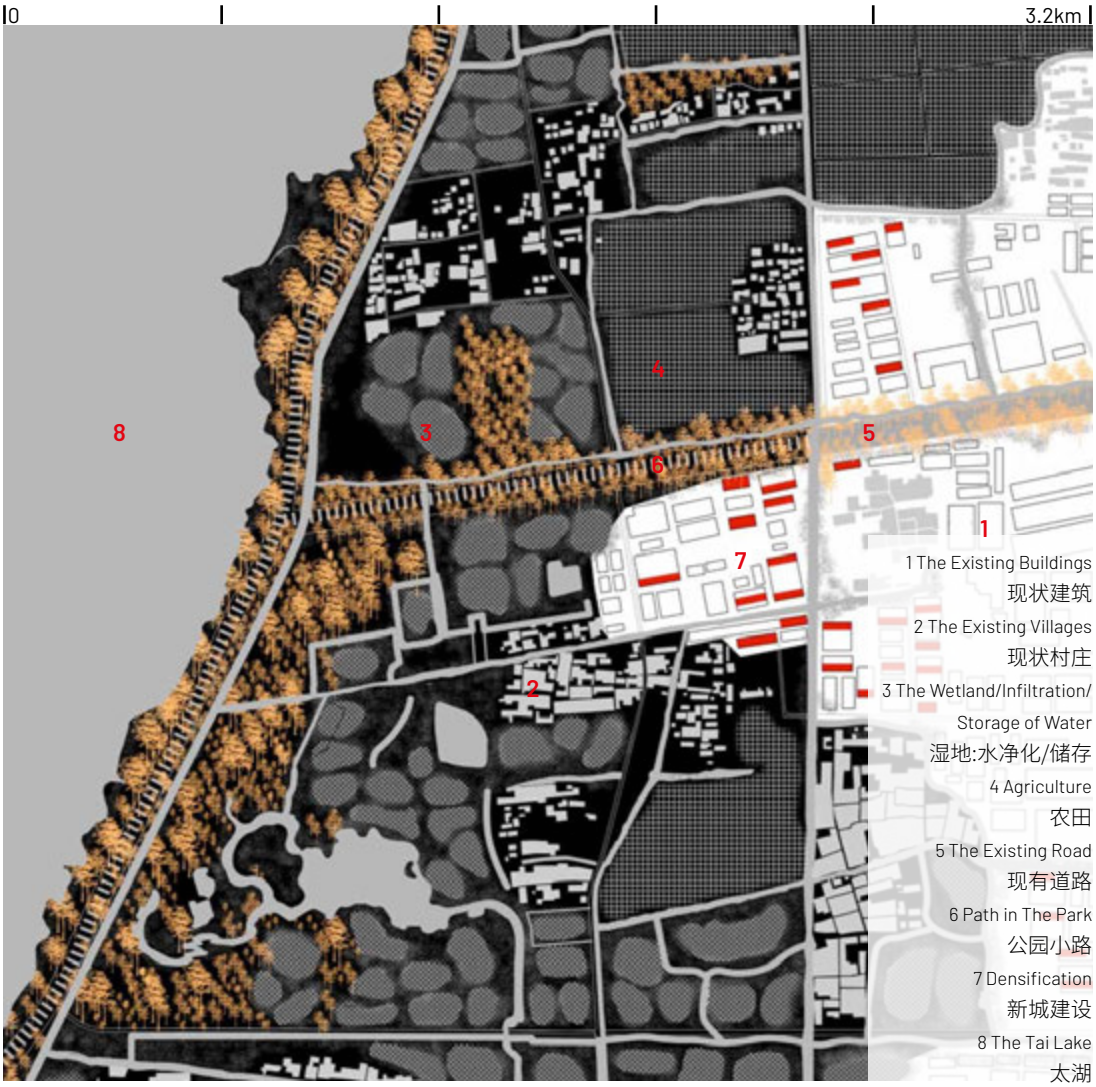


FIG. 3.87 Conceptual Plan of the Waterfront.
滨水空间概念设计图

Zoom: the Agricultural Buffer

The project of the workshop, instead of creating buffer zones based on metric distances and specific projects, recognizes the entire agricultural belt with the villages as a strategic space, which is capable of systematically addressing the issues of limitation and regulation, wetlands and purification, flood-control and the transformation of agricultural production, to eventually create a coherent space: a productive park. The construction of the park includes the following operations:

采样研究：环湖农业带

在太湖周边缓冲区的研究设计中，我们希望跳出目前以米或者公里为计量的规划方法，而将整个农业区包括其中的村庄作为一个整体进行规划。这个缓冲区作为滨水空间能够系统性的回应规范限制、排污和蓄水、湿地建设、农业的转型和升级等一系列的问题。最终，环湖农业带不但可以作为缓冲区发挥其基本的生产生活功能，还能够创造一个完整可持续发展的生态空间——一个具有生产力的公园。为了建设这样一个公园，设计了如下步骤：

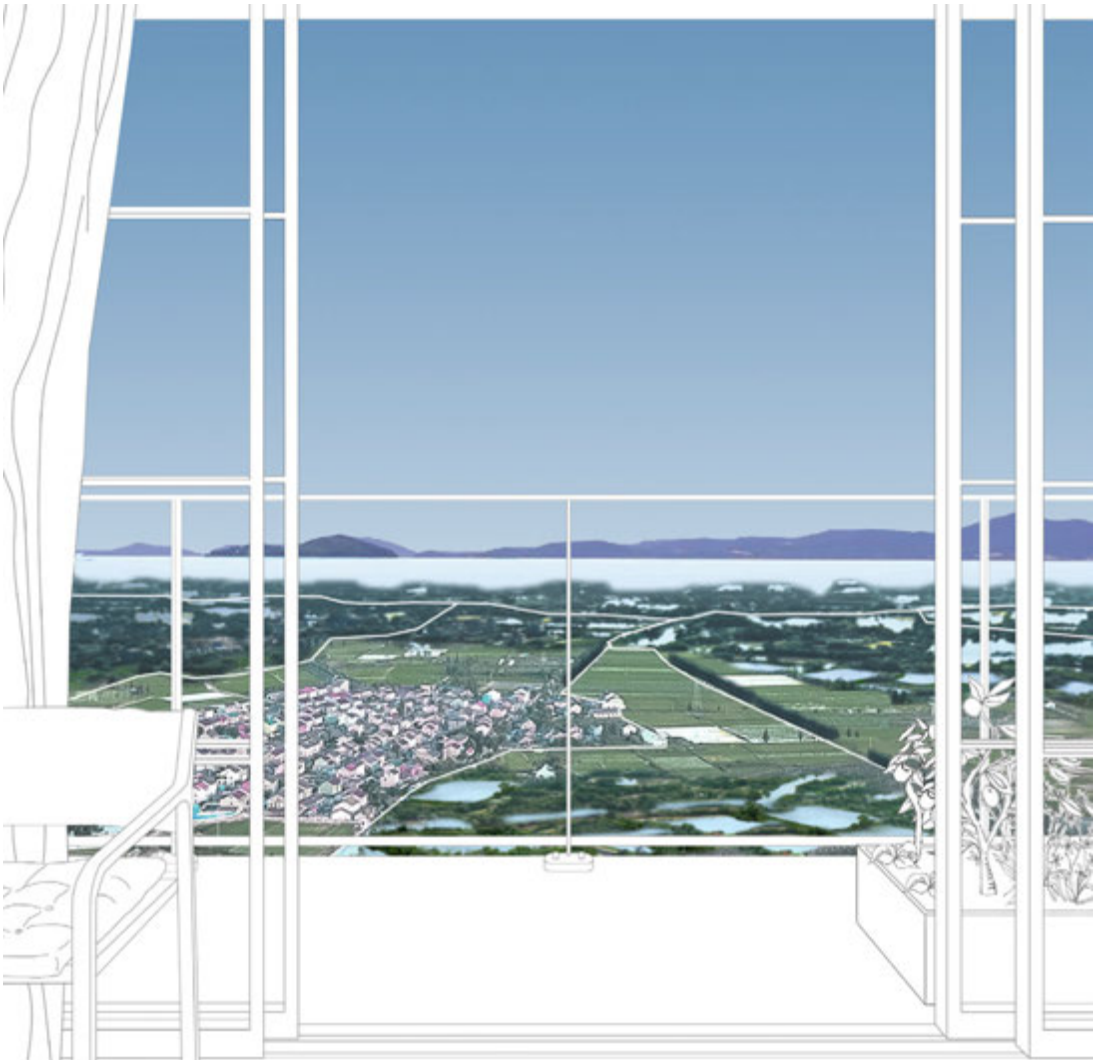


FIG. 3.88 The Window with a View.
窗景

1. The downgrading of the raised autoroad on the circular dike around the lake into a path for slow mobility. The pollution from the road will thus be reduced and more green spaces could be created for trees.

2. Within the agricultural belt, all agricultural parcels close to the Taihu lake are to be transformed into the land of agricultural functions with wetlands, forestry and orchards. The water discharges to and from the lake will pass through and be purified by this continuous space. Areas of woods and wetland are to be constructed around the villages to purify the water from the settlements before it is sent to the agricultural land, and to regulate the micro-climate within the villages. The traditional dike-pond system which was typical of the Taihu Lake basin and creates biological cycles between orchards, rice, fish, and other types of production, is to be promoted and re-introduced. It's also an unique agricultural landscape in the waterfront space of the Taihu Lake.

3. The grid of road and industrial platforms will be limited outside the agricultural belt. The industrial sites next to the agricultural belt are to be transformed into mixed development areas with high-density housing. We shall improve the service efficiency of residential and industrial land outside the agricultural belt and limit its spread to the agricultural belt.

The missing connections between the lake and the land, the industrial zones and the agricultural parts as the connection between the traditional villages and the arriving high-density residential areas therefore is defined. A resident in this high-density housing will be able to experience the new sequence of spaces around the lake: when the window is open, he/she will see an open agricultural park with re-qualified village; the park will be girded by a system of wetlands and forests, and further back the circular dike at the lake will be equipped with services in pavilions and penetrated by a mesh of paths for runners, cyclists and pedestrians; and eventually the Taihu Lake on the horizon.

1. 将环湖大堤上的快速道路降级并且缩减宽度，成为一条以慢速交通为主的线性空间，从而减少从路面和车辆排入湖中和农业区的污染，以及减少噪声和空气污染对自然环境的影响，为高质量的滨水空间创造条件。

2. 在环湖农业带之内，将邻近太湖的全域组织成以湿地、树林、果园为主的农业功能用地。从太湖中抽取的农业用水以及从农业区向太湖的排水都会经过这一环湖的连续空间并被净化。同时在村庄的建筑周围设立小型的片状树林和湿地，旨在净化部分从村庄向农田排出的污水，并且在村庄里创造怡人的小气候和小景观。设计也提出重新恢复苏州及太湖流域传统的桑基、果基等鱼塘，促进生态循环和生态多样性的发展，同时也作为太湖滨水空间独特的农业景观。

3. 限制网格状的新城建设（包括住宅和工业区）在环湖农业带之外。拉高农业带之外住宅及工业用地的使用效率，并限制其向农业带蔓延。

从而，太湖和周边的关系、工业区和农业区的关系、以及高密度住宅区和农村的关系通过滨水空间被建立起来。我们可以设想一位居住在临近环湖农业带的居住、生产混合的高密度城市区里的居民，他/她将生活在从高密度住区到太湖边一系列的滨水空间序列中。打开窗户，他/她看到的是开阔的乡村公园和其中星罗棋布的村庄；乡村公园的远处是一个由湿地和树林组成的滨水空间，更远处是环湖大堤，以及环湖大堤上的树木和植被，整个公园分布着联系着各村庄及公园中各种设施和小型建筑（如亭台楼阁等）的慢速交通网络，健身的人们、骑车的人们、以及各种行人和游客遍布其中；最远处是太湖广阔的美景。

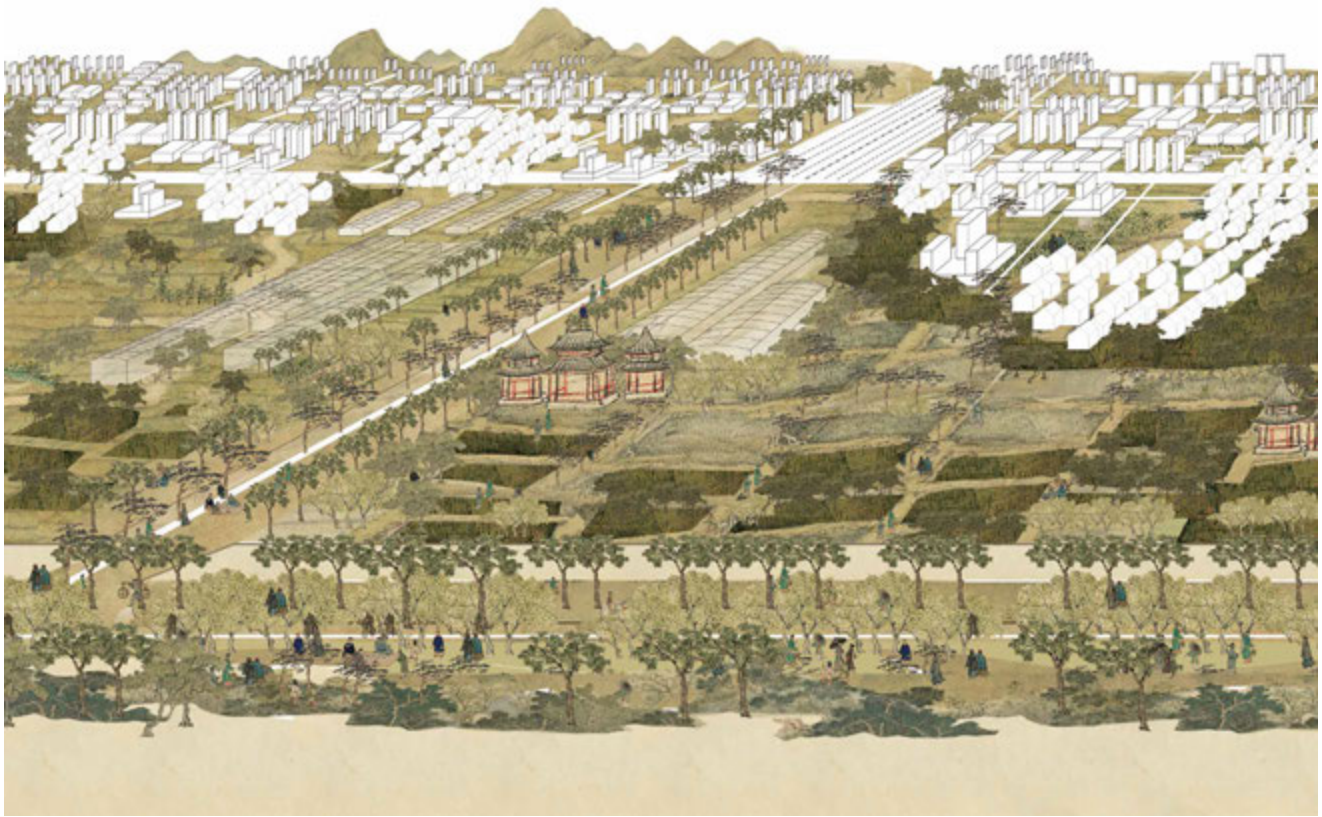


FIG. 3.89 Scroll: the Waterfront of the Tai Lake
画卷：环太湖滨水空间

3.4.3.2 – **The Grand Canal**
重要河流: 大运河

The Grand Canal has UNESCO world heritage status and is of great historical and cultural value, its Suzhou section is considered one of the most beautiful parts of it. The Grand Canal functions as the main water transport artery and a backbone for industry, and which has recently been widened and raised to a grade III transportation waterway. Its transportation efficiency is greatly improved.

京杭大运河是联合国教科文组织世界文化遗产之一，有着璀璨的历史和文化。其中苏州段又被认为是京杭大运河最美丽的部分。同时，京杭大运河又承担着繁忙的航运大动脉的角色，对周边沿岸的工业仍发挥重要的支撑作用。目前，京杭大运河已升级为三级航道，极大的提高了运输效率。

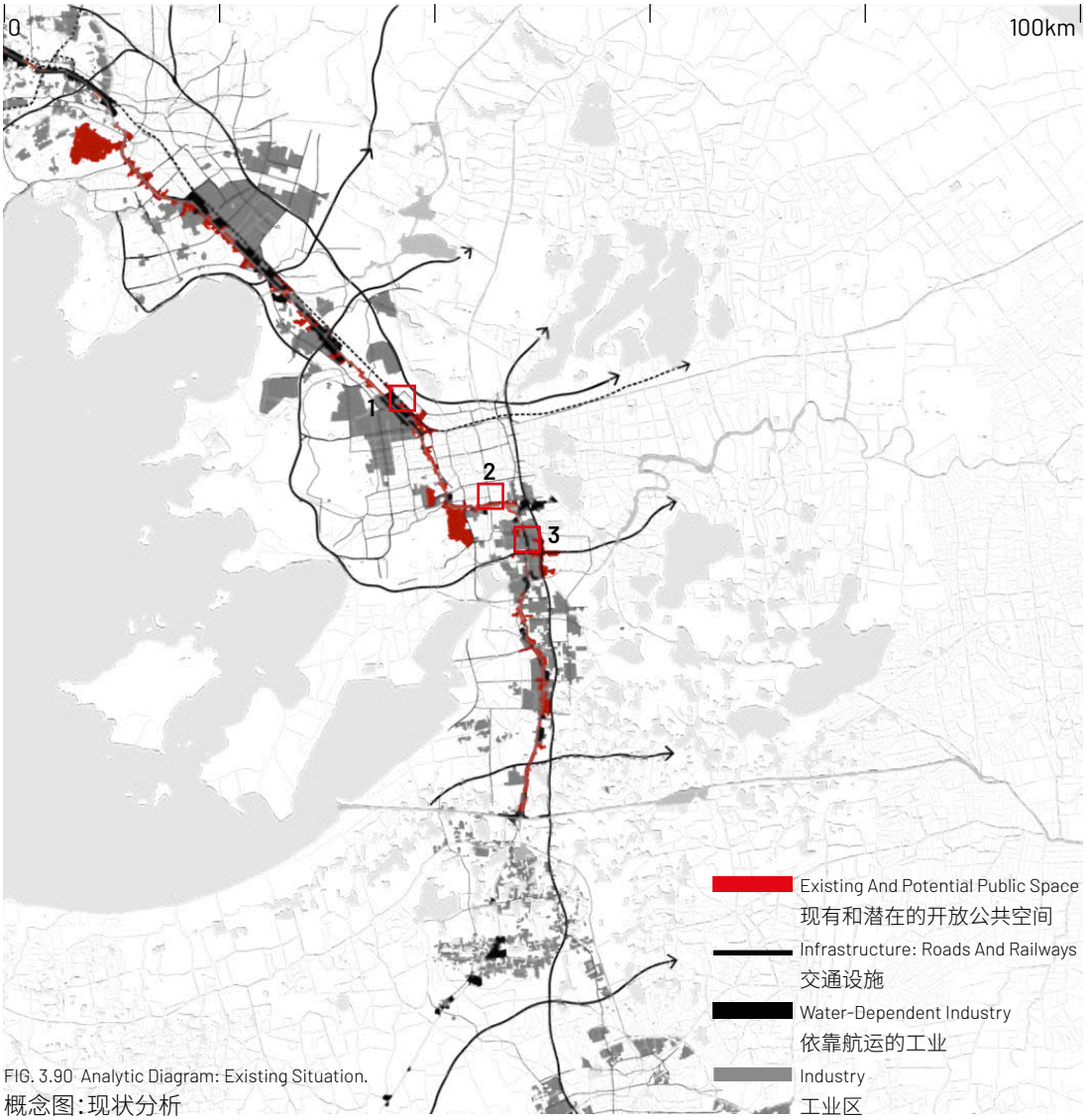


FIG. 3.90 Analytic Diagram: Existing Situation.
概念图：现状分析

Generally, the current industry along the canal is well infrastructured by highways, railways and ports and remains beneficial. In the long run, however, in order to highly automate and informationize the future industrial development of Suzhou, the waterfront space around the canal still faces the problem posed by transformation. Only a small number of workshops and creative parks integrated with residence are planned along the canal.

总体来说，依靠沿线的高速公路、铁路、码头等基础设施的良性运转，目前运河周边的工业用地运作良好。但从长远角度来看，要想实现苏州未来工业发展的高度自动化与信息化目标，运河周边滨水空间依旧面临转型的问题。计划在运河沿岸只保留部分小型的，并与居住紧密结合的工作坊与创意园。

FIG. 3.91 The Asymmetrical Condition of the Grand Canal.
大运河两岸的非对称型

FIG. 3.92 Water Front Concept .
滨水空间概念

FIG. 3.93 Satellite Image of the Zoom 1: 2002.
基地一卫星照片：2002

FIG. 3.94 Satellite Image of the Zoom 1: 2018.
基地一卫星照片：2018

The Grand Canal is an important flood-control apparatus, its dikes are to be raised by more than 1m (from 4.8-5.0m to 5.8-6.5m) in order to tackle the evermore frequent and extreme high-water levels caused by the land surface sealing of recent years (Suzhou's Water Bureau, 2018). Several requalification projects of its dikes have been designed and implemented including the consolidation of the banks and landscape construction of the Grand Canal, Gaoxin District. While the design of the new projects takes into consideration flooding control, water fluctuation, the naturalization of the banks with aquatic plants, the space has a more modern appearance than that of Suzhou. The Grand Canal, as a water supply resource for the city and for agricultural production, and a water system which provides important eco-system services, is heavily polluted (Yu, Liu, Yu, Li, 2011; Ren, Yang, Ren, Li, 2012).

The current section of the Grand Canal is in general asymmetrical: the eastern and northern side, or the side towards the city center, offers a large distance between the water's edge and the autoroad where waterfront parks and public spaces can be located; on the western and northern side, or the side pointing towards the outside of the city center, the roadway runs immediately along the water bank. The workshop project intends to have a large continuity of public space on the eastern and northern sides of the canal made out of the naturalization of the canal, with necessary enlargement and deviations; on the western and southern sides, pieces of linear public spaces and downgrading of the autoroad along the water as the land use permits are planned.

ZOOM 1: the north section: industrial port and the west station

The waterfront on both sides is largely occupied by industrial sites. On the eastern bank, a rapid urbanization with a high-density housing area is being implemented on the agricultural land and villages behind the industrial zone. A bundle of railways, autoroads and viaducts separate the new city development from the water front, fragmenting the continuity of the green area and water space.

同时大运河还是重要的防洪排涝设施。近年来，由于下垫面的显著改变、运河两岸排涝动力的陡然增加，以及太湖水环境保护等要求的变化，运河防洪能力明显不足。因此苏州正逐步将大运河沿线的河堤普遍升高1米左右（从4.8-5.0米升至5.8-6.5米）（苏州市水利局,2018）。这将不可避免的给滨水空间的形态和使用带来影响。苏州正在设计和施工数个和堤防加固有关的景观项目， 比如高新区京杭大运河堤防加固暨运河风光带建设工程等。虽然这些设计和工程充分考虑了防洪要求、水位的升降变化、对水生植物的引入等重要因素，空间设计如堤岸的台阶、下沉广场以及步道等，仍然偏向于现代化和均质化，并不能体现出苏州特有的水城关系。同时，京杭大运河作为苏州重要的供水渠道以及各种生态服务的提供者正在由于水污染而不断受到威胁(Yu, Liu, Yu, Li, 2011; Ren, Yang, Ren, Li, 2012)。

大运河现有的断面总体呈非对称型：在运河的东岸和北岸——或者说靠近城市中心的岸线，从水岸到第一条重要道路的距离相对较远，二者之间布置了滨水公园、公共设施、休闲设施等城市功能；在运河的西岸和南岸——或者说朝向城市外围的岸线，从水岸到第一条重要道路的距离相对较近，局部甚至直接与水岸线接触。针对这一空间现状，我们对运河两岸的滨水空间进行非对称的处理：在运河的东岸和北岸建立一条连续的公共空间带，并且在这条有着一定宽度的空间中实现大面积的运河岸线自然化，在有必要的地区对现有的空间带进行拓宽或者绕行；在运河的西岸和南岸在有条件的地块对滨水的道路进行降级和软化，并建立线性的滨水公共空间。

采样研究之一：运河北段工业码头及苏州西站地区

这一部分运河两岸的滨水空间大部分被工业建筑占据。在运河的东岸紧邻沿河工业的区域，大规模高密度高层住宅区正在发展，迅速取代了原有的农田和村庄。在新城和运河之间，分布着快速道路、高架桥、铁路、工业区等空间元素，不但分割了城市与运河的关系，还使原有的绿地和水面等开放空间碎片化。

研究设想了现有与运河垂直的码头的转型。这是一种非对称的转型：将码头的南岸适宜居住的部分转

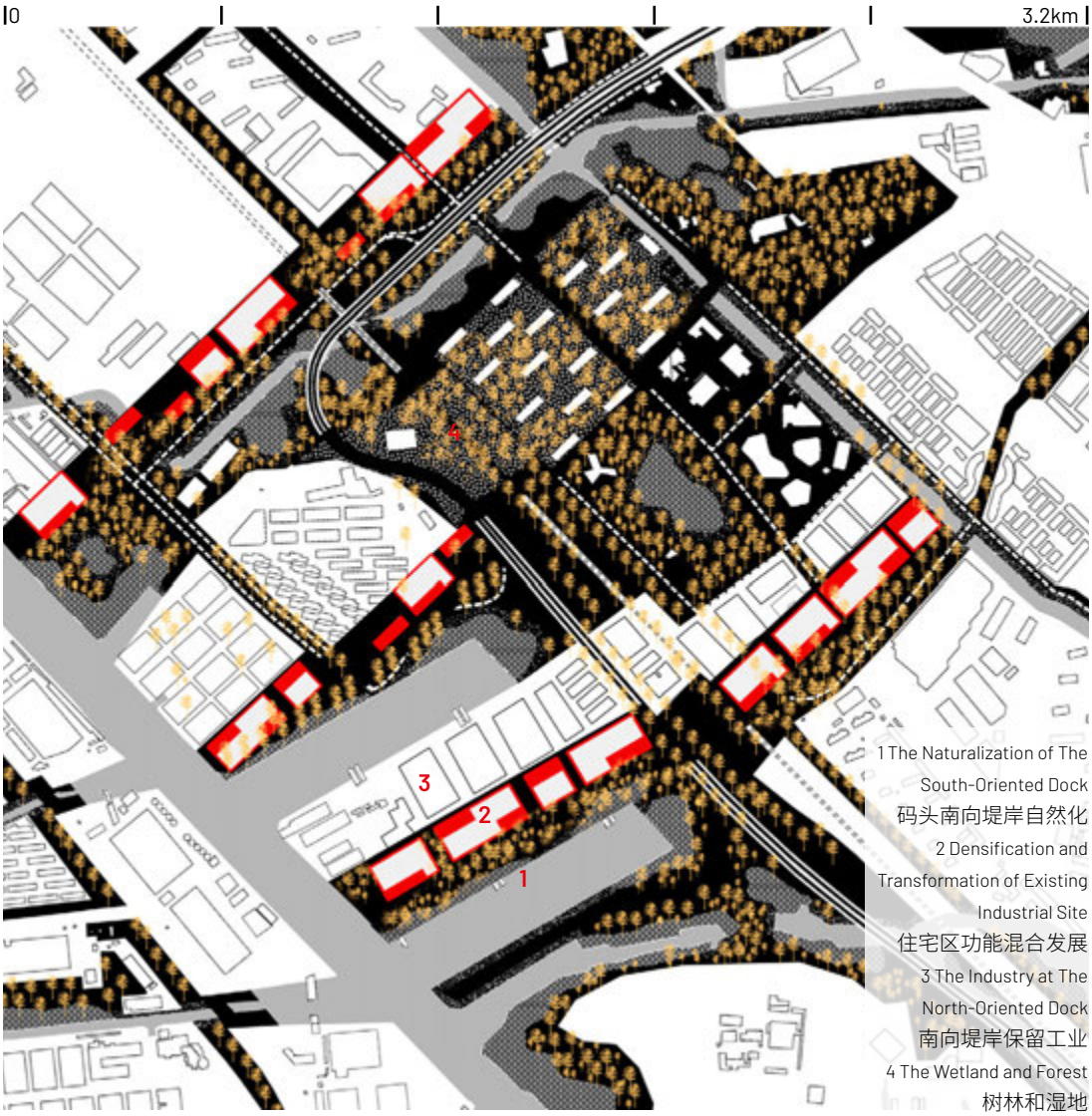


FIG. 3.95 Conceptual Plan of the Waterfront.
滨水空间概念设计图

The project of the workshop imagines an asymmetrical transformation of the docks: the transformation of the south-oriented side of the dock into a mixed community with high-rise residential buildings and green water front, while leaving the north-facing part for industries with less pollution and noise, and maintaining the waterfront shape of this part of docks to support industrial activities and shipping. The linear green waterfronts, offering new accesses to the water area for the city, penetrate into the city and connect up with large green patches in which the infrastructure is to be elevated or downgraded.

型成住宅区和绿色的滨水空间，并将这一部分河岸自然化；将码头的北岸不适宜居住的部分的工业进行转型升级，保留低污染和低噪音的工业片区，维持这部分的硬质码头滨水空间形状以支撑产业活动和航运。南岸的绿色滨水空间向新城延伸并且联系城市中的其它绿地和水域，为新城居民到达运河河滨提供了入口。在这个连续的空间中，对道路进行降级并提供了慢速交通空间。

FIG. 3.96 The Window with a View.
窗景

When the window is open, a new inhabitant in the waterfront community will see a green waterfront with wetlands for water purification, woods, and open green space equipped with public spaces and commercial facilities; he/she will see the movement of cranes and ships on the other side of the dock, where industry retains its function; he/she will see the Grand Canal up next to the window with the city on the horizon.

当码头南岸的一位居民向窗外眺望，展现在眼前的是一个丰富而多样的滨水景观：在窗下是绿色的滨水空间、自然化的河岸以及分布其中的各种小型的公共空间与商业设施、利于净化和储蓄雨水的湿地和树林；在绿色滨水空间的对岸是硬质的河岸，航船在这里停靠，机械臂不断的升降，岸上是各种产业空间以及大型的公共设施；再远处是蜿蜒的运河以及苏州的天际线。

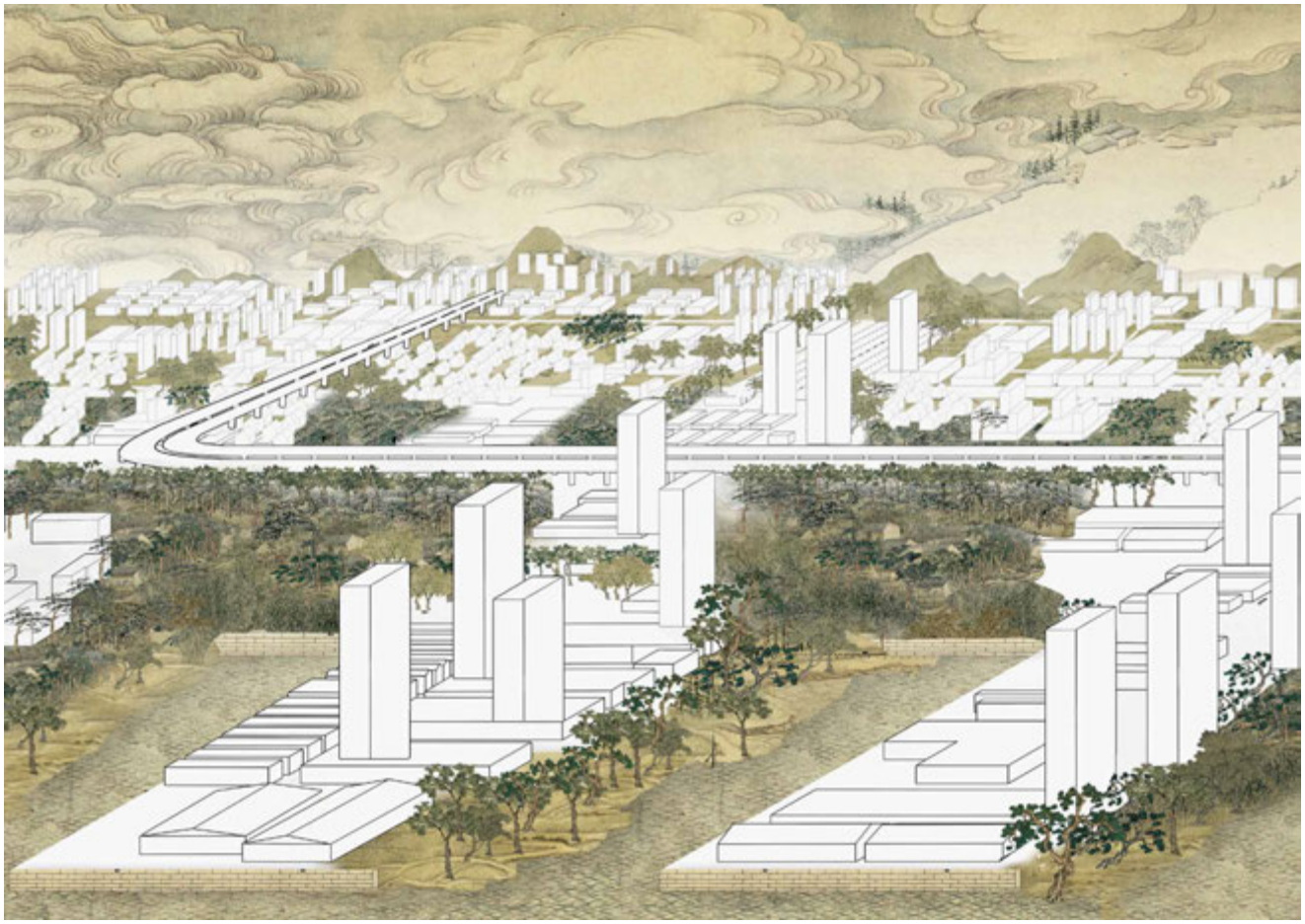


FIG. 3.97 Scroll: the Waterfront of the Grand Canal
画卷：大运河滨水空间

Zoom 2: the Middle Section: the City Center

The waterfronts at the city center are strongly asymmetrical: on the northern bank, or the bank towards the city, a large public space accommodates parks and public functions (cafés, hotels); on the southern bank, or the bank facing out of the city, the waterfront is occupied by gated residential areas or industry, leaving narrow open spaces along the waterfront.

采样研究之二：运河中段城市中心区

城市中心区这一部分的运河两岸展现了强烈的非对称性：在运河的北岸靠近城市中心的部分，一个大面积的滨水空间内分布着一系列的公园(苏州五龙桥公园,龙湖公园等)以及咖啡馆、宾馆等休闲设施和其他公共设施；在运河的南岸朝向城市外围的部分，滨水空间大部分被封闭的住宅小区和工业区所占据，在一些地区留下狭窄的公共滨水空间。

FIG. 3.98 Current Project: the Waterfront of the Grand Canal.
进行中的大运河滨水空间改造项目

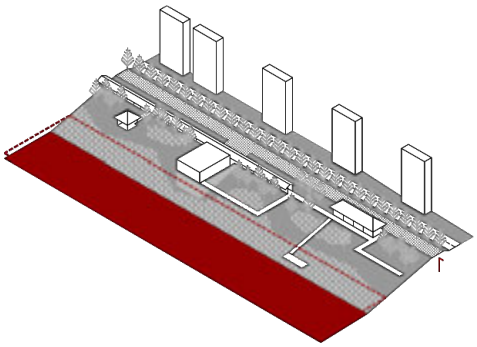


FIG. 3.99 Waterfront Concept .
滨水空间概念

FIG. 3.100 Satellite Image of the Zoom 2: 2002.
基地二卫星照片：2002

FIG. 3.101 Satellite Image of the Zoom 2: 2018.
基地二卫星照片：2018

The research imagines a radical naturalization of the northern bank. A natural and slowly inclined green space is imagined from the current auto road to the water, which plays as a wetland for purification of the run-off water from the city to the Grand Canal and an enlarged buffering capacity for flooding. The large auto road along the canal is downgraded and reduced to half, to make space for the new dike (+1m) with the path of slow mobility on top.

本次设计研究拟在运河北岸构建一个自然化的滨水空间体系。一个自然的缓坡从现有的临河道路开始缓缓地倾斜入运河，从而大大拓宽了运河在此的截面，增加了运河防洪排涝的容量。同时在缓坡上形成的自然湿地对流向运河的城市雨水起到净化作用。设计对现有的临河道路进行了降级，改善了从城市到运河河岸的可达性，利用节省出来的空间布置宽阔的慢速交通干线，并在必要的地方用作提高建设堤岸的提高部分（1米左右）。

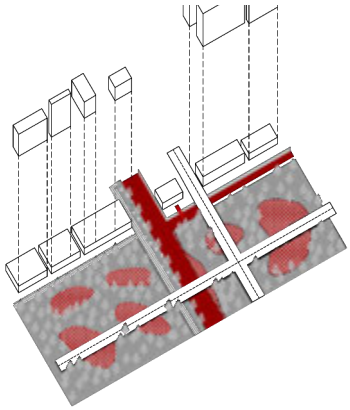


FIG. 3.102 Water front concept .
滨水空间概念

FIG. 3.103 Satellite Image of the Zoom 3: 2002.
基地三卫星照片：2002

FIG. 3.104 Satellite Image of the Zoom 3: 2018.
基地三卫星照片：2018

The architectural character of the space is inspired by the traditional Suzhou Gardens, in which the relation between architecture and water is unique: the pavilions and paths (partly covered) are right at or suspended over the water, instead of retreating from the water. A system of suspended, new paths (partly covered) at the level of the new dike will connect new and existing buildings beyond the dike. During the rainy season, the high water will appear among the paths and buildings, creating an appearance of living and walking on the water.

The project proposes a series of bridges and passerelles for pedestrians which connect a new green tissue following and crossing the canal. The strong willing to join all the green pockets together defined our proposal as well.

Zoom 3: the Southern Section: The Industrial Sites and the left-over green spaces

The asymmetrical character of the section of the Grand Canal is represented by the western bank's main layout of a grid of roads, industrial platforms and an autoroad at the bank, and the east bank's main layout of a row of industrial sites on the waterfront, new industrial platforms and a viaduct to the east of the industrial platforms. The canal is crossed by a strip of green space which is an unbuildable area due to the electrical wires and gas tubes it contains.

The project of the workshop imagines a gradual downgrading of autoroad grids towards the water and the green. The autoroad on the western bank is to be transformed into the new dike with the slow mobility path on top. The green space is constructed as a park with wetlands and trees, , which provide functions of rainwater saving, purification, ecological corridor, etc. The industries along the canal and the green space are to be turned into mixed communities with high-density housing with great views and orientation

在这个自然化的河岸上，建筑空间的意向受到苏州古典园林建筑的启发。在苏州古典园林中，建筑与水面有着独特的关系：亭台楼阁和有时开放有时覆顶的步道和桥梁常常直接临水而建，或者悬于水面之上，而不是像大部分现代建筑一样与水面保持着一定的距离。一个局部覆顶的并且与升高的堤岸同高的架空步道系统蜿蜒于自然缓坡的河岸之上，连接着堤岸与运河之间的建筑。在丰水期水位升高后，水面会出现以至充满在步道和建筑之间，给人以古典园林中行走并居住于水面之上的、苏州特有的空间感受。

同时，本次研究也提出建设一系列步行系统和人行桥梁，连接各种河岸与周围的、分布在城市中的小型绿色空间，将这些口袋状的公共空间纳入滨水空间的系统中。

采样研究之三：运河南段工业区以及碎片化的绿地

这一部分运河的非对称性体现在运河西岸以网格状路网、工业区以及位于堤岸上紧邻的运河道路为主要布局形态；而运河东岸以长条形临水工业码头、新建工业区、以及位于工业区东侧的高架快速路为主要布局形态。一条垂直于运河、东西走向的绿带穿过运河，绿带内穿过了燃气、电力等管线因而不允许建设。

设计研究对运河西岸整体路网进行了降级，特别是邻近运河的部分以及运河堤岸上的道路，建立从密集城市和工业区车行道路向滨水空间慢行道路过渡的交通体系，为运河滨水空间的公共活动和居住创造适宜的环境。东西走向的绿带内设计了湿地和树林，提供了雨水储蓄和净化、生态廊道等功能。转型运河以及绿带相邻的工业区，将其与新建的高密度住宅混合，使得新的住宅有优越的朝向和景观。

FIG. 3.105 Conceptual Plan of the Waterfront.
滨水空间概念设计图

3.4.3.3 – **The Grid**
网格水体

The grid is mainly constituted by two types of water grid: that in the historical city center, and that in the new development areas. The grid continues as a dense network of rivers and canals in the rural area.

The history of the ancient Water-road double chessboard structure in Suzhou can be traced to

苏州的网格水体由两种主要的网格组成：一是老城内棋盘状的水网，二是在新城中与林荫大道平行的人工水网。在农村地区，水体仍然是以一个密集的河流和运河的网络形式存在。

苏州传统的水路双棋盘格局可以追溯到唐宋时期。其中的水网与难以计数的小型堤坝和水塘相结合，

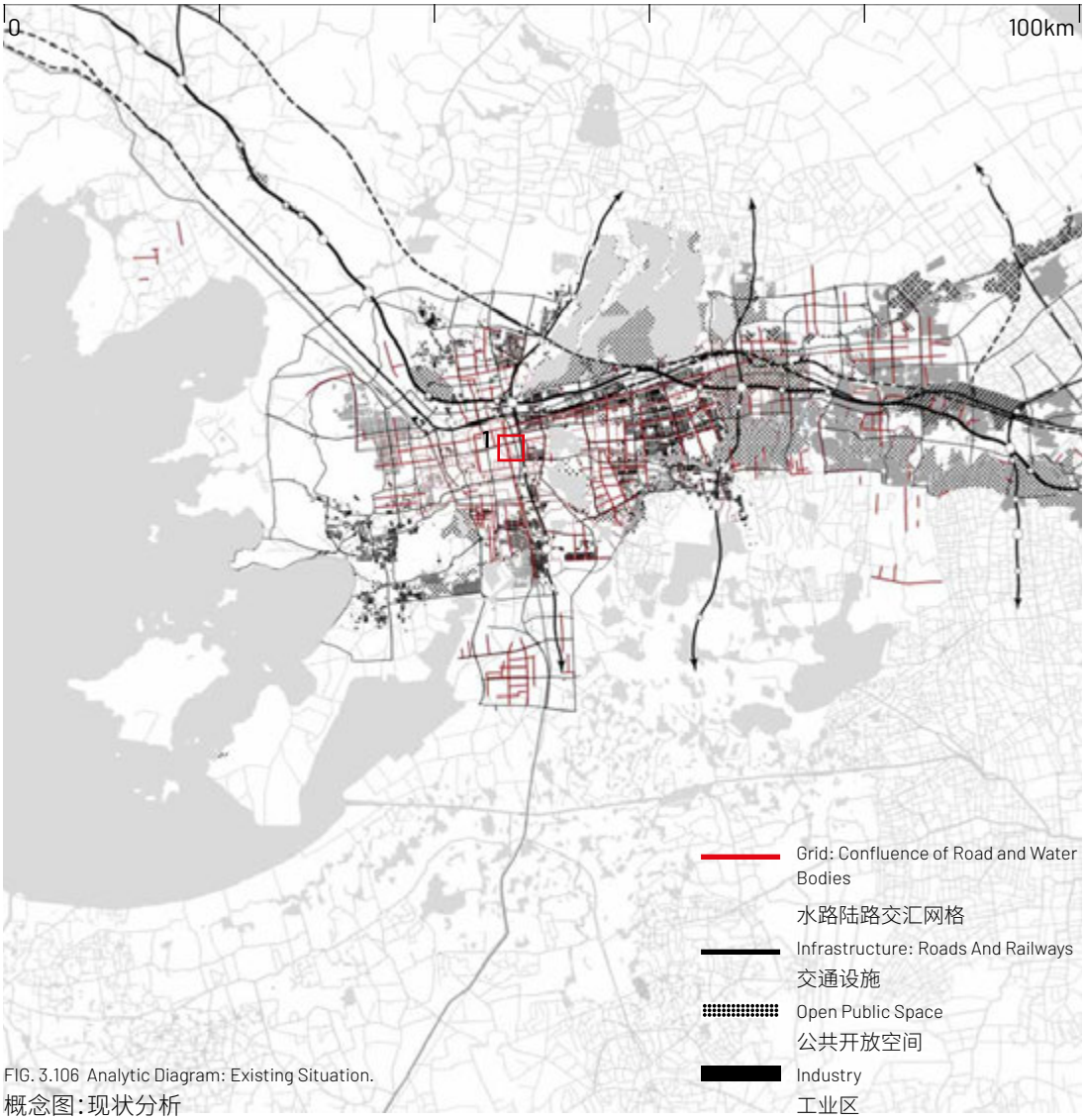


FIG. 3.106 Analytic Diagram: Existing Situation.
概念图：现状分析

the Tang and Song dynasty (7-13th century). The water grid, combined with small dams and ponds, was designed as both a water discharge and storage facilities precisely according to the micro topography (Che, Yang, 2016; Xiao, Zhao, Mao, 2017). During the modernization and urbanization that commenced in the twentieth century, the number and surface of waterways has been significantly reduced, many of them becoming dead-ends. Due to the massive construction in the city center, many waterways, historically the backbone of

并且依据其所在的微地形而精确的建设成一个泄洪和储水的系统(Che, Yang, 2016; Xiao, Zhao, Mao, 2017)。在从20世纪开始不断的现代化过程中，水面和水道的数量急剧减少，而且出现了许多“断头水”。由于在老城区的大规模城市建设，许多曾经作为承载交通和大量公共活动空间中心的水面被隐藏到新建建筑的背后而不可见。今天，虽然部分水道被重新整理和更新，并以之为中心建设了公共空间，苏州很大程度上还是失去了其作为水城的主要特征。从防洪的角度来说，今天苏州市中心（姑苏区）是以一个单一的包圩来管理，通过无数的水闸来调控每一条

FIG. 3.107 The Tranditional Suzhou Waterfront.
苏州传统滨水空间

FIG. 3.108 The Traditional Venetian Waterfront.
威尼斯传统滨水空间

FIG. 3.109 Comparision: Water Network in Suzhou and Venice.
比较：苏州和威尼斯的历史水网

mobility and public activities, are now out of sight behind the buildings. Today some of the waterways have been requalified as public spaces, but in general Suzhou has its character of being a water city. In terms of flooding control, the historical city center is managed as a closed polder with water gates to control the water level of each waterway. During the rainy season, the closure of the water gates and the polder as a whole, the reduction of water capacity, and the dead-end conditions cause the concentration of pollution; during the dry seasons, enormous quantities of water have to be constantly pumped through the grid, flushing the pollutants towards the downstream cities (Interviw with Prof. Huang Tianyin, Suzhou University of Science and Technology, 2018).

On the other hand, a water-road double chessboard – enormous in its scale compared to the ancient one - has been constructed in the new part of the city: the boulevard and its parallel-running canals. This grid can be found in the first industrial park – the China-Singapore industrial park (SIP), where the land has been pre-heightened and the ancient rural waterways and polders channeled into the artificial water grid. Due to the vast and rapid urbanization process and the extensive construction of dikes and water gates, the heightened land confronts increasingly higher water levels.

水道的水位。在丰水季，大运河及其他外围河道的水位升高，市中心常常通过关闭水闸而将高水位阻挡在包围之外。由于城市水容量的不断减少，丰水期水循环的减弱，以及“断头水”的存在，使得污染物容易在局部聚集。在枯水季，大量的水需要不断地由水泵泵入老城区的水网之中，将污染物冲刷而出。冲刷出的污染物往往流向下游城市(Interview, 2018)。

另一方面，新的水陆双棋盘模式（规模和尺度远超过历史上的水陆双棋盘空间模式）也在苏州新城的建设中有所体现：林荫大道及其平行的运河。这样的水网最早规划于苏州工业园区 – 新加坡工业园区。为了便于防洪排涝，工业园区内的地平被人为的加高，同时原有圩田的结构和细密水道被大型网格化的平直水道所取代。由于高速而大规模的城市化以及广泛建设的堤坝和水闸，工业区外围水位在丰水期不断增高，原已加高的地平受到洪涝的威胁以至于需要为工业区建设新的包圩，这将不可避免的影响滨水空间的形态。

FIG. 3.110 Satellite Image of the Zoom 1: 2002.
基地一卫星照片：2002

FIG. 3.111 Satellite Image of the Zoom 1: 2018.
基地一卫星照片：2018

Today the canal waterfront along the boulevard, despite the beautifully designed public space and urban furniture and wide pedestrian sidewalks and bike paths, often finds itself caught between numerous fast car lanes and the fences of gated community, revealing a lack of active users.

今天，林荫大道旁的人工水道虽然有着精心设计的公共空间、精致的设施、宽阔的人行道和自行车道以及茂密的植被，由于经常被多条车道以及封闭的住宅小区所包围，其使用者常常寥寥无几。

Zoom 1: the Ancient City Center (Shiquan Street)

Shiquan Street is representative of the current road-water relation in the ancient city of Suzhou. It is a famous commercial street with rows of shops on both sides, but it has very limited pedestrian sidewalks and green space with trees due to the two car lanes and one bike lane squeezed into such a narrow street. The water parallel to the street is hidden behind the commercial buildings, which can be seen on few occasions where small public spaces/bridges are located. The water quality is unsatisfactory due to the wastewater from the adjacent buildings and the road. In the in-progress General Master Plan of Suzhou 2035, the pedestrianization of the ancient city center is on the agenda. The project of the workshop imagines a radical pedestrianization of the street. More open space and pedestrian bridges along the water are conceived through a selective destruction of the low-quality buildings, to bring back the water to the center of the section.

