Managing River Basins as a System

Open meeting of the Special Policy Study on *River Basins* of the China Council

New York, 20 March 2023

Full names of the entities:
Special Policy Study on High-Quality Development of River Basins and Adaptation to Climate Change
China Council for International Collaboration on Environment and Development

This a short version of the report. A comprehensive version, with prints of the presentations and photos of the speakers, is available.

Introduction

Thematic focus

Climate change complicates and exacerbates the already large challenges of managing river basins. The complications include not only adaptation (of cities, ports, nature conservation and security systems) but also the decarbonization and deep change of economic sectors – from energy to agriculture. Restructuring and engineering on a massive scale during the past two centuries have created significant path dependencies for future management of basins.

There is a growing insight among river managers and knowledge organizations that river management extends, or should extend, beyond water supply and sanitation, transport and flood protection. Effective and future-oriented management needs to include the whole basin and their governance, from source to sea but also including activities on land. This is exiting and difficult at the same time, especially in terms of governance. Nobody has demonstrated the perfect approach yet. But here is a great opportunity to learn from the many ongoing initiatives worldwide.

The China Council for International Cooperation on Environment and Development (CCICED) was established in 1992 with the approval of the Chinese government. Over the past 30 years, consisting of leading international and Chinese experts and senior officials, and chaired by one of the leaders of China's State Council, CCICED serves as a high-level advisory body and has played an active role in advising Chinese senior leaders on policies related to environment and development and in sharing China's vision and practice on ecological civilization with the rest of the world. CCICED has set up five-year research framework during Phase VII (2022-2026) to learn from promising cases worldwide, and extract policy recommendations and peer insights and encouragement.

This River Basin Special Policy Study is one of CCICED's current ongoing SPS programs. It is co-led by Chinese and international knowledge organizations and involves a good network of multilateral development organizations and others. Its program is structured along five guiding principles: (i) make good on your responsibility stretching from the headwaters to the coastal seas; (ii) adopt a 100-year perspective and plan your steps; (iii) engage everybody who can contribute and develop a shared vision; (iv) adapt to climate change and other principal river stressors in every aspect of the management of river areas; and (v) continue to strengthen and innovate.

Cross-sectoral partnerships

The very nature of the three organizations leading the Special Policy Study demonstrates its broad, cross-sectoral scope: The China Academy of Urban Planning and Design; The Nature Conservancy; and a Dutch team comprised of Deltares, PBL Netherlands Environment Assessment Agency, with close connection to the Ministry of Water and Infrastructure. Speakers and panellists at the event represent a good mix of senior officials and experts, senior basin managers and development leaders, from China and elsewhere.

Comments, Addresses and Discussion

Hans Mommaas provides opening comments on behalf of the Kingdom of The Netherlands. The UN Water Conference will be the third in a row of high-level meetings on responsible management of the planet's environment resources: CoP Climate in Egypt, CoP Biodiversity in Montreal and now the second-ever UN Water Conference. Global coalitions, registered in the Water Action Agenda, will be the most important outcome of the Water Conference. The SPS has defined a great programme of work, worthy of being registered in the Action Agenda. Adding cases of the Global South would be a good idea.

Li Yuanyuan outlines the challenges ahead. They include increased variability, in many respects, for example in precipitation and in land use in each basin; a still-increasing pollution load; large-scale withholding of sediment; and increased linkages, in many ways, between basins. For details, see the attached presentation and the report of the 'Rotterdam' seminar.

Li Yuanyuan lays out three principles for effective approaches, namely (i) respecting biophysical and other scientific givens; (ii) a systematic approach, by embedding integrated river basin management in other development plans, including spatial planning; and (iii) a holistic approach, with integrated river basin management as a key component of various sector-oriented security policies, such as food security. Among the key measures is consolidation of stakeholder partnership. Key measures are all in the domain of planning, including priority setting and use of various types of redlining. Importantly, they require shared objectives throughout its components and phases.

Li Xiaojiang summarizes the main concepts and plans of the SPS. He expands on three cases CAUPD is exploring this year. The SPS is about the challenges and opportunities of managing river basins in times of climate change, with climate issues complicating ongoing concerns. To the SPS, integrated management has to consider everything in the basin: cities (this was the original entry point); manufacturing and energy industry; agriculture; nature; cultural heritage. While the necessity of integrated approaches is widely recognized, this is work in progress everywhere. Therefore, the SPS focuses on promising cases from practice across the world.

By way of illustration, Li Xiaojiang sketches how governance of the Yangtze basin evolved from 1949 to the present. He highlights two major interventions from the recent past, namely removing unsuitable chemical industry from the river's shores, and a ten-year fishing ban. He provides a preview of the three cases CAUPD will analyse in view of this year's research focus on mechanism of regional collaboration. The three cases represent very different situations: Jialing River, with issues around water, energy production and agriculture; Taihu Lake, with the complexities of being in the Shanghai metropolitan area and issues about flooding, water logging, and diffuse pollution from agriculture; and the Pearl Estuary, with the prospect of regional collaboration involving mainland, Macao and Hongkong, focusing on a joint biodiversity area and coastal zones.