采样研究之一：历史老城区(十全街)

十全街是现有苏州老城区保留下来的水陆空间的代表之一。十全街是著名的商业街，两侧布满了商铺。现状十全街的人行道和绿色空间十分拥挤，其道路宽度不足，同时车行道与自行车道占据了大部分的人行空间。北侧临街的树木挤压在人行道很小的空间之内。与道路平行的水面被临街的商业建筑所遮挡，只有在零星的小型的公共空间和桥梁处才能看到水面，滨水空间面积有限，环境质量较差，同时水质受到周围生活污水的污染。正在在制定中的苏州2035总体规划中，对老城区大规模的步行化已经被提上日程。设计研究以十全街的步行化为前提，提出了从十全街的南侧到水面北侧作为一个完整的空间断面进行整体考虑，对临街商业建筑特别是质量比较差的部分进行选择性的拆除并建立更多的滨水空间和桥梁，从而使水面重新成为整个断面的中心。

FIG. 3.112 The Tranditional Center: Shiquan Street.
苏州老城十全街

FIG. 3.113 The Waterfront in the Back of Shiquan Street.
苏州老城十全街背面的滨水空间

The asphalt surface is to be replaced with more permeable and pedestrian-friendly materials for the entire section, so as to implement more commercial spaces with more views towards the water. The green space with trees is to be significantly enlarged with a natural open wadi, which collects the rainwater before discharging it.

现有的柏油路面将被更加有渗透性的和有步行感的路面（如砖石等）代替，完善更多商业建筑的亲水性与开放性。路面的步行化也为大量增加绿色空间和自然开放的排水渠提供了空间，使得公共空间内的雨水在排入河道之前能够被部分收集和储蓄。

FIG. 3.114 Conceptual Plan of the Waterfront.
滨水空间概念设计图

FIG. 3.115 Scroll: the Waterfront of the Historial Center
画卷：老城中心滨水空间

Zoom 2: the Ancient City Center (North-East)

The waterfront space is divided into three forms: back river street, two streets and one river, and one street and one river. Accordingly, the transformation strategy is put forward.

The strategy of back river street : implanting multiple activities, rebuilding facades, adding cross-section elements such as corridor, step, three-dimensional greening, and windows to enrich thestreet space. The strategy of one street and one river: through opening windows, corridors and terraces, the interaction between people and water can be increased, the construction of recreational space should be emphasized, and the cross-section elements should be added, such as signs, seats, waterports, corridors, and green plants. The strategy of two streets and one riverfront space : to retain the original height-width ratio of the street and the function of the builder, and to add one or two small service businesses appropriately.

采样研究之二：历史老城区（东北部）

地块位于古城东北：背河内街缺乏活力；环境质量不佳；滨河街道空间单调，主要是车行道；亲水性较弱。地块展现出古城内三种典型滨水空间模式：背河内街、两街一河、一街一河，本设计逐一提出改造策略。

背河内街滨水空间改造策略：植入多元业态提升内街活力；进行建筑立面改造，通过规划回廊，靠河立面开窗的方式增加与水的互动关系。在内街断面增加回廊、台阶、立体绿化、橱窗等断面要素，丰富街道空间体验。一街一河滨水空间改造策略：紧邻河道的建筑参考背河内街改造策略，即在无法与水发生直接互动时，通过开窗、回廊、露台的方式增加人与水的视线互动，而在街道空间的一侧，参考两街一河中对街道的改造策略，注重休憩空间的营造，增加断面要素如标志物、座椅、水埠、回廊、绿植等。两街一河滨水空间改造策略：保留其1.5：1——0.8:1的街道高宽比，保留其居住为主的功能，适当增加一两处服务类小型商业，以满足日常生活的需求，丰富断面内容，增加休憩空间，适当增加水埠等亲水空间和绿植的同时注意两岸滨河视线通畅。

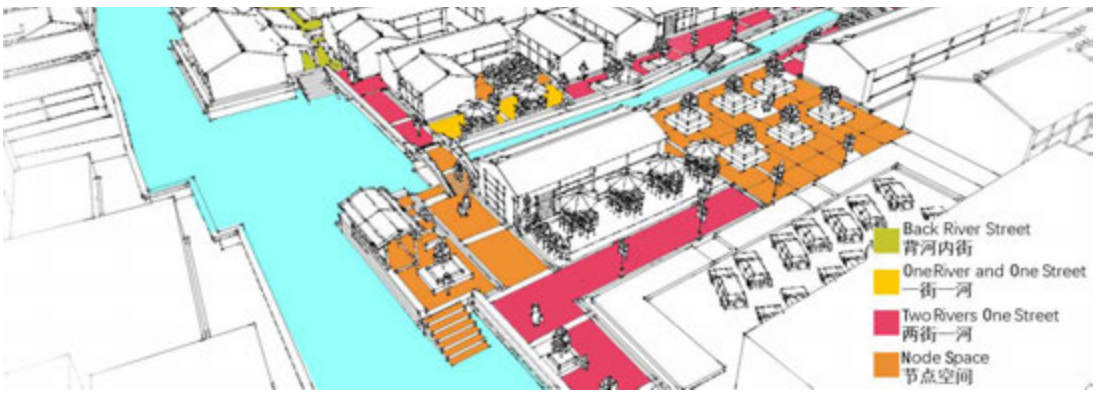


FIG. 3.116 Ancient City Waterfront Space Schematic Map after Renovation.
改造完的古城滨水空间示意图

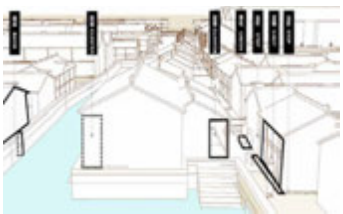


FIG. 3.117 Waterfront Reconstruction: Back River Street Type
背河内街型滨水空间改造示意图

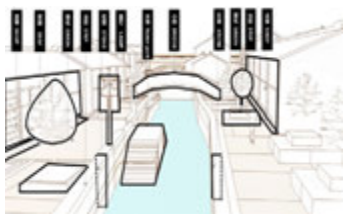


FIG. 3.118 Waterfront Reconstruction: Two Street and One River Type
两街一河型滨水空间改造示意图

FIG. 3.119 Waterfront Reconstruction: One Street and One River Type.
一街一河型滨水空间改造示意图

Zoom 3: the New Town (Xiangcheng District Center)

The zoom is located in the northern side of the city government of Xiangcheng District.

Strategies of urban design: 1. To enrich the rhythm of riverbank space, the water body actively forms a dialogue space with the shore. 2. Functionally retaining the original waterfront linear building and elevated form, and extending it into commercial form to meet the daily recreation of office and resident groups. 3. Providing more possibilities of waterfront activities, introducing the concept of street furniture, creating recreational nodes under different scenarios, and enhancing the intensity of public recreational use along the river. 4. Combining leisure function to build riverside ecological system and laying diversified herbal flower landscape. Using ecological vegetation to rebuild riverbed can not only satisfy the natural purification of water system, but also create a landscape system adapted to different seasons.

采样研究之三：新城（相城区中心）

该采样地块位于苏州相城区市政府北侧，主要问题是：亲水性差；商业空间活力不足，大面积的绿化阻隔了商业和滨水空间的互动，商业空间闲置率高；生态景观单一，滨水绿化空间以草坡为主；空间渗透性较弱，商业和滨水空间的可达性均较差。

城市设计策略：一、通过丰富河岸空间节奏，使水体主动与岸边形成对话。利用高差规划绿阶平台，丰富空间层次，提供更多亲水可能性。二、保留原有滨水线性建筑和高架形式，并对其进行延伸引入商业业态，满足周围办公和居住人群的日常游憩。有机的将商业空间、步道广场、阶梯式亲水空间和绿化进行串联，形成高架望水，吧台看水，平台触水的三层式空间体验，打造24小时活力空间。三、引入街道家具的理念，以“折线”与“水波”形式作为造型的基调，打造不同情景下的休憩娱乐节点，增强沿河公共休闲使用强度，打造更具生活性和可停留的滨河空间。四、结合休闲功能打造滨河生态体系，铺设多样化的草本花卉景观。利用生态植被重塑河床，在满足水系自然净化的同时打造适应于不同季节下的景观体系。

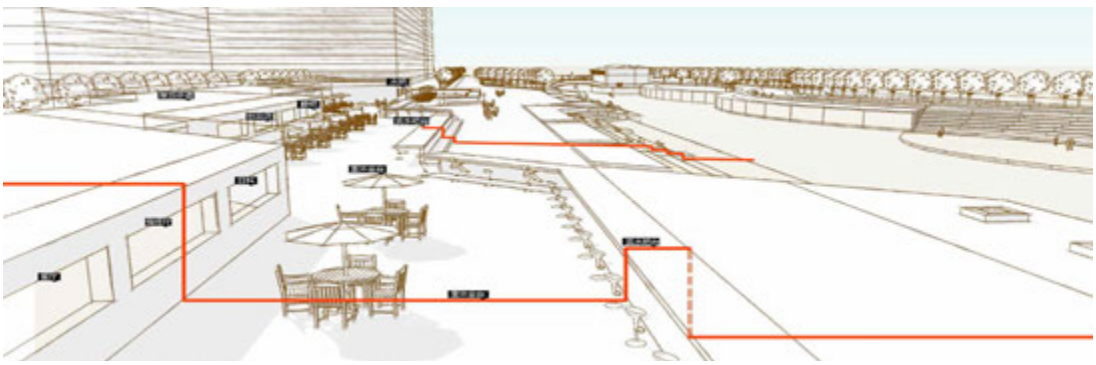


FIG. 3.120 New Town Waterfront Space Schematic Map After Renovation.
改造完的新城滨水空间示意图

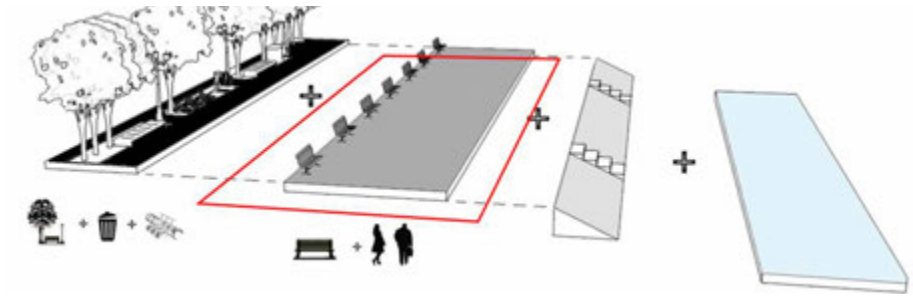


FIG. 3.121 An Ideal Component Model of Waterfront Space.
理想的滨水空间各部分组成模型。

Zoom 4: the Boulevards In The New Town (Housing)

The housing area of the new town is car-oriented: a great amount of surface is dedicated to roads with multiple car-lanes, and visiting parking spaces around the buildings. The dimension of the road grid in the new town is approximately from 200-400m.

The research imagines a concept of superblock, similar to the reference of Poblenou in Barcelona where nine typical Barcelonan blocks are combined and pedestrianized into one 400x400m superblock. Some of the autoroads inbetween gated communities are to be eliminated, and the visiting parking spaces are concentrated and shared, to create space for slow mobilities, canals and surfaces, wetlands for water purification and storage and green public space. Globally, it constructs a continuity of green and blue space with minimal car-interference from the new town to the city center.

采样研究之四：新城（住宅区的大道）

目前新城开发所产生的空间以鼓励车行为主。大量的面积被用于多车道道路以及建筑周围的停车。目前道路的网格在200m至400米左右，网格内多是封闭的住宅小区。

设计研究借鉴了巴塞罗那的“超大街区”的做法。在巴萨罗那Poblenou地区，9个被道路分割的当地特有的正方形街区被整合成一个400x400米的“超大街区”，将其中环境步行化。在苏州，我们提出有选择性的将一些封闭小区与小区之间的道路拆除，并将停车场合并和优化，增加其共享率。节省下来的空间可以被用作慢速交通、新的水道和滨水空间、绿色公共空间、储蓄和净化雨水的湿地等。许多这样局部的改造能够在整体上建立绿色空间和滨水空间的连续性，创造出一系列从新城到老城连续的、无车的滨水绿带。

FIG. 3.122 Satellite Image of the Zoom 4: 2007.
基地四卫星照片：2007

FIG. 3.123 Satellite Image of the Zoom 4: 2018.
基地四卫星照片：2018

Zoom 5: the Industrial Park And The Suzhou Creek

The Suzhou Creek is historically one of the main discharge channels from the Taihu Lake to the sea (The Suzhou's Water Bureau, 2015). It had a relatively wide surface and historical agricultural polders (Gao, Lu, 2004) with an installation of villages on both of its banks in the beginning of the 21st century. The conflict between industrialization and space for water is evident: In the last fifteen years, a grid of autoroads and industrial parks has rapidly taken the space of the agricultural land, and extended itself into the Suzhou Creek with a hard and straight water bank, while projects have recently been proposed and implemented to re-enlarge the river and reserve land on both banks, in order to improve its performance in flood control (for Suzhou and for the downstream Shanghai), water supply, water quality and environment, and capacity for transportation (The Suzhou's Water Bureau, 2015; Chen, Wang, 2017).

The project of the workshop imagines an enlargement of the creek to its historical dimension, and a re-naturalization of the banks into a largescale seasonal wetland park. The first existing road along the creek is to be transformed into a dike with a path of slow mobility on top,

采样研究之五：新城（工业区及吴淞江）

吴淞江是苏州有史以来主要的从太湖向东海泄洪的通道之一(苏州水利局，2015)。历史上直到本世纪初，吴淞江水面宽度一直维持较为宽阔的状态，同时两岸用地保持圩田和遍布的村庄(Gao, Lu, 2004)，岸线蜿蜒而相对自然化。现代化工业区的发展和水面空间的冲突在这里非常明显。在过去的15年之间，网格状的路网和大面积的工业园区不断向吴淞江扩张和蚕食，并且带来了平直而硬化的河岸。目前，为了增加吴淞江的容量（主要为苏州和上海等下游城市的防洪问题），改善其供水能力、水质、航运能力以及生态环境，对吴淞江的拓宽和对河岸空间的保留正在进行中(苏州水利局，2015; Chen, Wang, 2017)。

设计研究从重新恢复吴淞江历史宽度出发，将其硬质化的河岸重新自然化，成为大规模的滨水湿地和季节性的公园。紧邻河岸的第一条车行道路在有需要的部分将被改造成加高的堤岸，在其上布置慢行交通空间。沿着堤岸设置了各种类型的公共空间和功能，比如露台、小型建筑和临水台阶，它们架空于自然化的河岸并向水面伸出。

FIG. 3.124 The Possibility of "Superblock" In Suzhou .
苏州"超级街区"的可能性

FIG. 3.125 Barcelonan "Super Block" Dimension.
巴塞罗那"超级街区"尺度

connecting public spaces – terraces, pavilions and stairways – suspended on or stepping into the wetland park. The bank will be continuously green but won't be continuously public ; the inaccessible space will be given to the river, which will control flooding, improve biodiversity and helps purifying water. The industrial parks behind the dike are to be mixed with high-density residential programs and facilities/commerce, with spectacular views towards the water and the skyline of Shanghai.

滨水空间是绿色且连续的，但并不完全是公共的。在人的活动难以到达的区域，大量的空间被给与河流、蓄洪、净水和生态多样性的发展。在堤岸的后方是工业居住等各种功能混合区域。住宅有着朝向江景、乡村、以及上海天际线的优越景观。

FIG. 3.126 The Window with A View.
窗景

FIG. 3.127 Satellite Image of the Zoom 5: 2002.
基地五卫星照片：2002

FIG. 3.128 Satellite Image of the Zoom 5: 2018.
基地五卫星照片：2018

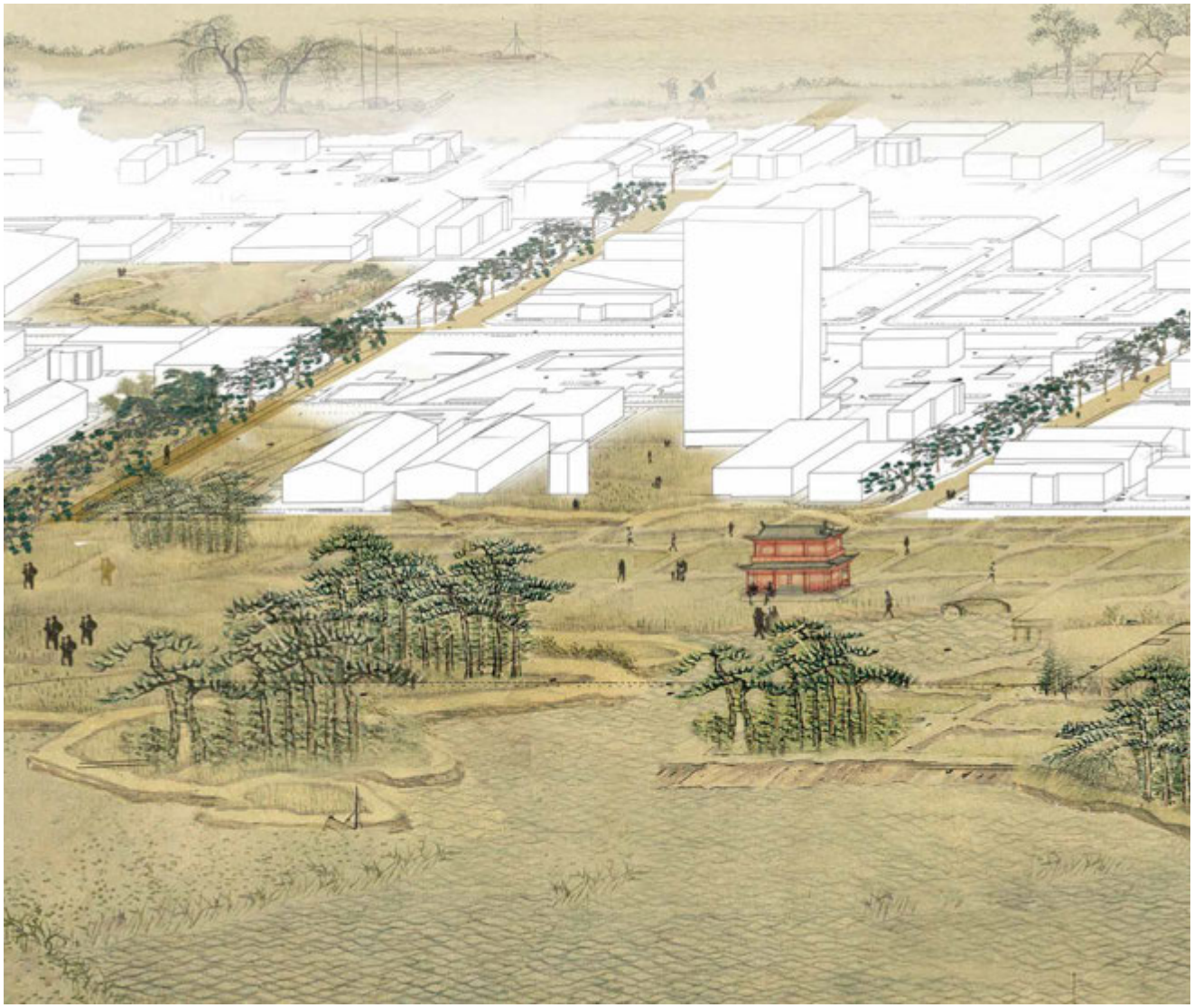


FIG. 3.129 Scroll: the Waterfront of the Suzhou Creek
画卷：吴淞江滨水空间

3.4.3.4 – **The Lakes and Polders**
塘圩湖荡

The Taihu Lake Basin is low, flat, and thus floodable. The level of most of the land is between the highest and the lowest water level of the major lakes and rivers. Through thousand years of history, a constant human effort has been dedicated to slicing and diking the land into pieces according to the topography for agricultural production, which forms the great numbers of waterways, polders,

太湖流域地势低平，盆地内大部分的陆地海拔在主要河流和湖泊的最高水位和最低水位之间，因而极易遭受洪涝灾害。几千年来，在这片土地上的居民不断的劳作，依据地势将土地分割成小块并将它们用堤坝包围起来以适应农业生产的需要。由此产生不计其数的水道、圩田和湖泊，其面积约占据平原面积的17.5%，是其平原部分的一半(Gao, Han, 1999; Yu, 2002)。在雨季，圩田和湖泊（如阳澄湖）受

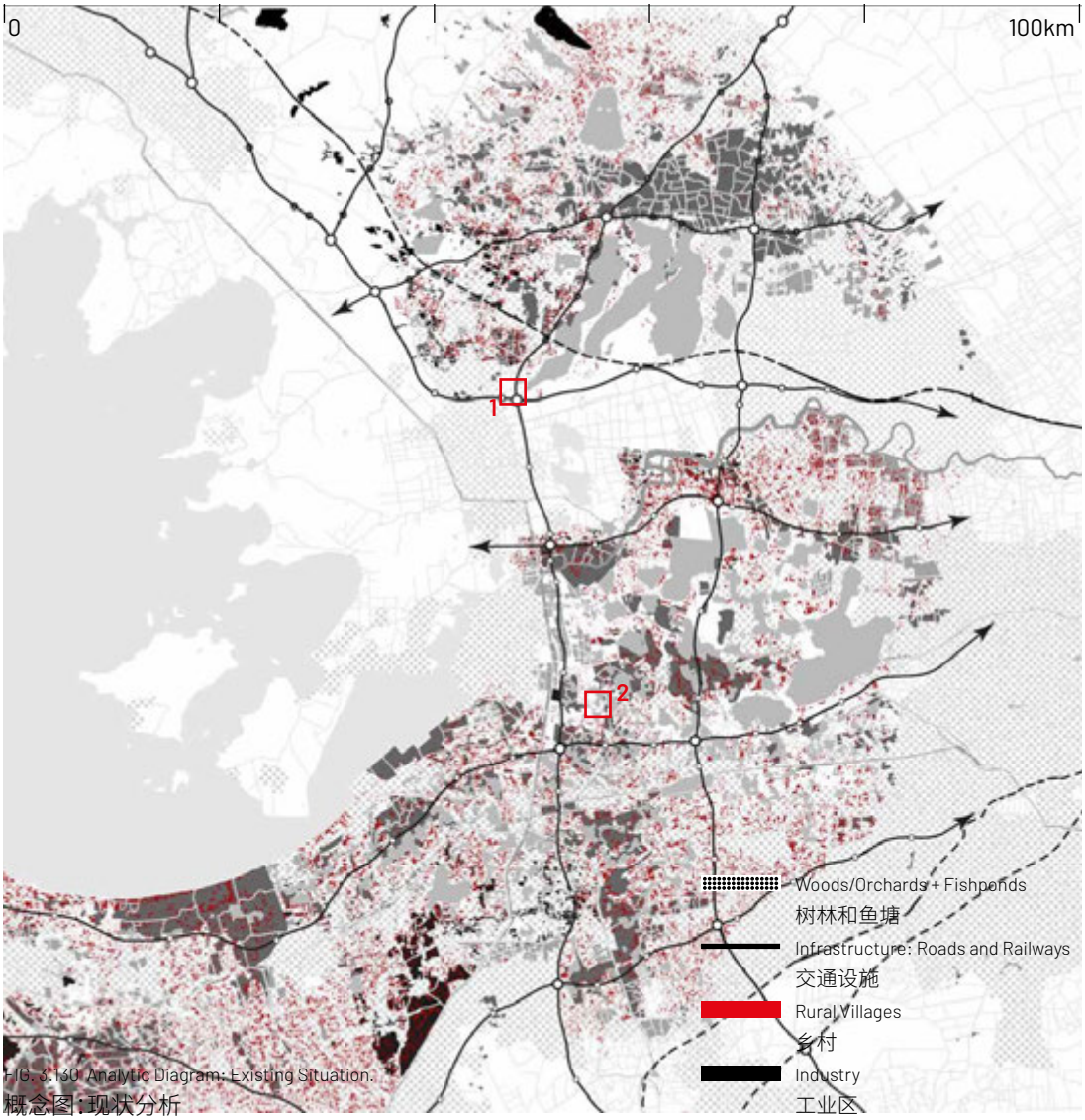


FIG. 3.130 Analytic Diagram: Existing Situation.
概念图：现状分析

and lakes that occupy about 17.5% of the plain (Gao, Han, 1999; Yu, 2002). During the rainy season, the polders and lakes (the Yangchen Lake for example) are always at risk of being flooded from the water in external rivers and in the polder itself. The capacity of flood resistance and resilience depends on the height and the strength of the dike, the pumping, the depth of the polder, and the dimension of water surface within the polder.The flooding control of the entire territory is complex: the absolute safety of the polder calls for a complete closure of the

到外部河流高水位和圩区内部积水的双重影响容易遭受洪涝灾害。整个区域的洪水管理是非常复杂的平衡关系：由于圩内部的水面不参与圩外的洪水管理，圩的包围面积越大，则其自身调节内部积水的能力越高，但是整个流域的调节能力由于无法向圩区泄洪而降低，使得下游城市如上海的防洪压力也增大。事实上外部河流和湖泊如太湖在汛期常常需要暂时向一些包圩泄洪。而整个平衡关系以及整个系统对洪水的消化和抵御能力是以堤岸的高度和坚固度、水泵能力、圩田内水域面积等一系列的因素为基

FIG. 3.131 Exisiting Situation: Infrastructure and Inaccessible Natural Area.
现状: 交通设施及周围人类活动不可达的自然空间

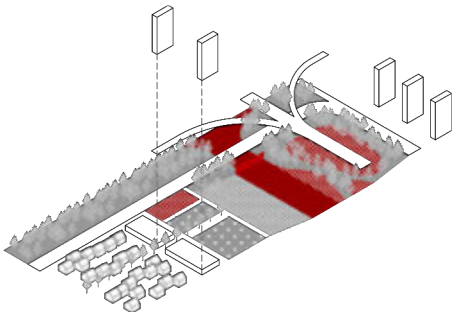


FIG. 3.132 Waterfront Concept .
滨水空间概念

FIG. 3.133 Satellite Image of the Zoom 1: 2002.
基地一卫星照片：2002

FIG. 3.134 Satellite Image of the Zoom 1: 2018.
基地一卫星照片：2018

polder and detachment from the external system, at the cost of higher water in the main rivers, lakes, and cities downstream; the flooding in external rivers and lakes, especially in the Taihu Lake, occasionally demands the temporary flooding of certain polders. Confronting the higher risk of flooding and water scarcity due to the climate change and concretization of the surface, a delicate mechanism of flooding control has to be built and managed based on more robust polder dikes and a larger capacity of water storage within the polder itself (Gao, Han, 1999; Qin et al., 2002).

The urbanization, which in its early stages was more to the east of Suzhou towards Shanghai, is now extending menacingly towards and into the lakes and polders in the northern and southern parts of Suzhou. The modern development, following the tabula rasa operation on the historical structure of agricultural villages, imposes generic forms of public space and waterfront, which evokes the dilemma of desperately seeking for design solutions capable of combining Suzhou's traditional character with modern urban development, while at the same time ruthlessly erasing the real historical heritage – a true part of Suzhou - and its structural function on the territory.

ZOOM 1: Yangchen Lake and connection to the city

Within this water body, the Yangchen Lake plays a significant role in water supply, flooding control, and eco-services, and is among one of the most environmentally sensitive areas (Wang, Chen, Zhao, 2008). Its connection with the city is compromised not only by the water gates but also by a giant bundle of highways and auto roads that cuts off the ecological continuity. The historical villages as communities with a mix of agricultural and non-agricultural activities are ghettoed by the new infrastructures, waiting to be relocated by strong political and financial motivations. The structuring landscapes is interrupted due to large-scale developments and megalomaniac infrastructures, water in particular lost its structuring role.

础的。在气候变化、洪涝灾害频发、供水短缺、地表不断硬质化等情况下，一个能够精确调节的水管理机制需要建立在圩田及包围自身更加坚固的堤岸以及更加充分的包圩内蓄水容量上(Gao, Han, 1999; Qin et al., 2002)。

苏州的城市化发展方向初期多以东部对接上海的方向为主，如今已经逐渐开始向北部和南部的塘圩湖荡地区推进。现代的城市化对原有的圩田结构、历史传承、村庄风貌等的考虑极其有限，主要以常见的现代城市公共空间和滨水空间为主，从而产生了一个显而易见的矛盾：苏州一方面努力的寻找苏州传统特色与现代化城市发展相结合的设计方案，一方面又大规模的不断的抹去那些真正意义上的遗产。这一部分的苏州并不像古典园林那么精致和著名，但它们也是货真价实的传统苏州的一部分。被抹去的不仅仅是建筑、空间和景观，更是它们在整个地域范围内起到的结构性作用。

采样研究之一：阳澄湖以及其和城市的连接

在塘圩湖荡组成的水体中，阳澄湖在供水、蓄洪和生态服务方面起着至关重要的作用，也是苏州生态环境最敏感的区域之一(Wang, Chen, Zhao, 2008)。阳澄湖和苏州市区之间的生态和景观联系非常有限，不仅是由于水闸的存在，更是由于两者之间的边界上集中了高速公路、快速路、高架桥等线性的基础设施。原本扎根于农业而又从事多种生产的村庄社区被这些线性的基础设施包围和分割，成为了一个个孤立的小岛，等待着被强有力的政治和经济力量迁徙到别处。在结构性景观被大型基础设施和现代城市发展所割裂的情况下，水作为结构性的空间丧失了它的功能。

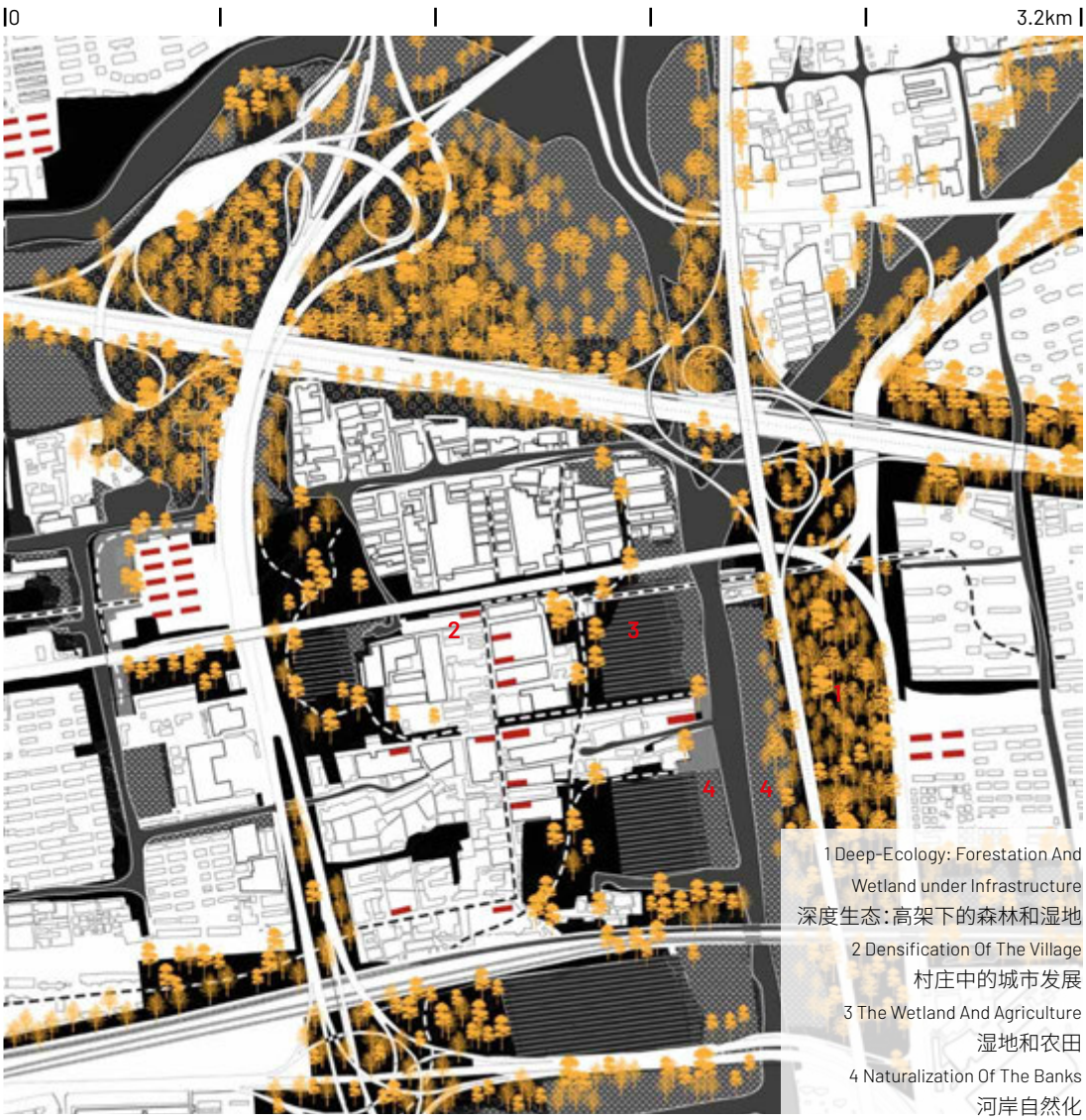


FIG. 3.135 Conceptual Plan of the Waterfront.
滨水空间概念设计图

The research imagines a deep-ecology operation, which:

1. Re-naturalizes the waterfront and spaces under the node of viaducts, to create spaces dedicated to forest, water, and wetlands, benefiting from its inaccessibility from human activities.

2. Requalifies the villages as local centers, and extend their slow mobility connection into the metropolitan system; diversifies and transforms the declining agriculture in the villages into the diversified urban agriculture with wetlands, woods, orchards, fishponds and kitchen gardens, which represent the images of the traditional agricultural landscape of Suzhou.

3. Densifies the villages with diversified and mixed functions, especially at the border of the waterfront, to benefit the view around the Yangchen Lake.

研究以“深度生态”为出发点，提出在阳澄湖和苏州市区之间建立完全为自然和生态服务的滨水空间：

1. 利用人类活动难以到达的有利条件，重新将这一部分滨水空间以及高架下的空间自然化，将这些空间完全建设成为森林、水面、湿地等野生环境。

2. 将靠近水面的村庄保留下来并发展成社区中心，将村庄与周围的现代城市部分通过慢行交通网络重新连接。同时将村庄内不断退化的农业转型为多样化都市农业，补充湿地、林地、花果、鱼塘、以及社区农场等功能，不但在视觉上和苏州传统的农业更加接近，同时也能更加适应周围居民的需要。

3. 鼓励村庄用地尤其是靠近滨水区空间用地功能的多样化和混合度，以优化阳澄湖周边的景观环境。

FIG. 3.136 Scroll: The Waterfront Of The Yangchen Lake - City Connection
画卷：阳澄湖与城市之间连接的滨水空间

ZOOM 2: The agricultural polder

The agricultural polders, for example the rice polders, are crucial for water storage. The concretization of the surfaces has largely reduced the polder surfaces, which counterbalanced the effect of the massive construction of pumping facilities and the energy spent on discharge. The flooding control standard (20-year-event) in the rural area has hardly been achieved (Luo, Gu, Gong, 2011). Another transition is the thinning of the dikes brought by the prevalence of modern mechanical fishponds, replacing the traditional and ecological dike-fishpond model. The waterfront today is thus very narrow and fragile, sometimes concretized, with limited space for pedestrians and vegetation.

采样研究之二：农业圩田

各种农业圩田如稻米圩田等是苏州整个区域蓄洪的关键部分之一。苏州建设了大量的泵站以提高城市的防洪排涝能力，但随着城市化的发展和硬质地面的增加，圩田面积不断减少，城市自然蓄洪能力不断下降，那些人工建设的泵站也难以满足城市的蓄洪需求，导致农村地区20年一遇的防洪标准都难以实现(Luo, Gu, Gong, 2011)。另一个关于圩田的重要转变是堤岸的逐渐窄化。传统的桑基、果基鱼塘需要较宽的堤岸来堆放和消化淤积在鱼塘底部的淤泥。这种农业模式由于经济效益不高正在被大规模机械化的现代鱼塘所代替，以至于今天圩田地区的滨水空间往往非常狭窄并且脆弱，有时还被硬质化，为步行者和生态植被留下的空间非常有限。

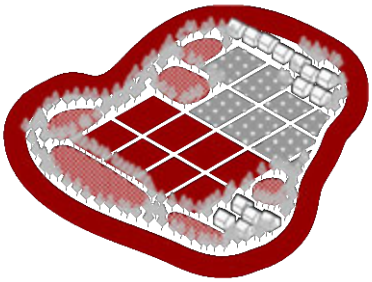


FIG. 3.137 Waterfront Concept .
滨水空间概念

FIG. 3.138 Satellite Image of the Zoom 2: 2002.
基地二卫星照片：2002

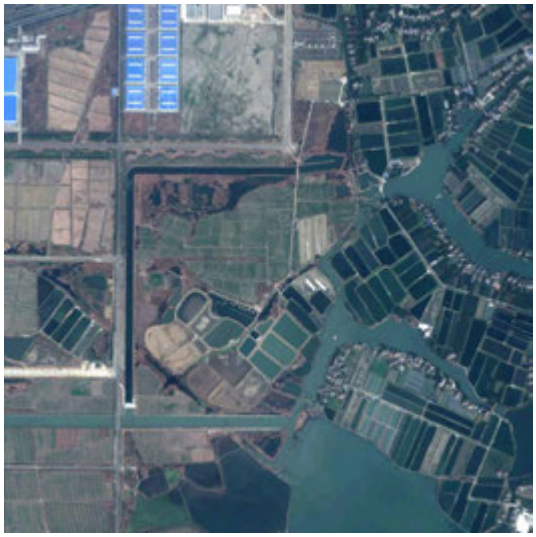


FIG. 3.139 Satellite Image of the Zoom 2: 2018.
基地二卫星照片：2018

The research imagines:

1. A re-introduction of the dike-fishpond model with wide, robust, yet natural dikes and banks. Trees and bushes are to be planted on the waterfront to stabilize the polder structure.

2. A diversification and upgrading of the declining agriculture with wetlands, woods, orchards, fishponds, and kitchen gardens, which represents the images of the traditional agricultural landscape of Suzhou.

3. A requalification of the traditional villages and local centers, with an extensive and light system of path for slow mobility at the naturalized waterfront.

研究提出：

1. 重新恢复传统的桑基、果基鱼塘，修建宽阔、自然化且坚固的堤岸。在堤岸上的滨水空间种植丰富的植被，提供必要的树荫同时能对整个圩田的结构起到加固的作用。

2. 同时将附属于村庄而不断退化的农业向都市农业转型，补充湿地、林地、鱼塘、以及社区农场等功能，使之在视觉空间上和苏州传统的农业更加接近，同时也能更加适应农村新的生活方式。

3. 将靠近水面的村庄保留下来并发展成社区中心，将村庄与村庄通过堤岸上的慢行交通网络重新连接。

3.5 – Water Designs III: Suzhou Garden, Guidelines for The Future

3.5 – 苏州水之设计三：苏州园林，面向未来的导则

All previous investigations depict a vision for Suzhou's future, "Suzhou Garden", where water management, ecological systemic thinking and urban design are allied in the production of a different space to live in. The guidelines translate both vision and design explorations into a set of concrete rules which renew the relations between mobility infrastructure, housing, activities, green and Suzhou water bodies. They are the starting point of a new project for the city.

通过对苏州水系的研究，我们对于苏州城市的未来发展提出了“苏州园林”这一美好的远景。在这个愿景中，城市设计和对水的管理、对生态系统的思考被统一整合在一个全新的生活体系中。导则同时将愿景和设计探索转化为一组具体而实际的规则里面。这些规则重新定义了交通设施、生活、生产以及生态空间与苏州各种水体之间的复杂关系。苏州的城市设计将以这些关系作为新的切入点而展开。

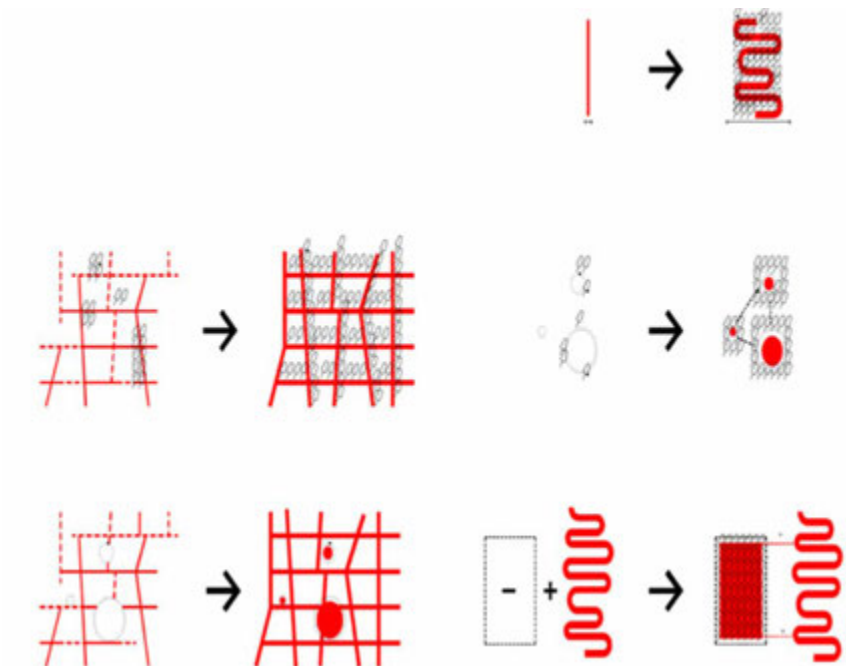


FIG. 3.140 Example *WATER AND ASPHALT The Project of Isotropy*: Guildlines of Water Space. (Secchi, Viganò, Fabian, eds., 2016)
水的空间设计导则图示举例：水与沥青_城市均质化发展 (Secchi, Viganò, Fabian, eds., 2016)

3.5.1 – **The Tai Lakescape Zone**
太湖滨湖风貌区

The main concept is to transform the space of the agricultural land and villages around the Taihu Lake entirely into a buffer zone for water storage and purification, and a productive park for recreation and slow mobility. From the Taihu Lake to the west to the dense residential and industrial area to the east, a sequence of spatial actions is to be implemented:

导则的主旨是将环太湖的乡村和农业带整体看成一个缓冲带，一个连续的滨水空间。这个缓冲带不但有蓄洪和净水等功能，同时也是一个有生产能力、能提供休闲和慢速交通等各种功能的综合公园。这个缓冲带位于西侧的太湖和东侧的密集城镇和工业区（如东渚，光福，胥口，横泾，吴江等）之间。滨水空间主要的设计导则包括：

1 Agricultral Belt: Purification/Storage Area around The Taihu Lake
环湖农业带：太湖周边的净水蓄洪空间

2 Naturalization / Enlargement of The Grand Canal and other Main Waterways
对大运河和主要河流的拓宽和堤岸自然化

3 Completion and Extension of the Water Grid, the Elimination of the Dead-Ends
对网格水体的拓展和补全，消除断头水体

4 Wetland: In-site Water Purification and Storage Space
湿地：在地净水及蓄洪空间

5 Naturalization and Reinforcement of the Agricultural Polders
对农业圩田堤岸的加固及自然化

FIG. 3.141 Conceptual Plan of the Waterfront.
滨水空间概念设计图

1. The dike:

Together with the current project of raising the circular dike around the lake, downgrade the high-level auto road on the dike into a path for slow mobility with trees and vegetation.

2. The villages:

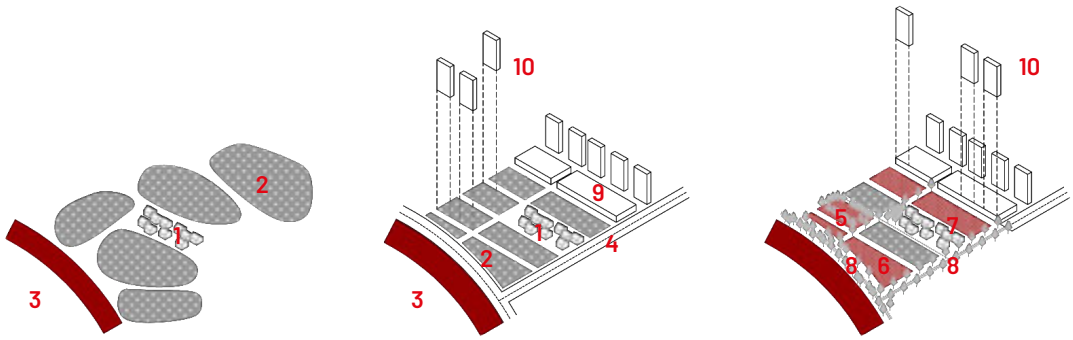
Transform the agricultural parcels close to the lakeinto wetland combined with forestry and orchards. Construct woods and wetland around the villages, and re-introduce the traditional dike-pond system. Serve the entire agricultural belt as a park with paths and facilities.

1. 环湖大堤：

结合提升环湖堤坝工程，将环湖大坝上的快速道路降级为一条有树木和植被的慢行道路，从而减少从路面排入湖中和农业区的污染，并减少噪声和空气污染对自然环境的影响，为高质量的滨水空间创造条件。

2. 环湖农业带：

以湿地、树林、果园等形式组织临近太湖的用地，从太湖中抽取的用水以及从农业区向太湖的排水均经过这一环湖的连续空间并被净化。在村庄周围设立小型片状树林和湿地，旨在净化部分从村庄向农田的排水，并且在村庄里创造怡人的微气候和微景观。设计也提出恢复苏州及太湖流域传统的桑基鱼塘、果基鱼塘等农业形式，促进生态循环和生态多样性的发展，同时也作为滨水空间景观的重要组成部分。



The Past 历史　　The Existing 现状　　The Guideline 导则

1 the Existing Villages 现状村庄
2 Agriculture 农田
3 the Taihu Lake 太湖
4 the Existing Road 现状道路
5 Orchards/ Biodiverse Nature 果园 / 生态多样性
6 the Wetland at the Water Front for Water Purification 滨水区用于水质净化的湿地
7 the Wetland/Infiltration/Storage of Water in Existing Green Space 在现状绿地上的湿地/净化/储存
8 Downgraded Roads within Buffer Zone 缓冲区内道路降级
9 Industries 工业
10 Urban Development 城市发展

FIG. 3.142 Conceptual Plan of the Waterfront.
滨水空间概念设计图

3. The dense industrial and residential area:

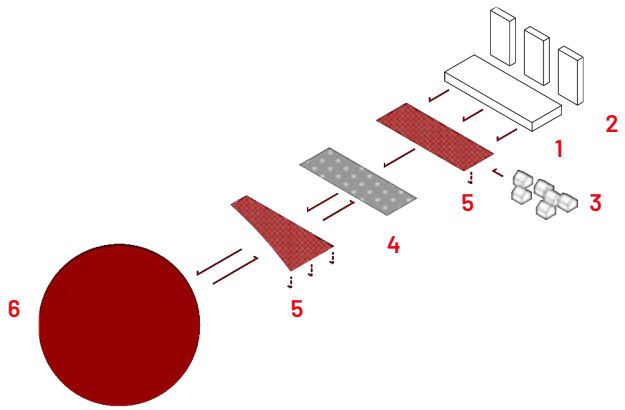
Limit the grid of road and industrial platforms out of the agricultural belt. Downgrade the existing roads through the belt and approaching to the lake into slow-mobility paths. Transform the industrial sites next to the agricultural belt into mixed development areas with high-density housing.

The three spaces are integrated by and contribute to a water management system. The entire village area is considered a buffer zone, in which the wetlands and ponds provide capacity for temporary water storage. The wetlands are located at strategic points in the system to purify the water introduced to the agricultural land and discharged into the Tai Lake.

3. 新城建设（住宅及工业区）：

限制环湖农业带外围网格城市道路以及工业区的建设。现有的已经在环湖农业带内的城市道路特别是快速路需要被降级并缩减宽度，转向以慢速交通为主。对临近环湖农业带的工业园区进行复合开发，将它们转变为居住、生产混合的高密度城市区。

这三种空间被一个统一的水管理系统整合在一起。太湖周边整个农业地区的湿地和小池塘就像海绵一样能蓄存过量的雨水。湿地被布置在整个系统的关键位置，旨在净化从农业区向太湖排放的水以及从太湖汲取向农业区灌溉的水。



1 the Existing Buildings 现有建筑
2 Densification 城市发展
3 the Vilalges 村庄
4 Agriculture 农田
5 the Wetland/Infiltration/Storage of Water in the Existing Agricultural Field
在现状农田上的湿地/净化/储存
6 the Tai Lake 太湖

FIG. 3.143 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

3.5.2– **The Grand Canal**
重要河流：大运河

The main concept is to recognize the asymmetrical situation on the left and right banks of the Grand Canal, and create a continuous and wide public waterfront on the eastern and northern banks and episodic yet connected public waterfronts on the western and southern banks.

大运河两侧设计导则的制定充分考虑了大运河两岸不同的滨水空间现状：运河南北段东岸和中段北岸滨水空间相对宽阔而连续，而南北段西岸及中段南岸相对狭窄而碎片化。我们试图在运河南北段东岸和中段北岸创造连续而宽阔的滨水空间，同时将河岸大规模自然化；在运河南北段西岸和中段南岸有条件的地方创造和滨水建成环境结合的滨水空间。

1 Agricultral Belt: Purification/Storage Area around the Taihu Lake
环湖农业带：太湖周边的净水蓄洪空间

2 Naturalization / Enlargement of the Grand Canal and other Main Waterways
对大运河和主要河流的拓宽和堤岸自然化

3 Completion and Extension of the Water Grid, the Elimination of the Dead-Ends
对网格水体的拓展和补全，消除断头水体

4 Wetland: In-site Water Purification and Storage Space
湿地：就地净水及蓄洪空间

5 Naturalization and Reinforcement of the Agricultural Polders
对农业圩田堤岸的加固及自然化

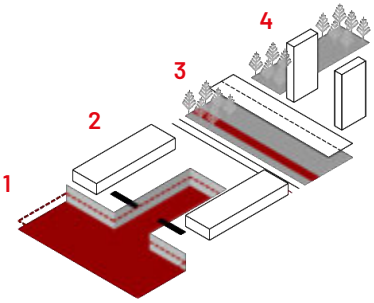
FIG. 3.144 Conceptual Plan of the Waterfront.
滨水空间概念设计图

1. Industrial sites on the eastern bank:

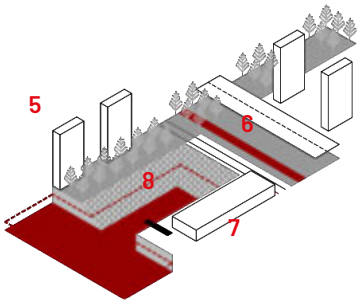
Transform the south-oriented side of the dock into mixed community with high-rise residential buildings and green waterfront, while leaving the north-oriented part for industries with less pollution and noise.

1. 运河北段东岸的工业区：

将工业区南侧朝向好的地区发展成高密度的住宅区，并将此处现用于航运的滨水空间进行生态化处理，设计成绿色的公园和湿地；而在位置相对较差的工业区北部地区保留噪声和污染较低的工业。整个码头将发展为创意产业社区。



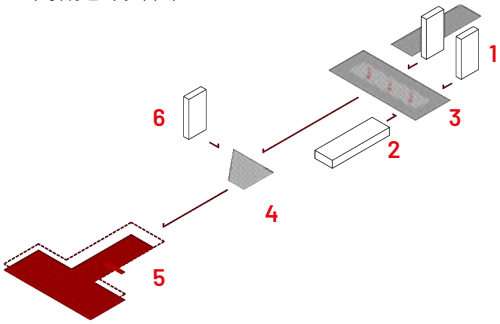
the Existing 现状



the Guideline 导则

1 the Grand Canal 大运河
2 the Industry along The Canal 沿运河工业
3 the Green Space 现状绿地
4 the Existing Housing 现状新建住宅区
5 New Development along The Water 滨水住宅混合发展区
6 The Wetland/Infiltration / Storage of Water In Existing Green Space 在现状绿地上的湿地/净化/储存
7 Industry/Creative Activities 保留工业/创意园区
8 Continuous Public Space / Naturalization of the Bank 连续的公共空间 / 自然化的滨水岸线

FIG. 3.145 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 the Existing Buildings 现有建筑
2 Industry/Creative Activities 保留工业/创意园区
3 the Wetland/Infiltration/Storage of Water in Existing Green Space 在现状绿地上的湿地/净化/储存
4 the Wetland at the Water Front for Water Purification 滨水湿地用于水质净化
5 the Grand Canal and Perpendicular Dock 大运河与垂直码头
6 New Development along the Water 滨水住宅混合发展区

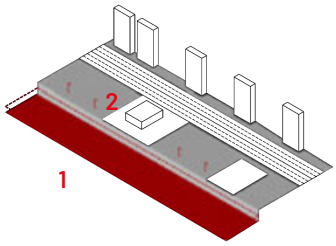
FIG. 3.146 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

2. City center on the northern bank:

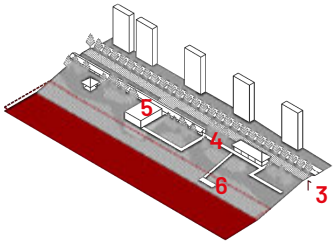
Naturalize the bank into a natural and slowly inclined green space, as a wetland for purification of the run-off water from the city to the Grand Canal and an enlarged buffering capacity for flooding. Downgrade the large autoroad along the canal to make space for the new dike (+1m) with the path of slow mobility on top.

2. 市中心段的北岸：

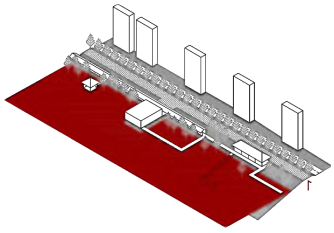
将整个堤岸进行大规模的生态化处理，形成向运河水面缓慢倾斜的坡状绿色水岸。将现有滨水道路的车道数缩减，提高滨水空间的可达性。节省下来的空间可用做慢行交通空间或在有需要的地方设置增高的堤岸。



the Existing 现状



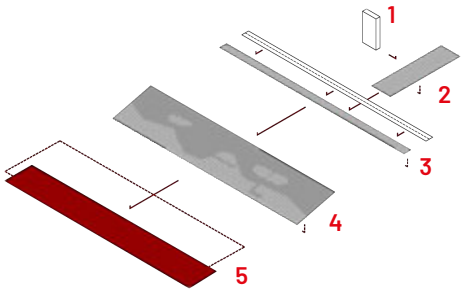
the Guideline:Dry Season 导则：枯水期



the Guideline:Rainy Season 导则：丰水期

1 the Grand Canal 大运河
2 the Green Space/the Raising Dike 现状绿地/正在加高的堤岸
3 the New Dike and the Downgrade of the Road 对现状道路的缩减及加高新的堤岸
4 the Suspended Pedestrian Spaces 架空的公共空间
5 the Existing Buildings at the Waterfront 现有滨水建筑
6 the Naturalization of the Canal 大运河堤岸自然化

FIG. 3.147 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 the Existing Buildings 现有建筑
2 the Wetland/Infiltration/Storage of Water in Existing Green Space 在现状绿地上的湿地/净化/储存
3 Linear Wadi along the Road for Water Collection 平行与道路的线状自然水渠
4 the Wetland at the Water Front for Water Purification 滨水湿地用于水质净化
5 the Grand Canal 大运河

FIG. 3.148 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

3. Industrial sites on the western bank:

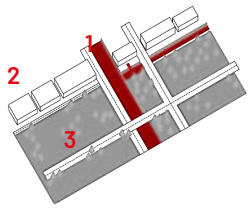
Gradually downgrade the roadway grids towards the water and the green. Transform the autoroad at the western bank into the new dike with the slow mobility path on top. Construct the green space with wetland and trees. Transform the industries along the canal and the green space into mixed communities with high-density housing with great views and orientation.

The naturalization of the canals and the main rivers in Suzhou, creates not only continuity of ecology and public space, but also a capacity for water purification and storage. Good examples can be found in Suzhou, and a systematic implementation is needed.

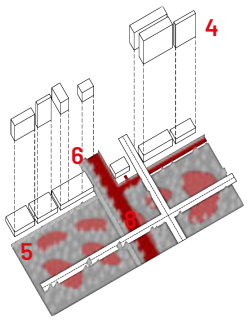
3. 运河南段西岸的工业区：

对运河西岸整体的路网特别是邻近运河和岸上的道路进行降级，使城市的交通设施从城市密集的居住区和工业区到滨水空间有一个从以车行为主到以慢行交通为主的转变，为运河滨水空间的公共活动和居住创造适宜的环境。在东西走向的绿带内布置湿地和树林，提供雨水储蓄和净化、生态廊道、生态多样性保护等功能。在运河沿岸与绿带相邻的工业区内混合建设具有良好朝向和景观的高密度住宅区。

对大运河和苏州其他主要河流的滨水空间特别是在运河的东岸和北岸进行自然化处理，建立生态系统和连续的公共空间，同时增强蓄洪和净化水的能力。苏州的一些城市建设已经采用了类似的原则，如宝带桥公园等，导则旨在将这种原则的实施系统化。



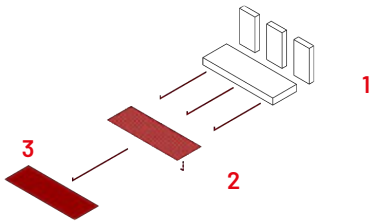
the Existing 现状



the Guideline 导则

1 the Grand Canal and Existing Road 大运河及临河道路
2 the Industry along The Canal 沿运河工业
3 the Green Space 现状绿地
4 New Development along The Water 滨水住宅混合发展区
5 the Wetland/Infiltration/Storage of Water in Existing Green Space 在现状绿地上的湿地/净化/储存
6 the New Naturalized Dike and the Downgrade of the Road 对现状道路的缩减及堤岸的自然化

FIG. 3.149 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 New Development along the Water 滨水住宅混合发展区
2 the Wetland at the Waterfront for Water Purification / Storage 滨水湿地用于水质净化 / 蓄洪
3 the Grand Canal 大运河

FIG. 3.150 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

3.5.3 – **The Grid**
网格水体

Two types of grids in Suzhou are recognized: that of the ancient city center, and that of the modern parts of the city with boulevards and canals. The main concept conceives the former one in the context of a radical pedestrianization of the space, and transforms the latter one according to the superblock principle and the use of car spaces for water and green areas.

苏州的网格水体由两种主要的网格组成：一是老城内棋盘状的水网，二是在新城中与林荫大道平行的人工水道系统。导则尝试将滨水空间的设计与苏州可持续交通发展的大背景相结合，依托滨水空间构建整个老城区步行系统的主要骨架，同时在新城内通过“超级街区”等概念将部分车行空间——如道路和停车场——转化为生态滨水空间。

1 Agricultral Belt: Purification/Storage Area around the Taihu Lake
环湖农业带：太湖周边的净水蓄洪空间

2 Naturalization / Enlargement of The Grand Canal and other Main Waterways
对大运河和主要河流的拓宽和堤岸自然化

3 Completion and Extension of the Water Grid, the Elimination of the Dead-Ends
对网格水体的拓展和补全，消除断头水体

4 Wetland: In-site Water Purification and Storage Space
湿地：就地净水及蓄洪空间

5 Naturalization and Reinforcement of the Agricultural Polders
对农业圩田堤岸的加固及自然化

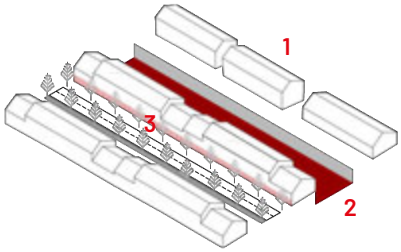
FIG. 3.151 Conceptual Plan of the Waterfront.
滨水空间概念设计图

1. The ancient city center:

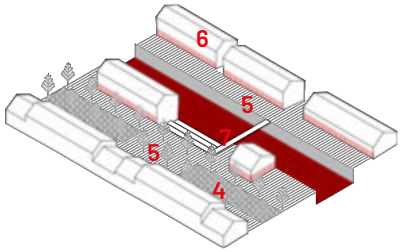
Create more open space and pedestrian bridges along the water through a selective destruction of the low-quality buildings, to bring back the water to the center of the section. Replace the asphalt surface with more permeable and pedestrian-friendly materials. Enlarge the green space with trees significantly with a natural open wadi to collect the rainwater before discharge.

1. 苏州老城区

导则以全面步行化为前提，对临街商业建筑特别是质量较差的部分进行选择性拆除并建立更多的滨水空间和桥梁，从而使水面重新成为整个滨水空间的中心。现有的柏油路面将被更加有渗透性的和有步行感的路面（如砖石等）代替。同时增加绿色空间和露天的排水渠使得雨水在排入河道之前能够被部分收集和储蓄。



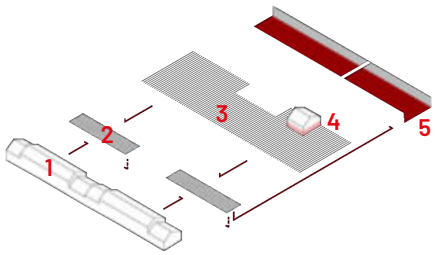
the Existing 现状



the Guideline 导则

1 the Existing Buildings 现状建筑
2 Historical Waterway 历史水道
3 the Existing Commercial Street 现状商业街
4 the Wadis in Public Space for Rain Water Storage 公共空间中的开放式排水渠
5 the No-Car Continuous Waterfront Public Space 连续的滨河步行公共空间
6 the Opened Up Commercial Buildings 新建滨水商业空间
7 the Bridge Connecting the Waterfront and Public Node 步行桥梁形成的公共空间节点

FIG. 3.152 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 the Existing Buildings 现有建筑
2 the Wadis In Public Space for Rain Water Storage 公共空间中开放且自然的排水渠
3 the No-Car Continuous Waterfront Public Space 连续的滨河步行公共空间
4 the Commercial Buildings at The Waterfront 滨水商业空间
5 Historical Waterway 历史水道

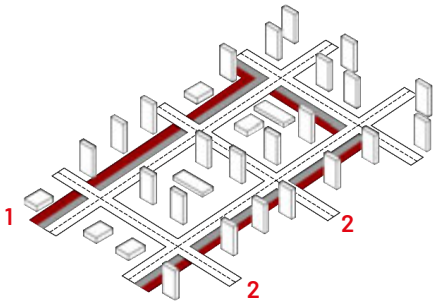
FIG. 3.153 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

2. The modern parts of the city (housing):

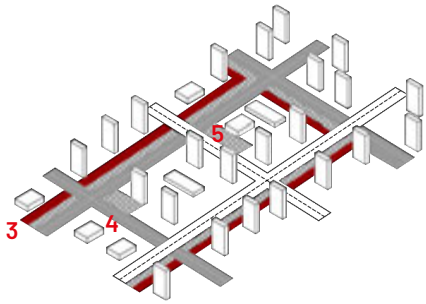
Selectively eliminate some of the autoroads inbetween gated communities, to combine them into the maximum 400x400m grid. Concentrate and share visiting parking spaces. Create space for slow mobility, canals and water surfaces, wetlands for water purification and storage and green public space.

2. 新城住宅区

导则借鉴了巴塞罗那“超级街区”的做法，有选择性的将一些封闭小区与小区之间的车行道路拆除，将车行道路网格扩大为400×400米左右。将停车场合并和优化，增加其共享率。节省下来的空间可以被用作慢行交通空间、新的水道和滨水空间、绿色公共空间、储蓄和净化雨水的湿地等。许多这样局部的改造能够在整体上建立绿色空间和滨水空间的连续性，创造出一系列从新城到老城连续的、无车的滨水绿带。



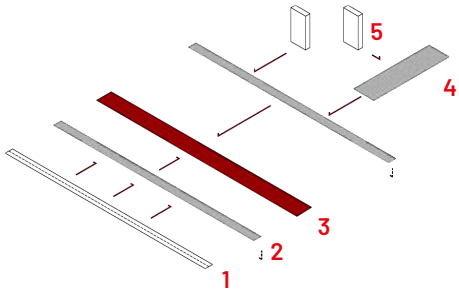
the Existing 现状



the Guideline 导则

1 the Canal 运河
2 the Existing Road 现状道路
3 the Wetland at the Waterfront for Water purification and Storage 滨水的水质净化和蓄水的湿地
4 the Downgraded Road and the Slow Mobility Space 降级的道路以及慢速交通空间
5 the New Green Waterfront in the Neighborhood 社区内新增绿色滨水空间
6 the Naturalization of the Canal 大运河堤岸自然化

FIG. 3.154 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 the Existing Buildings 现有建筑
2 the Wetland at the Waterfront for Water Purification 滨水湿地用于水质净化
3 Water 水道
4 the Wetland/Infiltration/Storage of Water in New Green Space 在新建绿地上的湿地/净化/储存
5 the Existing Buildings 现有建筑

FIG. 3.155 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

3. The modern parts of the city (industry):

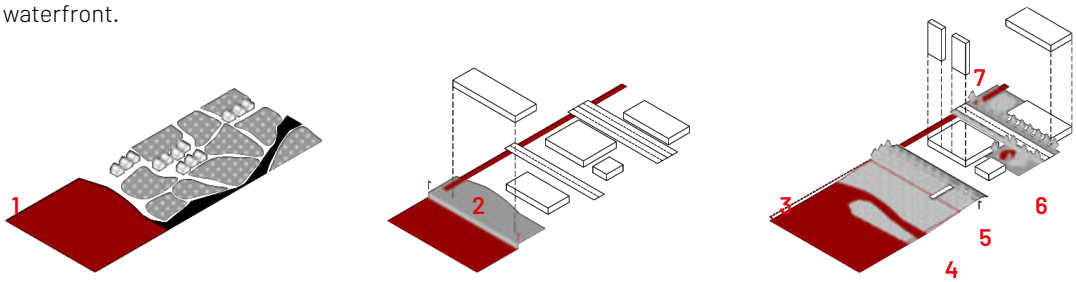
Widening the Suzhou Creek to its historical width. Transform the first existing road along the main rivers into a dike with a path of slow mobility on top. Create water space/wetlands by reducing the underused spaces and parking spaces. Connects the canals and the green spaces along them into a continuous network.

The two waterfront spaces – the one of the pedestrianized streets in the historical center and the one of the linear green space in the new parts of the city – are connected into one universal network of public space, a base for a 100% public waterfront.

3. 新城工业区

导则设计从恢复吴淞江的历史水道面貌出发，将其硬质河岸进行自然化处理，改造成大规模滨水湿地和季节性公园。紧邻河岸的车行道路在有需要的部分被改造成加高的堤岸，并布置慢行交通的空间。沿堤岸设置多种公共空间和功能，比如露台、小型建筑和临水台阶，它们架空于河岸并向水面延伸。在堤岸的后方是工业、居住等各种功能混合区域。

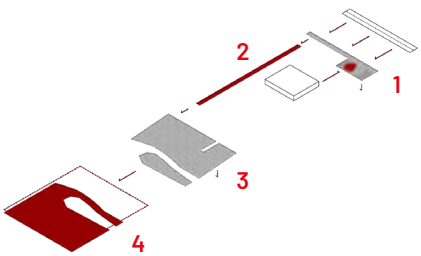
导则旨在将古城区步行化的滨水空间与新城区超级街区和工业园区中线性的生态滨水空间互相联系，成为一个地域尺度上统一的、联系老城和新城的公共空间系统。这个公共空间系统为苏州实现100%公共化的滨水空间提供了基础。



the Past 历史　　the Existing 现状　　the Guideline 导则

1 Suzhou Creek in the Past 历史上的吴淞江
2 Filling the River for Industry 填充水体以增加工业建筑用地
3 Extension of the Width of the River 拓宽水体
4 the Naturalization of the Bank 自然化堤岸
5 the Down-Gradation of the Road and Consolidation of the Dike 缩减道路并加强堤防
6 the Wetland/Infiltration/Storage of Water in New Green Space 在新建绿地上的湿地/净化/储存
7 Mixed Densification within the Industrial Site at Waterfront 在滨水工业区的混合城市开发

FIG. 3.156 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 the Wetland/Infiltration/Storage of Water in New Green Space 在新建绿地上的湿地/净化/储存
2 the Existing Canals 现状水道
3 the Wetland at the Waterfront for Water Purification 滨水湿地用于水质净化 平行与道路的线状自然水渠
4 the Naturalization of the Bank 自然化堤岸

FIG. 3.157 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

3.5.4 – **The Lakes And Pools**
塘、圩、湖、荡

The main concept is to reinforce the waterfront of the dense pattern of lakes as a structure and capacity for flooding control. The bank of the lakes and ponds has to be significantly naturalized and widened to improve its ecological value and build the systematic system of rural waterfront space.

导则旨在对广阔而细密的塘、圩、湖、荡地区的滨水空间进行加固，使得其蓄洪能力得到加强。同时对塘、圩、湖、荡的堤岸进行加宽和自然化处理，提升其生态价值，构建系统化的乡村滨水空间体系。

1 Agricultral Belt: Purification/Storage Area around the Taihu Lake
环湖农业带：太湖周边净水蓄洪空间
2 Naturalization / Enlargement of the Grand Canal and other Main Waterways
对大运河和主要河流的拓宽和堤岸自然化
3 Completion and Extension of the Water Grid, the Elimination of the Dead-Ends
对网格水体的拓展和补全，消除断头水体
4 Wetland: In-site Water Purification and Storage Space
湿地：就地净水及蓄洪空间
5 Naturalization and Reinforcement of the Agricultural Polders
对农业圩田堤岸的加固及自然化

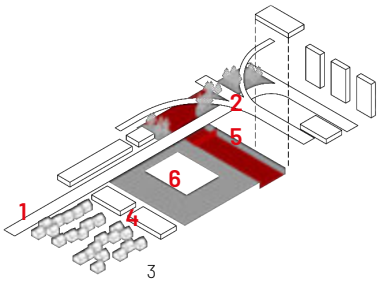
FIG. 3.158 Conceptual Plan of the Waterfront.
滨水空间概念设计图

1. The main lakes:

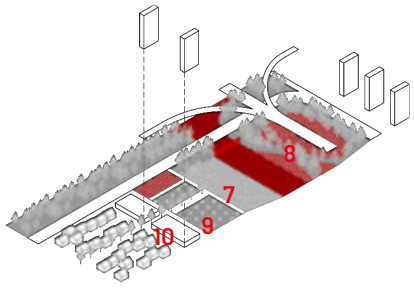
Profoundly naturalise the waterfront of the main lakes (e.g. Yangchen Lake) and the waterways that connect the lakes to the city. Create spaces under and around the main infrastructure dedicated to nature and limit the human activities within them. Transform part of the agricultural land at the waterfront into wetland and water storage. Connect the waterfront to the villages next to the water with public space and slow mobility.

1. 主要湖泊

将湖泊以及联系湖泊与城市的水道的滨水空间（如阳澄湖）进行大规模自然化，限制人类在其周边的活动。重新将高速公路、铁路以及高架等基础设施周围的空间深度自然化，将这些空间完全建设成为森林、水面、湿地等原生态的环境。保留靠近水面的村庄并将其发展成社区中心，将村庄与周围的现代城市部分通过慢行交通网络重新连接。对这些村庄的功能进行多样化混合，特别是在靠近滨水空间并且有一定景观的地方建设一定数量的新住宅。



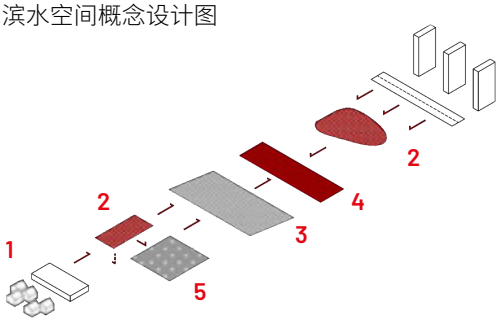
the Existing 现状



the Guideline 导则

1 the Existing Road 现状道路
2 the Elevated Bridge立交桥
3 the Villages 村庄
4 the Existing Industries 现状工业
5 the Water Gates 水闸
6 Parking Lot 停车场
7 the Wetland at the Waterfront for Water Purification 滨水区用于水质净化的湿地
8 the Natural Ecological Reservoir 自然生态区
9 the Transformation of Agriculture 新型农业转型
10 Industry Transformation 工业区改造

FIG. 3.159 Conceptual Plan of the Waterfront.
滨水空间概念设计图



1 the Existing Buildings 现有建筑
2 the Wetland/Infiltration/Storage of Water in Green Space 在绿地上的湿地/净化/储存
3 the Wetland at the Waterfront for Water Purification 滨水区用于水质净化的湿地
4 the Existing Waterway 现状水道
5 the Transformation of Agriculture 新型农业转型

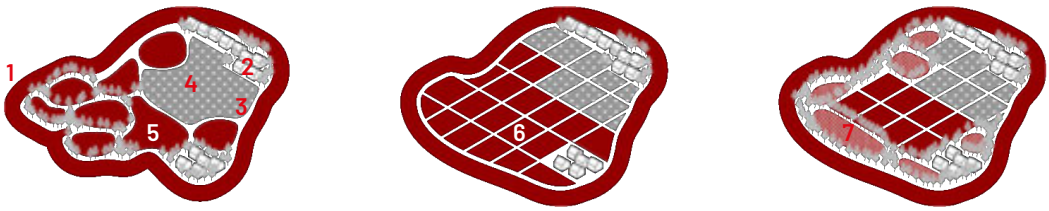
FIG. 3.160 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

2. The polders and fishponds:

Re-introduce the dike-fishpond model with wide, robust, yet natural dikes and banks with trees and vegetation. The minimum width of the top of the dike is 3m, and the fishpond cannot be within 10m from the foot of the dike. Requalify the traditional villages into local centers, with an extensive system of paths for slow mobility along the waterfront. The reinforced dikes are the basis to create a slow mobility network in the villages located in different polders, and to create a continues ecological system with rich bio-diversity thanks to the variety of natural vegetation and agricultural production.

2. 农业圩田

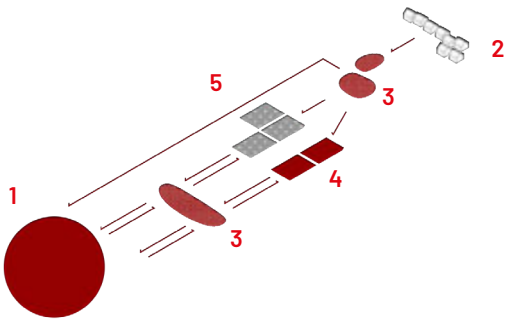
重新恢复传统的桑基、果基鱼塘，修建较宽、自然化且坚固的堤岸。在堤岸上种植丰富的植被，提供树荫的同时加固圩田结构。堤宽不少于3米，同时鱼塘距离基岸不小于10米。将不断退化的农业向都市农业转型，补充湿地、林地、鱼塘以及社区农场等功能，使之与苏州传统农业更加接近，同时适应农村新的生活方式。将滨水村庄保留下来并发展成社区中心，与城市其他部分通过堤岸上的慢行网络连接。重新加固的堤岸将成为塘、圩、湖、荡这些水体周围的村庄之间的慢行交通空间的重要载体。同时生态化的堤岸和堤岸上各种农产品的生产将使这个地区成为生物多样性极其丰富的一个区域。



the Past 历史　　the Existing 现状　　the Guideline 导则

1 Water between Polders 圩间水面
2 the Villages 村庄
3 the Dike 堤坝
4 Agriculture 农田
5 Traditional Fish Pond 传统鱼塘
6 Modern Fish Pond 现代鱼塘
7 the Wetland at the Waterfront for Water Purification + Reinforced Dike
滨水区用于水质净化的湿地以及加固的堤坝

FIG. 3.161 Conceptual plan of the waterfront.
滨水空间概念设计图



1 Water between Polders 圩间水面
2 the Villages 村庄
3 the Wetland at the Waterfront for Water Purification 滨水区用于水质净化的湿地
4 Agriculture 农田
5 Traditional Fish Pond 传统鱼塘

FIG. 3.162 Conceptual Plan of the Water Management.
滨水空间水管理概念设计图

3.5.5 – **Guidelines: Classification**
导则: 分类

The spatial system of waterfront space can generally be divided into three parts: revetment area, hydrophilic area and waterfront construction area. The design of waterfront space needs to give full consideration to the coordination among the three elements of waterfront space, so as to form a perfect and reasonable waterfront space system.

滨水陆域体系可以分为三部分：河岸区、亲水区以及滨水建设区。研究将河岸区控制导则细分成驳岸形式、驳岸材料、安全措施、水工建筑四种控制要素；亲水区包括慢行体系、景观设施、休憩设施、照明设施、服务设施五种控制要素；滨水建设区包括建筑退让形式以及建筑形态两种控制要素。滨水空间设计需充分兼顾水体及河岸、亲水空间和滨水建设空间三个层面要素之间的相互协调，使其功能配置和空间设计相得益彰，形成完善合理的滨水空间体系。

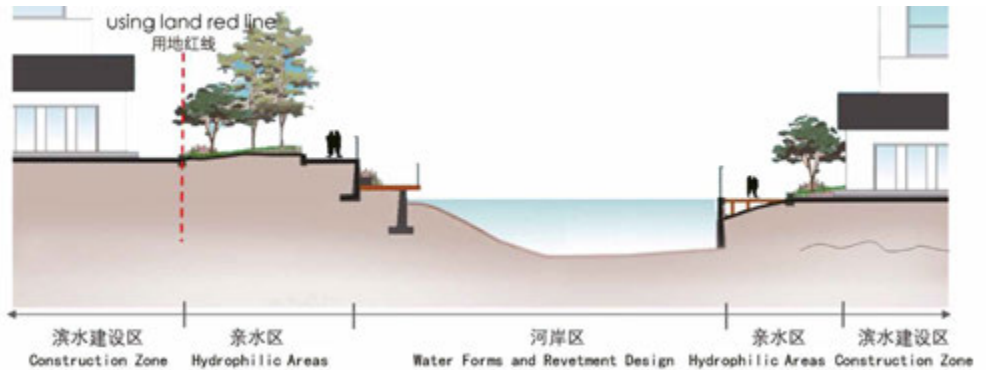


FIG. 3.163 Hierarchical division of waterfront space
滨水空间控制体系划分

3.5.5.1 – **Revetment Area**
河岸区

The revetment forms can be divided into the following five forms. Vertical revetment is suitable for narrow river sections. Compared with single brick or concrete material, ecological material is preferred. Hard slope revetment has strong artificial sense and good effect of flood control . The natural slope revetment is suitable for the wider reach, and has the best ecological effect. Platform-type revetment is suitable for urban areas where land is scarce and doesn't have enough land for activities. We can design lifting platforms extending to the water surface. Artificial and natural combination revetment can increase the hydrophilicity of the revetment by constructing steps at the bottom of the grass slope.It can not only protect the bottom of the embankment from waves and scouring, but also provide more activity space for citizens.

驳岸可分为以下形式：垂直驳岸适用于较窄河段或河岸用地有限处，可优先采用生态材料，避免使用单一的砖或混凝土材料。硬质斜坡驳岸人工感强，防洪防冲刷较好。自然放坡式驳岸适于河段较宽且河岸用地宽松处。坡脚可种植挺水植物，形成生物群落，具有良好的景观和生态效果。挑台式驳岸适用于城市用地紧张，没有足够用地作活动空间的河段，可采用向水域延伸活动平台的设计手法，但需要保证挑出的平台或构筑物应不影响防洪、河面交通及景观。人工与自然结合式驳岸可以通过在草坡底端构筑台阶，增加驳岸的亲水性，不仅可以起到对河堤底部防浪和防冲刷等的保护作用，同时也为市民提供了多样化的活动空间。在河面较宽且河岸空间富裕的河段建议优先选取人工与自然结合式的驳岸形式，在满足生态景观要求的同时提供了更多的亲水可能性，可以有效地提升滨水空间活力。河段较窄或河岸用地有限处建议采用垂直驳岸或硬质斜坡驳岸。生态型河段建议采用自然放坡式驳岸。

FIG. 3.164 Revetment Forms (from Left to Right): Vertical Revetment, Hard Slope Revetment, Natural Slope Revetment, Cantilever Platform Revetment, Revetment Combined with Man-Made and Nature.

驳岸形式（由左至右）：垂直驳岸、硬质斜坡驳岸、自然放坡式驳岸、挑台式驳岸、人工与自然结合式驳岸。

The material form of the revetment has a significant impact on the ecological and landscape effects of the riverbank space. Natural ecological revetment materials are mainly suitable for river sections with natural gentle slope and gentle flow. Artificial revetment materials have a wider scope of application, but their ecological utility is low. New porous concrete materials not only has less restriction on slope gradient, but also effectively maintains the hydrological relationship between land and water and the growth environment of amphibians. Cast-in-situ concrete or grouted rubble material has strong stability, and are suitable for areas with rapid water flow and steep slope. Traditional pebbles and rubbles are suitable for narrow rivers in old cities to reflect traditional local characteristics.

It is suggested that the traditional materials such as pebbles and gravel should be used as far as possible in the river section of the old city to maintain its traditional style. Ecological revetment materials should be used to enhance the landscape environment and ecological benefits of waterfront space. For river sections with rapid flow, large height difference between water surface and land, and steep slope, it is suggested to use concrete or grouted rubble material.

驳岸的材料形式对河岸空间的生态及景观效果有着显著的影响。自然生态型材料主要适用于自然舒缓（坡度在土壤自然安息角范围内），水位落差小，水流平缓的河段。生态型材料可分为以土壤、植物和叠石为主的原始自然生态型和生物有机材料（树桩、树枝插条、竹篱、草袋等可降解可再生材料）辅助护坡两种类型，两栖生物及景观结构丰富，生态功能健全稳定。人工驳岸材料适用范围更广，但生态效用较低。新式混凝土预制的高强度、多孔性的驳岸可用于水流冲刷力度较大的河段，不仅对适用坡度限制较小且可以基本维持自然岸线的通透性、水陆之间的水文联系和两栖生物的生长环境。现浇混凝土或浆砌块石材料，具有较强的稳定性和抗洪功能，适于水流急、水面与陆地高差大、坡度较陡的河段。但人工化较强，切断了水陆之间的生态流交换，岸栖生物基本不能生长，自然景观和生态功能较差。传统条形麻石、卵石、碎石等是传统砌筑工艺下常用的驳岸材料，适于传统村落中的较窄河道，反映地方特色；粗糙的表面和无数石缝可以让水自由的渗透至背面土层，保持水体循环，为两栖生物生长提供有利条件。

在古城内建议尽量采用条形麻石、卵石和碎石等传统材料，维持古城传统风貌。生态为主的河湖可采用可渗水生态型材料提升滨水空间的景观环境和生态效益。对于水流急、水面与陆地高差大、坡度陡的河段，建议采用混凝土或浆砌块石。建议尽量采用渗水率较高的地面材质，让水自由地渗透到驳岸背面的土层中，保持土层湿度，为岸栖生物生长提供条件。

FIG. 3.165 Ecological Revetment Materials (from Left to Right): Soil and Plants, Biological Organic Materials.

生态型驳岸材料（由左至右）：土壤植物、生物有机材料。

FIG. 3.166 Artificial Revetment Materials (from Left to Right): New Porous Concrete Materials, Traditional Pebble, Cast-In-site Concrete or Grouted Rubble.

人工型驳岸材料（由左至右）：新式混凝土多孔材料、传统条石卵石碎石、现浇混凝土或浆砌块石。

Waterfront space safety facilities are important factors affecting the hydrophilic safety and walking comfort of pedestrians. Guardrail is suitable for all kinds of river sections in cities. It is suggested that the height should be controlled between 1.05-1.2m.

滨水安全设施设计是影响行人亲水安全性和舒适性的重要要素。护栏，适用于城市中各类河段。在保证行人看向水体的视线通透性的前提下，建议采用厚重材质或不易攀爬的设计。高度建议控制在1.0-1.2m左右可以与座椅或其它景观设施一体化设计。

Low baffles are mostly made of stone, concrete and other materials.The height should not be less than 0.3m. It has good hydrophilicity and certain safety protection effect.

矮挡板，多采用条石、预制混凝土块，高度宜不小于0.3m，建议在适当位置设立安全警告标识以保证滨水空间的安全性。亲水性较好，且具有一定的安全保护作用。

Strip stone or stone-laying is suitable for shallow water reach. It is suggested that safety warning signs should be set up in appropriate places.

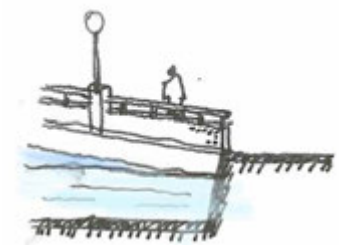
条石或砌块，适于常水位接近岸线顶，且岸顶至河底的高差≤1m左右的浅水位河段。亲水性较强，建议应在适当位置设立安全警告标识。

Plant segregation can not only prevent people from crossing the revetment, but also form a good landscape.

植物分隔既能防止人跨越驳岸，又可形成良好景观。宜种植亲水、浅根灌木。对于使用混凝土材料的垂直驳岸，应优先选择枝叶下垂型，从而丰富岸线层次。

Barrier or wall is negative elements of waterfront space, which block the interaction between pedestrians and water.

栅栏或围墙多用于划分内侧私有用地,是滨水空间的消极要素，阻隔了人和水之间的互动。在不必要的情况下建议减少栅栏或围墙式的滨水安全设施。



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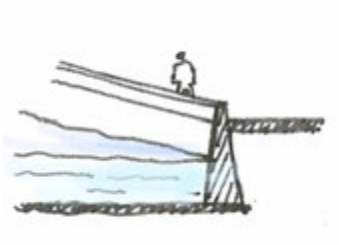

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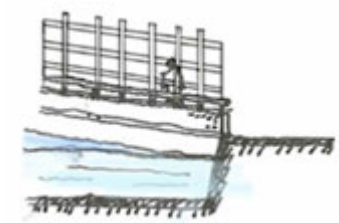

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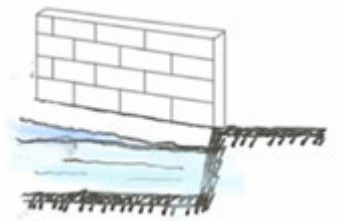

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FIG. 3.166 Safety Facility: Guardrail
安全设施：护栏

FIG. 3.167 Safety Facility: Low Baffle
安全设施：矮挡板

FIG. 3.168 Safety Facility: Stone-laying
安全设施：砌石

FIG. 3.169 Safety Facility: Plant
安全设施：植物

FIG. 3.170 Safety Facility: Barrier
安全设施：栅栏

FIG. 3.171 Safety Facility: Wall
安全设施：围墙

Close-to-water construction facilities realize the connection of land and water traffic environment and ensure the macro-controllability of the whole water system.

The main function of level bridge is to meet the needs of cross-river travel. When choosing the site, we should ensure that there is a good view and sight Corridor around the bridge. The bridge bottom elevation should be more than 0.5m above the designed flood level.

For arch bridges, if is navigable for small duty or sanitation vessels, The bridge bottom elevation should be more than 1.5m above the designed flood level. For rivers used as water tourism routes or urban water public transport, the height should be increased to 1.8m appropriately.

The design of water gate and pumping station needs to meet the requirements of flood control.

Waterport is a unique traditional hydraulic construction facility in old city.

水工建筑设施实现了水陆交通环境的接驳并保证了整体水系的宏观可控性。平桥以步行功能为主，选址时应确保桥周围有较好的景观及视线通廊。色彩、形式与周边环境相协调。桥面与道路高差不宜大于0.5m；同时还应保证桥底标高应高出设计洪水位0.5m以上。如需通航小型的执勤或环卫船只，应适当增加高度至1.5m以方便作业。

拱桥规划选点需要满足城市水陆交通的要求。不通航的河道，桥底标高应高出设计洪水位0.5m以上。如需通航小型的执勤或环卫船只，应适当增加高度至1.5m，以方便作业。对于用作水上旅游线路或城市水上公共交通的河道，应使桥底标高高出设计洪水位1.8m以上，其它河段可按航道规划设计桥底净空。

水闸泵站的设计需要满足防洪要求。在满足水利工程技术要求的同时造型尽量简洁。在开阔的河面上可突出其高大形象，使其被附有一定的象征性。在传统村落地区应注意与环境的整体风貌结合。

水埠是古城特色滨河空间要素，具有亲水性。可于古城生活空间内局部线型单调的滨河空间处添加，不宜过密（>100m）可结合滨河挑台布置。

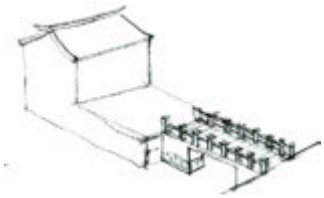


FIG. 3.172 Construction Facility: Level Bridge
水工建筑：平桥

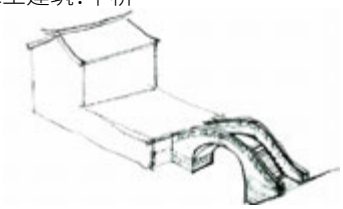


FIG. 3.173 Construction Facility: Arch Bridge.
水工建筑：拱桥

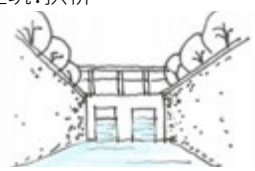


FIG. 3.174 Construction Facility: Water Gate and Pumping Station
水工建筑：水闸泵站

FIG. 3.175 Construction Facility: Waterport
水工建筑：水埠

3.5.5.2 – **Hydrophilic Area**
亲水区

The hydrophilic area needs to satisfy people's needs of recreation, entertainment, transportation, communication and activities. Recreational facilities provide a space for pedestrians to rest and communicate, and enhance the capacity to accommodate activities of waterfront space. The spacing of recreational facilities such as flower beds or seats should be 10-50 m, and the density of seat equipment should be increased in the places where people are concentrated. it is suggested to set up corridor, pavilion and other recreational facilities in the open space nodes to create a vitality node of waterfront space. The hydrophilic area of commercial waterfront space is suitable for planning open-air commerce to increase the vitality of waterfront public space. However, it is necessary to control the scope of these commercial activities so as not to infringe upon the right of public activities.

Lighting facility is an important factor to ensure the safety of pedestrians in hydrophilic areas at night. The standard height of road lighting facilities is 3-9m and the spacing is 4.0-5.0m. Waterscape lighting is generally located at the edge of the revetment, and the spacing should be 3-10m. Sign lighting is mostly located under bridges, waterfront platforms and wharfs. Plant lighting and building lighting are also important lighting facilities of hydrophilic area.

亲水区是人们与水发生互动的核心城市空间。需要满足人们的休憩、娱乐、通行、交流、活动等需求。其休憩设施、照明设施、服务设施、景观设施及步道设计等控制要素对滨水空间的舒适性、实用性、景观性有着直接的影响。通过对亲水区设计要素进行积极有效的引导和控制将显著提升滨水空间的吸引力和活力。休憩设施为行人提供了休息交流的空间，增强了滨水空间的可停留性。沿线性亲水空间建议规划花坛休憩设施或座椅等，在丰富步行空间绿化景观的同时满足人们休憩需求。间距宜为10－50m，但人流集中处应增加座椅设备的密度。座椅的设计宜考虑使用者能方便的眺望水面。在开敞的空间节点，宜设置廊架、凉亭等遮阳设施，打造活力节点。其位置宜方便到达及眺望水面，同时应与其它景观元素有机结合。商业型滨水空间的亲水区可适宜规划露天商业，丰富滨水休憩体验，以增加城市水边公共生活的活力。但需要控制这些商业活动的范围不得损害公众活动权，确保道路通行及正常人流活动等。

照明设施的合理规划是保证亲水区行人夜间通行安全的重要因素。道路照明需采用下照型和防止眩光的漫射型，标准高度为3-9m，间距为4.0~5.0m。水景照明一般设于驳岸边缘，向下照射水体以突出河流线型，间距宜为3－10m。标志照明多设于桥下、水边平台、码头、构筑物等，突出景物特色，增强重要节点、标志物、活动区的可辨性。植物照明需根据不同的植物及种植方式选择照明方式和设备，且不得干扰植物生长。建筑照明多设于滨水商业空间的橱窗和入口等。通过依托不同业态选择可有效烘托商业氛围的灯光形式，为滨水空间渲染丰富的夜景效果。

FIG. 3.175 Recreational Facilities: Flower Bed, Seat, Gallery Frame, Pavilion, Open-Air Commercial Space
休憩设施：花坛、座椅、廊架、凉亭、露天商业

FIG. 3.176 Lighting Facilities: Road Lighting, Waterscape Lighting, Sign Lighting, Plant Lighting, Building Lighting
照明设施：道路照明、水景照明、标志照明、植物照明、建筑照明

In the waterfront pedestrian area, some service facilities need to be set up, such as garbage cans, public toilets, signs and so on. The public sign boards can be designed in combination with regional cultural characteristics to introduce regional culture and activities. It is suggested to plan road sign boards in tourist areas to provide pedestrians with clear reference to tour routes. The toilet should be set up beside the river trail, and the spacing should be no more than 800m. The location of the sink and drinking water dispenser should be combined with the toilet. The trash should be placed along the road with an interval of 80-100m.

For landscape facilities, local plants should be retained and prioritized. In the design of landscape facilities, we need to consider the height of these Trees'crowns to avoid hindering people's view of the water.At the same time, different types of trees should be selected for planting in different active areas. In addition, flowering trees are encouraged to be planted to increase seasonal variability of landscape.

在滨水步行区，需要在方便可达的范围内设置一些相应的配套服务设施，如垃圾筒、公厕、指示牌等。信息公示牌可结合场地的文化特色设计，宜反应地域人文特色并与其它景观元素有机组合，介绍地域文化及活动等信息。建议在旅游区规划路线指引牌，为行人提供清晰的游览路线参考和配套空间布局。可采用多种形式、材料进行设计，同一河段应保持风格的连贯性。卫生间应在沿河步道旁设置，间距应不大于800m。其造型、色彩宜与周围环境协调。建议用绿化进行遮蔽以阻隔视线。洗手台和饮水台设置宜与公厕、景观相结合，增加使用的便捷性和趣味性。垃圾箱宜沿路摆放，设置间隔宜为80-100m。

在景观设施方面，优先考虑种植本地的植物，并注重其搭配。在临水步行空间的绿化设计中，考虑种植遮荫树木的同时，还需尽量保证这些树木的树冠不会阻碍人们欣赏水体的视线。针对不同的活动区，建议选择不同形态的树木进行种植，例如在人流相对集中的居住小区，适宜种植一些树冠较大的树木，以增加绿化覆盖率，吸引人流前来交流活动。此外鼓励在滨水区沿岸种植开花树木，利用不同植物的特性以增加季相的变化。

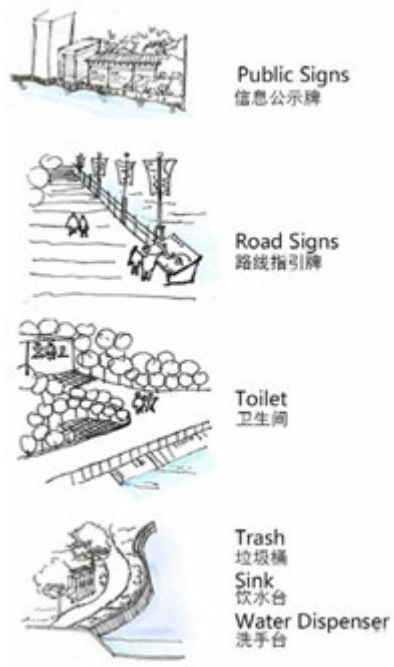


FIG. 3.177 Service Facilities
服务设施

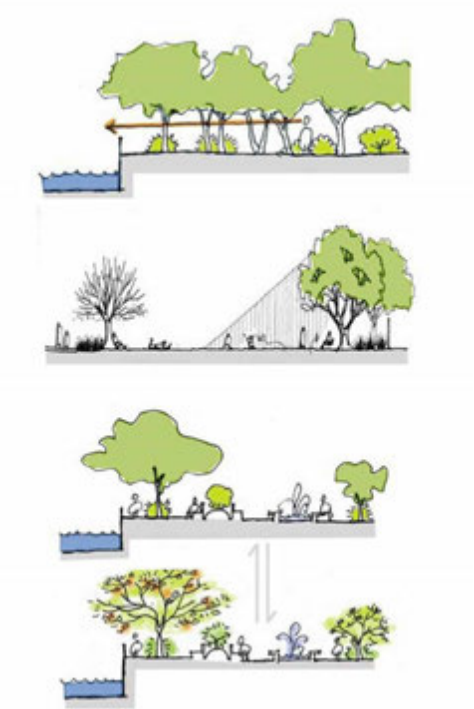


FIG. 3.178 Landscape Facilities
景观设施

The waterfront city slow traffic system is an important part of waterfront space. It is suggested that the motor vehicle lanes with large traffic flow should be placed in the non-water area, so as to ensure that the street along the water to be a space for public activities. The width of waterfront footpath should not be less than 1.5m in general. The waterfront park trail is proposed to be designed with adequate entrances and local enlarged nodes for users' convenience. The interval between entrances and nodes should not be more than 250m. The design of the trail where the height difference of the footpath changes should meet the requirements of the national barrier-free design code.

The material of waterfront walkway is an important factor affecting the comfort of pedestrian traffic. Slate, pebble, wood, concert brik and so on are common paving materials. Choosing the best paving material according to local conditions can effectively improve the space quality of hydrophilic zone.

FIG. 3.179 Waterfront Non-motorized Vehicle System
滨水慢行体系

亲水区慢行体系是滨水空间重要组成部分。建议把车流量较大的机动车道放在非沿水地区，尽量保证沿水街道成为生活性的活动场地。滨水步道宽度一般不宜小于1.5m。需考虑滨水步行安全性、舒适性、体验性。滨水公园小径的设计建议规划足够的出入口及局部放大节点以方便行人使用，出入口或节点的间隔不宜大于250m，路面纵坡坡度宜控制在0.2-5%，横坡1-2%。此外在滨水区步行道的高差变化处，要注意设置坡道，以方便老年人、残障人士、携同小孩的父母等行人来往。此外还需考虑视障人士在步行过程中的需要。在步行道的高差变化处应符合国家无障碍设计规范的要求。

滨水步道的材质是影响行人步行体验的重要因素。石板表面粗糙，自然、富野趣，适用于自然式小路或传统区域，厚度不宜太薄。卵石细腻圆润、耐磨、色彩丰富、装饰性强，排水性好，适用于各种通道、广场，但表面光滑易松动，不适用于坡地及残疾人步道。木质铺装古朴、自然、价格较高，注意防腐防滑。混凝土砖坚固、耐用、平整，价格适中,可塑性强，操作方便，可做成各种彩色路面，适用于人流密集地段。天然与人工材料混合铺装兼具渗水性强、生态景观性佳、可塑性强等多种优点。因地制宜的选择最佳的铺装材质可以有效的提升亲水区的空间品质。

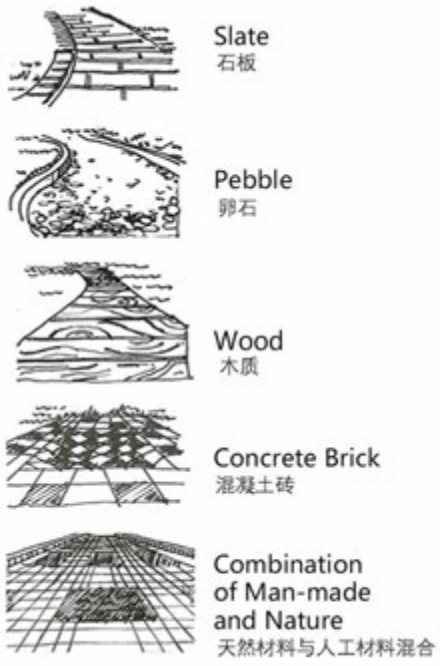


FIG. 3.180 Material of Waterfront Trail
滨水步道材质

3.5.5.3 – **Construction Zone**
滨水建设区

The scale of the distance from building to water body is an important factor which can control the spatial form of waterfront space. Most of the traditional waterfront buildings in the old city are close to the water body.

滨水建设区的建筑退让尺度是控制滨水空间形态的重要因素。古城传统风貌区滨水建筑大多紧临水体。建议原则上不允许新建直接临水建筑，如必须建设或对已有建筑进行改造时，可适当架空首层并开放给公众，或增加与河流垂直并通向水边的道路。

It is suggested that the waterfront construction area of new town should retreat more than 10m and construct space for walkway, greening, corridor or activity to create open waterfront space.

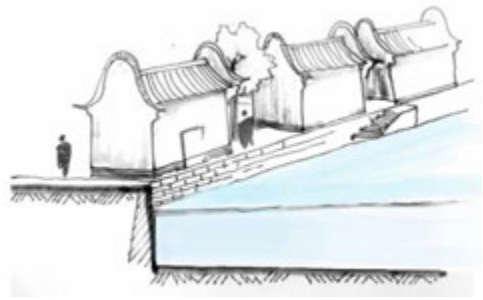
新城滨水建设区建议后退≥10m，临水一侧构建人行步道、绿化、长廊或活动场地，营造开放型滨水空间。

We suggest that the waterfront construction area alone major urban rivers should be appropriately increased backward distance of construction area and create the openness of waterfront sight.

主要城市河流的滨水建设区建议适当增加建筑退线宽度，营造滨水视线的开阔性。应注意控制滨水道路等级，以免与河道尺度不匹配。

In the waterfront construction area alone the wider reach, it is suggested that the distance from building to water body should be more than 50 meters.

在河面较宽河段的滨水建设区建议建筑退让出较大距离（50m以上），临水可规划大面积护岸林带或滨水公共绿地，营造良好的生态环境和景观效果。



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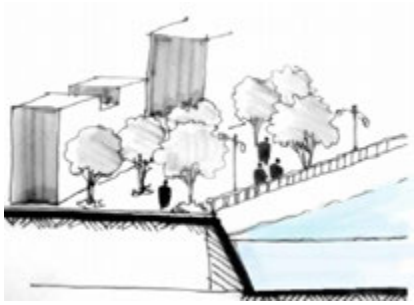

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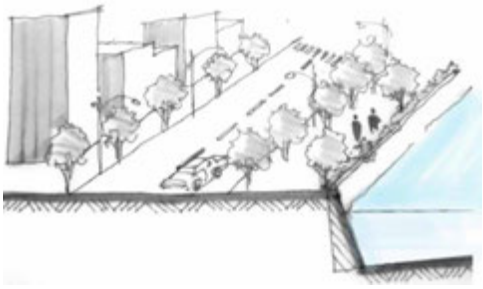


3

4

FIG. 3.181 Four Forms of Architectural Concession
建筑退让的四种形式

Architectural design of waterfront construction areas encourages diversified facades. At the same time, it is necessary to ensure that the facades of the new buildings along the water are in harmony with the facades of the original buildings nearby.

滨水建设区建筑设计鼓励多样化的建筑立面，同时确保沿水新建的建筑立面与附近建筑的立面式样保持和谐，并且通过使用相似的材料或构造形式来保证与老建筑之间形成和谐的关系。避免使用与附近已建的重要或传统建筑不协调的材料、比例和体量。

Reasonable architectural space texture, however, can ensure the patency of the view gallery. Pedestrians can view the beautiful scenery of the waterfront space from the urban area, and the waterfront pedestrians can also see the scenery of the urban area from the waterfront.

合理的建筑空间肌理设计，可以保证滨水区街道视线通廊的通畅性。例如，让行人可以从都市区远眺水体沿岸地区的优美景致，滨水的行人也可从水体沿岸看到都市区的景象。又如，在水体流经的地区，能让行人从建筑群中感受到水体的连续性。

Encourage the diversification of the shape of the buildings along the water to reduce the pressure of the buildings, so as to ensure adequate sunshine and air access to open space and other public areas. It is necessary to avoid the construction of oversize buildings in waterfront areas.

鼓励对沿水建筑外形进行塑造，减轻建筑的压迫感，以保证有充足的阳光和空气能进入开放空间以及其他公共区域。避免在滨水区建设体量过大的超尺度建筑。

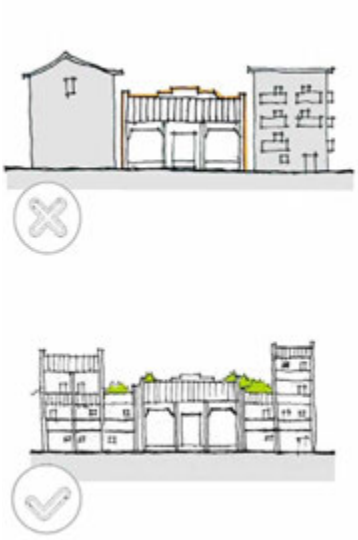


FIG. 3.182 Architectural Facade
建筑立面

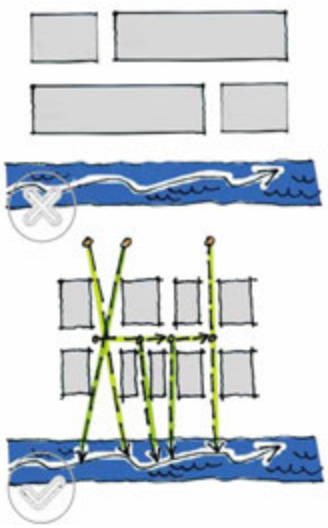


FIG. 3.183 Texture of Architectural Space
建筑空间肌理

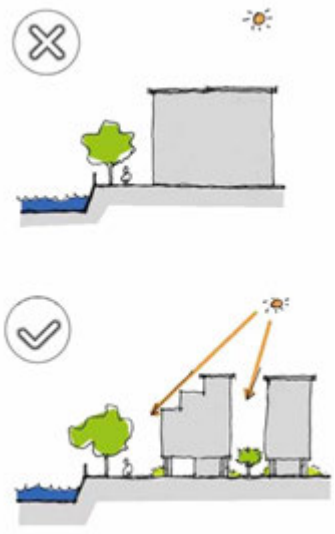


FIG. 3.184 Architectural Form
建筑形态

Conclusion

总结

The work led by a big group of teachers and students from different Chinese and European schools has been impressive. Still, this is only the beginning of a research that should find a way to continue and go deeper in all the different themes and proposals.

The relation between cities and water is more and more crucial and this is even more true in the case of Suzhou whose traditional and contemporary space is so deeply embedded with water design. It is starting from this couple, water and urban space, that the ancient city of Suzhou could be requalified and renovated, the ecological continuities restructured; that the villages structure could be valorized instead of erased, the mix use areas along the canals revived, the new campuses better integrated, the agriculture maintained and made part of the metropolitan space, the process of urban growth rethought. The actual hydraulic machine is in need of reconsideration at the prism of climate change and of water consumption and pollution.

This is the moment of investing in design and enter, in an innovative way, the ecological, demographic and economic transition. As a guideline we propose the vision of the "Garden of Suzhou" which aim at translating the long term image of the traditional Chinese garden into the future.

本次工作的团队由中外双方大学的师生共同组成，他们在工作中得到的成果无疑是令人印象深刻的。然而，这仅仅是一个研究的开端而不是结束，其中很多的主题和设计提案都值得更深入的研究。我们需要找到将它继续下去的方式和方法。

今天，水和城市的关系正在变得越来越重要。尤其是像苏州这样的一座城市，它的传统和现代城市空间都深深的扎根于其水系和滨水空间的设计。从水和城市空间的关系出发，不仅只是重新考虑水作为功能性的空间如何去应对气候变化，供水短缺和水质污染等挑战；而且只有从水和城市空间的关系出发，苏州才能被重新提升和更新，生态系统才能重新修复，传统村庄才能被重新利用而不是被拆除，运河周围空间的多样性才能重新焕发光彩，城市新区才能更加好的融入苏州整体，农业才能被保留而重新纳入苏州大都市的怀抱，而整个城市的发展方式才能被反思和重新出发。

这是一个召唤设计的时刻，我们需要带着创新精神去投入到生态、人口以及经济等领域正在产生的深刻变化中去。我们提出了"苏州园林"的愿景作为空间设计的导则，希望将传统的、中国的苏州园林的印象延续到苏州的未来中去。

PART 4

Yinchuan：Lake City on the Frontier

第4部分

银川：塞上湖城

Introduction

引言

Entering the lake city

Yinchuan,

Wide roads, towering buildings,

The vast waters everywhere, the exquisite green areas.

The sky is still blue and the mountains are still far away.

进入塞上湖城，

银川，

宽阔的道路，高耸的建筑，

到处都是茫茫水域，精致的绿地。

天空依然是蓝色，山脉依然很远。

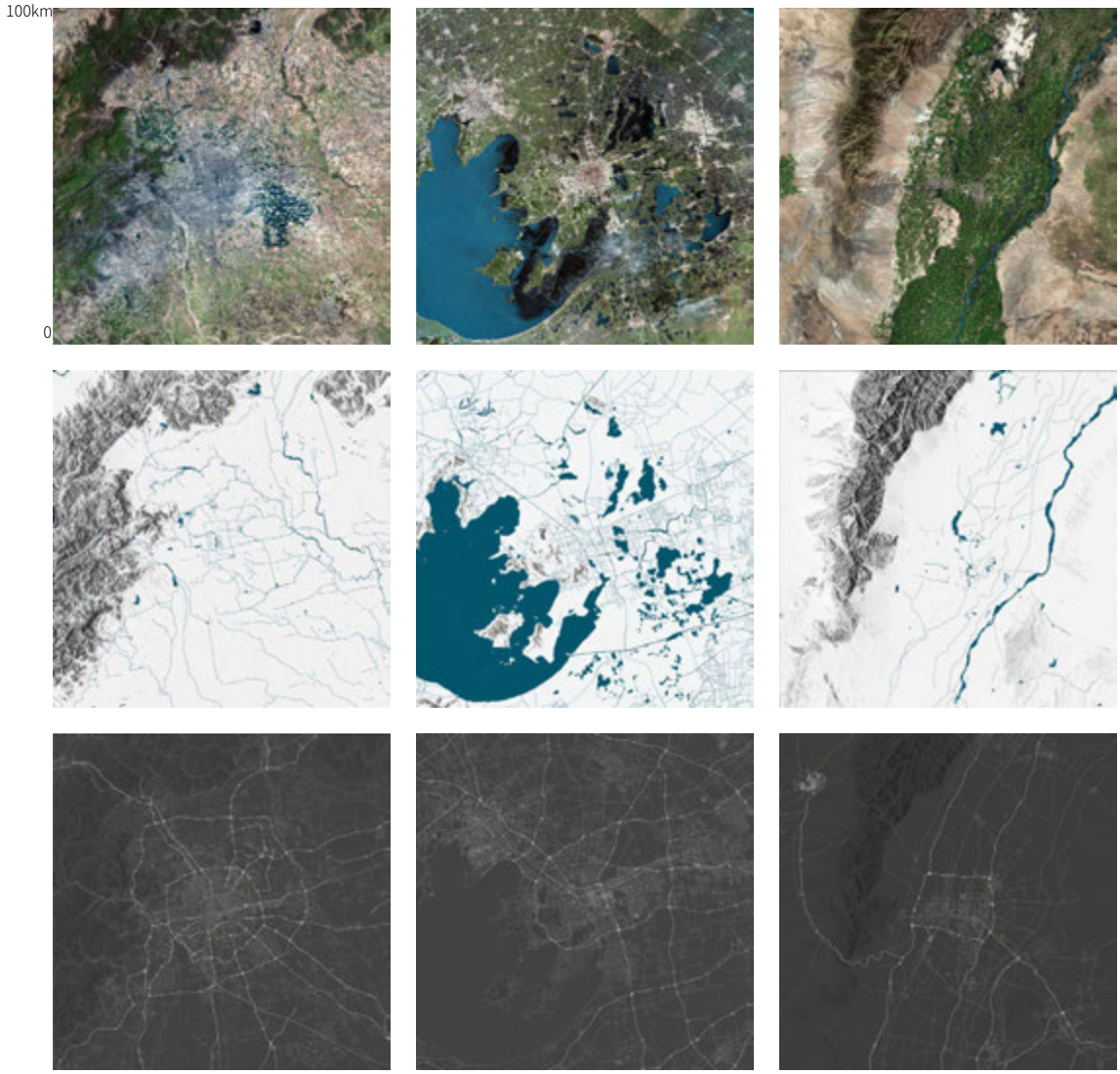


FIG. 4.1 The three cities studied in this book, with the Urban Landscape, the Water System and the Road Network.Source: ESRI
本书所研究三个城市的景观，水系和道路网络. 资料来源：ESRI

4.1 – Background

4.1 – 背景

4.1.1 – **Discussion on the Role and Design Method of Waterfront in Yinchuan**
关于银川滨水空间角色与设计方法的探讨

The design and research of Yinchuan waterfront is guided by landscape architects and urban designers, highlighting the analytical thinking and design strategies based on ecology.

This chapter is the result of the work of Yinchuan in the comparative study of the three Cities. It has a double meaning. it is a report formed by a group of students, teachers and various institutional researchers from different countries and regions in the process of research and design exploration for more than 10 months. These includes: research on the current water environment in Yinchuan City, exploration of the "Research through Design" (RTD) method, interpretation of the waterfront, typical sites selection and design results, and results with a final reflection of the lessons learnt.

In fact, the value of this collaboration goes beyond the process of raising, analyzing problems and designing solutions. It is a challenge and exploration of the limitations of cooperation between different cultures and (design) languages. Therefore, it is important to understand that the solution presented here is not a fixed result.

The core value of this achievement is reflected in the following aspects: the waterfront problem and its design solution are based on detailed and careful field research and comprehensive consideration of social, cultural, historical, environmental and institutional influences.

银川滨水空间设计研究工作是由风景园林设计师和城市设计师共同引导，突出了基于生态学的分析思路和设计策略。

本章节是三城比较研究中针对银川的工作成果，它具有双重意义。初看之下，它是由一群来自不同国家地区的学生、教师和各种机构研究人员在10个多月的研究和设计探索合作过程中形成的工作报告，分别包括：对银川城市当前水环境的研究，对"通过设计的研究"（RTD）方法的探索，对滨水空间的解读，典型地块选取及设计成果，并将所学的经验教训作为最后的反馈。

实际上这个合作的价值超越了提出、分析问题和方案设计的工作过程，它是面对不同文化和（设计）语言合作之间限制的挑战和探索。这是开展银川乃至中国城市滨水空间角色和特色问题研究的第一步。所以，这里所提出的解决方案并不是一个固定的结果，理解这一点至关重要。

这一成果的核心价值体现在：滨水空间的问题及其设计解决方案是基于现场详尽而谨慎的调研，以及综合考虑社会、文化、历史、环境和体制等方面的影响而产生的。

4.1.2 – **Urban Waterfronts, Global Trends and Local Reflections**
城市滨水空间，全球性趋势和地方性反思

To explore the interplay between global trends such as climate change , water stress and urbanization in China, especially the construction model of Yinchuan city. That is necessary to situate the global discussion for the future of cities in connection to the main topic of this collaboration, an approach towards the role of urban waterfronts in Chinese cities.

探索气候变化、水资源压力等全球性趋势，与中国城镇化特别是银川城市建设模式之间的相互影响，将城市未来的全球化讨论与这次合作的主要议题联系起来是有必要的，这也是选择中国城市滨水空间作为研究设计对象的意义和价值所在。

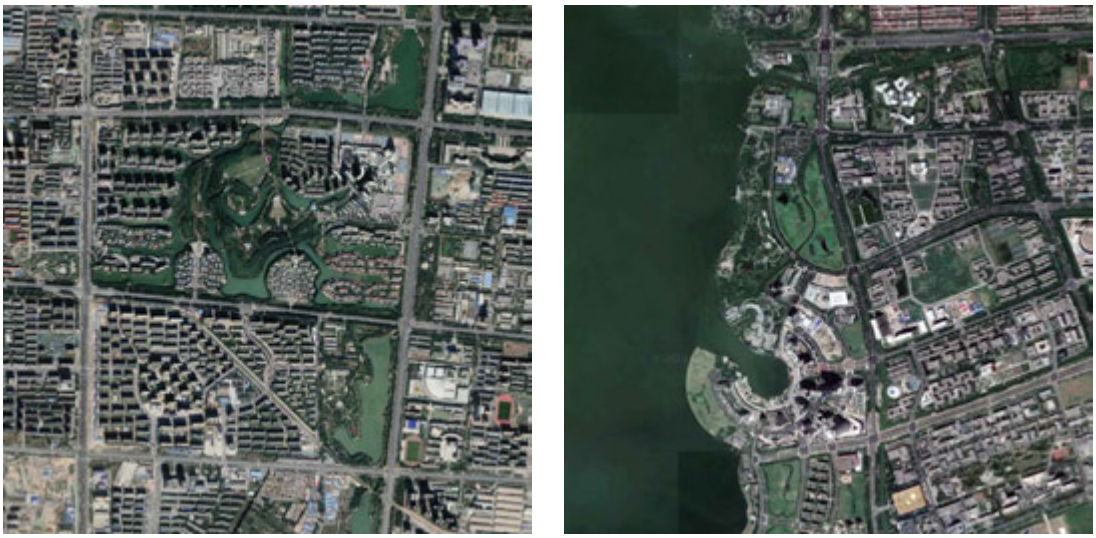


FIG. 4.2 Typical Urban Waterfront Developments in China .Source: ESRI
中国典型的城市滨水开发项目。资料来源：ESRI

4.1.3 – **Global Warming: Large Scale / Global Effects**
全球变暖：大尺度/全球影响

Urbanization is developing rapidly in the world today, the United Nations Population Division predicts that the urban population will account for two-thirds of the global population by 2050 (UN-DESA Population Division 2017). At the same time, the experience of urban development has fully explained its positive and negative effects.

Climate warming is one of the adverse effects of urbanization on the environment. According to the studies that have set the goals for the Paris Climate Change Agreement, the current global temperature has risen by an average of 1.1 °C compared to the pre-industrial figures. In the past 100 years, the average annual temperature of the whole earth has risen by 0.7 °C to 1 °C, while the average temperature of large cities has increased by 2 °C to 3 °C. The spread and development of urbanization have also impacted on agriculture, and the overall disadvantages outweigh the benefits. Other negative effects mainly include changes in the layout and structure of agricultural production, the spread of infestations and the increased use of chemicals, while annual fluctuations in agricultural production have increased.

当今世界范围内城镇化进程高速发展，联合国人口司预测2050年城市人口将占到全球人口的2/3。城市发展的经验已经充分说明了其正负两面的效应。

气候变暖是城镇化对环境造成的消极影响之一。有关专家称，当前全球气温比工业时代前的气温平均上升了1.1℃。近一百年来，整个地球的年平均气温上升了0.7℃～1℃，而大城市的平均气温上升了2℃～3℃。城镇化的发展对农业也产生着诸多影响，总体上弊大于利。其负面影响主要包括：农业生产布局和结构的变动；农业病虫害增多，同时也导致施肥量和农药施用量的增多；农业产量的年际波动增大。

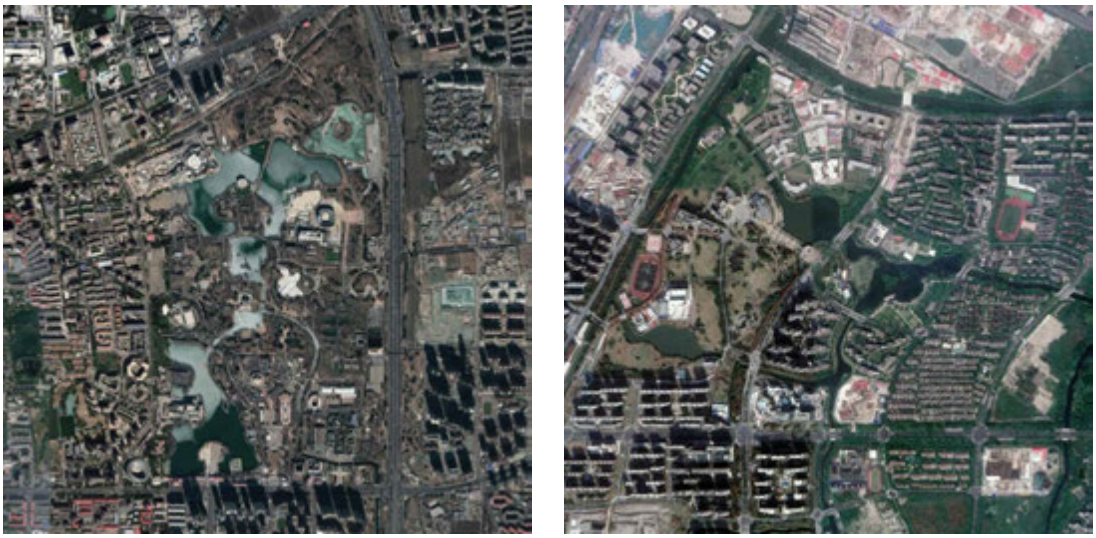


FIG. 4.3 Typical Urban Waterfront Developments in China .Source: ESRI
中国典型的城市滨水开发项目。资料来源：ESRI

Global warming also impacts, directly or indirectly, human health. The 2003 United Nations Framework Convention on Climate Change has pointed out that climate change has begun to endanger human health, and the number of deaths worldwide has exceeded 100,000 per year, possibly reaching 300,000 in 2030.

In addition, global warming will directly affect the world natural ecosystem, and will have a negative impact on the survival and development of human society. According to the analysis of scholar Chen Qingtai, developing countries will face negative impacts such as food and water supply shortages and infrastructure damage under such climate change trends.

全球气候变暖直接或间接地危害着人类的健康。2003年的《联合国气候变化框架公约》已指出，全球每年因气候变暖而死亡的人数将于2030年达到30万人之多。

此外，全球气候变暖会直接影响全球自然生态系统，会给人类社会的生存与发展带来负面影响。根据学者陈清泰的分析，发展中国家在这样的气候变化趋势下将面临食品短缺、水供应短缺、基础设施受到破坏等消极影响。

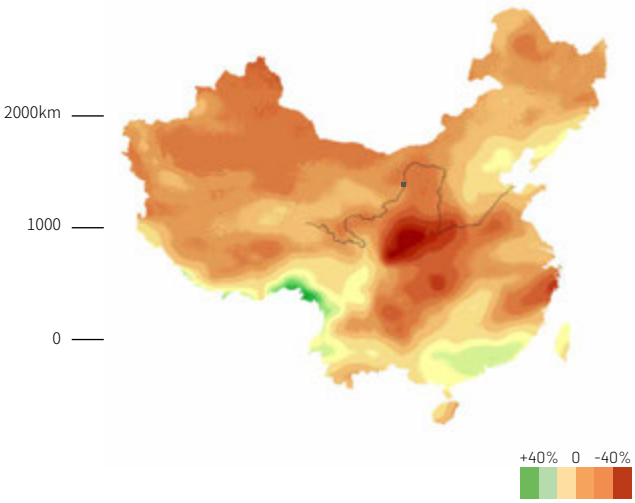


FIG. 4.4 Precipitation Change 2050 Scenario 2.6 Source: IPCC ESRI.

2050年降水量变化预测。资料来源：IPCC ESRI

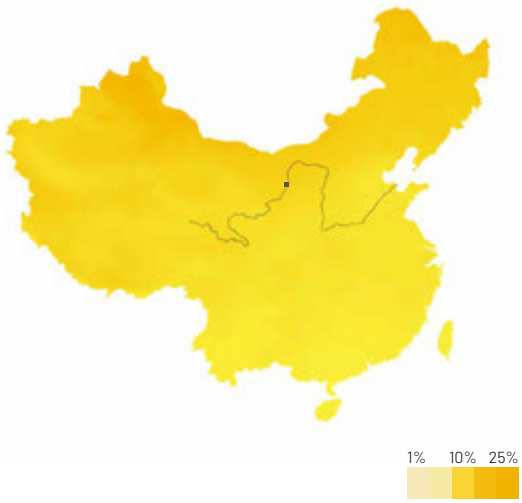


FIG. 4.5 Temperature Change 2050 Scenario 2.6 Source: IPCC ESRI.

2050年气温变化预测。资料来源：IPCC ESRI

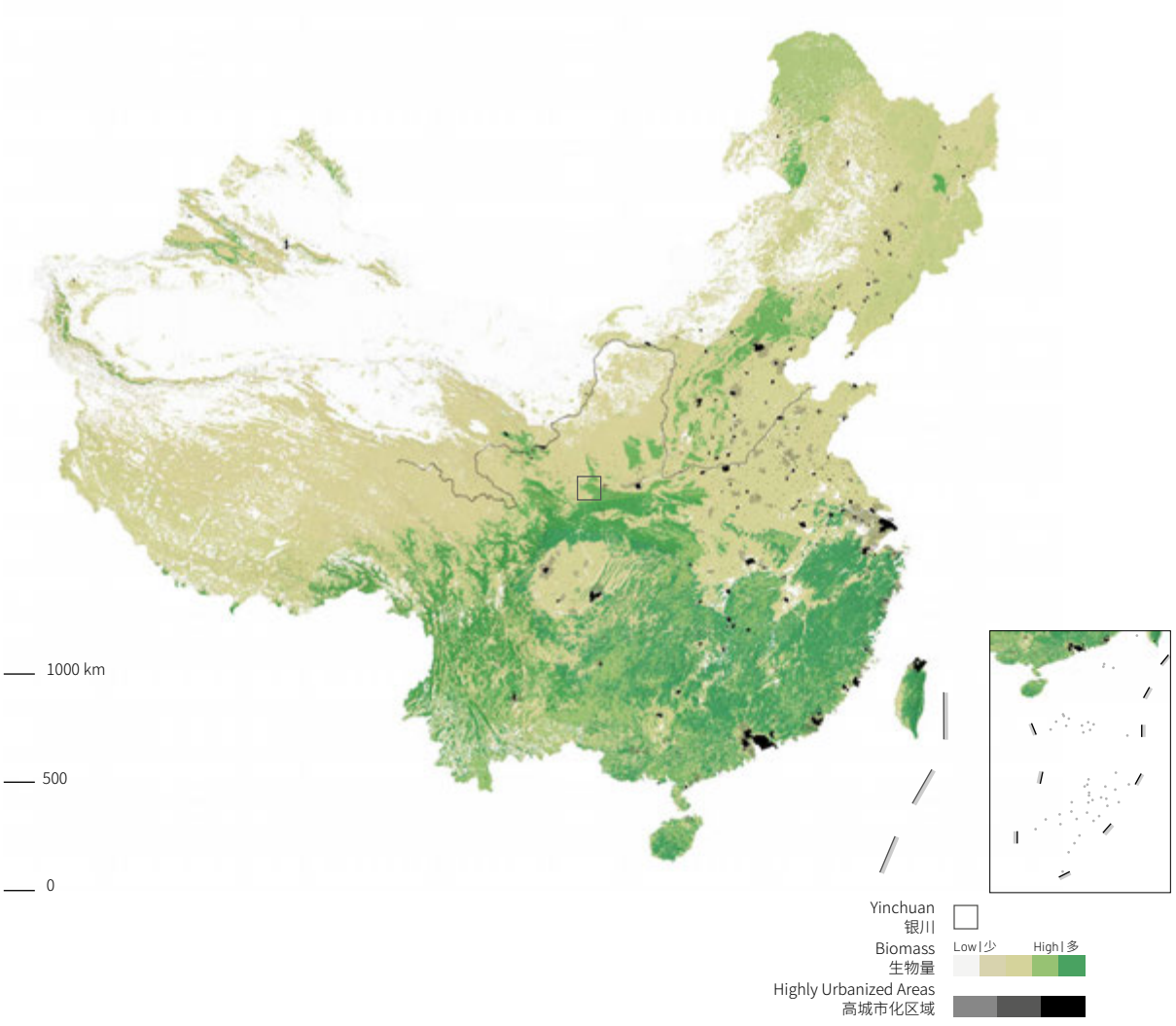


FIG. 4.6 Urbanization and Intensity of Green Surfaces (Biomass) Source: ESRI
城市化及绿化强度（生物量）。资料来源：ESRI

4.1.4 – **Global Warming and Yinchuan**
全球变暖和银川

Since 2000, Yinchuan's economy has developed rapidly, and the scale of urban construction has continued to expand. With the development of the city and economy, the local climate of Yinchuan has also experienced significant changes. The city's average temperature has increased as rapid urbanisation has enabled more people to enjoy urban life, but climate change can also negatively impact socio-economic development in the city.

According to the data, from 1951 to 2005, the annual average temperature in Yinchuan has risen, and the temperature increase was higher than the multi-year average. Before 1987, the yearly average temperature fluctuated around the multi-year average; after 1987, the average yearly temperature was significantly higher than the multi-year average and has continued to rise since. At the same time, the interannual changes in the "heat island effect" have increased significantly. From 1972 to 1980, the "heat island effect" became more and more prominent and then stabilised.

The change of urban construction land area is consistent with the shift in industrial output. The temperature of the urban impermeable ground is 6°C to 12°C higher than urban green space. Urban construction and an increase in density in Yinchuan has led to a rise in temperatures, especially in the city centre. When the building area increases sharply, the air temperature also increases. Similarly, correlating the data regarding construction intensity and temperature, it can be concluded that the change of urban construction land area is positively correlated with the temperature increase trend.

近20年来，银川的城市建设规模不断扩大，经济水平不断提高，气候也随之呈现非常明显的变化趋势。城市化的快速推进，在使更多人享受到城市文明的同时也对城市的社会经济发展产生了负面影响。

据资料显示，1951-2005年，银川市年平均气温在波动中不断上升；1987年前，年平均气温基本上在多年平均值附近波动；1987年后，年平均气温明显高于多年平均值，且在波动中不断上升。同时，“热岛效应”的年际变化也呈现出波动性；1972-1980年，“热岛效应”越来越明显，而后趋于稳定。

城市建设用地面积的变化与工业产值变化趋势基本一致。城市建设用地通常使用的不透水地面的温度比城市绿地高6°C—12°C。银川市城市建设面积及密度的增加，导致地面散热困难，最终导致城市区域内，特别是中心城区气温增高。当建筑面积急剧增加后，空气温度也随之升高。同样通过Spearman相关性系数可以得出城市建设用地面积增加与温度上升趋势呈正相关。

4.1.5 – **Water Scarcity: Arid Areas of Northwest China**
水资源短缺：西北干旱地区

China's water resources are vast but the water available per capita in China is reduced when compared to the world's figures. In Western China, there is a more significant stress on available water.

According to the data from 2017 issued by the National Water Resources Bureau, Tibet, Chongqing and Guangxi are water-rich areas, unlike Xinjiang, Sichuan, Yunnan and Guizhou which experience water-scarcity regularly. Ningxia and Qinghai are moderately water-deficient areas, whereas Shaanxi, Inner Mongolia and Gansu are experiencing a severe lack of water resources. Overall, the five provinces in the northwest and Inner Mongolia are mainly experiencing water shortages as resources become depleted while in the southwestern region, despite a highly engineered approach to water management, scarcity still exists. Additionally, water quality is of significant concern in these areas as cities continue to expand and demand increases.

Increasingly, there are issues with water waste in agricultural operations. Water waste in the agricultural sector is an extremely pressing concern. Due to inefficient irrigation technology, water use is unnecessarily high. The coefficient of water use in the regional irrigation canal system is only 0.40.

At the same time, surface water and groundwater near many cities in the western region are generally polluted, reducing the number of available water resources. At present, the rivers near Xi'an, Lanzhou, Chongqing Yinchuan and other cities are polluted.

尽管中国水资源总量大，但人均水资源占有量非常低，是一个水资源短缺的国家，西部地区水资源短缺问题更为严重。

根据国家水利局发布的《2017年中国水资源公报》数据显示，西藏、四川、广西等地水资源丰富，其他西部省份则不同程度地面临水资源短缺情况。将水资源短缺的地区进行再分类，青海、新疆等地可视为资源型缺水地区；宁夏、山西、内蒙古等地区则为资源过载型缺水区；水资源相对充分的西南地区，则存在工程型缺水的问题。

西部地区农业用水、工业用水和生活用水都存在水资源浪费的问题，其中农业对水资源的浪费最为严重。由于农业灌溉技术落后，西北地区灌溉渠系水的利用系数仅为0.4-0.5。

同时，西部地区许多城市附近的地表水和地下水普遍受到了污染，减少了可用水资源的数量。目前，西安、兰州、重庆、银川等城市附近的河流均有污染问题。

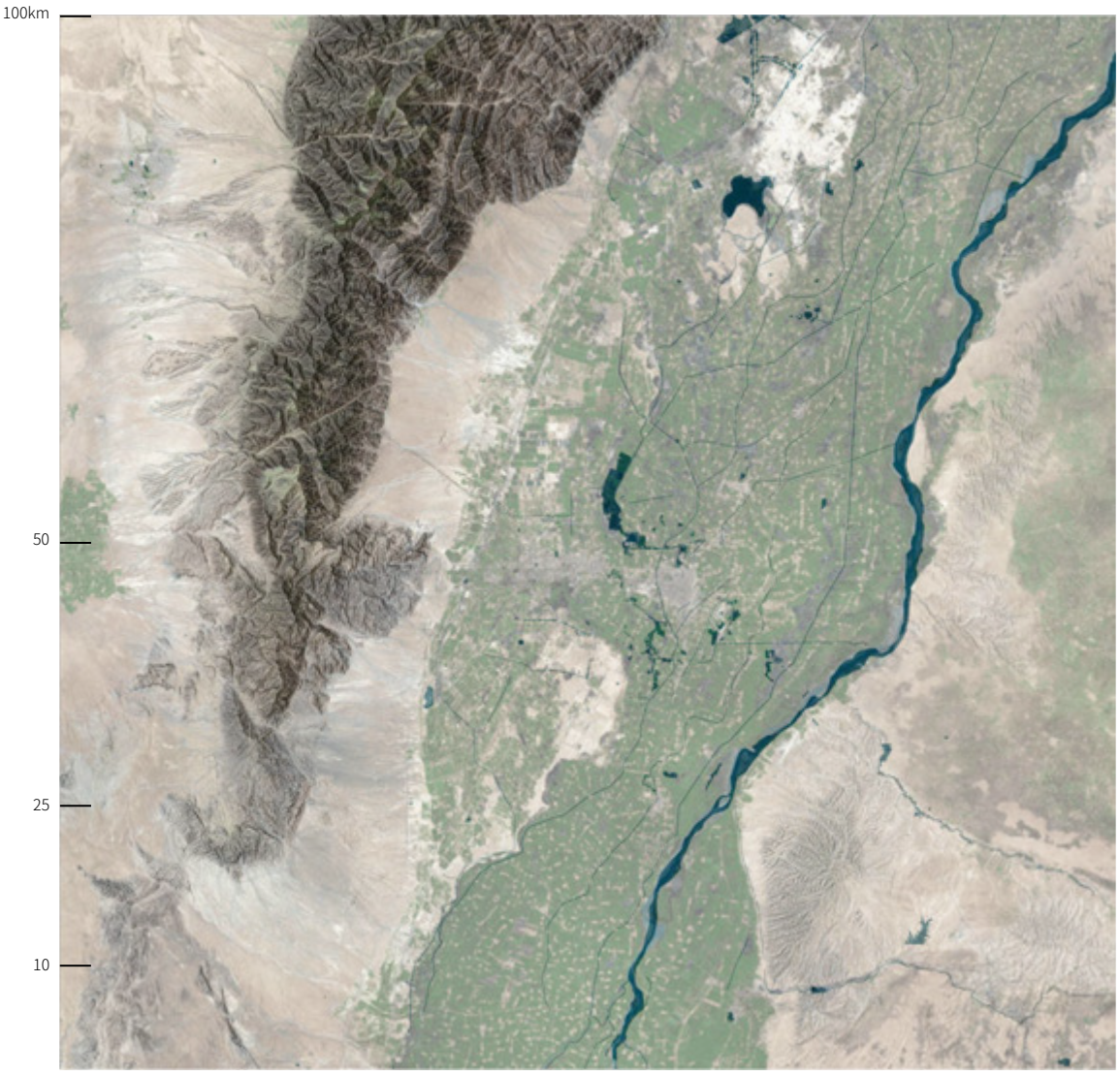


FIG. 4.7 Location and Natural Environment of Yinchuan City. Source: ESRI
银川市位置与其自然环境。资料来源：ESRI

4.1.6 – **Water Scarcity and Yinchuan**
水资源短缺和银川

Yinchuan is in the arid north-western region of China with an average annual rainfall of 200mm. However, humidity levels have significantly increased due to a large irrigation area near the Yellow River, where annual evaporation is approximately 1149mm (generally below 1200mm). Precipitation is unevenly distributed during the year, and seasonal changes are more pronounced than interannual changes. Precipitation is concentrated from June to September, and it is rare from November to March. This concentrated period of rain often results in floods which are restricted to detention areas and a flood discharge channel, forming part of the surface water.

Water resources in Yinchuan are mainly from surface water and groundwater. In recent years, the total amount of water resources has remained relatively stable except for a significant increase in precipitation in 2012. Water supply from the Yellow River has been decreasing annually, especially since the implementation of a stringent water management system in Yinchuan in 2014.

Overall, water in Yinchuan is unevenly distributed, characterised by low per-capita access and excessive water use by the agricultural sector.

According to the forecast of economic and social development, in 2020, there will be a situation where the demand for water will largely exceed the allocation of water resources. Not to mention the cases of over-exploitation of groundwater, especially in areas where industrial and agricultural production is predominant.

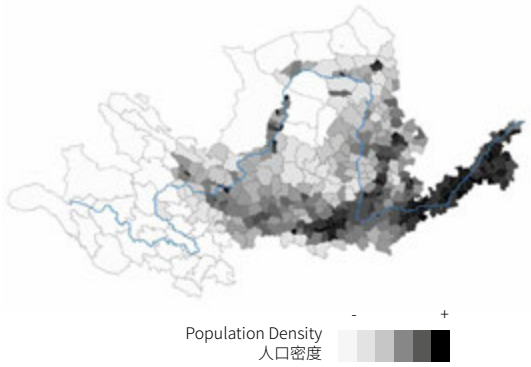
银川市位于干旱的中国西北地区，年平均降雨量仅为200mm。降水基本集中在6-9月，11月至次年3月降水量很少，年内分配不均匀，季节变化较年际变化突出。集中降水主要引入滞洪区和泄洪沟道，形成了部分地表水。然而，由于黄河流域的灌溉面积较大，银川平原水体表面积大，每年的蒸发量达1149-1200mm。

银川市水资源主来自黄河，但黄河供水正在逐年减少，特别是自2014年实施了严格的水资源管理系统以后。

总体而言，银川市水资源存在分布不均、人均占有量低、农业耗水量大的特点，并呈现出水资源缺乏的趋势。根据经济社会发展布局预测，2020年将会出现需水量大于水资源配置量的情况，出现巨大缺口。同时银川市部分地区还出现地下水超采的情况。在工农业生产较发达的地区，深层地下水超采严重。

Yellow River Basin 黄河流域

Total Drainage Surface km² 总排水面积	752,000
Population 人口	166,361,430
Number of Municipalities 市镇数量	442



1 Lanzhou 兰州

Urban Built-up km² 城市面积	221
Population 人口	3,279,600
Annual Rainfall (mm) 降水量	227
Annual Evaporation (mm) 蒸发量	1,410
Groundwater Content (m³) 地下水储量	2,700,000,000

2 Yinchuan 银川

Urban Built-up km² 城市面积	166.8
Population 人口	2,191,000
Annual Rainfall (mm) 降水量	203
Annual Evaporation (mm) 蒸发量	1,757
Groundwater Content (m³) 地下水储量	1,100,000,000

3 Baotou 包头

Urban Built-up km² 城市面积	360
Population 人口	2,100,000
Annual Rainfall (mm) 降水量	296
Annual Evaporation (mm) 蒸发量	2,265
Groundwater Content (m³) 地下水储量	7,700,000,000

4 Yan'an 延安

Urban Built-up km² 城市面积	36
Population 人口	2,552,000
Annual Rainfall (mm) 降水量	507
Annual Evaporation (mm) 蒸发量	1,576
Groundwater Content (m³) 地下水储量	4,200,000,000

5 Louyang 洛阳

Urban Built-up km² 城市面积	209
Population 人口	6,800,000
Annual Rainfall (mm) 降水量	578
Annual Evaporation (mm) 蒸发量	1,200
Groundwater Content (m³) 地下水储量	16,700,000,000

6 Zhengzhou 郑州

Urban Built-up km² 城市面积	443
Population 人口	9,881,000
Annual Rainfall (mm) 降水量	636
Annual Evaporation (mm) 蒸发量	1,130
Groundwater Content (m³) 地下水储量	7,800,000,000

7 Ji'nan 济南

Urban Built-up km² 城市面积	310
Population 人口	7,233,100
Annual Rainfall (mm) 降水量	671
Annual Evaporation (mm) 蒸发量	1,420
Groundwater Content (m³) 地下水储量	12,100,000,000

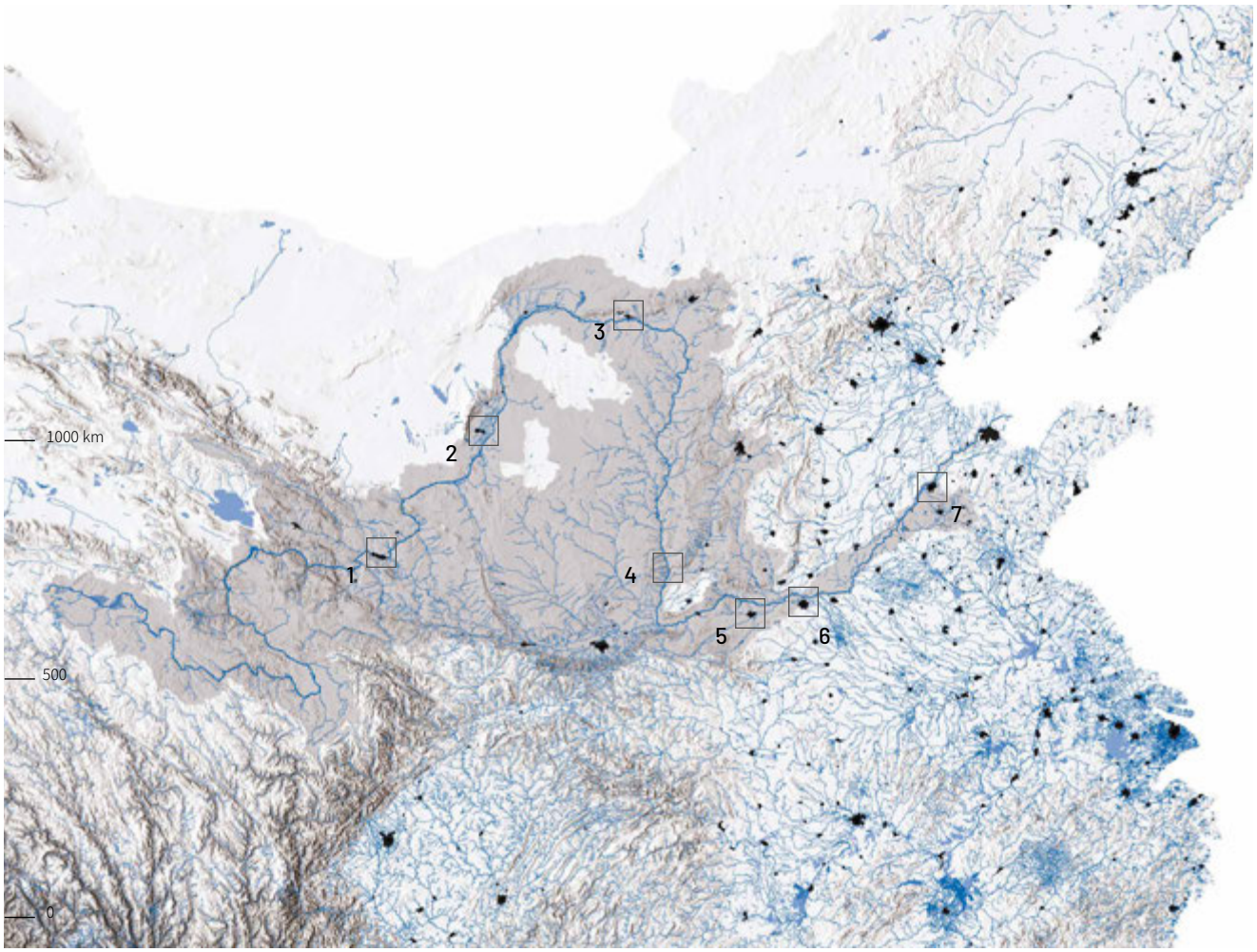


FIG. 4.8 Urbanization and the Use of Water Resources on the Yellow River Basin Source: Author's Own with Data from ESRI / Open Street Maps
黄河流域城镇化及水资源利用。资料来源：据ESRI和Open Street Maps资料自绘

4.1.7 – **Rapid Urbanisation: Chinese Trends**
中国的快速城镇化趋势

Urbanisation mainly refers to the process of agglomeration of large populations of people and non-agricultural industries in cities. After 1949, China experienced an extreme urbanisation process. It was not until 1979 that policy reform was implemented, and urbanisation took on a different form. Since the 1990s, economic growth in China has led to a period of rapid urbanisation. This process has affected labour markets in China's agricultural sector as people have shifted to the non-agricultural sector, accelerating China's economic, social and spatial transformation. Living conditions, public services and infrastructure have also improved significantly.

This process of urbanisation has mostly occurred over the last 30 years. In 1980, the rate of urbanisation was only 19.39%, far behind the global average. In 1990, China's urbanisation rate reached 26.44%, and the urbanisation rate rose to 49.95% in 2010. Additionally, this new urban population mainly comes from rural areas, some of which are local farmers, but most of them are migrants from rural areas.

The inter-provincial differences in urbanisation rates are significant in China's vast territory, and the level of economic development in various places has always varied. Since 1990, coastal areas have taken advantage of their favourable location to integrate into the process of economic globalisation. Due to the rapid economic growth in the coastal areas, large numbers of people from rural areas have been attracted to these central and western regions. This characteristic has dramatically accelerated the pace of urbanisation and led to significant inter-provincial differences in urbanisation levels.

城镇化主要是指大量人口和非农业产业向城市集聚的过程。1949年后，中国经历了一个极端的城镇化进程。直到1979年改革开放政策得以实施，城镇化的形式也有所不同。自20世纪90年代以来，中国由于经济高速发展而进入了快速的城镇化阶段。这一过程推动了中国农业劳动力向非农业部门的转移，也相应地带来中国经济、社会乃至气候和自然环境上的改变。

中国城镇化的进程主要发生在过去几十年间。其城镇化率1980年为19.39%，1990年达到26.44%，又经过持续高速发展，2018年达到了59.58%。新增的城市人口一部分来自就地转化的农民，而大部分则是来自农村的流动人口。

中国幅员辽阔，城镇化水平的省际差异显著，各地方的经济发展水平也参差不齐。1990年以来，沿海地区利用良好的区位和人文环境条件，率先融入经济全球化的进程，并吸引大量中西部农村人口，至今两类地区仍存在显著的城市发展差异。

In a fast-growing economy, where urbanisation occurs over a shorter period, the "time compression" effect of rapid development can severely impact the city and its population. In developed countries, urbanisation has occurred progressively over the past century and a half. In China, however, the period of fast growth and urbanisation has been concentrated in a period of 30 years, severely impacting cities and its residents.

在经济高速发展的同时，也有一些城镇化问题出现：跨越式发展产生的"时间压缩"效应。在发达国家的经验中，城镇化过程普遍在过去一个半世纪中逐渐发生，但中国在三十多年间保持经济与城镇化水平的高速增长，给城市与人民带来了从未认识到的问题。

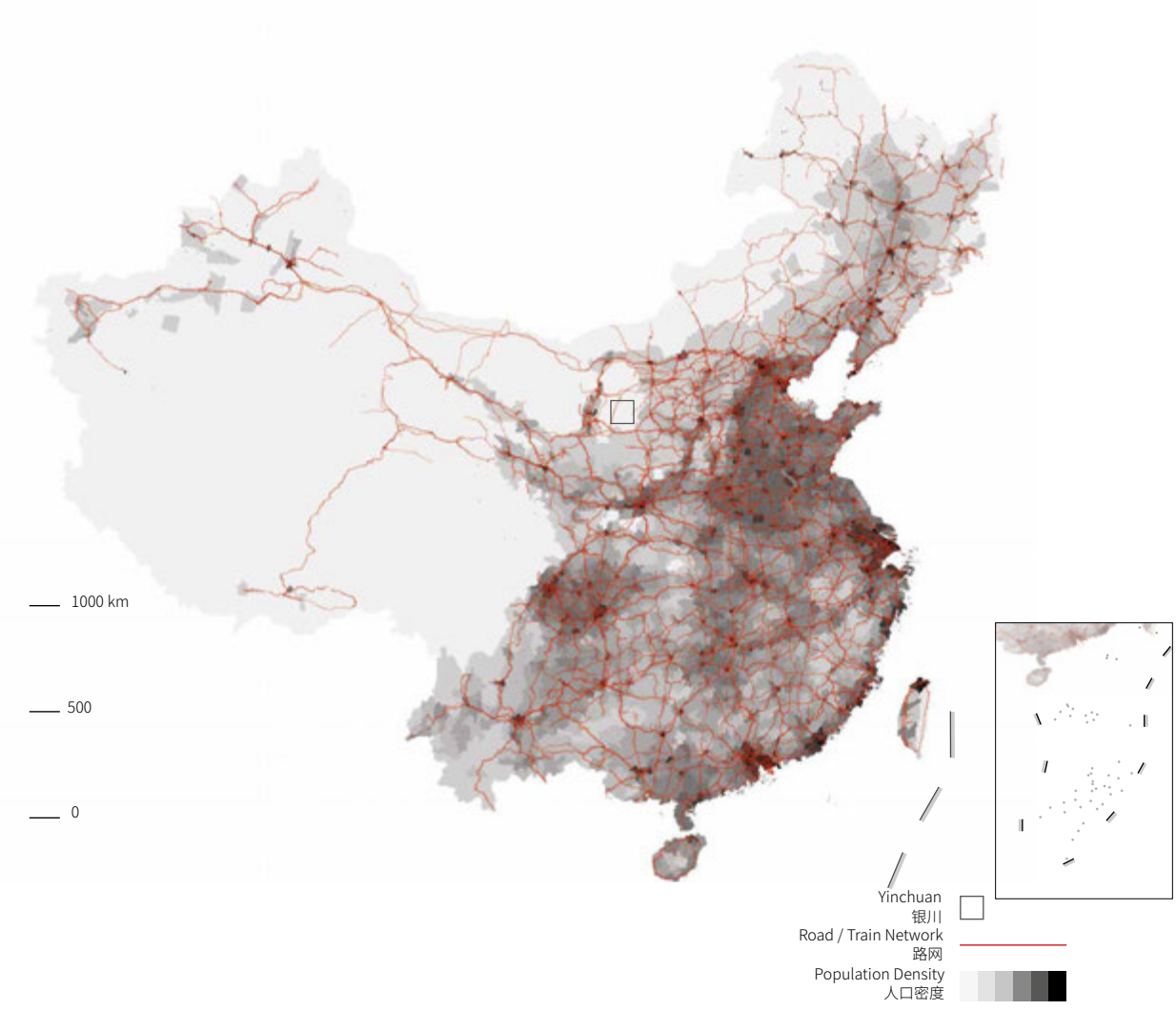


FIG. 4.9 Urbanization in China, Population Density and Structural Network. Source: ESRI / Open Street Maps
中国城镇化、人口密度、结构网络。资料来源：ESRI / Open Street Maps

4.1.8 – **Rapid Urbanisation and Yinchuan (Discussion of the Current Process of City Expansion)**
银川的快速城镇化（关于近期城市扩张进程的探讨）

The urbanisation process of Yinchuan is affected by macro policies administered by the state and the autonomous region. It can be roughly divided into three stages since the founding of the country: recovery, volatility, and enthusiasm (1949-1977), steadily rising stage (1978-1999) and rapid development stage (2000-present). From 1978 to 2009, with the development of urbanization level in Yinchuan, urban construction land expanded year by year. Moreover, the growth rate of urban construction land in Yinchuan is significantly higher than the growth rate of the actual urban population.

The intensity of constructible land expansion is also an important indicator of land use. This intensity is generally measured by the absolute expansion intensity (increased area of construction land/total area of construction land) and relative expansion intensity (annual growth rate of construction land/ annual growth rate of urban population). According to this calculation, the absolute expansion intensity of urban construction land in Yinchuan from 1978 to 2009 was 0.7, and the relative expansion intensity was 1.69, which was slightly higher than the reasonable expansion limit of 1.12. According to the research data of the China Urban Planning and Design Institute, a reasonable expansion rate of a city is 1.12). Among them, the relative expansion intensity between 1978-2002 was 0.82, which was considered reasonable. The relative expansion intensity in 2002-2009 was 4.04, and the urban expansion speed was too fast, and many urban problems may occur.

银川市的城镇化进程受国家及自治区宏观政策的影响，自建国以来可大致划分为3个阶段，恢复、波动、徘徊阶段（1949-1977年）、稳步上升阶段（1978-1999年）、快速发展阶段（2000年至今）。从1978年至2009年，银川市随着城镇化水平的发展，城市建设用地规模逐年扩大。并且，银川市城市建设用地面积的增长速度明显高于市区实际人口的增长速度。

建设用地扩张强度也是土地使用的重要指标之一，一般用绝对扩张强度（建设用地增加面积/建设用地总面积）和相对扩张强度（建设用地年均增长率/市区人口年均增长率）来衡量。据此计算银川市区1978-2009年城市建设用地绝对扩张强度平均为0.7，相对扩张强度为1.69，略高于合理扩展限度1.12（根据中国城市规划设计研究院的研究资料显示，一个城市合理的扩张强度为1.12）。其中，1978-2002年相对扩张强度为0.82，在合理的扩展范围之内；2002-2009年相对扩张强度为4.04，城市扩张速度过快，出现了许多城市问题。

Since 2002, the expansion of urban construction areas in Yinchuan has entered an accelerated period. The Xingqing District is still the main area for urban expansion, as it is an area located next to the Yellow River, at the east of the Tangyu Canal. Urban development and the protection of farmland around the city have always been in conflict. Although urban planning strategies have strictly controlled development, expansion is continuing at a rapid and sometimes uneven, pace. Some construction projects have even begun to take place in areas outside the jurisdiction of urban planning zones, particularly on land previously used for agriculture.

The development of many cities in China is based on development zones. In economically underdeveloped regions, this phenomenon is more prominent. Due to the influence of the national "development zone fever", Yinchuan has also seen an unprecedented "enclosure movement". Since 2002, it has developed and built a comprehensive development zone such as the Yinchuan Economic and Technological Development Zone. As the region with a healthy investment environment and rapid economic growth, the contribution rate to Yinchuan's economy is as high as 40%, which is an important source of urban economic development. At the same time, however, the "enclosure movement" of the development zone has also revealed the hidden dangers of this type of land use. Yinchuan's large and small development zones cover an extensive area expanding tens of square kilometres, causing a large amount of farmland to be occupied. A large part of the urban land has not been developed and constructed, due to the occupation of some real-estate development enterprises that have been idle for a long time, which has caused considerable losses in precious land resources.

2002年以来银川市城市建设用地扩张进入了加速时期，扩张速度是之前的数倍，城市发展建设占用了中心城区周边大量耕地。其中，兴庆区坐落在唐徕渠以东的引黄灌溉良田范围内，城市用地的发展需求与城区周围的农田保护存在严重的矛盾与冲突。历次的城市规划虽然对其用地发展做出了严格控制，但实际上扩张趋势仍在继续。有些建设项目开始随意侵占城市规划区以外的用地，特别是耕地。

中国许多城市的发展都以开发区为基本建设模式。在经济欠发达地区，这种现象更为突出。受到国家"开发区热"的影响，银川也出现了前所未有的"圈地运动"。2002年银川成立的银川经济技术开发区，属于投资环境健康、经济快速增长的地区，对银川经济的贡献率高达40%，是城市经济发展动力的重要源泉。然而，与此同时，开发区的"圈地运动"也揭示了这种土地利用方式的隐患。银川的大小开发区覆盖数十平方公里的广阔区域，占用了大量的农田。一些企业占用和房地产开发的用地长期闲置，造成了宝贵的土地资源的浪费。

4.1.9 – **Current Scenario**
银川市滨水空间的现状

The brief review of global, national and local trends regarding climate change and water scarcity associated with urbanisation figures presented in the previous pages points out to an aggravated scenario. The current setting of trends presents a future (present) scenario for Chinese cities and Yinchuan where the exhaustion of natural resources will be associated with the worsening of quality of life for their inhabitants as a consequence of the changes in the urban and natural environment.

前文对城镇化问题、气候变化和水资源短缺在全球、国家和地方表现趋势的简要回顾，揭示了一个日益严峻的城市建设发展状况。包括银川在内的诸多中国城市，城市无序扩张都可能给其带来自然资源枯竭、居民生活质量恶化等问题。

FIG. 4.10 Urbanization in Yinchuan and the Typical Waterfront Configuration.
银川的城镇化和典型的滨水空间配置

In this scenario, it is clear that the role of urban waterfronts in Yinchuan must be reassessed and water extraction from the Yellow River, which has historically been the primary asset for the region's development, also has to be revisited. The aim defined by this scenario for both research and design exploration, is to find alternatives for waterfront spaces from a future-proof perspective, learning from historic practices in the use of limited water resources and at the same time responding to the authorities and population wishes for a developed and prosperous urban environment in Yinchuan

在这种情况下，必须重新评估城市滨水空间在银川的作用，重新审视城市滨水空间与黄河水资源的关系，因为黄河水资源历来是该地区赖以发展的主要资源。本次研究和设计探索的目标，是从未来的角度寻找滨水空间的合理方案，通过总结有限水资源条件下的本土发展经验，回应地方政府和民众对发达和繁荣城市环境的期望。

FIG. 4.11 Urbanization in Yinchuan and the Typical Waterfront Configuration.
银川的城镇化和典型的滨水空间配置

4.2 – Design Method

4.2 – 设计方法

4.2.1 – **Research through Design**
通过设计的研究

In the field of urbanism and its related disciplines, landscape architecture, urban design and planning, spatial design is a core activity oriented towards generating solutions for urban and rural areas or exploring potentials by creating conditions for spatial, ecological and social developments. In an academic context as well as in practice, spatial design is increasingly used and acknowledged as a form of research, often referred to as Research through Design (RTD).

RTD can be regarded as a powerful research strategy in which complex spatial problems are approached in a creative, integrated manner (Nijhuis et al. 2017). In many cases, the exact problem is not apparent in advance. Design – conceiving of a spatial solution – can help to define problems further and to search for integrated solutions at multiple scale levels. The researcher-designer answers knowledge questions by visualising and testing spatial solutions. During the design process, designers make choices based on their specialised knowledge, the context and the situation. The targeted search plays a central role within a process in which thinking and producing go hand in hand. Mechanisms of research and design are combined with imagination, creativity and innovation. RTD is not so much about the actual design as it is about the use of design thinking to explore possibilities and to solve problems. RTD thus involves more than merely creating a design; it is a systematic search for answers in which possible solutions are made explicit (Nijhuis 2018).

在城市规划学及其相关学科，如风景园林学、城市设计领域，空间设计是一项核心活动，旨在为城乡地区的各种功能提供解决方案，或通过创造空间、生态和社会发展条件来促进活力。在学术语境和实践中，空间设计越来越多地被使用，并作为一种研究形式，这一方法理论通常被称为通过设计的研究（RTD）。

RTD可被视为一种强有力的研究策略，它以创造性的、综合的方式探讨复杂的空间问题（Nijhuis等人，2017）。在许多情况下，具体的问题并不会提前显露。设计（构思一个空间解决方案）有助于进一步明确问题，并在多个级别上寻求综合解决方案。研究型设计师通过可视化和空间构建的解决方案来回答知识型问题。在设计过程中，设计师根据他们的专业知识、背景和情况做出选择。有针对性的探索在思考和产出这一相辅相成的过程中发挥着核心作用。研究和设计的机制是与想象力、创造力和创新性相结合的。RTD与其说是关于设计方法，不如说是利用设计思维来探索各种可能性和解决问题的方法。因此，RTD的内容不仅仅包括创建一个设计，它更是对答案的系统性探索，在这个答案中，可能的解决方案是明确的（Nijhuis，2018）。

As an action, RTD consists of structuring through a creative process that involves the interaction of reason and emotion and that focuses on visual thinking and communication. Structuring refers to the intuitive or rationally supported spatial translation or transformation of conceptual, contextual or programmatic properties. The conscious or unconscious synthesis that emerges through this process is precipitated in some way into a visual form through drawing, charting or modelling involving the use of analogue and digital media. Visual thinking is essential to the generation of knowledge and ideas through the creation, inspection and interpretation of the representation of that which has not previously been visible. Visual communication entails the effective transfer of ideas into visual form (Nijhuis 2018). Given these specific properties, RTD can be seen as an intellectual tool for structured thinking and action aimed at the acquisition of practical-productive knowledge (Cross 2007).

作为一种行动，RTD包含一个基于创造性过程的结构关系，该过程涉及理性和情感的相互作用，并侧重于视觉思维和交流。结构关系是指直观或合理地空间转译，或是概念性、语境背景或程序内容的转换。在这个过程中出现的有意识或无意识的综合想法，通过绘图、制图或建模，及其它模拟和数字媒体方式所形成的视觉形式来表达的。通过创造、检查和解释前所未见的表现来产生知识和思想，视觉思维在这一过程中是至关重要的。可视化交流需要将想法有效地转化为视觉形式（Nijhuis，2018）。鉴于这些特性，RTD可被视为结构化思维和行动的智能工具，旨在获取实用生产性知识（Cross，2007）。

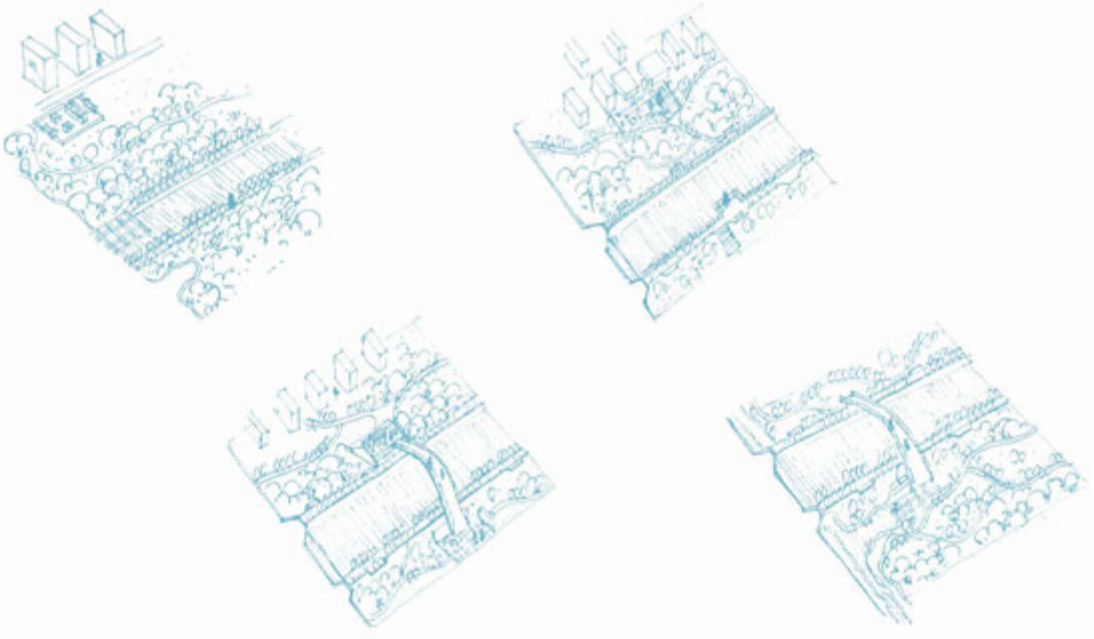


FIG. 4.12 To Convert a Synthetic Idea into a Visual Form through Drawings.
通过绘图将综合想法以视觉形式表达

In this respect, RTD is a way to understand where action, observation and searching are used methodically in order to arrive at new insights. Such new insights or knowledge can take on a variety of forms, specific to a given location or more generic (e.g. design principles, typologies), but always practically applicable in some way. The results of RTD are not necessarily objective, although they must be characterised by integrity and validity. RTD is not about the truth, but about practical feasibility. Combining the application of a spatial designer's expertise with a precise manner of testing creates an element of intersubjectivity that forms the foundation for general applicability. Although a designer can create a unique spatial solution, generally applicable principles can be derived from the design experiments. The assignment for designer-researchers is to work in a manner that meets the requirements for proper research: it is targeted, reliable, consistent, transparent and usable (Nijhuis 2018).

在这一方面，RTD是一种理解如何有效地使用行动、观察和调查来获得新见解的方法。这些新的见解或知识可采用各种形式，可以特定于一个特定的地点，也可以更具通用性（例如设计原则，类型），但在某种程度上总是实际适用的。尽管RTD的结果必须以完整性和有效性为特征，但它不一定是客观的。RTD不是关于事实，而是关于实际可行性。它将空间设计师的专业知识应用与精确的测验方式相结合，创造了一种交互主体性的元素，从而形成了普遍适用性的基础。虽然设计师可以设计出独特的空间解决方案，但适用的原则通常可以从设计试验中推导出来。研究型设计师的任务是以满足适当研究要求的方式工作：它具有针对性、可靠性、一致性、透明性和可用性（Nijhuis，2018）。

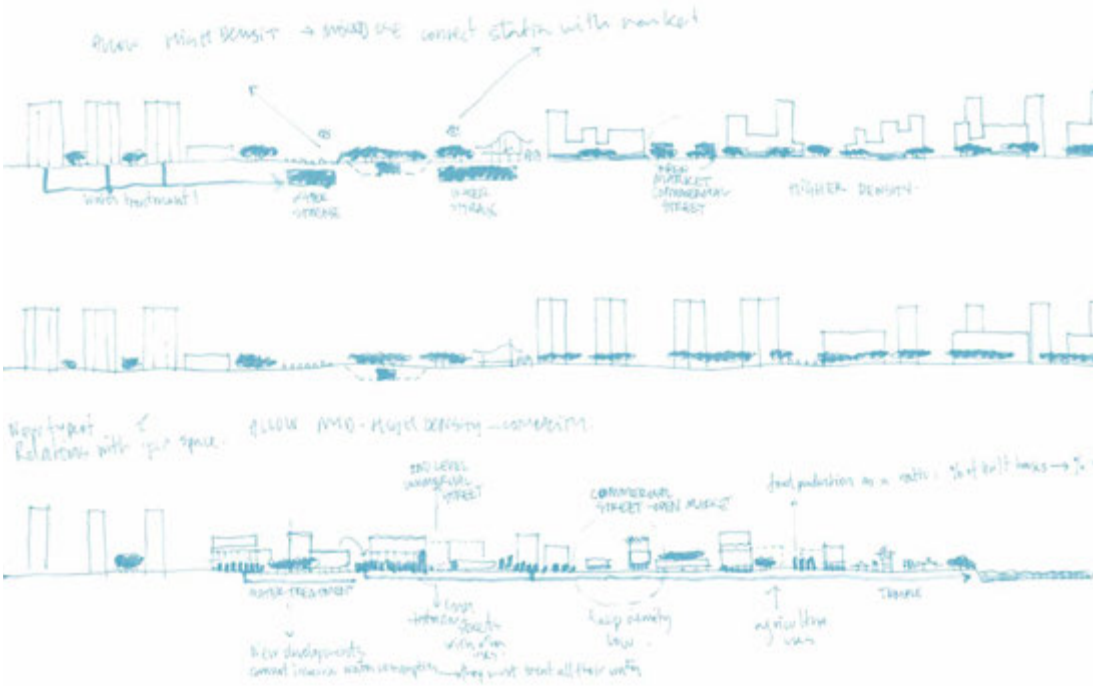


FIG. 4.13 To Do Design Experiments to Derive Design Solutions by Drawing.
通过方案草图进行设计探索实现设计方案的推进

4.2.2 – **Conceptual Design as an Approach**
概念设计作为一种方案构思方法

During the workshops in Yinchuan and Beijing, the design students worked with a method, which we call Conceptual Design. One can ask whether it is a method or merely an approach where the "Concept" plays an essential role in the process of design.

Most non-designers are not aware of the need or existence of this key element. Clear and tangible parts of the process are the assignment accompanied by a measurable program and a final design which is constructible. Anything beyond this lies in the designer's creative expression.

However, in the design process, there are often key elements that structure the whole process. The concept is one of them and is a crucial element. The definition of the concept in itself is a concept. Non-designers call a concept the first draft or the first outcome in a productive process. Designers call the concept the fundamental base of subsequent design solutions. The Central Idea is another term used for this. So, by this definition, the concept is not the early stage of the design itself. It is the fundament upon which the designer can make design decisions.

In the publication "How Designers Think" (1997), Brian Lawson describes the concept as:

....These primary generators, however, often do much more than simply get the design process started. Good design often seems to have only a very few major dominating ideas which structure the scheme and around which the minor considerations are organized. Sometimes they can be reduced to only one main idea known to designers by many names but most often called the 'concept' or 'parti'.

在银川和北京举行的研讨会期间，参与设计工作营的学生使用了一种方案构思方法，我们称之为概念设计。实际上，人们会问这是否是一种理论方法，还是仅仅是一个"概念"在设计过程中起重要作用的构思途径。

大多数的非设计师并不知道这个关键元素的寻求或存在，并将这个神秘的设计过程称为黑盒子。设计过程中清晰和有形的部分是具有可衡量的指标计划和可实施的最终设计任务，除此之外，一切都在设计师的创作范围。

然而，在设计过程中，一些值得信赖的决策和锚固点将构建整个过程。"概念（concept）"就是其中的一个，也是重要的一个因素。"概念"的定义本身就是一个概念。非设计师们将"概念"称为生产过程中的初稿或第一个设计成果。而设计师则将"概念"称为即将到来的设计解决方案的基础。"中心思想"是用到的另一个术语。因此，根据这个定义，"概念"不是设计本身的早期阶段，而是设计师做出设计决策的基础。

在《设计师如何思考》（1997）一书中，布莱恩·劳森将这个概念描述为：

…然而，这些主要的生成器通常不仅仅是简单地启动设计过程。好的设计似乎通常只有极少数主要的主导思想，这些思想构成了方案的结构，并将围绕主导思想的次要因素组织在一起。有时它们可以简化为设计师通过许多名称知道的一个主要想法，但通常称为"概念"或"主意"。

Lawson refers to "primary generators". That is a term which emerged from the research of Jane Darke published in 1979. Based on a range of interviews with British architects who designed dwellings, Darke discovered the same recurring element in the different design processes. These architects tended to select and simplify just a few objectives to reach an initial idea and by doing so deliberately limiting all the possible design varieties. Moreover, this is done at an early stage of a project. Darke's formulation of "primary generators" is a kick start for the design process. A generator can even be a group of related concepts.

Designers must learn to formulate, draw and express concepts in a broad range of ways. Designers must learn to think conceptually. They are intelligently simplifying the essence of the design challenge. The concept can be materialised and expressed in every form and manner needed. In Yinchuan, we used drawing to express and clarify the concept of The Garden.

Thinking about the situation in Yinchuan, with an enormous amount of non-used green public space, we came up with the concept of The Garden. A concise idea about the meaning of public space. The Garden became an alternative or addition of a concentrated and meaningful place. That worked, mostly as a primary generator for the design process. However, we did not know how controversial the concept of gardens was. We discovered many different fundamental opinions about the meaning, history and typology of the garden between the Chinese and Western students and designers (including the staff). However, this made our discussion even richer.

劳森提到的"主要发生器",是简·达克在1979年出版的研究中出现的一个术语,它是在对英国设计住宅的建筑师进行一系列访谈的基础上,发现在不同的设计过程中出现相同的重复元素。这些建筑师倾向于选择和简化一些目标以达到最初的想法,并通过故意限制所有可能的设计变化去实现这样的过程。这是在项目的早期阶段完成的。达克的"主要生成器"的制定是设计过程的一个开始,而生成器可以是一组相关的概念。

设计师必须学会规划、绘制和表达各种各样的概念,必须学会以概念的方式去思考,也必须学会智慧地简化设计作为挑战的本质。这个概念可以用任何需要的形式和方式具体化和表达。在银川,"花园"作为概念被提出,并用图示语言作为表达方式。

考虑到银川拥有大量的不被人们使用的绿色公共空间,我们提出了花园的概念。这是一个关于公共空间含义的简化思想。花园赋予场地主题,是聚焦富于意义的地方。这显然是有效的,并且能够作为设计过程的主要生成器。然而,事先我们不知道花园的概念会产生那么多的争议。在中西方学生设计者(包括教师)之间发现了许多关于花园的意义、历史和类型的这些基本观点的差异,这也使得我们的讨论更加丰富。

The following diagrams explain the position of the concept in the design process.

The axes in the diagram are Abstractness and Progress. Abstractness is the indication for the non-measurable, the subjective and the more value-framed part of the design process. Progress is the indication for the process in time.

Diagram 1 shows a simple chart with the linear "Black Box" process as often perceived by non-designers.

Diagram 2 shows the many components of the design process with the analysis, vision, concept and the model-phase on different levels of abstractness. The concept is on a high level of abstractness because it is a simplification of reality. The level of experience of the designer (Darke 1979) and the understanding that the analysis is a subjective activity, will push the concept higher in abstractness and will make it more useful as the fundamental base for design decisions.

下图说明了"概念"在设计过程中的位置。

图中的纵横两轴分别指的是抽象性和进度。抽象性是设计过程中不可测量的、主观的和更有价值框架的部分，进度是指设计过程中各阶段的准时性。

图1展示了一个简单的图表，其中包含非设计师们经常察觉到的线性的"黑盒子"过程。

图2显示了设计过程的许多组成部分，包含分析、愿景、概念和不同层次的抽象模型，这个"概念"具有很高的抽象性，因为它是对现实的简化。设计师的经验水平（Darke，1979）以及分析是一种主观活动，这都会将"概念"推到更高层次。

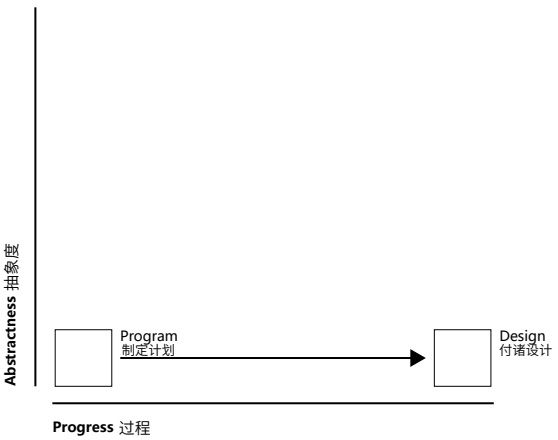


FIG. 4.14 Diagram 1 - Linear Design Process
线性设计过程

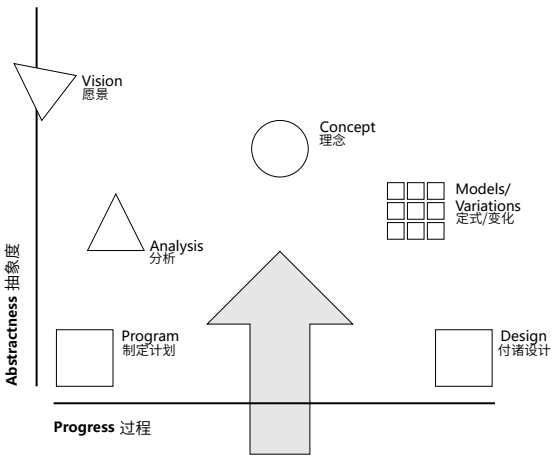


FIG. 4.15 Diagram 2 - Components of the Design Process
设计过程的组成部分

Diagram 3 shows that the concept, as the fundamental base of upcoming design solutions, is constructed on the basis of a) the interpretation of the program, b) the outcome of the analysis of the context and the program and c) the holistic or specific, professional or private vision of the designer him/herself. By testing the premises of the concept in the model-phase, the design will crystalise and descent into reality: the more models, the better.

Diagram 4 shows the never-ending design process as a spiral-like, iterative process. It only comes to a halt with a certain degree of acceptance (which is fundamentally different from the process of making art).

图3显示了“概念”作为设计解决方案的基础和前奏，是在以下基本条件上构建的：a）对项目计划的解释，b）对背景文脉和项目计划的分析结果，以及c）整体性或特殊性，来自设计师本人的专业性或个人愿景。通过在模型阶段对“概念”的敷形测试，设计将被具体化落实并实施。在这个过程中，模型越多越好。

图4显示了永无止境的设计过程，它是一个类似螺旋的迭代过程。它只是在某一程度被接受时，才会停下来，这与艺术创作的过程有着本质上的不同。

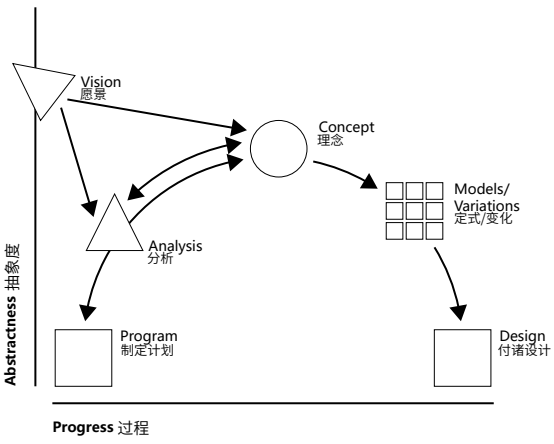


FIG. 4.16 Diagram 3 - Model Design Process
模型设计过程

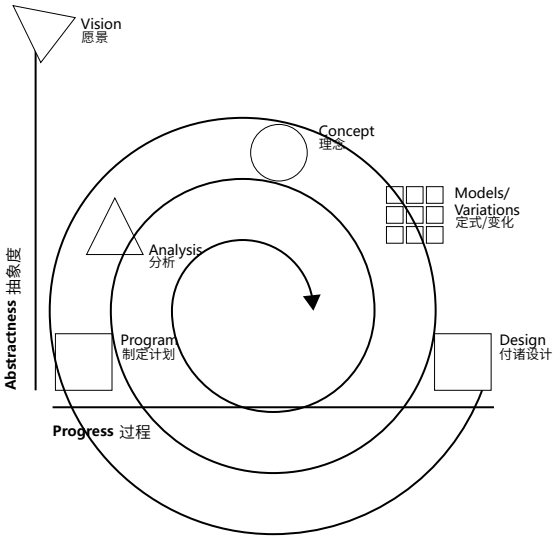


FIG. 4.17 Diagram 4 - Iterative Design Process
迭代设计过程

4.2.3 – **Three Scales**
三个尺度

Generally, the objects of urban design can be divided into three scales: overall urban landscape system; city area where the site is located; environment of the site and the internal space.

通常，我们将城市设计的研究对象分为三个尺度：城市整体风貌、场地所在的城市片区，以及场地空间及其场所。

Overall Urban Landscape
城市整体风貌

The overall urban landscape is manifested in the external morphological characteristics of the overall scene of a city, as well as the internal mechanism of nature and society. It is under the natural environmental conditions of a city, under the influence of history, culture, social economy, politics and cultural concepts in different periods, and forms the tangible entity environment attribute and intangible spiritual outlook. Deconstructing it can reveal that the overall urban landscape is based on the natural landscape environment and meteorological phenology. Historical and humanistic characteristics are its soul. Commerce and civic life are signs of its vitality. The public space constituted by urban sign landscape is its essential carrier. It is the overall intention of the city that can be perceived, remembered and expressed by people.

城市整体风貌表现在一个城市整体景象的外在形态特征，具有强烈的可识别性，是城市自然和社会特征的外在表现，是城市所在自然环境条件下，不同时期历史社会经济政治和文化观念影响下，形成的有形的实体环境和无形的精神面貌。城市整体风貌是以自然山水环境、气象物候为基底，以历史人文特色为灵魂，以社会经济活动和市民生活为活力表现，以城市标志景观构成的公共空间为其重要载体，能够为人们所感知、所记忆、所表达的城市整体意向。

Site's Location and Situation in the District
场地所在的城市片区

Before studying the internal space of the site, the role and function of the urban area where the site is located should be studied first. In planning and design, the mutual influence between the site space and the surrounding environment should be considered. On a large scape, this helps to define the context in which the site is located. For example, in order to ensure the continuity of road traffic inside and outside the site, specific nodes within the immediate range of the site should be taken into consideration. The purpose of this study is to ensure that planning and design will form a harmonious relationship with the surrounding area in terms of form, function and temperament.

理解城市整体风貌并开始研究场地内部空间之前，需要对场地所在的城市片区中的角色和作用，以及场地空间与周边环境间相互影响的因素作出分析，进而确定场地所在这一片区角色定位。例如要保证场地内外的道路交通的连续性，若周边有标志性节点在场地的视线范围内，也应纳入视觉空间的关联。对场地空间及周边环境进行研究的目的是为了保证规划设计后的场地从形态、功能、生态、视觉感知等方面都与周边形成和谐融洽的关系。

Site's Internal Space and Places
场地空间及其场所

Among the three scales of urban design research, the design of a site environment and its internal space are the smallest in scope, but the most detailed in content. We should start from the basic elements such as the building, road, hydrology and vegetation inside the site. Through the study of the overall appearance of the city, typical plots of urban public space have been selected. Through the study of the site and the surrounding environment, a series of requirements have been put forward for the planning and design of the site interior. At the level of site environment and internal space, it is possible to propose solutions to urban problems through planning and design and respond to the requirements of the surrounding environment.

三个尺度的城市设计研究对象中，场地空间及其场所的设计是项目实施的主要内容，需要从场地中的地形竖向、水文水体、植被、建构筑物、道路铺装等要素着手。

研究基于城市整体风貌的景观类型化分析，选取了四种典型的城市滨水空间地块，通过区位及周边环境的影响分析，对场地现状问题、角色定位及项目诉求提出任务要求，回应三个尺度下的城市设计的关联性。

4.2.4 – **Seven Principles**
七个原则

Principle 1: Meaningful Perspective
原则一：方向感和主题景象

The sense of direction and orientation of urban natural environment should be displayed and established in the site design:

- Visual perception of the direction of the mountain skyline and landmark
- Flow direction and landmark
- Direction of sunshine
- Direction of wind
- Visual perception of the direction of the city skyline and landmark
- Orientation and direction of visual perception of urban landmarks and landmark

场地设计中应保护和强化城市历史空间格局中心的方向感、方位感和主题景象：

- 山体天际线的视觉感知方向及其标志性景观
- 水系的流向及标志性景观
- 日照光影的方向感
- 风的方向感
- 城市建筑群天际线方向感和标志性景观
- 城市地标视觉感知方位、方向感和标志性景观

Principle 2: Appropriate and Characteristic Proportion & Scale of the Physical Space
原则二：适宜而特色的实体空间比例和尺度

Establish the sense of the scale of the Aiyi river and Tanglai canal waterfront spaces:

- The visual scale and distance in the east-west and south-north directions.
- The scale of design and construction.
- The scale of human behaviour.

建立多样的水体景观空间尺度感：

- 东西、南北向的视觉尺度
- 设计场地与环境的设计建造尺度
- 人的行为活动尺度

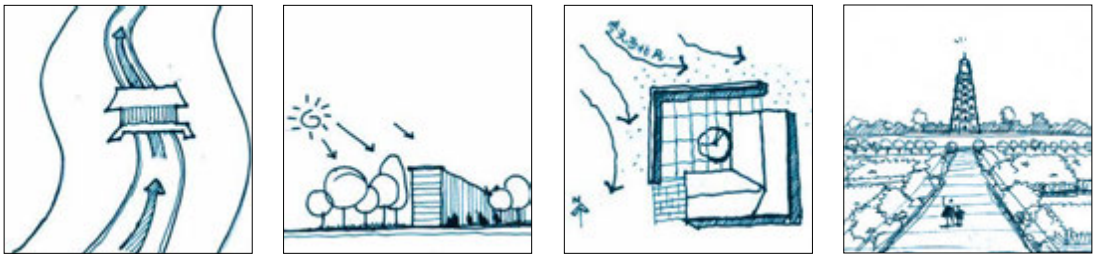
Principle 3: Setting the Meaningful Stations & Circulations
原则三：有意义的站点与流线

Establish a streamlined system for the waterfront space site:

- Accessibility.
- Distribution of stations and viewpoints.
- Route organisation.
- Spatial and visual sequences.

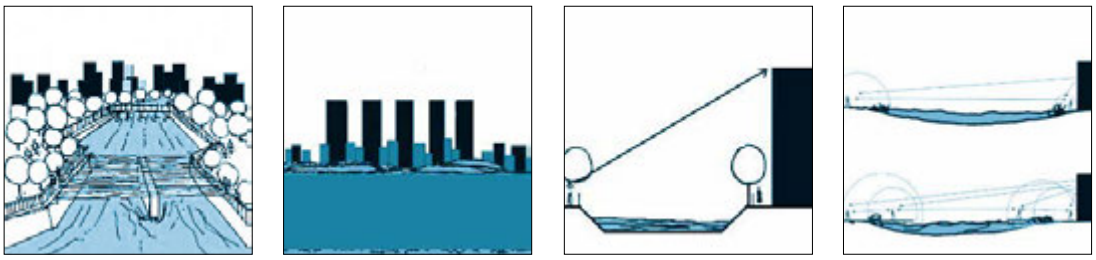
建立滨水空间场地的站点和流线系统

- 可达性
- 站点分布，包括观景点
- 流线组织
- 空间及视觉序列



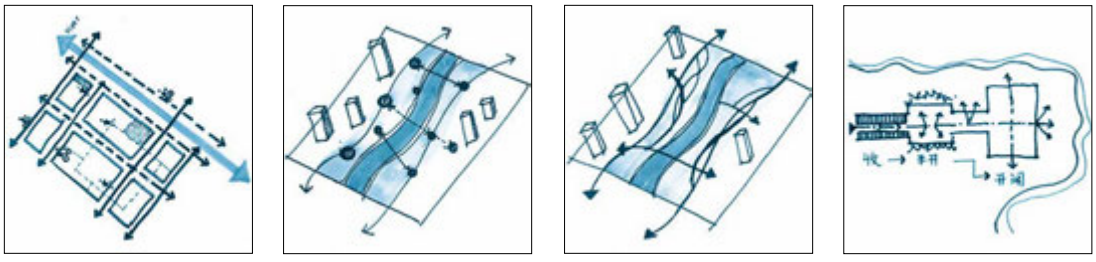
a b c d

FIG. 4.18 Orientation & Perspective, (a) Flow Direction. (b) Direction of Sunshine. (c) Direction of Wind. (d)Direction of City Landmarks.
方向感和主题景象 a) 水流的方向 b) 日照的方向感 c) 风的方向感 d) 城市地标的方向感



a b c d

FIG. 4.19 Scale & Proportion, (a /b) the Visual Scale and Distance.(c) The Scale of Design and Construction. (d) The Scale of Human behavior.
比例和尺度 a) 东西、南北向的视觉尺度与距离 b) 东西、南北向的视觉尺度与距离 c) 设计场地与环境的设计建造尺度 d) 人的行为活动尺度



a b c d

FIG. 4.20 Station & Circulation, (a) Accessibility. (b) Distribution of Viewpoints. (c) Route Organization. (d) Spatial and Visual Sequences.
站点与流线 a) 可达性 b) 站点分布，包括观景点 c) 流线组织 d) 空间及视觉序列

Principle 4: Climate adaptability & Physical Environment Comfort
原则四：气候适应性与物理环境舒适度

Establish a suitable microclimatic physical environment for the four seasons of waterfront

- Shading, preventing heat radiation and reflection in summer; use Tuyere guide.
- Thermal and wind factors in winter.
- Avoid noise and light pollution.

建立滨水空间四季适宜的小气候物理环境：

- 夏季遮阳、防止辐射和反射热设施
- 冬季保暖避风设施
- 避免噪音污染、光污染设施

Principle 5: Diversity of Activities in Public Space
原则五：公共空间活动的多样性

Establish the possibility of diverse activities:

- Maintain original local activities.
- Meet current requirements for activity types.
- Plan for potential future activities.
- Event design.

建立滨水空间的多样活动可能性：

- 保留和维护地方原有活动
- 满足当下活动类型需求
- 具有未来活动的潜质空间场所
- 主题事件设计

Principle 6: Sustainable Design & Habitat-site Design and Construction
原则六：设计的可持续性与生境营造

Establishing sustainable and diverse habitats for waterfront space:

- Design and construct invertibility and/or irreversibility.
- Biodiversity of urban waterfront space.
- Sustainability of management and maintenance.
- Native plants in the design.

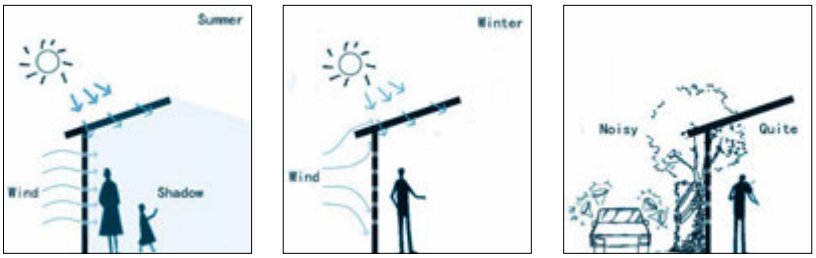
建立滨水空间的可持续性和多样性生境：

- 可逆性与不可逆性的设计与建造
- 城市滨水空间的生物多样性
- 管理维护的可持续性
- 乡土植物群落设计

Principle 7: Adaptive Technique & Material
原则七：适宜性的技术与材料

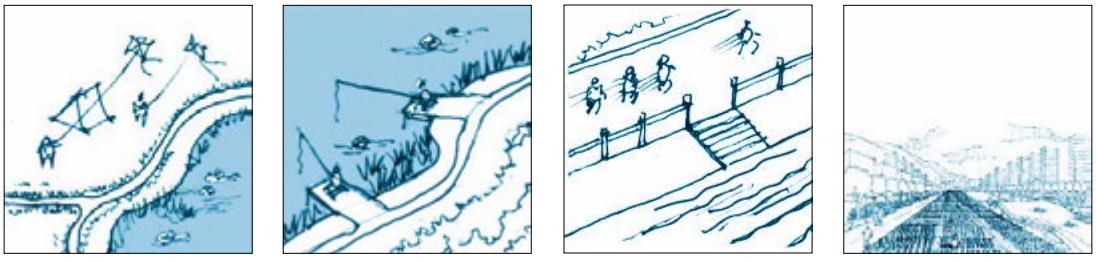
- Traditional materials and construction techniques.
- Modern materials and construction techniques.

- 传统材料与建造工艺
- 现代材料与建造工艺



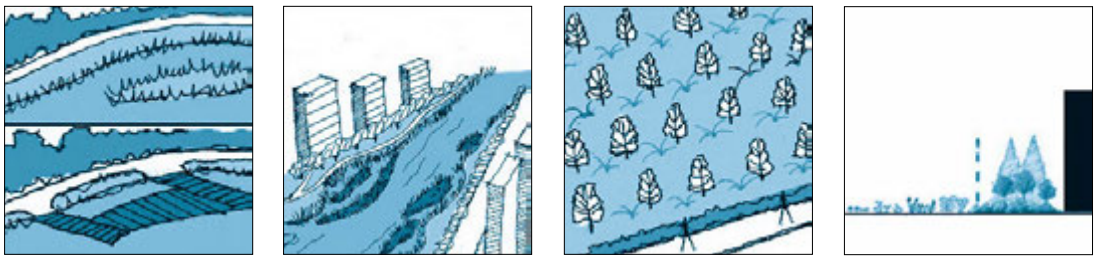
a b c

FIG. 4.21 Climate & Physical Environment,(a) Shading. (b)Thermal and Wind Factors in Winter. (c) Avoid Noise and Light Pollution.
气候与物理环境 a) 夏季遮阳、防止辐射和反射热设施 b) 冬季保暖避风设施 c) 避免噪音污染、光污染设施



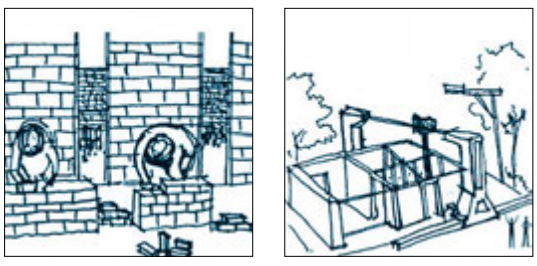
a b c d

FIG. 4.22 Diversity of Activities. (a) Maintain Original Local Activities. (b) Meet Current Requirements for Activity Types. (c) Plan for Potential Future Activities. (d) Event Design.
活动的多样性 a) 保留和维护地方原有活动 b) 满足当下活动类型需求 c) 具有未来活动的潜质空间场所 d) 主题事件设计



a b c d

FIG. 4.23 Sustainability (a) Design and Construct Invertibility and/or Irreversibility. (b) Biodiversity of Urban Waterfront Space. (c) Sustainability of Management and Maintenance. (d)Native Plants in the Design.
可持续性 a) 可逆性与不可逆性的设计与建造 b) 城市滨水空间的生物多样性 c) 管理维护的可持续性 d) 乡土植物群落设计



a b

FIG. 4.24 Adaptive Technique & Material, (a) Traditional Materials and Construction. (b) Modern Materials and Construction.
适宜性的技术与材料 a) 传统材料与建造工艺 b) 现代材料与建造工艺

4.2.5 – **Framework**
工作框架

On the 14th of July, 2018, in the Three Cities Waterfront Urban Design Comparative Study 2nd Plenary Meeting, the work framework of urban design research of Yinchuan urban waterfront space was proposed, including four parts, namely Site Space Composition, Three Levels of Thinking, Seven Principles, and Landscape Design System.

2018年7月14日，在《三城滨水区城市设计比较研究》工作营第二次全体会议上，工作组提出了银川城市滨水空间城市设计研究的工作框架，包含“场地空间构成”、“三个思考层面”、“七个原则”和“景观设计系统”四个部分。

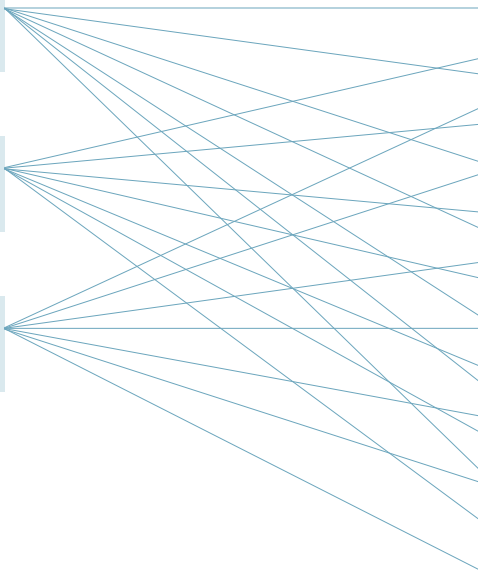
Site Space Composition
场地空间构成

- Defining Waterfront Space
  定义城市滨水空间

- Waterfront Space Type Division
  城市滨水空间类型
- Typical Characteristics and Problems
  典型性特征及问题
- Definition and Composition of Space
  空间的界定和构成

Three Levels of Research
研究的三个思考层面

- Urban Landscape
  城市整体风貌
- Site & Surrounding
  场地所在的城市片区
- Space & Place of Site
  场地空间及其场所

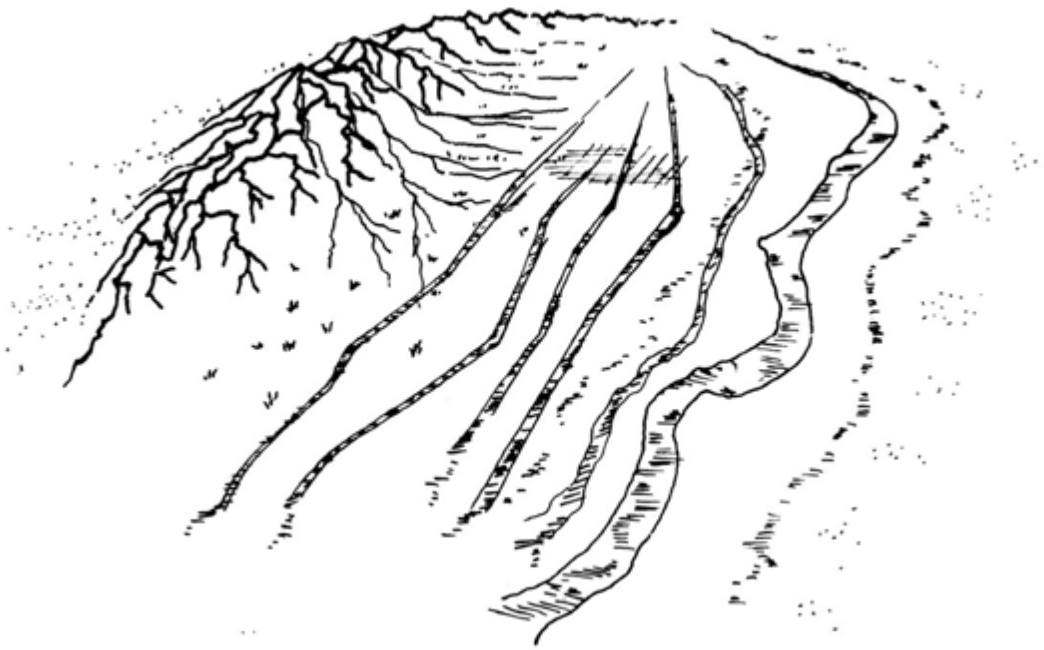


Seven Principles
七个原则

- Principle 1: Orientation & Perspective
  原则一：方向感和主题景象
- Principle 2: Appropriate and Characteristic Proportion & Scale
  原则二：适宜而特色的实体空间比例和尺度
- Principle 3: Meaningful Station & Circulation
  原则三：有意义的站点与动线
- Principle 4: Climate Adaptability & Physical Environment Comfort
  原则四：气候适应性与物理环境舒适度
- Principle 5: Diversity of Activities in Public Space
  原则五：公共空间活动的多样性
- Principle 6: Design Sustainability & Habitat-site Design and Construction
  原则六：设计的可持续性与生境营造
- Principle 7: Adaptive Technique & Material
  原则七：适宜的技术与材料

Landscape Design System
景观设计系统

- Space Edge Limited by the Urban Building & Big Infrastructures
  城市建筑与路桥系统
- Water Body System
  水体系统
- Vertical & Landform System
  竖向与地形系统
- Structure System
  构筑物系统
- Road & Pavement System
  道路和铺地系统
- Plants & Planting System
  植物和绿化系统
- Public Servise Facility System
  设施系统
- Virtual Design Element System
  虚质设计要素系统（光线、声音、风、色彩等）



4.3 – Yinchuan And Its Waterfront Spaces: From Diagnostics To Projects

4.3 – 银川及其滨水空间：从诊断到项目

4.3.1 – **Yinchuan City and its Water System** 城市及其水系

The urban ecological pattern of Yinchuan can be summarised as "one mountain, one Chuan, and one oasis".

"One mountain."

It refers to the comprehensive ecological belt of Helan mountain, which consists mainly of the Helan mountain nature reserve (in the urban area) and the ecological buffer zone (at the eastern foot of Helan mountain).

"One CHUAN"

It refers to the Yinchuan plain formed by the alluvium of the Yellow River, as well as the rice agricultural area and the natural landscape area of Lianhu wetland formed by the Yellow River system, the lake and valley water system formed by the original geological structure, the Yellow River irrigation canal system, which runs through the city and the plain.

"One oasis."

It refers to the oasis system composed of the natural environment, the ecological background of the oasis in Yinchuan city and the green space system inside the city.

银川市城市生态格局可概括为"一山、一川、一绿洲。"

"一山"

是指贺兰山，主要包括银川城市段内的贺兰山东麓。

"一川"

由贺兰山和鄂尔多斯高原夹峙，黄河冲击形成川道。与原有地质结构形成的湖泊湖洼水系和人工开挖的引黄灌溉渠系共同构成的米粮川。

"一绿洲"

由黄河孕育的银川平原，是由自然生态本底和城市内部绿地共同构成的绿洲系统。

FIG. 4.25 Scenery of Waterfront in Yinchuan
银川城市水景

Tanglai, Aiyi	*唐徠、艾依，*
An old canal and a new river,	*一古渠一新河，*
Yellow water and a clear lake,	*一黄水一清湖，*
One torrent of water runs north,	*一湍流不息直直北去，*
One flat quietly winding south.	*一平平静静蜿蜒南往。*
Water runs through Yinchuan,	*水穿银川，*
Telling the story of man and nature,	*述说人与自然的故事，*
Carrying the time of nature and man.	*载着自然与人的光阴。*

4.3.1.1 – **Evolution of the Spatial Layout by the Water System**
水系统影响下的空间布局演进

Yinchuan's river system is divided into four types: Yellow River, ditch & canal, lake, and linked-lake.

In the prehistoric period, there were a large number of freshwater lakes, saltwater lakes and salt lakes in Yinchuan plain. In the period of Emperor Wu of the Han Dynasty, the Yellow River was introduced for irrigation, and no attention was paid to farmland drainage. Gradually, "canal linked lake" water system form was formed in Yinchuan plain. It can be seen from the "Summary Map of Canal Flows in Ningxia Province" drawn in 1935 that there are lakes lying to the end most of the branch canals or among two canals. The water area around Yinchuan accounts for about 1/4 of the total area. After the founding of new China, many shallow lakes and waterlogged depressions were drained, and the lake area was reduced due to the completion of relatively complete drainage systems. From the 1950s to the end of the 20th century, the lake area was greatly reduced due to land reclamation and urban construction. At the beginning of the 21st century, in order to restore the visual of "lake city" in Yinchuan, it began to dig lakes and rivers, and the area of Yinchuan waters gradually increased.

银川的水系分为黄河、沟渠、湖泊和连湖四类。

史前时期，银川平原存在大量淡水湖和咸水湖、盐湖。汉武帝时期，人们开始引黄河水灌溉，且不注重农田退水排水，逐渐形成银川平原"渠连湖"的水系形式。从1935年绘制的"宁夏全省渠流一览图"可见，大多数支渠渠尾、渠间均为湖沼，银川附近地区水域面约占城市总面积的1/4。新中国成立后，由于建成较完整的排水沟系，许多浅水湖泊与积水洼地被疏干，湖泊面积减少。20世纪50年代至20世纪末由于围湖造田、城市建设等原因，湖泊面积大量减少。21世纪初，为了恢复银川"湖城"的景象，开始人工挖湖、挖河，银川水域面积逐渐增加。

FIG. 4.26 Two Types of Lake in Yinchuan Plain (1935)
银川平原的两类湖

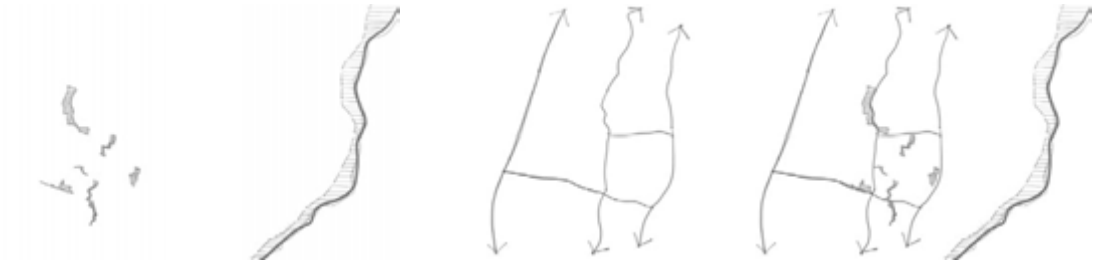


FIG. 4.27 Main Water Ellements in the Landscape of Yinchuan
银川市水系演进图

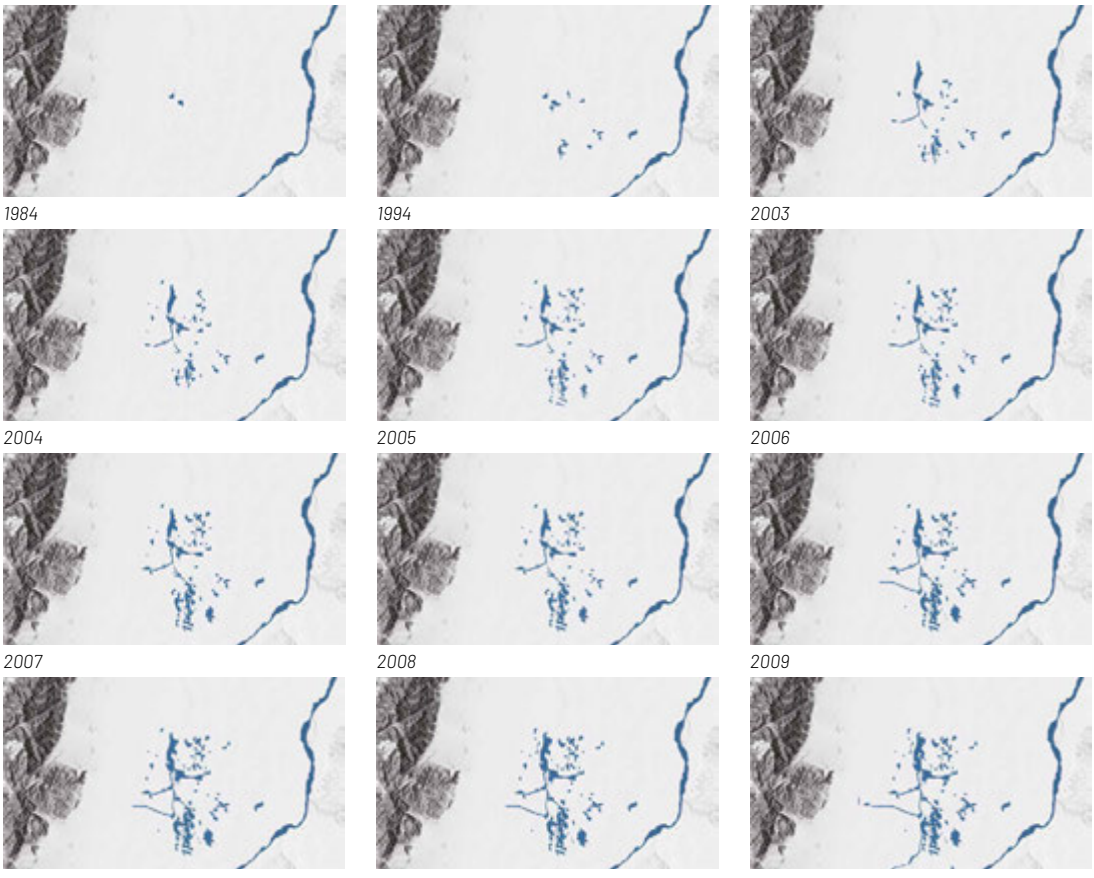


FIG. 4.28 Evolution of Yinchuan Water System
银川市水系演进

4.3.1.2 – **Formation and Characteristics of Urban Space**
城市空间的形成和特征

After the founding of the People's Republic of China, the urban spatial structure of Yinchuan experienced four stages:

1 Formation stage of urban spatial structure from 1958 to 1985. The urban spatial structure developed from the early "point shape" to a "dumbbell shape".

2 Urban area development stage from 1986 to 1995. Urban form evolved from the "dumbbell shape" to "four areas in one city and two districts" (one city: Yinchuan city; two districts: urban areas and new urban areas; four areas: old city, new city, development zone, and new urban area) spatial pattern, among which are four areas separated from each other by farmland and not connected to each other.

3 The scale expansion stage of urban built-up areas from 1996 to 2002. Administrative division adjusted into three areas along the road network to form a zonal urban spatial form framework.

4 Urban regional structure improvement stage from 2003 to the present. The urban form of the downtown area of Yinchuan city starts to show the trend of "axial spread" along urban traffic (as opposed to the "massive" form of earlier). The urban central and peripheral areas (groups) constitute the compact "four-axis two-belt multi-center city" urban spatial structure.

建国后银川市城市建设发展经历四个阶段，其空间结构逐渐形成。

1 1958—1985年，城市空间结构初步形成阶段。城市空间结构由点状集中发展到东西向“哑铃状”的空间形态。

2 1986—1995年，城市地域拓展阶段。城市形态由“哑铃状”演进成长“一城两区四片”(一城：银川市；两区：城区和新城区；四片：旧城、新城、开发区和新市区)的空间格局，其中四片区之间由农田相互隔离，并未连成整体。

3 1996—2002年，城市建成区规模扩张阶段。行政区划调整为三区，沿道路网形成东西向带状城市空间形态框架。

4 2003年至今，城市空间结构完善阶段。银川市中心城区的城市形态开始呈现由“块状”向沿城市交通“轴向蔓延”的趋势。城市中心区和外围片区(组团)组成紧凑的“四轴两带多中心”的城市空间形态。

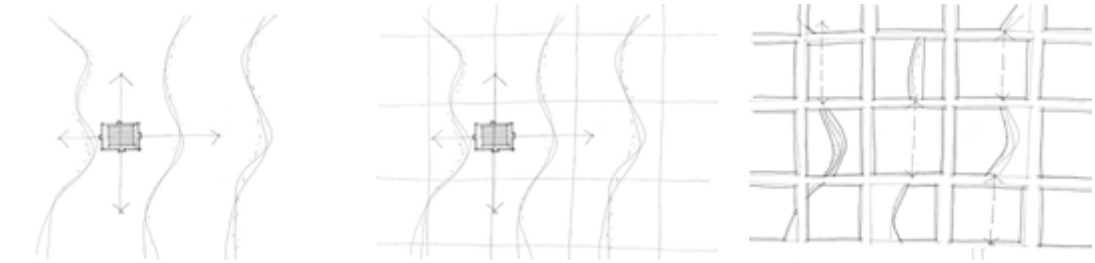


FIG. 4.29 Evolution of the Relation between City and Nature
银川市建设区演进图

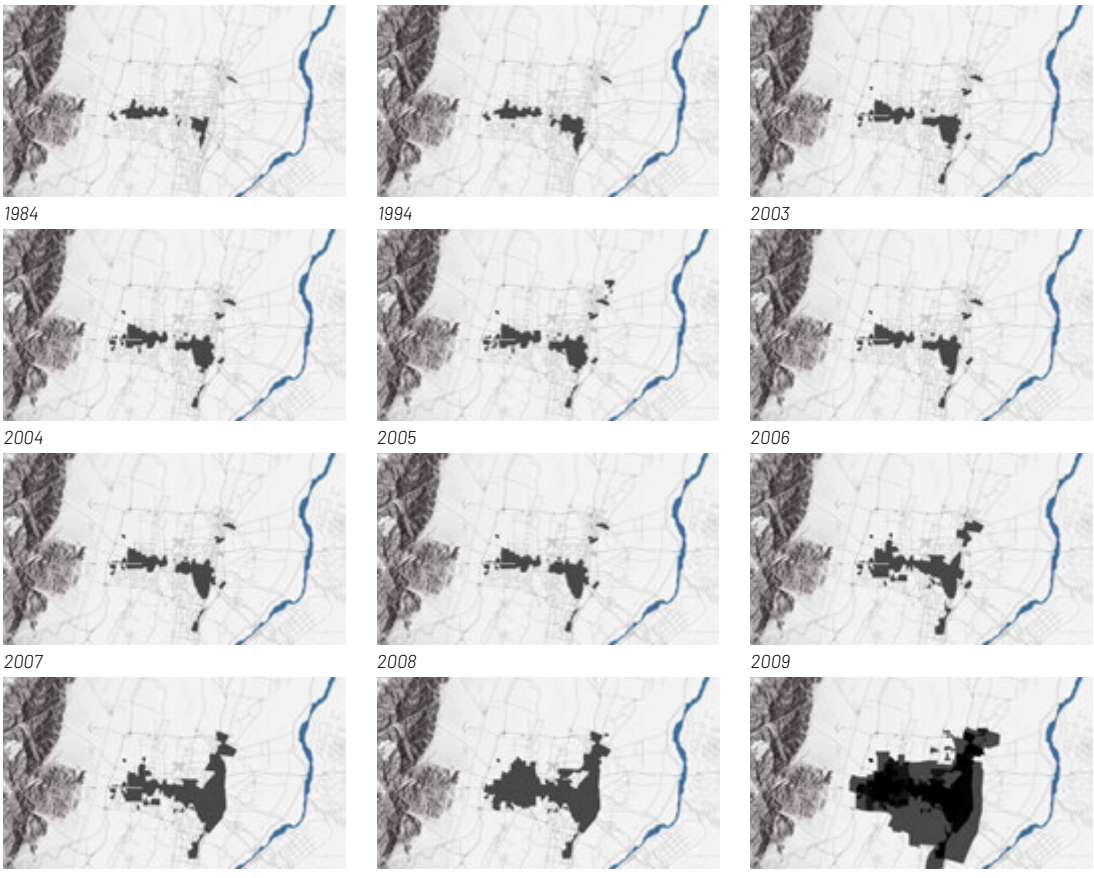


FIG. 4.30 Evolution of Yinchuan Urban System.
银川市建设区演进

4.3.2 – **Definitions of Waterfront**
滨水空间的认知

4.3.2.1 – **Waterfront Defined in Urban Planning and Construction.**
城市规划建设视角下的滨水空间

In urban planning waterfront is defined as "the part of the town adjacent to the water body", "it belongs to the special section of the city", "it is the urban public open space where the artificial construction system and the natural ecosystem interact".

In the detailed planning instruments, this refers to waterfront construction formed by zones and the area composed by the road, water line and other sites composed of different properties. Such areas are often composed of green spaces, but activities are limited, the problem of homogenised landscapes is prominent, and the separation by different forms of boundaries makes pedestrian accessibility difficult.

城市规划中滨水空间被定义为"城镇临近水体的部分","属于城市中的特殊地段","是人工建设系统和自然生态系统相互作用的城市公共开敞空间"。

城市控制性详细规划中,滨水空间是由蓝线、绿线和红线控制所形成的滨水区建设范围,或者是片区的修建性详细规划中由道路水岸线等不同性质场地范围构成的区域,这类区域往往由绿地构成,活动内容较单一,同质化景观问题突出,被不同形式的边界所分离,使得公众的抵达性差。

FIG. 4.31 Waterfront and the Built Environment in Yinchuan
银川滨水空间和建成环境

FIG. 4.32 Typical Built Environment.
典型的建成环境

4.3.2.2 – **Waterfront Defined by People's Perception**
公众感知视角下的滨水空间

According to an on-site and online survey with residents of Yinchuan, the waterfront is a key urban area that has the ability to attract the public with parks, accessible routes, and residential areas adjacent to the water. Many residents believe that green space for walking and views towards the water all belong to the waterfront.

According to the "urban residents' psychological perception of waterfront", the range of public spaces should be determined according to their function and distance to people, without a specific value and range.

银川市民的现场访谈及网络调查表明，滨水空间是具有吸引力的公共绿地、游览道路或毗邻水景的居住区绿地等重要城市空间。很多居民认为，楼下的公园、能散步的绿地、能看到水景的地方都属于滨水空间。

根据"城市居民对滨水空间的心理感知"来看，滨水空间的陆域空间范围可根据其对人的吸引距离来确定，没有一个具体的的数值和范围。

FIG. 4.33 Structured Use of Waterfront Space
结构化使用的滨水空间

FIG. 4.34 Informal Use of Waterfront Spaces.
非正式使用的滨水空间

4.3.2.3 – **Waterfront Defined by the Spatial Composition**
空间构成视角下的滨水空间

The spatial composition of the waterfront includes: the river, the shoreline and the land, among which the spatial interface between land and water is essential in redesigning the waterfront.

Water is the main factor that shapes the visual perception of the waterfront, including design factors such as water form, bottom texture and colour, as well as water flow, the size of the area and the opposite scenery affecting visual perception. The bottom texture will influence the formation of reflections and visual focus. It is also an important part of maintaining good water quality and the ecology of the river edge. There are two kinds of waterscapes in Yinchuan City: the static waterscape of Aiyi River, wide and open with various opposite sceneries and the dynamic waterscape of Tanglai Canal, with a strong sense of direction but mostly inaccessible.

滨水区的空间由水域、水岸和陆域构成，其中陆域范围的空间界面是构成滨水空间设计的关键因素。

水域是形成滨水空间视觉感受的主体因素，受水面的形态、水底质感、色彩等因素的影响，水体的动静、面积与对景景物的尺度和距离都将影响视觉感受。水底质感影响倒影形成与视觉焦点。水域的竖向、形态及水底深度是保证水质的基础。

银川市的自然水文特征和历史上灌溉工程形成两种水体景观，艾依河是静态湖面水体景观，宽阔疏朗，对景变化丰富；唐徕渠是季节性动态水体景观，方向感强，但无法靠近。

FIG. 4.35 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

FIG. 4.36 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

The water boundary line includes a retaining wall and the morphological features of the natural shoreline. These edge types affect people's activities and behaviours and is also an important component. Most of the embankments in Aiyi river are natural grassy edges with winding shapes. Tang canal has an artificial type of embankment, with a hard form like a straight line.

The land adjacent to the river is typically part of the large-scale urban construction happening in Yinchuan, where land use is influenced by society, culture, economy and ecology. The site contains a variety of landscape infrastructures, such as roads, plazas, and open green spaces. In fact, most of the waterfront areas in Yinchuan are covered with a large amount of greenery but, the waterfront is an important area reflecting the image of the city.

水岸包含驳岸特征及水岸线的平面形态特征，它影响人的行为活动，也是水体生态环境的重要构成要素。是生物多样性最为丰富的地带。艾依河大多为自然式和人工的草坡堤岸，形态蜿蜒。唐徕渠则为人工式硬质堤岸。

滨水空间的陆域部分是城市开发建设的重要地带，其用地性质不同，有居住、商业、办公等，常见的是公园绿地。包含一定的园路和公共服务设施。绿地设计一般为人工式绿化模式，其生态性和低维护的效益并不突出。

FIG. 4.37 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

FIG. 4.38 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

4.3.2.4 – **Waterfronts Defined by the Ecological System**
生态系统视角下的城市滨水空间

The bottom surface is an important component of the aquatic ecosystem, which is the basis for ensuring water quality. It is also the main distribution area for deep-water and aquatic plants, and the habitat of benthic species, waders, fish and other animals.

The waterfront boundary is an essential part of the ecological environment of water bodies and wetlands, as well as the habitat of wetland plants, amphibians, insects, birds and other animals.

The overall ecological function and ecological landscape of the Aiyi river are good, but the ecological function of Tanglai Canal is basically lost.

水底是水体生态系统的重要组成部分，是保证水质的关键。分布的深水和挺水植物是底栖类、涉禽、鱼类等动物的栖息地。

水岸空间是湿地生态环境的重要构成部分，是湿地植物、两栖类动物、昆虫、鸟类等动物的栖息地。驳岸的竖向形态和植物种植方式影响生物多样性。

艾依河整体景观较好，但自然湿地功能及生物多样性明显不足。

FIG. 4.39 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

FIG. 4.40 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

Main Water Features in Yinchuan
银川主要水系特征

FIG. 4.41 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

FIG. 4.42 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

4.3.2.5 – **Waterfronts Space Status Analysis**
滨水空间场地问题的判读

The interpretation of the waterfront space is a process that needs to be revised continuously and summarised through a comprehensive field survey, observation records, residents' questionnaire survey, designers' keen judgment of the site and other aspects. Based on this, the Yinchuan group discussed the typical problems of waterfront space in Yinchuan and northwest China. Based on preliminary studies, three field surveys, paper and online questionnaires, a survey summary and other work contents, several key conclusions were made.

Summary of social survey (questionnaire):
Residents are concerned about human-made facilities and environmental problems in waterfront spaces. The improvement of entertainment facilities, fitness facilities, recreation facilities, lighting and activity venues is directly related to the vitality of waterfront space. At the same time, residents hope to further improve the waterfront, forming a beautiful, safe environment and suitable microclimate.

关于滨水空间场地的范围、功能定位等问题的判读，需要综合现场调研、居民问卷调查和设计者的场地诊断等各个方面的分析，是不断修正和总结归纳的过程。基于此，银川工作营在前期研究、三次现场调查、纸质和网络问卷调查以及调研总结等工作的基础上，探讨银川市滨水空间的典型问题。

社会调查（问卷）总结：

居民比较关注滨水空间的人工设施和环境问题。休憩设施、健身设施、照明设施、娱乐设施和活动场地的完善与否，直接关系到滨水空间场地的活力。同时，居民希望可以进一步改善滨水空间设计，创造更加优美、安全的滨水环境和舒适的滨水活动环境。

FIG. 4.43 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

FIG. 4.44 Waterfront and the Built Environment in Yinchuan
银川滨水空间及建成环境

Summary of field survey (questionnaire):
Water quality, the embankment, vegetation, skyline, artificial facilities, sight and perception, the intensity of use in open space and activities were investigated and recorded. Three problems are summarised: 1. The ecological sustainability of waterfront space is low; 2. The character of the waterfront is not prominent; 3. Insufficient vitality of waterfront spaces.

- Waterfront space and skyline: the opposite skyline on the banks of the Aiyi river includes Helan mountain but is partially obscured by buildings; Tanglai canal's skyline is characterized by vegetation along the shore.
- The intensity of use in open spaces: the use of the waterfront ranges dramatically depending o the season and the time of the day, but the overall use of space is low.
- Waterfront activities: near the water but not hydrophilic, fewer activities and a single type.
- Accessibility of waterfront space: lack of facilities, slow traffic is not convenient, not safe.
- Waterfront environment: low biodiversity, lack of management, poor environmental health.
- Waterfront line of sight and perception: local line of sight is blocked; waterfront spatial perception is weak

现场调查(问卷)总结:

主要对滨水空间环境的水质、堤岸、植被、天际线、人工设施、视线感知、开敞空间使用率、活动等进行调查和记录。总结出三大方面的问题:1.滨水空间生态可持续性较差;2.滨水空间风貌个性不突出;3.滨水空间活力不足。

- 滨水空间的天际线:艾依河自东向西方向的对景天际线应突出贺兰山的景象,但山体局部被高层建筑物遮挡;唐徕渠沿岸的天际线因沿岸林带植被突显特色。
- 开敞空间使用率:滨水空间的季节性、时段使用率差别大,整体使用率偏低。
- 滨水活动:近水而不亲水,活动较少且类型单一。
- 滨水空间可达性:缺乏人性化设施,慢行交通不便利、不安全。
- 滨水绿化与环境:绿化单一、缺乏管理,局部卫生环境差。
- 滨水视线与感知:局部视线受阻,滨水空间感知弱。

FIG. 4.45 Waterfront and The Built Environment in Yinchuan
银川滨水空间及建成环境

FIG. 4.46 Waterfront and The Built Environment in Yinchuan
银川滨水空间及建成环境

4.3.1 – **Site Selection**
场地的选择

Considering the distribution of waterscapes, the environmental characteristics of the urban construction area, an analysis of current land use planning, as well as the needs of urban planning, construction and development, the waterfront space and site design conditions were classified into 9 typical sites. Through site surveys and research analysis, 4 sites were selected, 2 of which are adjacent to the Aiyi River, and the other two are close to the Tanglai Canal.

根据不同水体景观分布及城市建设区环境特征，以及现状图、用地规划图的判读分析，根据城市规划建设发展的需要，研究组对滨水空间类型及场地设计条件进行划分，并提出9个代表性滨水空间地块。通过现场踏勘及调研分析，选取了4个地块，其中2块滨临艾依河，2块紧邻唐徠渠。

TABLE 4.1 Sites Distributiony
地段分布

CLASSIFICATION	SITES ALONG AIYI RIVER	SITES ALONG TANGLAI CANAL
New Construction on the Vacant Lot	Site 1 - the Site of Yuehai	Site 4 - North Site of Tanglai Canal
	Site 3 - the Site of Guan Lake	
	Site 6 - the Site of Aiyi River and Laifo Temple	
Rehabilitation	Site 2 - the Site of Ning´An St Jinfeng District	Site 5 - South Site of Tanglai Canal
		Site 9 - The Site of Ximen Bridge
Reference	Site 7 - the Forest Park	Site 8 - The Site of Bao Lake Park

分类	艾依河沿岸地块	唐徠渠周边地块
空地新建类	地块1 阅海地块	地块4 唐徠渠北部地块
	地块3 关湖地块	
	地块6 艾依河来佛寺地块	
更新改造类	地块2 艾依河宁安大街地块	地块5 唐徠渠南部地块
		地块9 唐徠渠西门桥地块
范例参考类	地块7 森林公园地块	地块8 宝湖公园地块

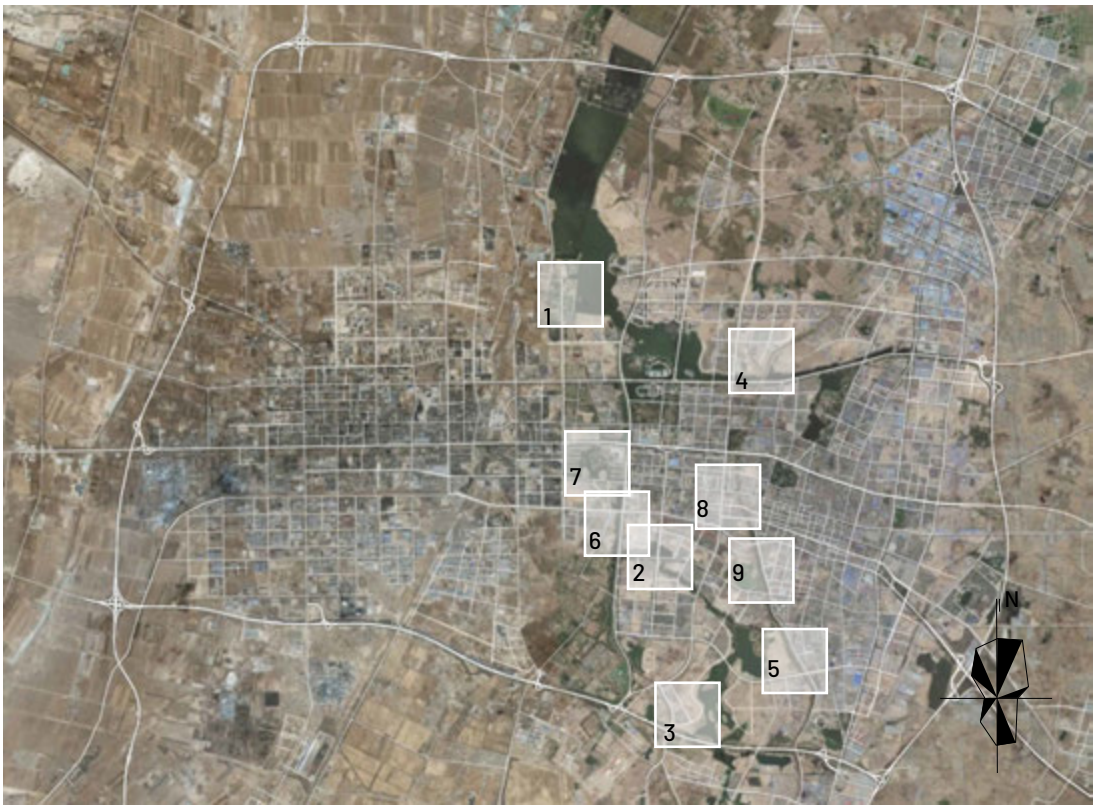


FIG. 4.47 Site Location.
基地选择

4.3.3.1 – **Projectual Possibilities: Master Planning, Mapping Analysis, Field Investigation**
项目的可能性：整体规划、绘图分析、现场调查

TABLE 4.2 Field Investigation and Meetings

PERIOD	WORK STAGE	WORKING PROCEDURE	DETAILED WORK CONTENT
March to April 2018	Waterfront Spatial Cognition	Mapping Analysis	The water body of Yinchuan is divided, and the waterfront space of Yinchuan is preliminarily interpreted.
22-25 April 2018	Field Investigation	Field Investigation	Investigate the overall waterfront space.
27 April to 3 June 2018	Mapping Analysis; Preliminary Definition Of Typical Waterfront Space, Site Selection	Mapping Analysis	Interpretation four plots given by CADG and choose 1 site, define the typical waterfront space and suggested to increase site along TangLai canal. To prepare the design specifications for each site
4 June 2018		Meeting Communication and Discussion	At the first video meeting of the four parties, the team of Ningxia university formally joined the Yinchuan waterfront space urban design work camp, and the meeting confirmed the research content.
5-9 June 2018		Mapping Analysis	Read the new selected 4 typical waterfront sites, and write the design assignment for each site
10-14 June 2018	Field Investigation; Site Selection	Field Investigation	Investigate 9 sites, analyze their representativeness, discuss and determine the final design sites.
15 June to 2 July 2018	Site Selection	Mapping Analysis	Detailed analysis and interpretation of the selected four typical plots, preparation of the site design task.

调研及会议

时间	工作阶段	工作方法	详细工作内容
2018年3-4月	滨水空间认知	绘图分析	将银川水体类型进行分区，初步判读银川滨水空间特征
2018年4月22-25日	现场调查	现场调查	了解整体滨水空间与城市生活景象
2018年4月27日-6月3日	绘图分析、初步定义典型滨水空间、地块选择	绘图分析	选定9个银川典型滨水空间地块，判读场地特征。 编写设计任务书
2018年6月4日		会议交流讨论	首次四方视频会议交流，宁夏大学团队建议并解读银川市典型滨水空间，会议初步确定增加4个典型地块
2018年6月5-9日		绘图分析	新选4个典型滨水地块判读，编写各场地设计任务书
2018年6月10-14日	现场调查 地块选择	现场调查	调研9个地块，分析地块典型性，讨论并确定最终设计地块
2018年6月15日-7月2日	地块选择	绘图分析	选定4个代表性地块。其中，2个位于唐徕渠沿岸，2个位于艾依河两岸，并对地块进行详细分析与判读，编写各场地设计任务书

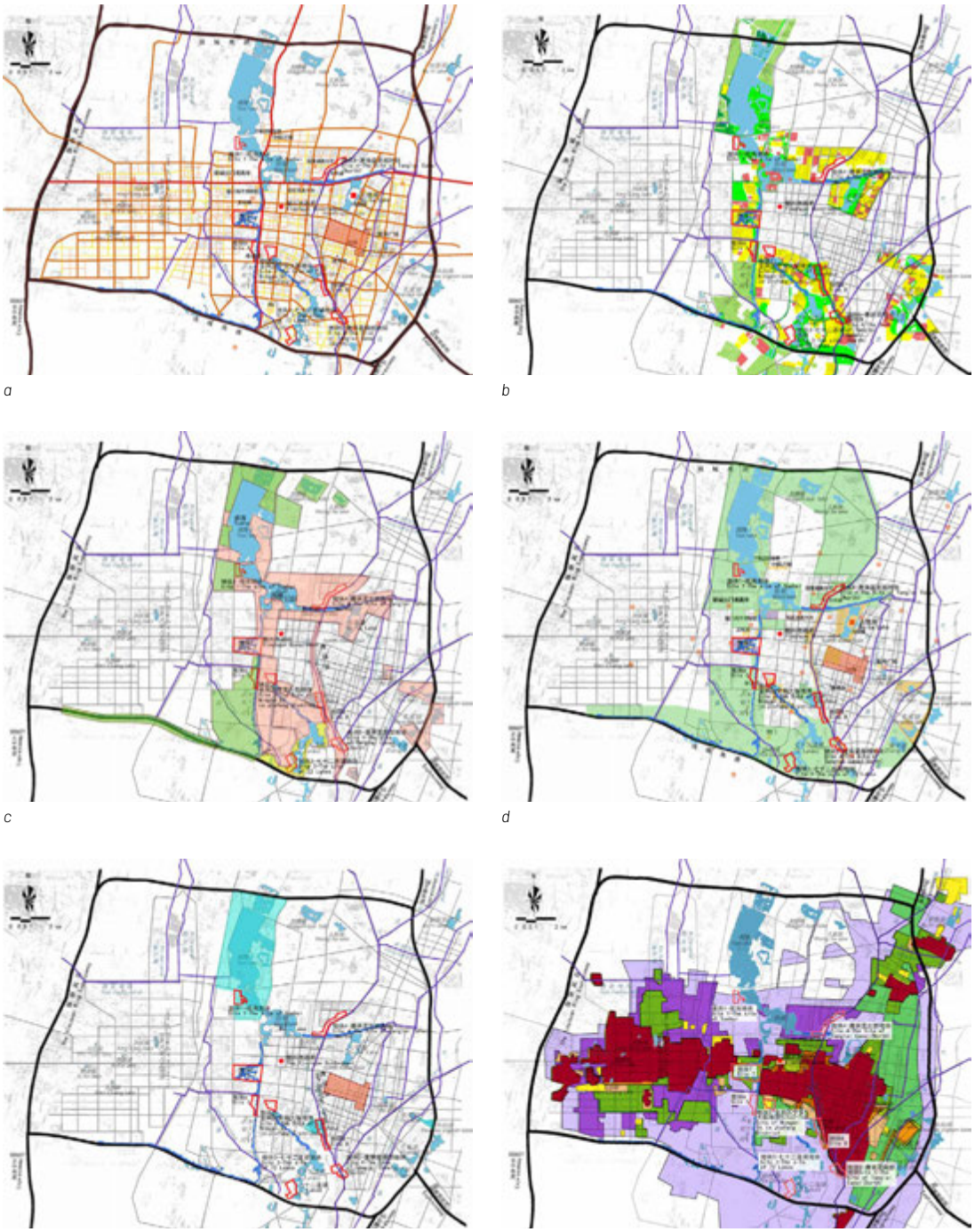


FIG. 4.48 Analysis of the Current Situation. (a) Road Network Hierarchy. (b) Waterfront Function. (c) Landscape Type. (d) Spatial Type. (e) Bird Watching Sites. (f) Period of Construction.

现状分析：(a) 路网密度，(b) 滨水空间功能，(c) 滨水空间景观 (d) 滨水空间类型 (e) 鸟类栖息地 (f) 建设时序

4.3.3.2 – **Synthesis of the Analysis / Fieldwork and Design Brief.**
综合分析/基地考察和设计简介

Site 6: Aiyi river and Laifo temple
地段6 艾依河来佛寺地块

Typical feature: The waterfront area of the new city has an intense atmosphere of commercial and religious culture.

Design idea: Highlight the traditional irrigation canal system in Yinchuan city, waterfront design reflects the local urban water system model. It provides ideas for Yinchuan's urban water system to inherit and innovate the wisdom of the traditional irrigation canal system.

地块典型性特征：城市新区滨水地段建设模式的代表，农业景观、商业文化和宗教文化氛围浓厚。

设计思路：突出银川市传统的灌渠体系智慧，滨水区设计体现具有地方性的城市水系统模式。为银川城市水系统对传统灌渠体系智慧的传承与创新提供思路。

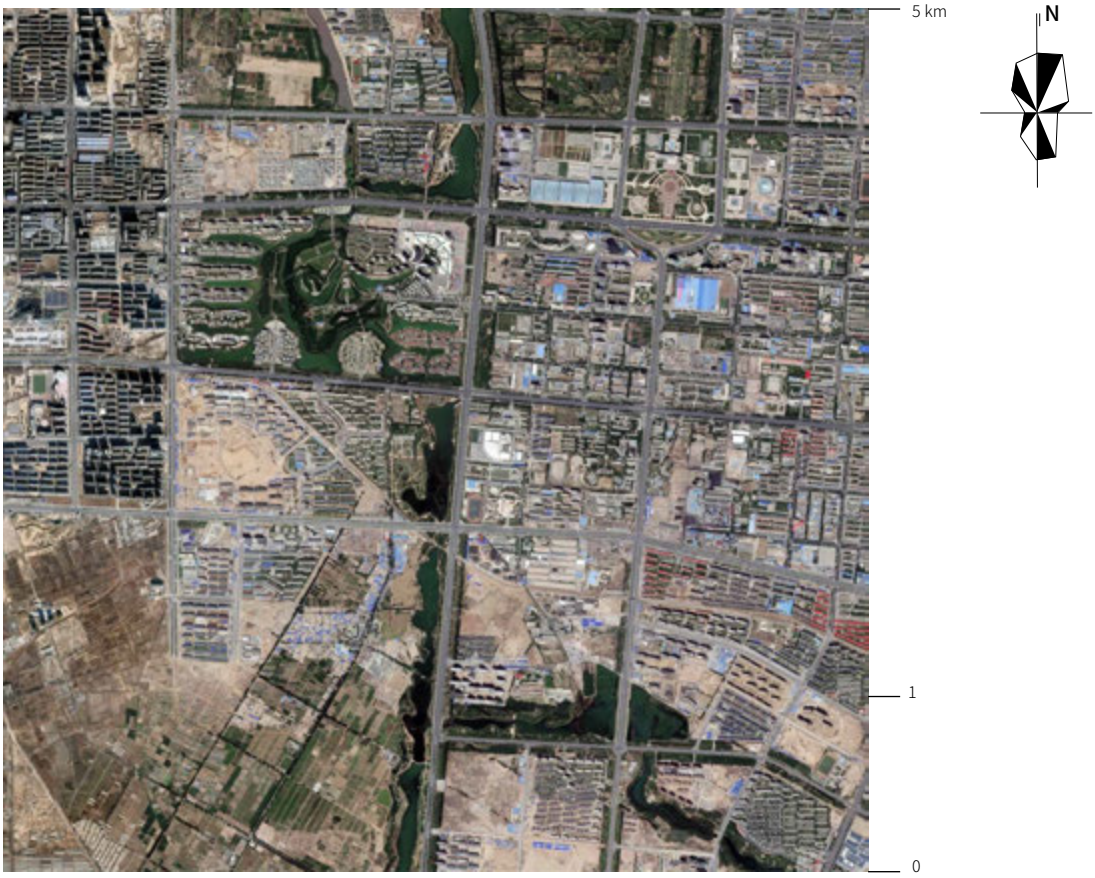


FIG. 4.49 Site 6 - Location and General Context
地段6 - 位置和文脉关系

Site 3: Guan lake
地段3 关湖地块

Typical feature: Semi-natural landscape, with the potential to restore natural habitat.

Design idea: How to deal with the relationship between people and land in Yinchuan city on the premise of highlighting local characteristics to achieve the balance between people and land. How to explore appropriate ecological design methods for Yinchuan city to provide ideas for the ecological construction of Yinchuan's urban waterfront (for the enhancement of biodiversity).

地块典型性：湿地景观地块，具有多样性生物栖息地的潜力。

设计思路：如何处理人地关系，在突出银川地方特色的前提下，探究合适银川城市人工湿地的生态设计方法。为银川城市滨水空间的生态建设，特别是生物多样性的提高提供思路。

FIG. 4.50 Site 3 - Location and General Context
地段3 - 位置和文脉关系

Site 4: North of Tanglai Canal
地段4 唐徠渠北部地块

Typical feature: The waterfront canal area in the new urban area has a variety of land functions and a space to guide the city's new lifestyle and waterfront vitality.

Design idea: Highlight a proper development guidance strategy for urban expansion on the waterfront. Take the vital waterfront node as a catalyst to drive the benign urbanisation of this urban-rural junction through the catalytic point of the waterfront to realise the urban-rural link. This start provides a way for the correct development of the waterfront space at the boundaries of urban expansion

地块典型性：城市新区临渠地段，用地功能多样，具有引导城市新的生活方式和滨水活力的空间。

设计思路：增加优化城市扩张边界滨水空间范围和功能，促进其良性发展引导策略。以重要滨水空间节点为触点，带动城乡交界处的良性城市化。

FIG. 4.51 Site 4 - Location and General Context
站段4 - 位置和文脉关系

Site 9: Ximen bridge, Tanglai canal
地段9 唐徕渠西门桥地块

Typical feature: The waterfront canal area in the old city is in an intensive construction environment, frequently used, bearing a variety of urban life sites, urban image is dominant, and has the needs for urban renewal.

Design idea: Trace the historical memory of the old city of Yinchuan, continue the context and memory of the bridge by activating the vitality of the site through an updated design of the old city along its waterfront. Provide ideas for the renewal and activation of Yinchuan's old city waterfront.

地块典型性：城市老城区临渠地段，处于密集建设环境中，使用频繁，承载着各种城市生活的场地，城市形象特征明显，并具有城市更新的需求。

设计思路：追溯银川老城历史记忆，通过滨水老城区的更新设计，延续桥头的文脉与记忆，激活场所的活力。为银川滨水老城区的更新与激活提供思路。

FIG. 4.52 Site 9 - Location and General Context
站段9 - 位置和文脉关系

4.4 – Design Explorations

4.4 – 设计探索

4.4.1 – **Introduction**
介绍

Yinchuan's waterfront urban design summer camp lasted 12 days. Considering the four typical waterfront design plots that were selected, the group divided into smaller groups of three students each to carry out their design explorations.

基于前期大量的工作基础，针对4个典型的滨水空间设计地块，组织开启了设计工作营。西安建筑科技大学、代尔夫特理工大学和宁夏大学三校学生共计26人，分为4个小组，调研分析4个地块的特点及问题，开展设计方案构思。

4.4.2 – **The Oasis and the Garden Concept**
绿洲和花园的概念

Yinchuan is an oasis in an arid area. The "Mother" River, the Yellow river feeds the city.

All water bodies are human-made, including the river and the lakes. Large green zones along the waterbodies are public parks. Forty per cent of the water supplied by the Yellow River is used for the irrigation of farmland.

In the observations of the spatial configuration of the waterfronts in Yinchuan, It became clear that in some cases:

- The distances between the residential area and the waterfronts are too large to have a functional and spatial relationship between the residents and the use of the waterfronts. In most of the cases, wide roads form barriers.
- The green zones along with the water bodies, often designed as parks, are extensive and non-descript. People do not use it.
- People do not treat water as a scarce commodity.

These three observations lead to three design ideas, namely accessibility, the meaning of space and awareness.

银川是中国西北干旱地区的一片绿洲。作为"母亲河"的黄河哺育着这座城市。

目前城市中大部分的水体都是人造的，包括河流和湖泊。沿着水体的大型绿色区域大多是公园。黄河的40%供水被用于农田灌溉。

通过对银川市滨水空间形态的观察，可以很清楚地看到以下情况：

- 住宅区和滨水区之间的距离太大，在居民和岸线之间没有建立起有效联系的空间关系。在大多数情况下，大型城市交通成为障碍。
- 沿着水体的绿色区域通常被设计为公园，规模非常大且缺乏特色，养护投入较大。
- 人们不把水当作稀缺资源。

这三个观察结果导致了三种设计思想，即可达性，空间意义和意识。

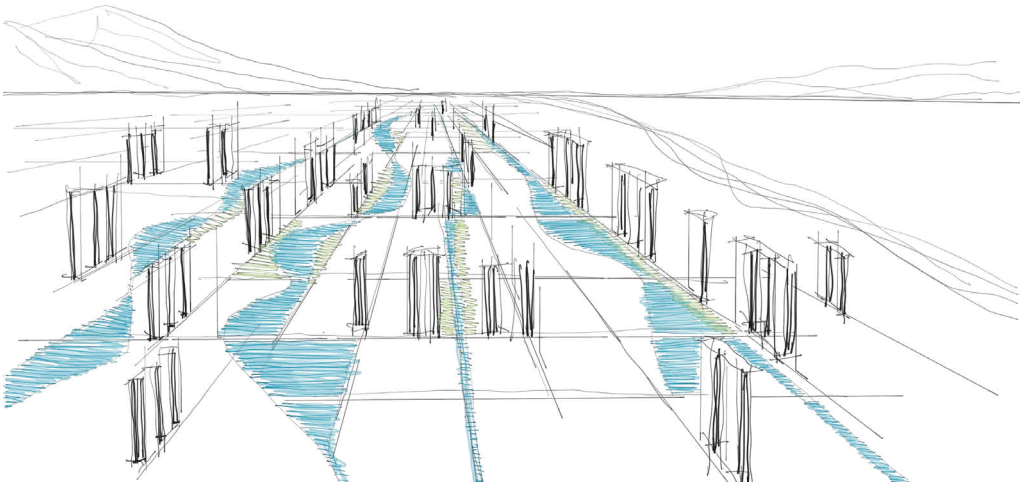


FIG. 4.53 Current Relation City - Watefront in Yinchuan
银川市城水关系现状

– Accessibility: Can we connect the green zones and water bodies in a better way with the residential areas? Overcome the infrastructural barriers, make precise access entries?
– Meaning of space: Can we make waterfront places that will become favourite places? Reduce the scale, carefully design these places and offer the possibility to develop popular activities. Moreover, can we design these places in a Chinese and Yinchuan way?
– Awareness: Can we make meaningful waterfronts which will contribute to understanding the unique role water has in Yinchuan?

These ideas combined, form the concept (or central idea) of The Gardens. The Gardens are carefully-designed, human-scaled and joyful, appreciated places for the residents. The Gardens connect the city with the waterbodies on selected places in Yinchuan.

On the city scale: Yinchuan is an oasis and will be an oasis in the future, but now built on series of Gardens, connecting the city with the water bodies. Meaningful and accessible to everybody. This concept was a jumpstart for the further design process by our students.

– 可达性：我们能否以更好的方式将绿色区域和水体连接到住宅区？克服通行障碍，使人们可以明确地进入这些空间？
– 空间的意义：我们能否将滨水空间建成人们喜欢的场所？缩小规模，精心设计这些地方，并提供开展受欢迎活动的可能性。我们可以用中国且银川的风格设计这些地方吗？
– 意识：我们能否做出有地方生态意义的湿地岸线？这将有助于了解水在银川的特殊作用。

这些想法的结合，形成花园的概念（或中心思想）。花园是为居民精心设计的、人性化的、欢乐的、受欢迎的地方。通过在银川一些特别地段用“花园”将城市与水体连接起来。

在城市尺度上：银川此刻是一片绿洲，未来仍将是绿洲，当下的策略是通过建设一系列的花园，将城市与水体连接起来。这对每个人而言都是有意义的、可接近的。这个概念是学生们进一步展开设计过程的开端。

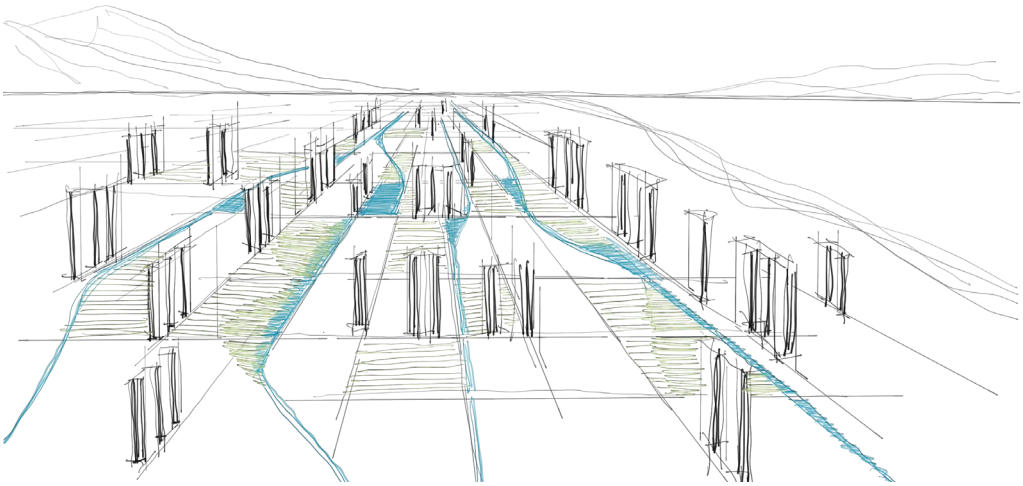


FIG. 4.54 The Proposed Landscape of Waterfronts in Yinchuan
银川城水滨水空间景观意向

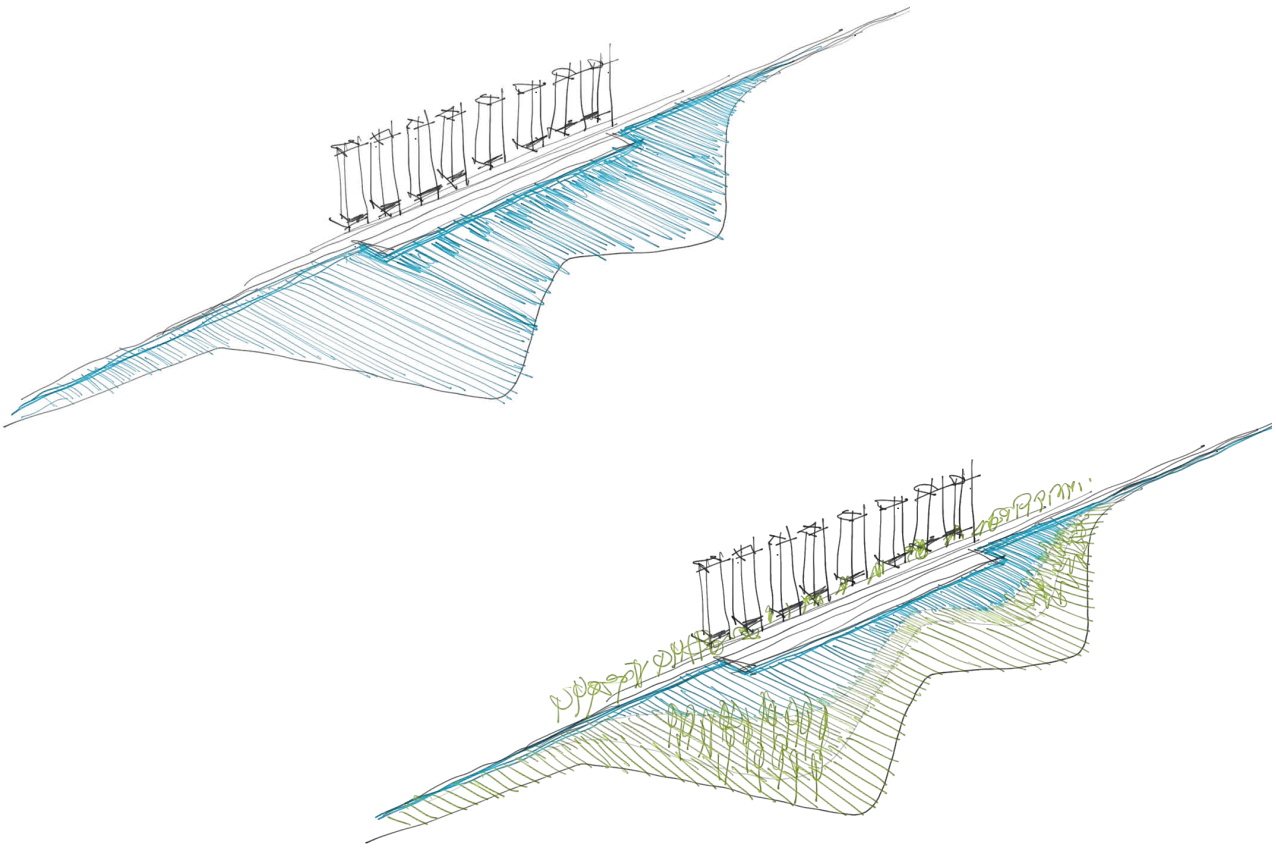


FIG. 4.55 The simple open water surface model is transformed into a model combining lake and tidal flat wetland.
单一开阔水面形态转变成水面与滩涂湿地相结合的模式

4.4.3 – **Aiyi River**
艾依河

4.4.3.1 – **Site 6 The Site of Aiyi River and Laifo Temple**
地段6 艾依河来佛寺场地

Preliminary Work / Field Survey
前期工作／实地调研

The research team conducted two field surveys: a 'before' and an 'after' one. During the research process, team members found the waterfront vacant, with little energy or vitality. The plots' elements could be described as varied and messy, e.g. the north-south commercial street across the block, the temple, the abandoned railway, abandoned farmland, the dry ditch, and the city's only waterfront high-speed roads, etc., with no connection between each other, and each element lacking interaction with the waterfront space.

研究团队前后共进行两次现场调研。调研过程中，团队成员发现滨水空间缺少活力与生机，场地的元素多而杂乱，如横穿地块的南北向的商业街、来佛寺、废弃的铁路、荒废的农田、干涸的沟渠以及城市唯一一条滨水快速道路等，彼此间毫无联系，并且每一个元素都缺乏与滨水空间的互动。

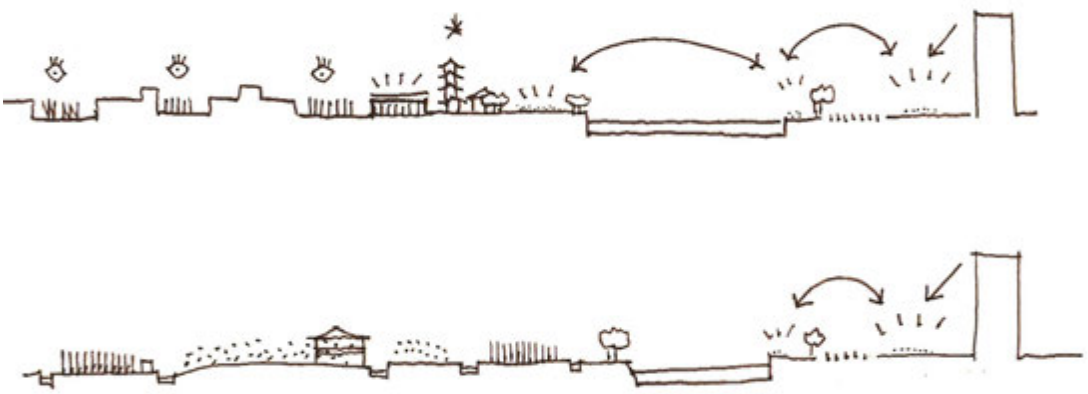


FIG. 4.56 Increase the Visual Interaction of Each Waterfront Space.
增加各滨水空间的视觉联系

STRENGTHS
– The availability of green space.
– Economic activities: commercial street.
– Agricultural production of vegetables.
– Nursery for native species.
– Less polluted water than in other places, making fishing possible.
– Temple: a heritage and cultural site.

WEAKNESSES
– Diversity of people who do not want to mix.
– Decaying buildings in the village area.
– Isolated communities in the village area.
– Irrigation water is taken from the Aiyi river.
– Lack of accessibility from residential areas to green and water areas.

OPPORTUNITIES
– Bring different people together.
– Attract new inhabitants to the area.
– Bring back agriculture to the city.
– Allow leisure activities on the river (e.g. fishing, swimming – currently forbidden).

THREATS
– Displacement of the local population in the village.
– Aiyi river gets polluted by grey water.
– Low water levels.
– Water table decreases and causes land subsidence.

In the next phase, everyone discussed the status quo together, and proposed four important to consider: accessibility, public space, agricultural landscape, and architectural texture, and summarised the elements that the site can retain and reuse for transformation.

优势
– 绿地率很高
– 经济活动：商业街
– 生产蔬菜
– 本地物种的苗圃
– 水污染比其他地方少，可以钓鱼
– 寺：遗产和文化场所

弱点
– 不同的人不愿意混合在一起
– 村子里的建筑物正在老化
– 村子里处于孤立状态的社区
– 灌溉水取自艾依河
– 缺乏从住宅区到绿化区和水域的通道

机遇
– 把不同的人聚集在一起
– 吸引新的居民到该地区
– 把农业带回城市
– 允许目前禁止的与河流相关的休闲活动（例如钓鱼和游泳）

威胁
– 当地村民的异地安置
– 艾依河被灰水污染
– 水位下降
– 地下水位下降并产生地面沉降

研究小组讨论了基地的现状问题，提出了基地现状中较为重要的四点因素：可达性、公共空间、农业景观和建筑肌理，总结出基地可保留和待改造利用的元素。

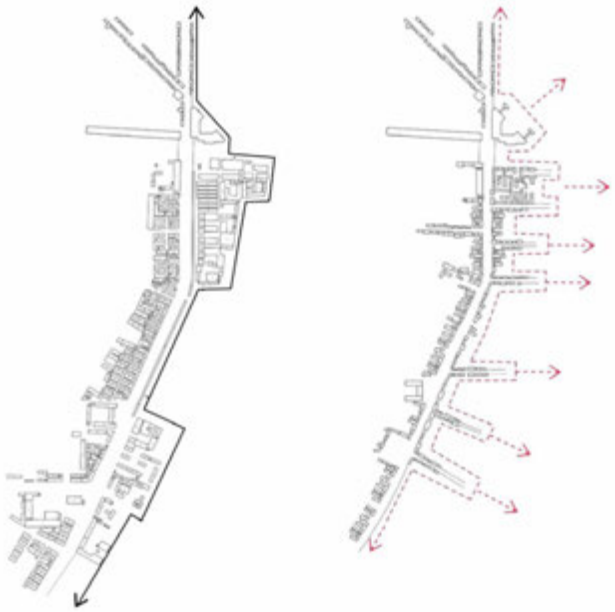
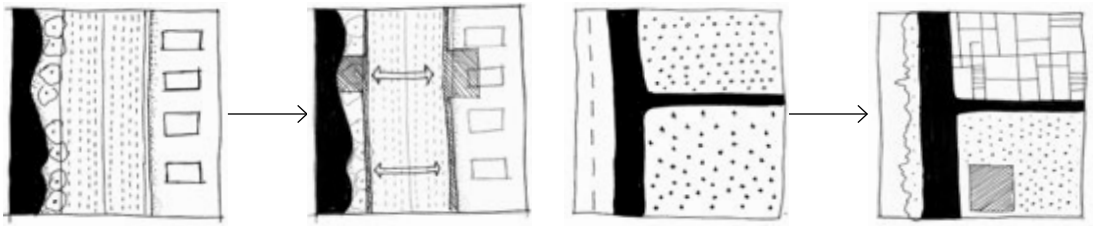
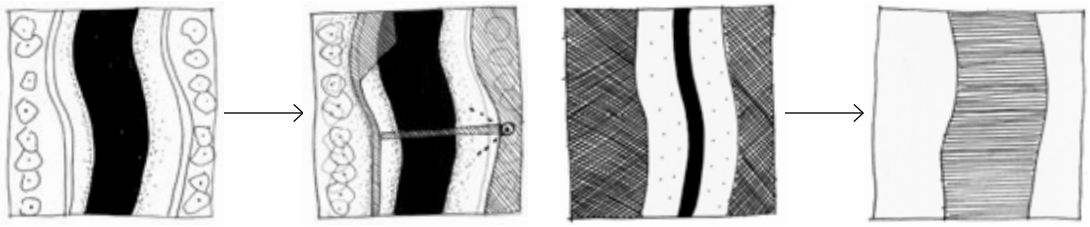


FIG. 4.57 Connecting Street Vitality to the Riverfront.
将商业街的活力导向艾依河



Accessibility
可达性

Landscapes
景观丰富性



Water and Public Spaces
可见性

Built Environment
整合蓝带、绿廊、社会

FIG. 4.58 Aiyi River, Key Issues
关键问题

Conceptual Design / Conceptual Planning
概念设计/概念规划

Based on previous research, exchanges, and discussions we proposed a planning idea to re-activate the interior of the plot and its waterfront's vigor by creating a low-density city through new urban agriculture and by tying up the missing canal network. As part of the Aiyi river's urban section, the plot reflects the urban evolution of both the city's low-density and high-density spaces against extrusion, which is quite special.

在前期调研和交流讨论的基础上，研究小组提出了一个规划思路：通过建设都市新农业理念营造低密度城市，织补缺失的渠网，从而重新激活地块内部及其滨水空间活力。作为艾依河流域城市剖面的一部分，这个场地反映了城市低密度和高密度空间对抗的城市演化，具有相当的特殊性。

FIG. 4.59 Qingshui Street
亲水大街滨水空间建成环境

FIG. 4.60 Comercial Street
商业街建成环境

Key issues
关键问题

Qingshui Street
- Lack of accessibility.
- No visual connection to the river.

Waterfront Space
- Lack of waterfront activities, waterfront space utilization rate is low, spatial structure is single-story.

Laifo Temple
- It has no relation with the water.
- The temple is unfinished.

Commercial Street
- Weak connection with the river.

Railway
- Lack of interaction with the water.

Farmland
- The farmland is barren, and has nothing to do with the river
- The ditch is dry.

亲水大街
- 缺乏可达性
- 与艾依河无视觉联系

滨水空间
- 滨水活动少，滨水空间利用率低，空间结构单一

来佛寺
- 与水无密切联系
- 寺院未建设完成

商业街
- 与艾依河联系较弱

铁路
- 与水缺乏互动

农田
- 农田贫瘠，与艾依河无关
- 沟渠干涸

FIG. 4.61 Dry Ditch on Site
场地中干涸的水沟

FIG. 4.62 Riverfront
典农河河边

Scheme Design

The design relies on the wisdom of the traditional irrigation district system in Ningxia, combined with the ecological wisdom of the rainwater system and modern technology of the water treatment, to restore the damaged drainage-network system and use it as a carrier to explore the water system serving the site and surrounding neighbourhoods. The model rebuilds farmland texture, creates a farmland landscape, irrigates green land, improves the site's microclimate, alleviates the problem of land salinization, and revitalises the original base.

方案设计

设计借助了宁夏传统灌区体系的智慧，结合雨洪系统的生态智慧与中水处理的现代技术，通过重新织补破损的渠网体系，并以其为载体，探索服务于场地与周边街区的水系统模式，重新构建农田肌理，打造农田景观，灌溉绿地，改善场地小气候，缓解土地盐碱化问题，使原本荒芜的基地重新焕发出新的活力。

We grow our crops under the tall buildings
We work the fields on the land of the city
We stand besides the water and look West
The clouds go away and the Helan mountain appears.

FIG. 4.63 The Concept Image.
概念景象

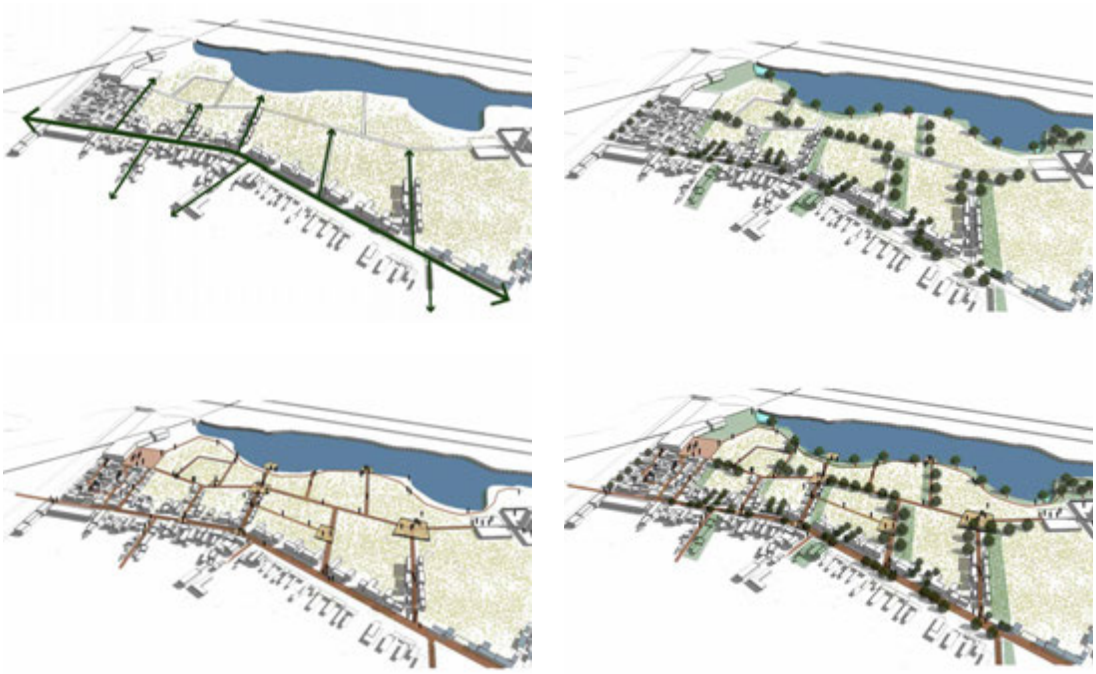


FIG. 4.64 Strengthen the Connection between Commercial Street and River through Street, Garden Road and Greening
通过街道、游路、绿化增强商业街与河道的联系

FIG. 4.65 General Plan
概念规划方案平面

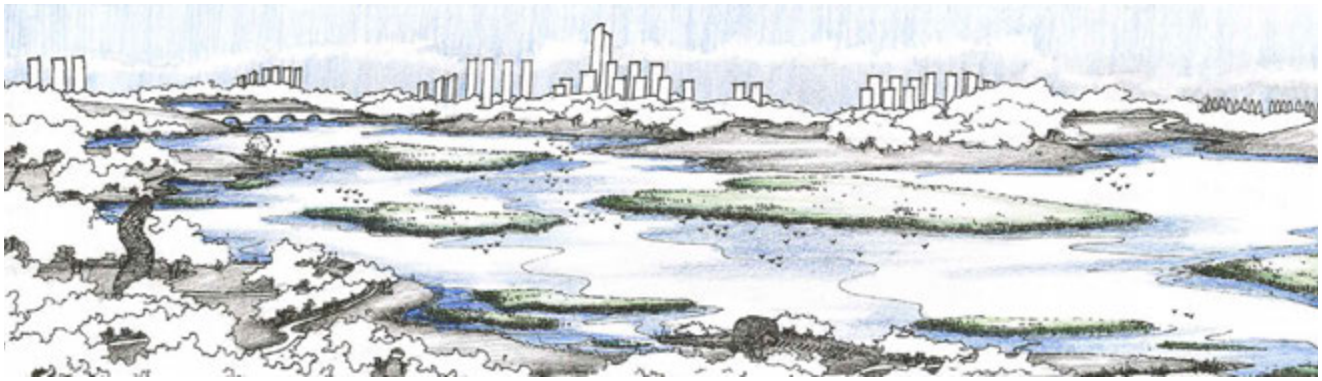


FIG. 4.66 Vision of Guan Lake Landspace
关湖空间景象愿景

4.4.3.2 – **Site 3: Guan Lake**
地段3 关湖地段

Preliminary Work / Field survey
前期工作／基地概况

The selected site is located on the southwest bank of Guan lake, a beautiful natural lake in the southern part of the main urban area connected to it by the Aiyi river. At present, there are a few high-rise residential buildings in the surrounding area, with a low level of development, making it a rare natural area in the city.

For the Guan lake site, the research team conducted four field surveys. The first preliminary field survey was completed by CADG and XAUAT in early April, when the preliminary investigations into the land parcels was completed (these were located near the natural water shores). The second was an in-depth field survey jointly completed by XAUAT and NXU in early June, when the delineation of typical plots of urban waterfront space in Yinchuan was completed. Site 3 was the mode of "residential area - road - urban public space - water". The third survey was a location survey conducted by XAUAT in early July, laying the foundation for the subsequent joint survey conducted by XAUAT, TU Delft, and NXU. The fourth land survey was completed jointly by XAUAT, TU Delft, and NXU, and the detailed design site selection and site design groups were completed.

所选场地位于与艾依河连接的主城区最南端美丽的自然湖泊西岸。目前，内部几乎为空地，主要规划为城市公园用地和文化设施用地；周边有少量高层居住建筑，开发程度较低，是城市中难得的一片未开发土地。

对于关湖场地，研究小组前后共进行四次现场调研。第一次为四月初中国建筑设计研究院与西安建筑科技大学共同完成的初步现场调研，完成对地块的初步认知，即位于近自然水体水岸；第二次为六月初西安建筑科技大学与宁夏大学共同完成的深入现场调研，完成了银川城市滨水空间典型地块选取，地块三为“居住区-道路-城市公共空间-水体”模式；第三次为七月初西安建筑科技大学进行的选地调研路线踏勘，为随后的西安建筑科技大学、代尔夫特理工大学和宁夏大学共同选地调研打下基础；第四次为西安建筑科技大学、代尔夫特理工大学和宁夏大学共同完成的选地踏勘，完成详细设计地块选取和地块设计分组。

From south to north, the Aiyi river is divided into a number of sections: Qizilianhu lake, urban river, West lake, Yuehai lake, rural drainage ditch, and Guan lake (located in the Qizilianhu lake section).

Qizilianhu lake is located to the southeast of the main urban area of Yinchuan. Through Aiyi river, Tanglai canal, and the Liangtian canal the urban water system forms an organic whole. This lake district is a precious natural wetland preserved amidst the construction and development process of Yinchuan city. With less urban construction and less manual intervention both the existing ecological state and the wetland landscape effects are better.

Satellite images from different periods show how the base was farmland before 2010, and there were plenty of fish ponds in 2004. After 2010, high-rise residential communities were built around the base, and the fish ponds disappeared. The area of surrounding wetlands remained basically unchanged, the number of reeds in the water decreased and the exposed area of the water became larger.

艾依河从南往北分为七子连湖段、城区河流段、大小西湖段、阅海湖段、郊野排水沟段，关湖则位于七子连湖段。

七子连湖位于银川主城区水系东南部，通过艾依河、唐徕渠、良田渠等与城市水系连为一体。该片湖区是在银川市建设发展过程中保留下来的珍贵的自然湿地，城市建设较少，人工干预较小，现有生态状态较好，湿地景观效果较好。

从不同时期卫星图可以看到，地块在2010年以前主要为农田，2004年时有大量鱼塘。2010年后，周边有高层住宅小区建成，鱼塘消失，但周边湿地面积基本维持不变，2010年后水中苇洲面积缩小，水体裸露面积变大。

FIG. 4.67 General View of the Site
该地块湖滨景象

Status & Planning
现状及规划

The site is a large sparsely populated open space with only a small number of residential areas. The natural lake body has good resources and the space is well covered by roads. The site is located in the planned Qizilianhu Lake Wetland Park, which is surrounded by the Yinchuan Special Botanical Garden and the Yinchuan Wild Botanical Garden. According to plans for the upper part of the site, there will be a large number of residential areas, which will bring in large numbers of residents and with them a large requirement for public space. There will be more segmentation caused by new roads, highlighting the contradiction between human activity and nature.

基地现为大量的空地，仅有少量居住区，自然湖体资源好，空间被道路明显分割。地块位于规划的七子连湖湿地公园，周边规划有银川市专类植物园、银川市野生植物园。据上位规划，地块周边将有大量居住区建成，会带来大量居民和随之而来的大量公共空间需求，会有更多道路分割空间，人与自然矛盾突出。

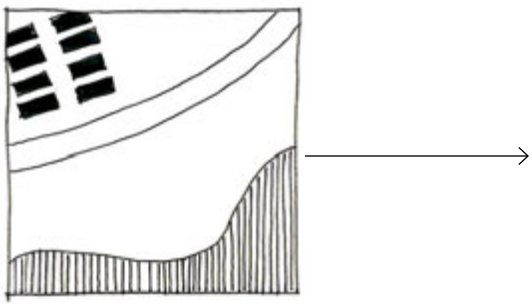
FIG. 4.68 Vacant land / Wetland - Visual Corridor to the Mountain - Built Environment
空地/湿地-看山视廊- 建成环境

Conceptual Design / Conceptual Planning
概念设计/概念规划

Key Issues
问题提取

At the urban level, the most prominent problem of the urban waterfront space in Yinchuan city is spatial blocking and the separation of people from water, resulting in poor participation of citizens in water activities. In addition, the spatial pattern of the water bodies is messy, and the waterfront space lacks identifiable characteristics. At the site's block level, the prominent problems of the waterfront space are mainly to do with connection, activity, function, and ecology.

城市层面，银川城市滨水空间最突出的问题是空间阻隔，人水分离，导致市民对滨水空间活动的参与性差；此外，水体空间格局凌乱，滨水空间景象亦无特色。地块层面滨水空间突出问题主要表现在交通联系、活动功能、生态三个方面。



Current Situation: Weak Accessibility and Continuity
现状：可达性、连续性差

from Lack of Activities to A Network of Gardens
变缺乏活动的空间为多个花园组成的网络

from Marked Zoning and Inaccessibility to Different Degrees of Accessibility and Areas or Occupation
变明显的分区和不可达的区域为功能多样的可达的区域

from Disconnected Patches to a Continuous Ecological System and Integration of the Gardens in the Built
变破碎的绿色斑块为连续的生态系统

from Big Highrises to Smaller Grain Buildings and Punctual Interventions
变大型高层建筑为小的相互联系的建筑群

Progressive Circles Model
A common urban waterfront spatial pattern is to construct a circle of coexistence between human activities and nature, where humans and nature mix together. This progressive model of improved enclosure divides the boundary between humans and nature into three layers: 1) enclosures close to human activity mainly serves these, while 2) enclosures close to natural water spaces mainly serve these, while 3) the transition zone see coexistence between humans and nature, making the main functions of these places different, with different focuses and coordination.

Ecological Habitat design for Animals and Plants.
Land plants and structures can be seen as being formed under the influence of yin or yang, which account for dry and wet conditions respectively. So yin conditions are sunny and dry while yang are wet. These can be divided into ten characteristics. According to the morphological characteristics and growth environment of different plants, different ground-cover communities were developed by selecting the group, seasonal phase, and ground cover which corresponded to one or more of the ten different habitat conditions.

Yinchuan is rich in species of birds and fish and is located on the route of migratory birds. At the beginning of April, large numbers of red-billed gulls can be seen in the many lakes in and around Yinchuan.

圈层递进模式
常见城市滨水空间圈层模式为在人与自然之间营建一圈人与自然共存区，人的活动与自然的生存共享同一个空间。改善的圈层递进模式将人与自然的交界分为三层：(1) 靠近人类生活区的圈层主要服务于人。(2) 靠近自然水体空间的圈层主要服务于自然。(3) 过渡带为人与自然共存区，使不同圈层主要功能不同，各有侧重，相互协调。

动植物生境设计
根据地块植物、构筑物影响下形成的不同日照环境、干湿情况，将场地进行生境分区，共分为阳生旱地、阳生湿地、植物半阴生旱地、植物半阴生湿地、构筑物半阴生旱地、构筑物半阴生湿地、植物阴生旱地、植物阴生湿地、构筑物阴生旱地、构筑物阴生湿地十类。根据不同植物的形态特征、生长环境等，选取建群种、季相种和地被种构建不同的地被植物群落，对应十类不同的生境条件。

银川鸟类、鱼类物种丰富，且位于红嘴鸥迁徙的必经路线。每年四月初、十月底在银川多个湖泊能看到大量红嘴鸥，在燕鸽湖、鸣翠湖湿地每年更有红嘴鸥观鸟节。

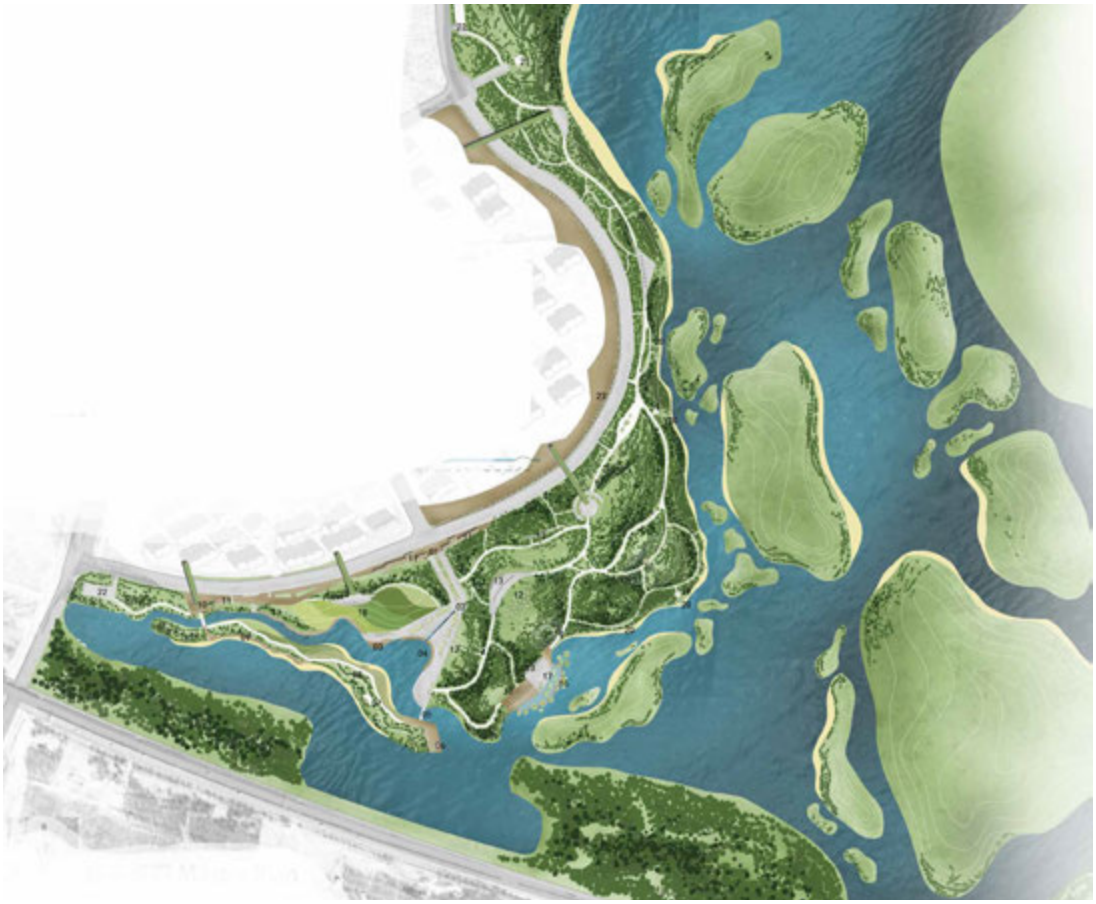


FIG. 4.69 General Plan
概念规划平面

FIG. 4.70 Circulation and Mobility Network
连续而流动的路网

FIG. 4.71 Zoning
不同的功能空间

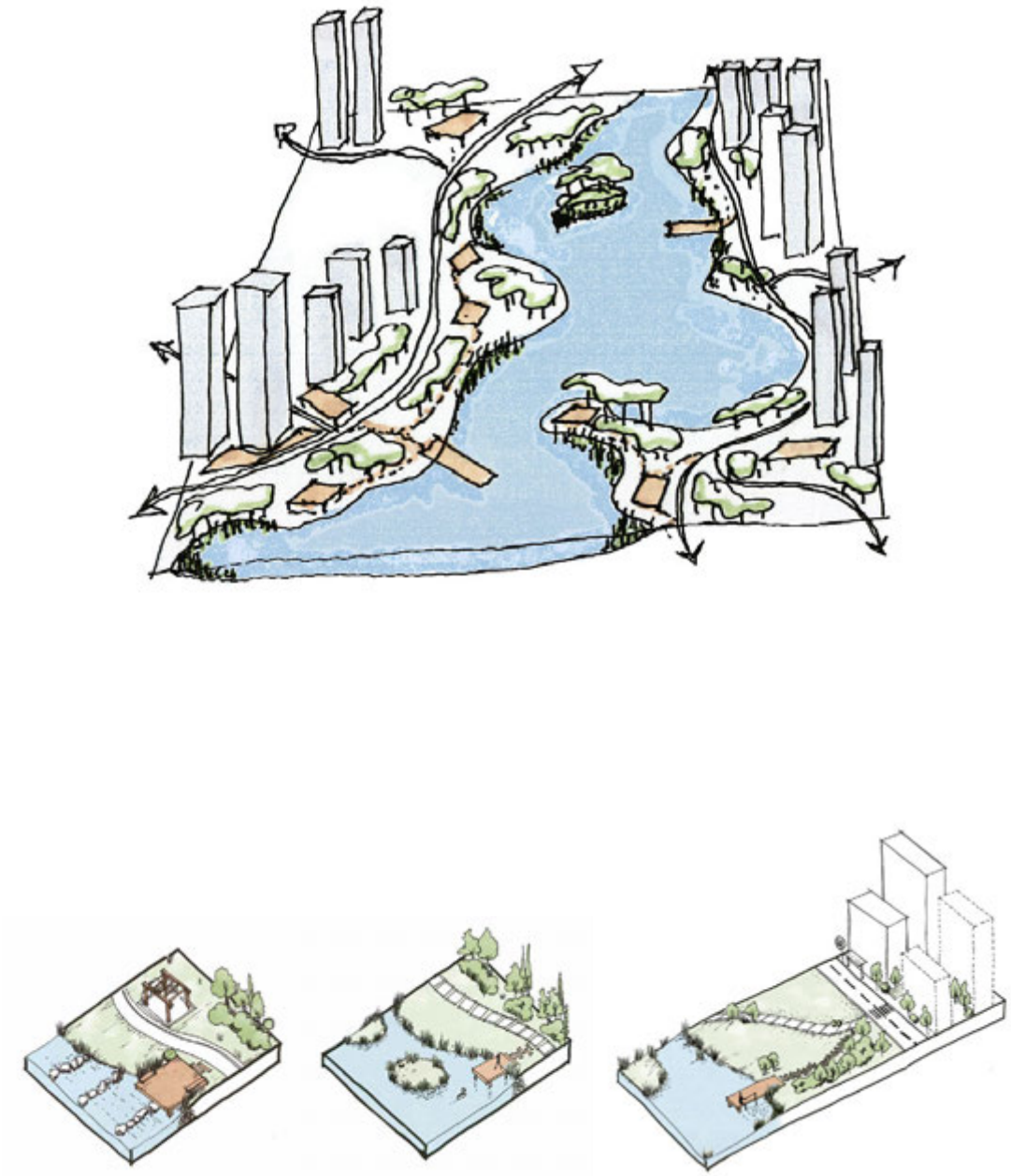


FIG. 4.72 Conceptual Patterns
设计的概念模式

FIG. 4.73 Vision of Northern Tanglai Canal Landscape
唐徠渠北地块空间景象愿景

4.4.4 – **Tanglai Canal**
唐徠渠

4.4.4.1 – **Site 4: North of Tanglai Canal**
地段4 唐徠渠北部地段

Preliminary Work / Field Survey
前期工作／基地概况

Tanglai canal is the administrative dividing line between Yinchuan city and Helan county. This site is located on the northern edge of the city, where the Tanglai canal and Chenjia lake water system form a three-dimensional intersection. Natural water features and artificial canal landscapes are available.There is a Guandi temple in the area, and the rest is open space. The surrounding area is residential and commercial. There are plans for a park, cultural venues, administrative offices, and other land uses.

唐徠渠为银川市与贺兰县的行政分界线。地块位于城市北部边缘区的唐徠渠与陈家湖的水系立体交汇处，自然水景与人工渠系景观兼备。基地内有一座关帝庙，其余为空地，周边为居住区、商业用地，未来规划为公园绿地、文化娱乐、行政办公用地等。

Field analysis
基地分析

For the north site of Tanglai canal, the research team conducted four field surveys. The first was a preliminary field survey completed by CADG and XAUAT in early April when a preliminary understanding of the land parcels was completed. The second was an in-depth joint field survey completed by XAUAT and NXU in early June when typical urban waterfront plots in Yinchuan were completed. The third survey was a location survey by XAUAT in early July, laying the foundation for the subsequent location survey jointly conducted by XAUAT, TU Delft, and NXU. The fourth land survey was completed jointly by XAUAT, TU Delft, and NXU when the detailed design site selection and site design groups were completed.

对于唐徠渠北地块，研究团队前后共进行四次现场调研。第一次为四月初中国建筑设计研究院与西安建筑科技大学共同完成的初步现场调研，完成对地块的初步认知；第二次为六月初西安建筑科技大学与宁夏大学共同完成的深入现场调研，完成了银川城市滨水空间典型地块提取。第三次为七月初西安建筑科技大学进行的选地调研路线踏勘，为随后的西安建筑科技大学、代尔夫特理工大学和宁夏大学共同选地调研打下基础；第四次为西安建筑科技大学、代尔夫特理工大学和宁夏大学共同完成的选地踏勘，完成详细设计地块选取和地块设计组分组。

Analysis of the Problem of the Status of the Site.
基地现状问题分析

The Tanglai canal's status has problems as following four aspects:

Access/Connectivity
- Difficult to access the site/restricted access from residential areas to site/canal.

Fragmentation (Spatial)
- The canal and the road system lack coherence.

Suppressed Historical Value
- The value of historical features is neglected.

Lack of
- Facilities (Social/Cultural/Recreational).
- Functions (Social/Cultural).
- Integration between these above and the landscape.

唐徕渠现状问题有以下四个方面：

- 可达性与联系性较差。进入基地困难，周围居住区到基地和渠的通行受限。渠和周边建筑、道路、绿地等要素缺乏联系。渠两岸缺少连接。
- 空间碎片化，路线不连贯。
- 被抑制的历史价值。历史文化要素的价值被忽略。
- 缺乏社会、文化、娱乐设施和功能，以及以上设施与功能的整合。

FIG. 4.74 Difficulty to Access the Site
难以通达地块的道路

FIG. 4.75 Seasonal Variation
季节性变化的水位（夏季水位）

SWOT analysis
基地的SWOT分析.

Through the field survey, we have a further understanding of the site. Summarizing the research results, we formed a SWOT analysis of the site:

STRENGTH
- Waterfront of canal and lake.
- Attractive public buildings.
- Difference between lake and canal.
- Link with the old city centre.

WEAKNESS
- Lack of accessibility.
- Lack of social or cultural functions.
- General lack of safety.
- Weak connection between residential areas, canal, lake, and between them.

OPPORTUNITY
- People from newly planned residential areas.
- People from the old city.

THREATS
- Fragmented residential buildings.

通过现场调研，研究小组对基地有了更进一步的了解，总结调研成果，形成了对基地的SWOT分析。

优势
- 同时拥有渠和湖这两种形态的滨水空间，及两者交融的滨水空间
- 公共建筑具有吸引力
- 渠和湖两种不同颜色的水系在此交错让基地更具特色
- 和老城中心联系

劣势
- 可达性不足
- 缺少社会文化功能
- 普遍性的安全问题
- 居住区、渠、湖、人行道之间缺乏联系

机会
- 来自新规划的居住区的人们
- 来自老城的人们

威胁
- 周围住宅建筑的碎片化

FIG. 4.76 Suppressed Historical Value
隐含的历史价值

FIG. 4.77 Lack of Integration
横向连接缺乏

Conceptual Design / Conceptual Planning
概念设计/概念规划

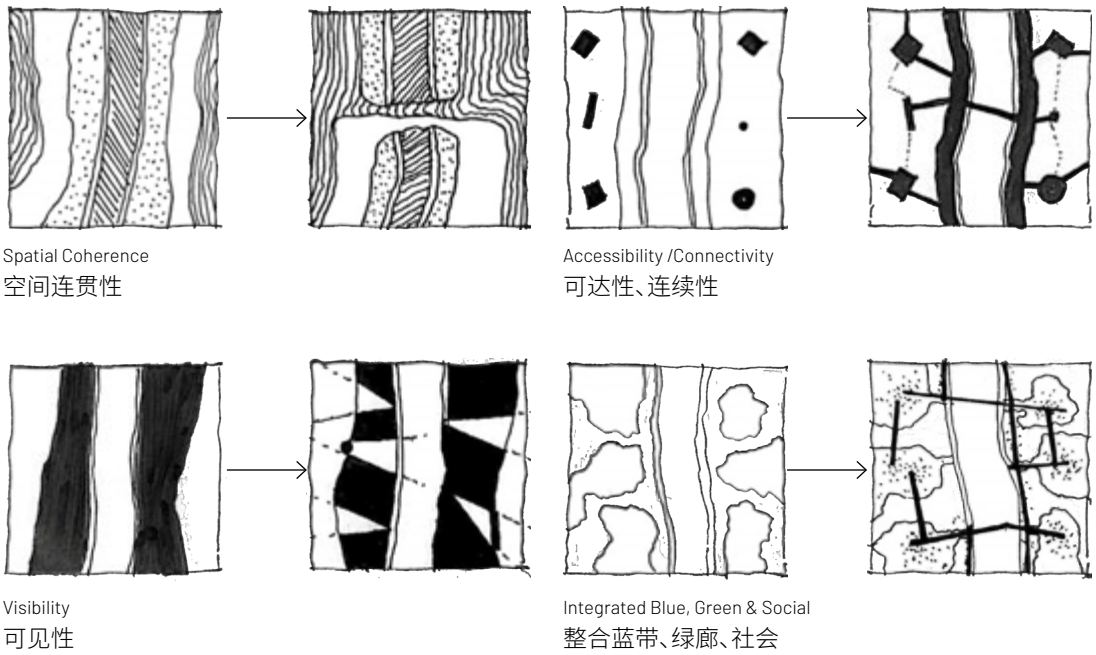
Key Issues
问题提取

How Can We Use Tanglai Canal to Define Surrounding Space?

Irrigation was the most important function of the Tanglai canal in the past. With the development of urban construction, the function of that part of the canal flowing through the city will change. Based on this, our concept is to use the canal system's framework to develop an urban public space framework.

我们如何用唐徠渠再定义周围的空间?

唐徠渠过去的重要功能是灌溉农田,随着城市建设发展,唐徠渠流经市区的渠段功能将发生转变。在此基础上形成概念方案,利用唐徠渠的渠系网络,构建城市公共空间发展的骨架。



Spatial Coherence
空间连贯性

Accessibility /Connectivity
可达性、连续性

Visibility
可见性

Integrated Blue, Green & Social
整合蓝带、绿廊、社会

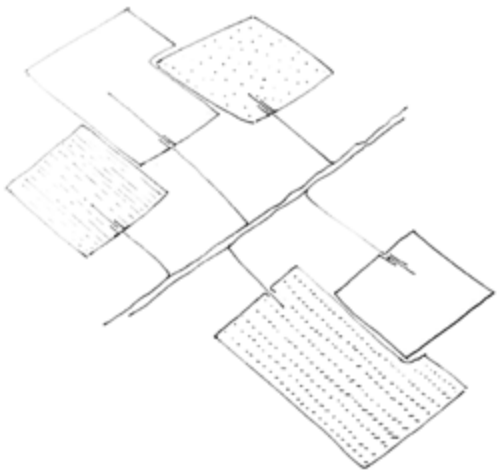
FIG. 4.78 Tanglai Canal, Key Issues
关键问题

In the process of transforming village to city, the space beside the canal also has to be changed. We need farmland transformed into gardens, bridges connected to cities, corridor bridges leading to increased public space, and public life increased along the canal.

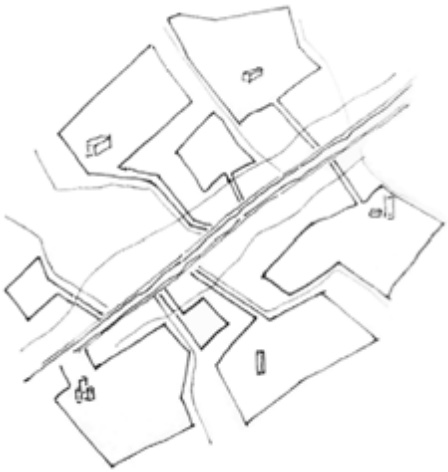
Slow road transformation.
The general section of Tanglai canal is arranged according to the reasonable walking distance of 10 minutes and 1 kilometre; the key section of Tanglai canal is arranged according to the reasonable cycling distance of 30 minutes and 5 kilometres or combined with public space.

在从乡村转变为城市的过程中，渠旁空间也随之发生改变。应促使农田转变为花园，用桥连接城市，用廊桥增加公共空间，在渠旁增加公共生活。

具体措施包括：
唐徠渠慢行路改造
唐徠渠普通段滨水空间根据人合理步行10分钟时间约1km的距离进行分段布置；唐徠渠重点段根据人骑车合理骑行30分钟时间约5km的距离或结合公共空间分段布置。



The Past
Dominant Purpose: Irrigation - Agriculture
过去 - 主要目的: 灌溉 - 农业



The Future
Dominant Purpose: Stirring Social / Cultural Dynamics
未来 - 主要目的：活跃的社会空间、文化动力

FIG. 4.79 Tanglai Canal, A Backbone of Development
唐徠渠是地块发展依托的骨架

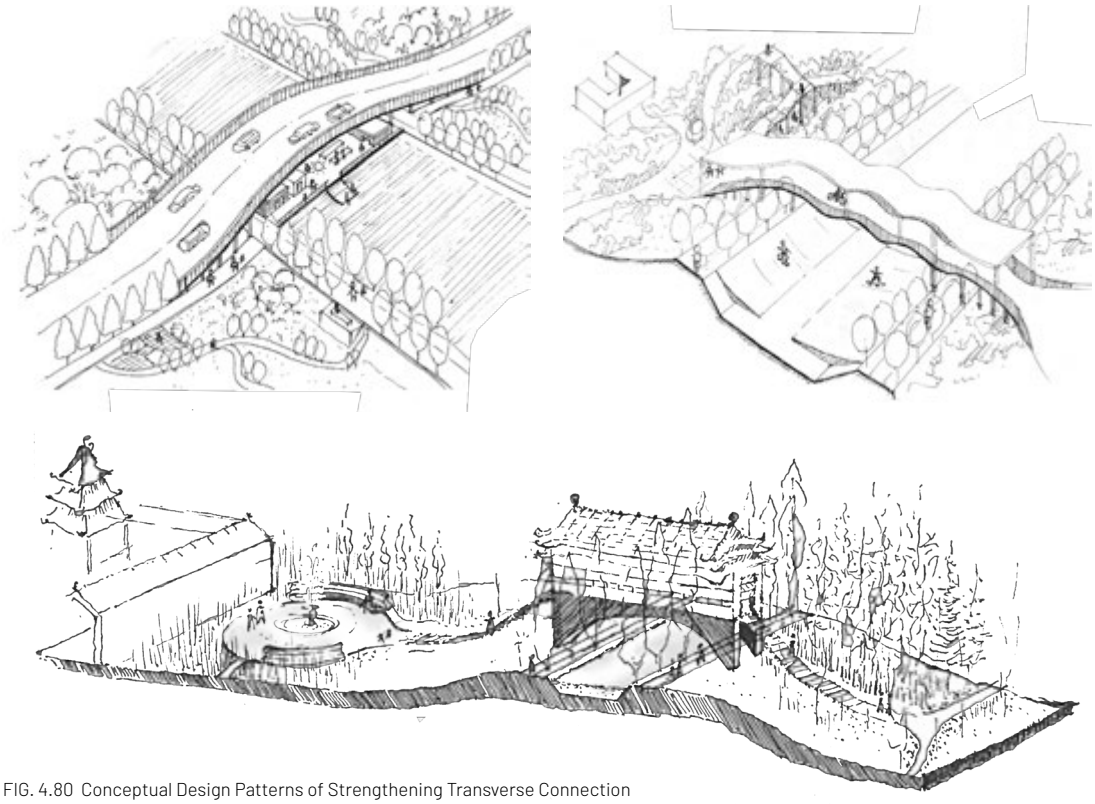


FIG. 4.80 Conceptual Design Patterns of Strengthening Transverse Connection
增加横向连接的概念设计模式


1. Populus
杨树


2. Prunus Lannesiana
日本晚樱


3. Pseudoacacia
刺槐


4. Pinus Sylvestris
樟子松


5. Acer Negundo Linn
复叶槭


6. Salix Babylonica
垂柳

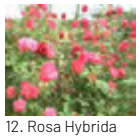

7. Pinus Tabuliformis
油松


8. Buxus Megistophylla Levl
冬青卫矛

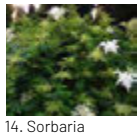

9. Weigela Florida (Bunge) A. DC.
锦带花


10. Berberis Thunbergii
紫叶小檗


11. Sabina Procumbens
铺地柏


12. Rosa Hybrida
丰花月季


13. Forsythia Suspensa
连翘


14. Sorbaria Sorbifolia
珍珠梅


15. Iris Lactea Pal
马蔺


16. Lolium Perenne
黑麦草

FIG. 4.81 Vision of Ximen Bridge, Tanglai Canal Landscape
唐徠渠西门桥地块空间景象愿景

4.4.4.2 – **Site 9: Ximen Bridge, Tanglai canal**
地段9 唐徠渠西门桥地段

Preliminary Work / Field Survey
前期工作／基地概况

The Tangmenqu Ximen bridge site is located at the intersection of the Jinfeng and Xingqing districts in Yinchuan city, in the middle of the Tanglai canal section, adjacent to the Drum Tower in the Old Town. The surrounding area of Ximen bridge is one of the most representative of a dynamic old town. Traffic is very convenient, and the population density is high.

The plot runs north to Xinchang Road and south to Liangtian Road. The east-west direction extends to both sides, with the Tanglai canal as its centre. The two sides are bounded by buildings. The interior of the base is basically a square where the green space next to the Tangyu canal meets the road. The parking lot, which used to be the former Ximen bridge market, is included as a carrier of historical memory.

The Yinchuan Waterfront Space Research Group went to Yinchuan for investigation twice in April and June. At the time of the July summer camp, Xi'an University of Architecture and Technology and Ningxia University and the Technical University of Delft in the Netherlands made an in-depth study of the Ximen bridge site. During the research work, a large number of pictures were taken, and some problems of public activity venues around Tangshuiqu were also found.

唐徠渠西门桥地块位于银川市金凤区与兴庆区交界之处，在唐徠渠城区段的中部，毗邻鼓楼，是最具有活力的老城区典型地段之一。交通十分便利，人流密集。

地块北至新昌路，南至良田路。唐徠渠东西两侧以建筑为边界，基地内部基本为唐徠渠旁边的绿地和与道路相接的广场，曾经是原西门桥集市的停车场。

Conceptual Design / Conceptual Planning
概念设计/概念规划

Key Issues
问题提取

The Tanglai canal can be seen as having four important elements: a rigid boundary; a tradition of inactivity in winter dating back to the Tang dynasty; the slow-scale transport system is not continuous; the connection with the old city is non-existent.

Rigid boundary.
Tanglai canal is an agricultural irrigation canal; its elevation is higher than the residential areas on both sides of the canal. The entrances and exits to the public venues on either side of the canal are few and inconvenient.

Tang dynasty inactivity in winter.
The Tanglai canal was inactive due to freezing in winter, and because Yinchuan is cold, wet, and rainy few people use the canal.

The slow-scale transport system is not continuous.
Tanglai canal runs in a line from north to south. The pedestrian routes on either side of it are also mostly north-south. Because of the Xinchang East Road, Jiefang West Road, and Liangtian Road, there are three east-west trunk roads blocking the canal. The organic connection of linear walkways is disturbed making it difficult for pedestrians.

The connection with the old city is not close.
In recent years, there has been a fixed open-air market in the square near Ximen bridge. Not far from the east side of the bridge is Yinchuan's Phoenix monument, Drum Tower, and the Yuhuang Pavilion, symbolising a new era. The places where different people lived in harmony have been lost because of a lack of design considerations.

西门桥区段是十分具有活力的地区，但也存在四大现状问题：僵化的边界、冬季缺乏活动、慢行系统不连续、与老城联系不紧密。

僵化的边界
唐徕渠是农业灌溉渠，标高要高于渠两边的居民区，居民到达渠边公共活动场地的出入口很少，较为不便。

冬季缺乏活动
唐徕渠冬季由于关闸停止向北方送水而干涸，且由于冬季的银川寒冷干燥，多风少雨，很少有人会在渠边活动，唐徕渠失去了往日的活力。

慢行系统不连续
唐徕渠南北向的布局，由于地块内有新昌东路、解放西路、良田路三条东西向的城市干道横穿而过，因此阻断了线性步行流线的有机联系，行人不易通过。

与老城联系不紧密
近些年西门桥附近的广场上还有固定的露天集市，不远处就是银川的新时代象征凤凰碑以及鼓楼和玉皇阁，但相距不远的两处人民生活的场所却因为缺乏一定设计上的考虑而失去联系。

Design Strategy
设计策略

Based on the thought processes listed above, and the intense discussions of the group, we summarized five solutions to the current situation: 1) penetration into the surrounding population; 2) seasonal changes in landscape and crowd activities; 3) vertical and pleasant public spaces; 4) reshaping the canal's connections; and 5) reproduce the memory of the ancient city. Through these strategies the public life of the canal system can come closer to those of the surrounding residents. As people can quickly and easily reach the canal and its activities, and can also arouse ancient memories of Ximen bridge, representing them as showing a connection with the ancient city (Gulou, jade, and the Imperial Court are connected to each other).

针对现状问题提出五个解决策略：(1) 景观设计响应周边人群生活；(2) 景观与人群活动的季相性变化；(3) 塑造竖向宜人的公共空间；(4) 重塑渠系两岸的连通性；(5) 重现古城记忆。通过这些策略使渠系公共生活更加贴近周边居民，使人们能快捷方便的到达渠边，唤起人们对西门桥的古老记忆，并将其与东边古城的代表鼓楼及玉皇阁相互联系起来。

FIG. 4.82 Public Space Contact Tanglai Canal and the Surrounding Urban Space.
公共空间渗透唐徠渠与周边城市空间

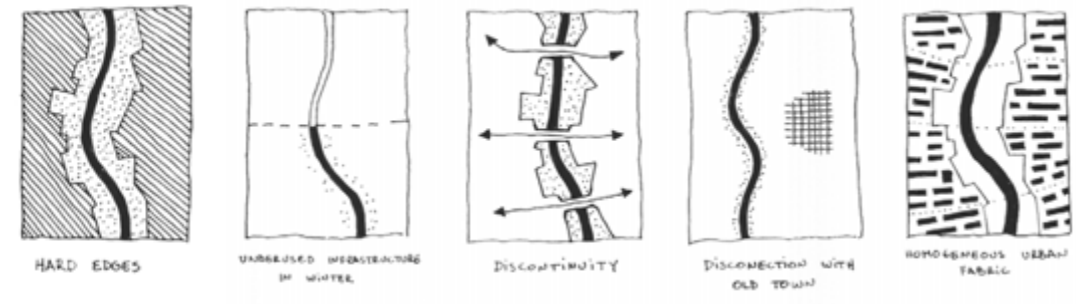


FIG. 4.83 Problems on Site
现场问题

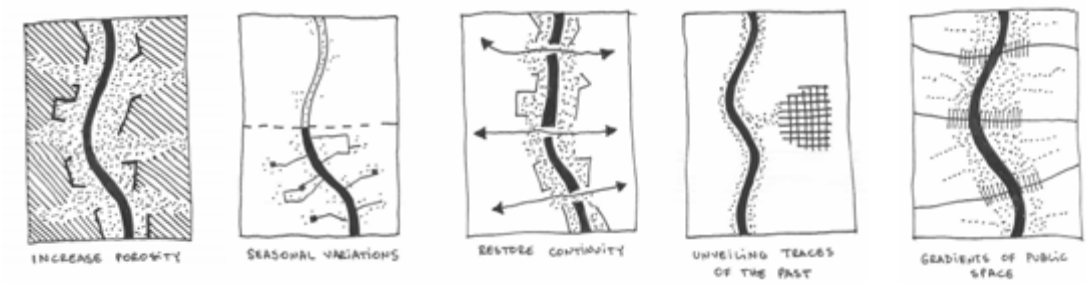


FIG. 4.84 Strategies
空间策略

FIG. 4.85 Level Diferences
高差

FIG. 4.86 Seasonal Variation
季节性变化

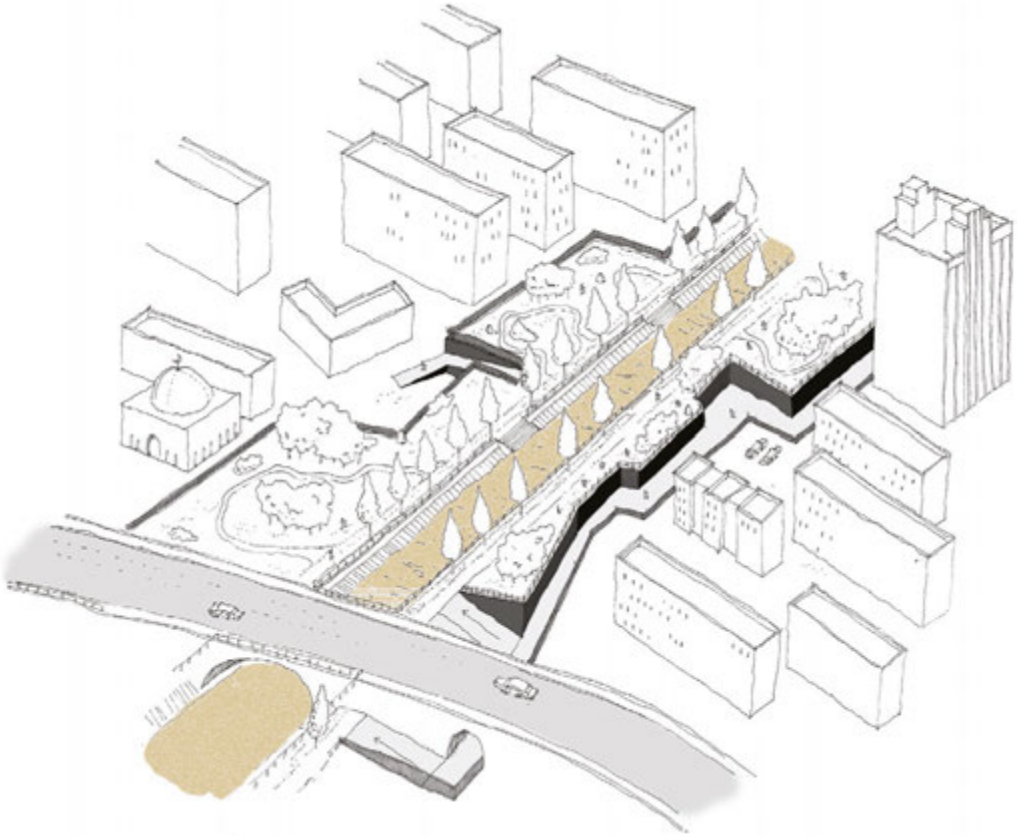


FIG. 4.87 Cars over Pedestrians and Ecology
汽车凌驾于行人和生态之上

FIG. 4.88 Lack of Diversity in Typologies
空间类型缺乏多样性

The design theme of "From the channel into the world", the application of modern design techniques to the ancient canal, intended to reconstruct the local market life.

The design intent was mainly reflected by the section design. One group extracted typical nodes from the plot: firstly, the sixth elementary school node of Jinfeng district, Yinchuan city. In order to increase the amount of public activity space, we proposed a time-phase management mode during the day or normal school hours. There are many possibilities here for the creation of public life. In the second node, we selected the Ximenqiao section. The crowds are varied, and it is a busy place. A height difference of four to five meters was formed between the Eye Hospital and the canal. We used the platform to directly connect the second floor of the hospital with the walking path of the canal, eliminating the separation of the canal space from the Hospital by the parking lot.

At the same time, we selected more than a dozen places that are not popular on the banks of Tanglai canal and designed multi-functional devices for them. During the investigations we found that Yinchuan people of an older generation liked to swim in the canal during the summer. Therefore, we added some ways to facilitate people entering the canal. In the winter, we designed a similar activity tied into the Yinchuan marathon to make full use of the lower space and transform the single-function Tanglai canal into a multi-purpose recreational and leisure waterfront space.

方案选定"从渠入世情"的设计主题，将现代的设计手法运用到古老的河渠，意在将当地的市井生活重新构建编织起来。

首先在银川市金凤区第六小学节点，为了增大公共活动空间面积，提出分时段管理模式，为公共生活提供多种可能性。第二个节点选取西门桥地段，人群类型多样，人流密集。在地段内的眼科医院一侧与渠边形成四到五米的高差，利用平台将医院二层与渠边的步行道直接相连，消除了停车场对渠边空间的阻割。

同时，在唐徕渠两岸就近选取十几个人气不足的地点，设计多功能装置。另外因在调研过程中我们发现， 夏季时老一辈的银川人十分喜欢在唐徕渠中游泳，因此，我们在设计中加入了一些便利人们进入渠中的途径；在冬季设计了银川马拉松等活动充分利用渠底空间，将单一功能的唐徕渠改造为全时段多功能的游乐休闲滨水空间。

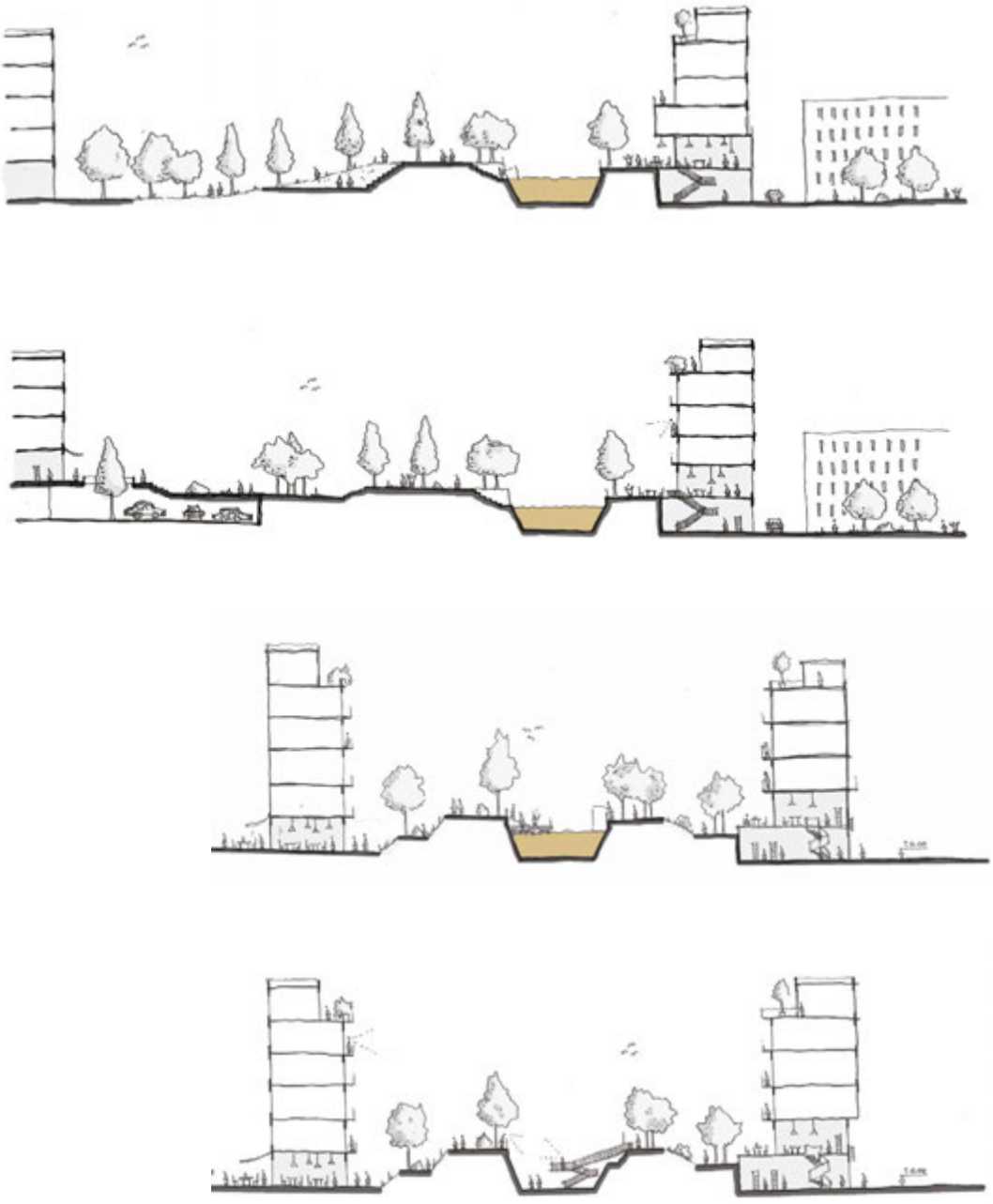
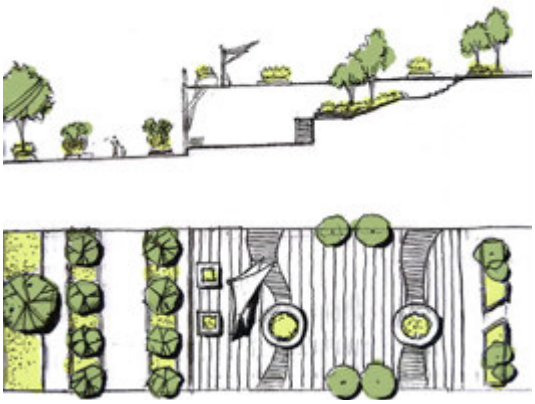


FIG. 4.89 Conceptual Models of Different Section Designs
不同断面设计的概念模型

Activity scenes
活动场景

EDGE BETWEEN CITY AND DIKE
城市与堤岸之间



Populus X
Hopeiensis
河北杨
Lolium Perenne
黑麦草
Syzygium
Aromaticum
丁香

Forsythia
Suspensa
连翘
Amorpha
Fruticosa Linn.
紫穗槐

Sophora
Japonica
龙爪槐
Lolium Perenne
黑麦草

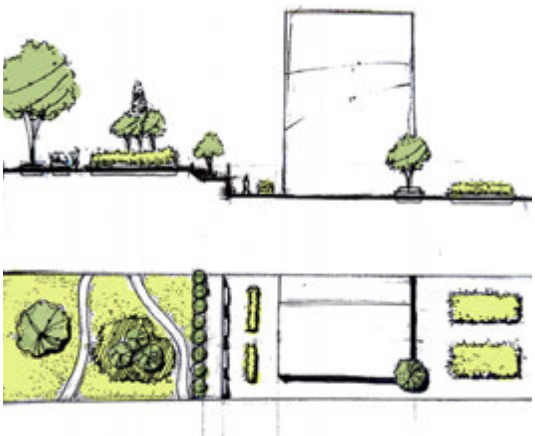
WATERFRONT
滨水空间

Picea Crassifolia
Kom.
青海云杉
Amygdalus
Davidiana
山桃
Lolium Perenne
黑麦草

Ulmus
Pumila'jinye'
金叶榆
Eugenia
Caryophllata
丁香
Buxus
Megistophylla
Levl.
冬青卫矛

Robinia
Pseudoacacia
刺槐
Forsythia
Suspensa
连翘
Berberis
Thunbergii
紫叶小檗
Medicago
苜蓿

PRIVATE GARDENS IN-BETWEEN BUILDINGS
建筑物之间的附属花园

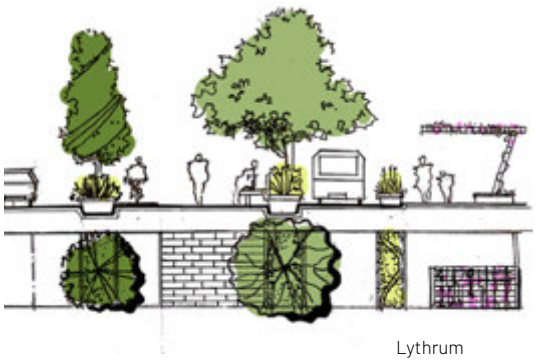


Robinia
Pseudoacacia
刺槐
Medicago
苜蓿
Ulmus
Pumila'jinye'
金叶榆

Sedum
Spectabile
八宝景天

Malus
八宝景天
Aster Novi-Belgii
荷兰菊
Iris Lactea Pall.
马蔺

TREE-LINED STREET TOWARDS HISTORIC CENTER
通向历史街区的林荫道



Populus
Bolleana Lauche
新疆杨
Iris Lactea Pall.
马蔺

Robinia
Pseudoacacia
刺槐
Aster Novi-Belgii
荷兰菊
Lolium Perenne
黑麦草

Lythrum
Salicaria
刺槐
Aster Novi-Belgii
荷兰菊
Wisteria
Sinensis
紫藤
Parthenocissus
Quinquefolia
五叶地锦

4.5 – Lessons Learnt and Future Perspectives

4.5 – 经验总结与展望

4.5.1 – **Re-Understanding and Re-Defining Waterfront Space in Yinchuan**
银川滨水空间的再认识与新定义

We learned from the urban design research of Yinchuan waterfront space that urban waterfronts cannot be defined only by the scope of land construction. From the perspective of space, it is necessary to discuss multiple levels of spatial composition and the components on either side of a waterline. Also, it is necessary to recognise the urban waterfront space from a holistic and systematic perspective. That means including the formation and evolution of urban water relationships, urban hydrological processes and morphology, and the internal driving forces under the influence of various factors. Among these factors, there are society, economy, and policy, as well as the urban design connotations of waterfront space with the coordination of various functions, such as urban public activity places, urban landscape construction, and habitat protection and construction.

From the perspective of nature and the historical evolution of urban water relationships, it is necessary to understand the type of water system in Yinchuan and its relations with urban construction and development. The types of waterfront space formed the old town and the suburban agricultural district nearby the ditch and canal, the new urban and suburban areas near the lake, the new city area near the human-made linked-lakes and the new area in the future city near the Yellow River.

从银川滨水空间城市设计研究中，我们认识到城市滨水空间不能仅仅以建设用地范围来定义。从空间的角度来讲，需要探讨水际线两侧的多个层次的空间及其构成要素；另外，还需要从整体和系统的角度认知城市滨水空间，其中包含城水关系形成及演变，城市水文过程及形态，社会、经济、政策等多种因素影响下的内在驱动力，以及城市公共活动场所，城市风貌构建与城市生境保护营造等多种功能互相协同的滨水空间城市设计内涵。

从城水关系的自然背景及其历史演变的角度来看，首先应该认识银川的水系类型及其与城市建设发展之间的关系。在银川城市发展过程中形成的滨水空间主要类型有：滨沟渠的老城区和城郊农业区、滨湖泊的新城区和城郊自然区、人工“连湖”的新城区和滨黄河的未来城市新区。

In particular, Yinchuan is located in the Yellow river diversion irrigation area. The farmland landscape of the irrigation system and its historical evolution are essential parts of the water culture in Yinchuan, but they have been neglected and forgotten. Also, the relationship between sustainable hydrological processes and the landscape image of the artificially restored "lake" and "river" system, is the premise of the waterfront spatial cognition and design strategy.

From the perspective of social preference, the landscape image of Yinchuan waterfront space is of considerable significance to the construction and development of Yinchuan. Its symbolic recognition should meet the preferences and needs of different target groups, and it should also guide the goals of sustainable development for future urban construction. The significance of urban water systems and waterfront space construction should be examined from a more meaningful regional perspective. At the same time, scientific quantitative analysis and research should be the basis of the urban water system and its waterfront space composition.

From the perspective of economic development, the waterfront space in Yinchuan should not be used exclusively as a tool for urban land appreciation and real-estate development.

特别是银川位于引黄灌溉区的源头，农田灌溉系统的景观及其历史演变，是银川水文化的重要组成部分，但被忽略，甚至遗忘。另外，认知人工营造的"湖""河"系统及其水文过程与景观形象之间的关系，是制定滨水空间设计策略的前提。

从文化景观的角度，银川滨水空间的风貌形象对于城市建设发展具有重要意义，其"形象符号"认知既应考虑不同目标人群的偏好和需求，更需要引导未来城市建设可持续发展的目标。应以更大区域的本土环境审视城市水系与滨水空间建设的意义。另外，科学量化的分析和研究是认知城市水系及其滨水空间构成的基础。

从经济与社会发展的角度，银川的滨水区应避免单一的房地产开发，建设应寻求城市土地价值提升与公共活动与社会幸福的平衡发展。

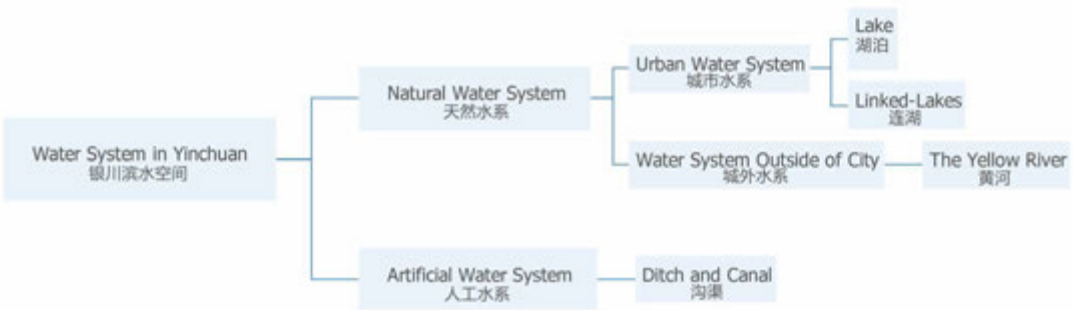


FIG. 4.90 The Classification of Water Systems in Yinchuan
银川市水系分类

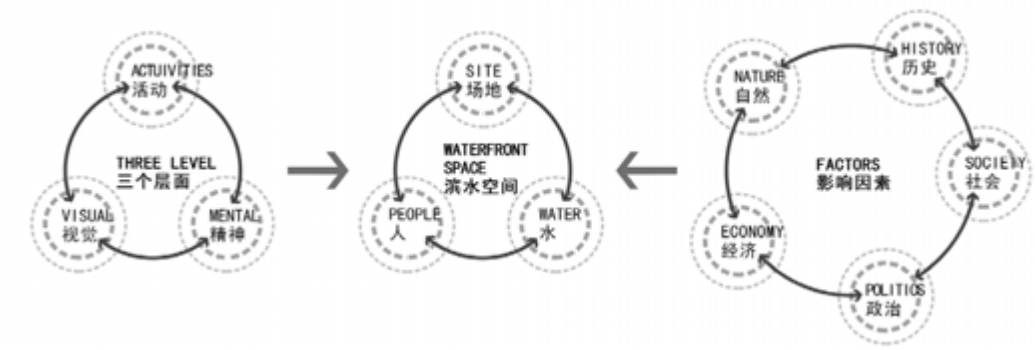


FIG. 4.91 Factors and Levels of Perception to Be Considered when Planning Waterfront Spaces.
规划滨水空间时要考虑的因素和层次

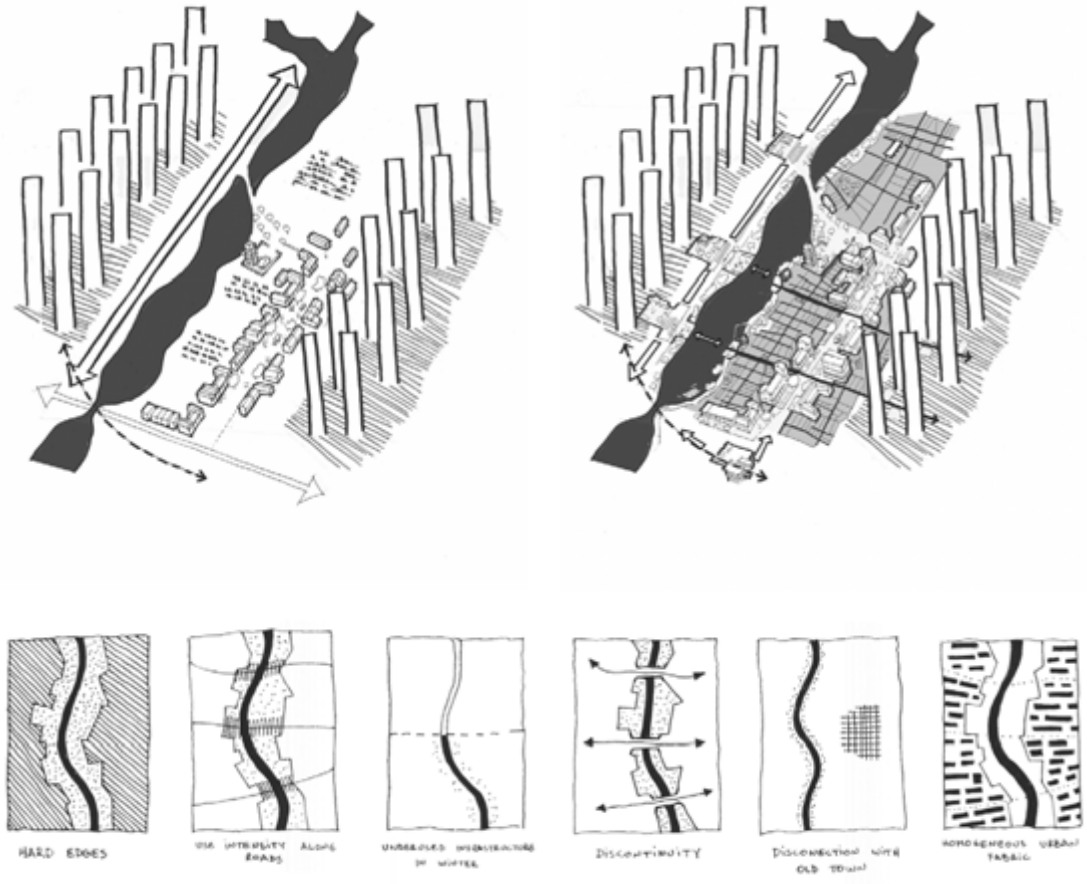


FIG. 4.92 Examples of the Transformation of the Waterfront Space in Yinchuan
滨水空间改造示意

4.5.2 – **The Design Language for Effective Translation between Different Contexts, Historical and Contemporary,Local and Global, Different Disciplines.** 在不同文脉、历史与现代、地方与全球化及不同学科之间有效转译的设计语言

Exploration of Design Language with a Different Context.
不同语境下设计语言的探索

The whole process of this project involved teams with different backgrounds, including design, and a combination of universities, including one foreign and two domestic ones (one of which was non-local), as well as local governments. In addition to language problems, there were also differences in cultural backgrounds, so there are deviations in the understanding of some concepts — for example, the word "garden". There were different understandings between teachers and students from TUD and XAUAT. The modern expression of Chinese traditional landscape construction involving modern design language, and how water conservancy knowledge and ecological knowledge can be involved in site design, were some of the challenges and explorations faced by the summer camp.

In order to communicate effectively and build consensus, a "Glossary of Chinese-English Terms Used in the Design of Waterfront Space in Yinchuan" was compiled at the beginning of the summer camp to reduce misunderstandings of some of the concepts. On the other hand, in view of the unique natural geographical environment and historical and cultural background of Yinchuan, some common principles for urban design of waterfront space were found and established, namely the seven principles, which are called the expression of a design thinking mode and promote effective communication and the generation of design schemes.

本次课题研究的全过程中涉及设计企业、国外专业型高校、国内非本地专业型高校、本地高校和当地政府等不同背景的团队，除了语言沟通的问题，更多是文化背景的差异，甚至对同一概念的理解都会有偏差。例如"Garden"一词，荷兰代尔夫特理工大学和西安建筑科技大学双方师生的理解就有所不同。中国传统风景营建思想如何转化为现代设计语言，水利和生态学知识如何引入场地设计等，是工作营面对的挑战。

为了有效沟通，建立共识，工作营一开始便制定了简易的《滨水空间城市设计中英专业词汇对照表》，以减小各方对同一概念的理解偏差。另一方面针对银川特殊的自然地理环境与历史人文背景，确立了滨水空间城市设计的七个共同原则，促进了各方有效沟通和设计方案的生成。

Operability – Typological Studies and Site Selection.
可操作性——滨水空间类型化及典型场地的选取

The determination of fundamental design principles and the application of specific designs are in the process of interaction and repeated revision. From the design principles to the site design method, this needs specific operability. Conducting typological studies based on waterfront types, selecting typical sites through investigation and analysis, delimiting the scope and content of design research, and organizing students from three parties to carry out field research and specific designs, we made each site a catalyst driving the formation of a type of waterfront design language.

设计基本原则的确定与具体设计是一个相互作用和反复修正的过程。从设计原则到场地设计手法，需要具有一定的可操作性。对滨水区进行类型化研究，并通过调研和分析，选取典型地块，划定设计研究的范围及设计内容，组织三方学生展开现场研究和具体设计，将每一地块提炼为设计范式，带动这一类型的滨水空间设计语言的进一步成型。

Garden of Place and Scene - Concept and Design.
场所与场景的花园——概念与设计

Clarity of concept can often give a design thought and direction, to be realised through a design method. Lacking suitable scales and paths for human activities, having regions without space, sites without places, roads with greening but without great scenic spots or thematic scenes, all characterize the current situation of the waterfront space in Yinchuan.

To help the group think about specific location selection and design, a concept based on a series of "gardens" (of places and scenes) was given. In the summer camp, the specific design needed to be done within a minimal time. Partners reached consensus, closely focused on the theme, and then designed very rapidly. The intervention of the concept of "garden" made the teams quickly enter their roles, and made the design thinking very practical.

概念的明晰往往能使设计具有思想和方向，并通过设计手法加以实现。银川市现状很多滨水空间缺少适宜人活动的空间和路径，有区域无空间，有场地无场所，有道路绿化，无重要观景点和主题场景，这些都是其现状。

工作营提出了帮助团队思考具体的选址和设计一系列“花园”（地点和场景）的概念。“花园”概念的介入使设计小组迅速进入角色，让合作伙伴们紧紧围绕主题达成共识，快速构思，展开具体的地块设计，在短时间内取得成效，推进设计思想的落地性。

4.5.3 – **Diversified Cooperation Based on Local Values**
基于地方价值的多元合作

The year-long "design research and teaching" camp is a multi-faceted collaboration based on local values. In the research work of the "comparative study on the urban design of waterfront space in three cities", CADG, as a front-line design practice, plays the role of communicating with the government and organising research work, proposing tasks and promoting cooperation, and establishing communication channels between universities and the government. In addition, CADG will compile the research results and complete "the Yinchuan waterfront space urban design guidelines".

XAUAT is rooted in the well-known architectural colleges of Northwest China. Facing Yinchuan as the representative of waterfront space in Northwest China, XAUAT has a solid research foundation and working conditions and has become the leading researcher of Yinchuan group.

TUD, as a foreign university with re atively mature research and practical experience in urban waterfront space design, places the waterfront space of Yinchuan under an international lens, providing an international frontier for theories on this subject.

NXU's participation enables the work of the summer camp to reflect more its local and traditional values. NXU's teachers and students are both designers and end-users of these spaces. They can represent and give feedback on the social convenience and usage of local waterfront space and offer advantages of available research.

Finally, Yinchuan Urban Planning Bureau, as the manager and decision-maker, implemented the research and practice results of all parties. All parties focused on the waterfront space of Yinchuan city to achieve win-win cooperation.

本次历时一年的"设计研究教学"式工作营，是基于地方价值的多元合作。在这个过程中，中国建筑设计研究院作为一线设计实践机构，扮演了与政府沟通及研究工作组织的双重角色，提出课题任务并促进合作，在国内外高校与政府之间建立沟通渠道。同时作为乙方，研究成果有效编制完成《银川滨水空间城市设计导则》。

西安建筑科技大学作为扎根于西北地区的建筑类知名院校抓住银川这一西北地区滨水空间的突出代表，对类似地区具备扎实研究基础和工作条件，成为银川组研究工作的主导者。

荷兰代尔夫特理工大学作为具有较为成熟的城市滨水空间设计研究与实践经验的国外高校，将银川市滨水空间置于国际视野之下，为本次课题提供国际前沿的理论。

宁夏大学的加入更有效的为工作营传递了地方性价值，他们则既是设计者又是使用者，能代表并反馈当地人滨水空间的社会便好和使用感受，并具有现场调研的优势。

最后银川市规划局作为决策者和管理者，将各方研究与实践成果付诸实施。各方紧紧围绕银川市滨水空间品质提升的目标，实现一加一大于二的合作共赢。

4.5.4 – **Feedback Wto Local and Long-Term Service**
回馈当地与长效服务

The real value of waterfront urban design research is to give back to Yinchuan. There are three approaches: first, the research results have a direct impact on activities, function, landscape features of Yinchuan's urban waterfront space to promote sustainable urban development; second, to train local professionals; and third, the social and ecological value of waterfront space in Yinchuan should be recognized by the domestic and international scientific communities. All this requires more long-term planning and promotion, not just one year's worth of research projects, but a consensus among government, professionals, and the public.

The government should actively listen to the advice of professionals and investigate the needs of the public to make better decisions and invest in meaningful projects. Professionals should respect the characteristics of the city, understand the practical needs of the public, and thoroughly study and design the project before implementing their designs. As the users and beneficiaries of waterfront space, the public often redesigns waterfront space to promote the multiple functions and social and ecological benefits of waterfront space with northwest characteristics.

滨水空间城市设计研究的真正价值，是能够回馈银川当地。有三个途径实现该目标：一是研究成果直接对银川城市滨水空间的功能、风貌特色产生有效影响，促进城市可持续发展；二是为当地培养专业人才；三是让国内和国际科学认知银川城市滨水空间的社会和生态价值。这都更加需要长期的计划和推进，不是一年周期的研究项目所能完成，需要政府、专业人士和公众达成共识，共同促进。

政府方面要积极听取专业人士的建议，调查公众的需要，以做出更好的决策，引导有意义的项目投资。专业人士要尊重城市特征，理解公众的实际需要，在项目实施前充分研究、合理设计。公众作为滨水空间的使用者和受益者，常会对滨水空间进行再设计，推动西北特色的滨水空间实现多重功能和社会、生态效益。

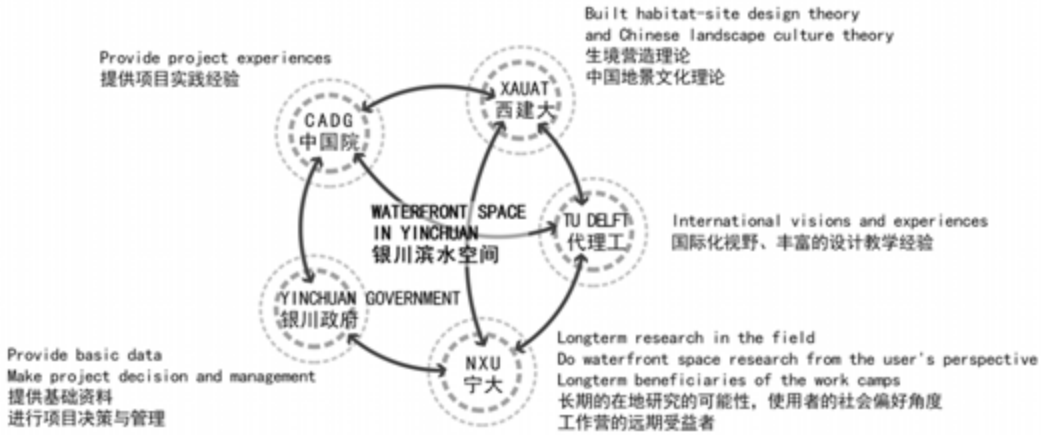


FIG. 4.93 The Role of the Partner Institutions in the Process of Planning and Designing Waterfront Spaces in Yinchuan.
银川滨水空间研究的多元合作角色构成

FIG. 4.94 Aerial View from the Yellow River, the Plain and the Mountains
黄河、平原和山脉的鸟瞰图

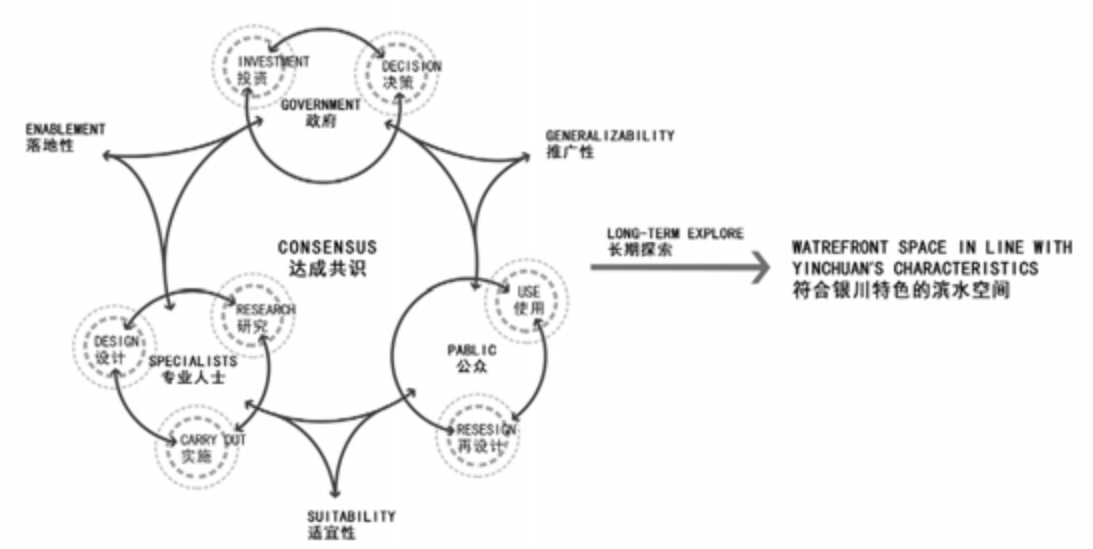


FIG. 4.95 The Phases and Process involved in the Planning and Design of Waterfront Spaces.
滨水空间设计推进关系图

FIG. 4.96 Aerial View from the Yellow River, the Plain, the Lakes and the Mountains
黄河、平原和山脉的鸟瞰图

Postscript
后记

The work process of the workshops was "problems – hypotheses – pathways – directions – design validation". The purpose was to identify "new possibilities" and establish the most valuable directions before standard guidelines would be compiled by a professional design team. Hence, in a situation where a series of intrinsic ideas, practices and extensive built-up areas are already in place in all three target cities, the main value of the workshops lies in how to find the right way of work in a systematic and scientific manner that both preserves the existing values and avoids the constraints of these values, rather than work out a mature package of concrete actions or a complete set of standard illustrations. From this perspective, workshops have fulfilled their tasks.

Beijing workshop: Chaired by Prof. XU Suning, this part of the work gives an accurate manifestation of the intention of the workshop design, within a Research – Judge - Design framework. The workshop determined the overall objective of waterfront construction in Beijing based on the historical evolution of city-water relations in Beijing, city-water relations in other typical capital cities in the world, and city-water relations in other representative ancient metropolises in China; evaluated the value system of waterfront areas on the six dimensions of ecology, space, demand, history, economy and aesthetics; established the design strategy on these six dimensions and finally validated them through typical node designs. The systematic analysis framework resulted from the workflow is logically well defined. The information and value systems from research through design are smoothly communicated.

这次工作营的工作过程是“提出问题-提出假设-提出路径-选定方向-设计验证”，目的是提出“新的可能”，并选定最有价值的方向，最后再交由专业设计团队完成规范的导则编制。因此在三个目标城市已经建立了一系列固有观念、习惯做法、大面积已建成区域的情况下，如何在延承现有价值的基础上突破既有观念束缚，通过系统的科学方法，找到当下的工作思路，是工作营的主要价值，而不在于提出成熟的具体措施和完善的规范图示。从这个角度评价，这次工作营圆满的完成了使命。

北京工作营：该部分由徐苏宁教授主持，以“研”、“判”、“设”的工作架构准确的展现了工作营设计的初衷。工作营从北京城水关系的历史演变，世界典型首都城市城水关系比较，中国代表性古都城水关系比较出发，确定北京滨水区建设的总体目标。梳理出生态、空间、需求、历史、经济、美学等六个维度的滨水区价值体系进行评价，随后也从这六个维度确立设计策略，最后用典型节点设计予以验证。整个工作过程建立的系统分析架构逻辑清晰，从研究到设计的信息和价值体系传导顺畅。

Suzhou workshop: Chaired by Prof. Paola VIGANÒ, this part of the work features a unique western perspective in determining the vision of Suzhou and also reflects the common demand of people for high-quality spaces despite differences between East and West. Its quick analysis of problems and challenges, and accurate identification of problems in a short period of time are very impressive; it efficiently grasped the characteristics of the object and established the entry point for solving problems; it provided enlightening pathway of solving problems and came up with an astonishing hypotheses that have never been thought about in the existing experience of Suzhou (e.g. the potential possibility of acquiring a 4200-km long waterfront public, open space in Suzhou). This is a result of the "design-oriented research" of the working team, as well as the result of repeated mutual checkup, inspiration and modification between macroscopic and microscopic studies.

Yinchuan workshop: Co-chaired by Prof. LIU Hui, Prof. CHANG Haiqing, and Marco LUB, and Luiz de CARVALHO FILHO, this part of the work impresses us very much with its technical route that enters the theme from landscape ecology perspective. The workshop tried to find a Yinchuan solution for global and national topics such as climate warming, water shortage, and rapid urbanization, established design-oriented "seven principles" with definite values long before, carried out design under the guideline of the "oases and gardens" concept using an "iterative design process", and has worked out a series of customized, creative design strategies for Yinchuan.

As the final contribution of workshops in their supports for the technical management of the three cities, the professional planners and designers from China Architecture Design & Research Group, based on the insightful conclusions from the workshops, worked on themselves in parallel with the workshops, having compiled technical documents for guiding the local waterfront design of Beijing, Suzhou, and Yinchuan.

苏州工作营：该部分的研究由宝拉 · 薇佳诺教授主持，对苏州愿景的设定具有独特的西方视角，同时折射出超越东西方差异的人们对高品质空间的共同需求。工作营迅速的分析问题与挑战，在较短的研究时间周期里对问题的识别准确度让人印象深刻；高效的把握对象特征，找到解题切入点；提出具有启发性的解题思路，并在研究中得到在苏州原有经验中未曾想到的惊人假设（例如：在苏州获得4200公里长的滨水公共开敞空间的潜在可能性）。这是工作组通过"从设计出发的研究"获得的成果，同时也是宏观与微观研究之间不断相互校验、启发和修正的成果。

银川工作营：该部分研究由刘晖教授、常海青教授和马克 · 陆、路易斯 · 德 · 卡瓦洛 · 菲洛共同主导，从景观生态学角度切入主题的技术路线让人印象深刻。工作营试图提出回应气候变暖、水资源短缺、快速城镇化等全球和国家议题的银川解决方案，很早就确定了带有明确价值观，并从设计出发的"七个原则"，采用"迭代设计过程"推进研究的技术方法，在"绿洲和花园"概念引导下展开设计，提出了一系列为银川量身定做的，具有创见的设计策略。

作为本次工作营支撑三个城市技术管理的最终贡献，中国建筑设计研究院的专业规划师和设计师们在充分汲取工作营所凝结的真知灼见的基础上，开展与工作营并行的独立研究，已分别为北京、苏州、银川编制完成指导当地滨水区设计的技术文件。

YANG Yifan
杨一帆

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Beijing team made emphatic investigation and discussion on the structure and characteristics of the water systems and the classification method of Beijing waterfront, established the five design principles of common sharing, clear hierarchy, history inheritance, high-low harmony, and water preservation against characteristics and problems of water systems in Beijing, and provided an innovative waterfront space classification method that is applicable for all domains and contains near-water spaces and adjacent-to-water spaces.

The *Urban Design Guidelines for Beijing Waterfront* will be published for the compilation, approval, and implementation of related plans. It will effectively bridge the planning and requirements of individual districts for water structure and classification. The opinions and suggestions of water affairs and parks and woods authorities have been extensively solicited. Multiple readjustments and improvements have also been made.

The guidelines, targeted at the municipality of Beijing and based on the context of waterfront spaces, review the water system frameworks of the administrative region, downtown, and core districts of the city and identify the focal points of control for different levels of waterfront spaces. At the administrative region level, the zoning and classification design guides for waterfront spaces based on the urban space structure in the general plan; at the downtown level, using a guide and control combining constraint with flexibility, the design principles are incorporated into the review requirements to ensure the design intentions are fulfilled, and the key control contents and general design strategies for waterfront spaces are provided with the help of illustrative expression. At the core districts level, the requirements of the general plan for the restoration and protection of historical water systems in old urban districts are intensively fulfilled and, based on urban design means, quantitative control indicators and fine design guides are provided. By structuring a multiple guideline series spanning from macroscopic to microscopic levels, a technical guidance document capable of leveraging the integrated waterfront space design of the whole area is established.

北京项目组集中对北京水系结构、特征及滨水空间分类方式进行了调研与探讨，针对北京水系特征及问题明确了滨水空间全民共享、分级明确、传承历史、丰枯兼容和涵养水源5大设计原则，创新性的提出包含近水空间和邻水空间的适用全域的滨水空间分类方式。

北京滨水空间设计导则将公开出版，用以指导相关规划编制、审批和实施。导则编制有效衔接了各分区规划对水系结构和滨水空间分类的规划与要求，广泛征求了水务、园林等相关权责部门对成果内容的意见和建议，并进行多轮调整和补充完善。

导则以北京市辖区作为研究范围，基于对滨水空间现状特征和问题总结，从北京市域、中心城、核心区三个层面梳理了水系格局，明确各层级滨水空间管控重点。在市域层面衔接总规城市空间结构，提出滨水空间的分区和分类设计引导。在中心城区采取定性与弹性相结合的导控形式，将设计原则纳入审查要求来保障设计意图的贯彻，结合图示化的表达方式提出滨水空间重点管控内容和通用设计策略。在核心区深化落实总规对老城历史水系恢复和保护的要求，结合城市设计的手段，提出量化管控指标和精细设计引导。构建从宏观到微观的多元导则系列，形成一个能统筹全域滨水空间一体化设计的技术指导性文件。

Project Team of *Urban Design Guidelines for Beijing Waterfront,*
China Architecture Design and Research Group
中国建筑设计研究院有限公司
《北京滨水空间城市设计导则》编制组

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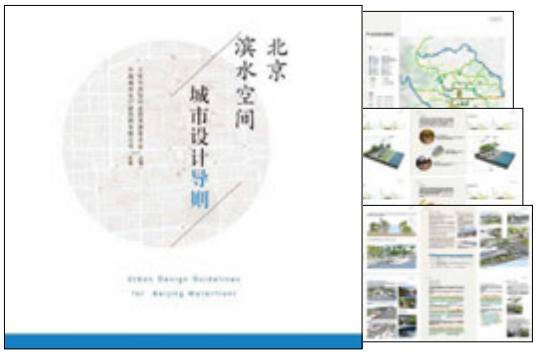

Deliverable of *Urban Design Guidelines for Beijing Waterfront (excerpts)*
《北京滨水空间城市设计导则》最终成果（局部节选）

During the research, Suzhou team held four workshops in Beijing, Suzhou, and Tianjin, which included surveys, interviews, central designs, master forums, periodical discussions, and output presentations. An important part of these workshops was the special lecture given by each of the foreign professors that offered chances for exchanging ideas and widening horizons. These workshops provided good basis for visioning future prospects, reviewing the waterfront space characteristics and summarizing existing problems.

The research report was compiled simultaneously with the *Overall Urban Plan of Suzhou (2017-2035)* and the *Overall Urban Design of Suzhou*. During the work, the two working teams joined together to discuss the framework of water systems and classification method of waterfront spaces in Suzhou. The research covered the administrative region of Suzhou. At the macroscopic level, the urban space structure was reviewed, important waterfront spaces were identified; the feature zoning of the waterfront spaces was established according to the current water network structure, urban functions and urban features; operable planning strategies and construction guidance requirements for individual levels and classes have were provided. At the microscopic level, around the planning objective of a "waterfront space network that is spacious and good for water preservation, allows living by water, is open and shared, and reflects the history and culture of the city", design tips in respect of section design, landscape design and surrounding building control were identified for different kinds of waterfront spaces.

The opinions and suggestions of water affairs, gardens and woods, and transportation authorities were extensively solicited during the research. Some of the outputs have been included into the *Overall Urban Design of Suzhou*, providing guidance for the upgrading of the waterfront spaces of the city.

研究过程中，苏州项目组在北京、苏州、天津共举办了四次工作营，包括了调研、访谈、集中设计、大师论坛、阶段讨论及成果展示等多项内容，工作营中重要的环节是每名外籍教授进行专题讲座，提供交流机会，扩展视野。工作营为畅想未来愿景、梳理滨水空间特征和总结现状问题提供了良好的工作基础。

课题与苏州市城市总体规划(2017-2035年)、苏州市总体城市设计同期编制，在工作过程中两个项目组集中对苏州水系格局、滨水空间分类方式进行了探讨。课题以苏州市行政辖区作为研究范围，在宏观层面，梳理城市空间结构、明确重要滨水空间，综合现状水网结构、城市功能、城市风貌明确滨水空间风貌分区，并对苏州滨水空间提出了分级分类具有可操作性的规划策略与建设指引要求；在微观层面，围绕"塑造疏朗有致、涵养水资源、临水而居、开放共享、体现历史文化的滨水空间"的规划目标，对不同类型滨水空间在断面设计、景观设计、周边建筑控制提出设计要点。

课题组在研究过程中广泛征求了水务、园林、交通等相关部门的意见和建议，部分成果已经被纳入苏州市总体城市设计，为苏州滨水空间的提升提供指导。

Research Team of *Waterfront Urban Design Guidelines for Suzhou,*
China Architecture Design and Research Group
中国建筑设计研究院有限公司
《苏州滨水地区城市设计引导研究》编制组

2020.4.2

Deliverable of *Waterfront Urban Design Guidelines for Suzhou (excerpts)*
《苏州滨水地区城市设计引导研究》最终成果（局部节选）

In compiling the *Waterfront Design Guidelines for Yinchuan*, Yinchuan team has fully drawn on the following valuable experience in three aspects in the research outputs of the workshops.

Firstly, comparative communication. Through comparative communication with the Beijing and Suzhou teams, the Yinchuan team was able to come up with a more pertinent, characterized urban design strategy for Yinchuan. Besides, universities also entered this research into events like Beijing International Design Week, which attracted more participants into our discussion.

Secondly, theoretical basis. Delft University of Technology provided international perspectives and mature experience; Xi'an University of Architecture and Technology possesses specialties in ecology and landscape, as well as rich research basis in Northwest China; Ningxia University, as a local school in Yinchuan, can offer indigenous feedback to our design and add to its workability.

Thirdly, survey data. The nearly 40 teachers and students from the three universities provided detailed and accurate survey data and analysis results for our research.

On this basis, China Architecture Design & Research Group reorganized the divergent, theoretical research results of the universities according to the realities of the city and turned them into operable, easily usable regulatory provisions, which are finally combined into the Waterfront Design Guidelines for Yinchuan and reported to the Yinchuan Planning Administrative Bureau (presently Yinchuan Natural Resources Bureau) many a time. So far, these guidelines have been adopted at the expert review meeting and mayor thematic meeting organized by this bureau.

The guidelines mainly include four parts: overall understanding of Yinchuan, model study of indigenous construction, guidance on urban design at the general level, and guidance on urban design at the key plots level.

银川组项目在编制银川滨水区城市设计导则成果的过程中，充分汲取工作营研究成果中的三方面宝贵经验：

1. 对比交流。在与北京、苏州组的交流对比中，得以提出对银川城市更具针对性、特色性的设计策略。此外，高校还将此课题积极参与到北京国际设计周等活动，使得有更多人参与到讨论中来。

2. 理论基础。荷兰代尔夫特理工大学提供了国际视角与成熟经验；西安建筑科技大学具备生态与景观专长，以及西北地区的丰富研究基础；宁夏大学作为银川本地高校，可对设计做出本土意见反馈，增加设计的可实施性。

3. 调研资料。三所高校的近40名师生为研究提供了翔实的调研资料和分析成果。

在此基础上，中国建筑设计研究院将高校发散性、理论性的研究成果结合实际情况进行梳理归纳，转化为可实施、便于管理者使用的管控条文，最终形成《银川市滨水空间及规划建筑导则研究》，并向银川市规划管理局（现自然资源局）进行多次汇报交流，目前已由其组织专家评审会、市长专题会进行论证通过。

导则主要包含银川城市整体认知、本土建设模式研究、总体层面城市设计导则指引、重点地块城市设计导则指引四部分内容。

Project Team of *Waterfront Design Guidelines for Yinchuan,*
China Architecture Design and Research Group
中国建筑设计研究院有限公司
《银川市滨水空间及规划建筑导则研究》编制组

2020.4.2

Deliverable of *Waterfront Design Guidelines for Yinchuan (excerpts)*
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Group Photos
工作营照片


The 1st Plenary Meeting of the International Workshop
国际工作营第一次全体会

The 2nd Plenary Meeting of the International Workshop
国际工作营第二次全体会


Suzhou Supplementary Meeting
苏州补充工作会

International Seminar (TU Delft, the Netherlands)
国际研讨会 (荷兰代尔夫特理工大学)

Bike Tour in Delft
代尔夫特骑行调研


Field Trip in Antewerp

安特卫普项目调研




Field Trip in Paris

巴黎调研

Discussion with Experts

专家座谈