Willem Ligtvoet presents key findings of the worldwide report *The Geography of Future Water Challenges: Bending the Trend.* For eight key water-related issues the report explores what can be done by system-wide measures and, in particular, what the worldwide impact would be. It does so for four landscape types and all global regions. Emerging as particularly tough problems are nutrient loading (with urban development, especially on the African continent, offsetting potential gains in agriculture) and

accelerated erosion of many of the world's delta areas (sediment withholding by dams + sand mining + man-made soil subsidence + sea level rise).

Nicole Silk states that we have years, not decades, to take on the connected crises of climate change and biodiversity loss. She explains the logic of TNC setting itself ambitious overall targets and tells of TNC's guiding vision of balance at the landscape level. In this vein, she quotes Minister Li Guoying of Water Resources, China. TNC's regionally distributed portfolio of projects provides many opportunities to learn while doing, with learning to collaborate being the most important. Key objectives are striving for connections; realizing benefits beyond the benefits of water alone; working for nature and people. For this work, the basin scale is the most promising.

Gerry Galloway reminds that the need for a systems approach to managing the Mississippi River was recognized in law as early as 1927. Implementing that approach was another matter, because of state-federal dynamics. Moreover, at that time, the 'system' was to serve navigation (shipping). Current management of the Mississippi is very divided and diverse. Upstream-downstream differences are large, and the question is: how do you manage as system this big? At the same time, river-related problems are large, especially in terms of sediment disappearing out to sea.

The key to building a collaborative approach (alliances), seems to be in communication and public participation in various forms. A systems approach can work if there is collaboration through all levels.

Lv Xiaobei focuses on the economically dense Pearl River Delta – in fact, the economic center of gravity of China. At the same time as hosting a global concentration of ports, industries and urban agglomerations, it is also home to nature reserves and its wetlands are an important waypoint in bird migration. Urban expansion and establishment of new towns is increasingly going in the direction of the coast. The percentage of natural coastlines has decreased fast. At the same time, the public's attention for the significance of the estuary's wetlands is growing and the Chinese government engages in, for example, wetland restoration projects.

Bob Tansey, master of ceremony

Ms. Lv suggests that there is scope for productive collaboration between the jurisdictions facing each other across the water (Guandong province on the mainland; Macao and Hongkong across the water). Concrete topics for collaboration could be:

- a common nature reserve in the wetland area, and, around that asset, concretely harmonize regulation, monitoring and reporting;
- a regional coordination mechanism in environmental impact assessment for the construction of large infrastructure such as ports, bridges and roads in the Pearl Estuary region.

Jodie Bignall sketches the vision of the International River Foundation of thriving and resilient rivers. Achieving that vision requires dialogue across sectors and implies a connected landscape and going far beyond the traditional agenda of drinking water, sanitation and hygiene (WASH). She characterizes the work of the International River Foundation as a champion of thriving and resilient rivers by pointing to four underlying lines of activity: Collaboration (in particular the Resilient Rivers Blueprint and Hub), Convening (for example the annual IRF symposium), Communication (right now through a series *Voices for Rivers*) and Celebrating success (through river prizes and twinning). The IRF is keen to partner with the SPS River basins and could help to connect with important cases in the global South. Mining in Indonesia, in relation to river basin management, would be an example.

Huang Yan describes how river basin management works in China, by example of the Changjian basin, which comprises the Yangtze. Details are in the attached presentation. Key features are an extensive management structure and engineering works; the river chief system (typically a mayor or governor is the river chief for a given section of the basin), a comprehensive mandate, including off-river aspects. The current Master Plan 2012-2030 is the fourth since 1956. Concerns include:

- increasing severity of both floods and droughts, with the prospect of continued increases, in a basin that already had an uneven spread of rainfall along its length and over the year;
- additions to the water diversion from Yangtze to Han River, under construction
- illegal sand mining and lake reclamation to be addressed.

Extensive coordination with various sectors and parts of government is in place and/or foreseen. Future plans include a thirteen-point action list. Of this, strict enforcement of the maximum allowable water use is a key item. Like the previous speaker, Ms. Huang looks forward to expanded international collaboration and exchange of experiences, including through the SPS *River Basins*.

Hans Mommaas states that ‘water’ is a good entry point into a much wider discussion about the future organisation of our lands, especially in spatial terms. By way of example, he shows gigantic pumps that structurally keep low lying lands dry, and thereby, structurally, keep that land subsiding. Such situations are not tenable, vested interests are large, and how do you prepare the public for a discussion about that? Water may be a good, natural entry point.

Applying a systems perspective in these discussions requires frequent zooming in and zooming out. Therefore, it is good that the SPS’ approach is open and case-based. Methodologies exist for connecting substance and governance, in preparation of this kind of complex discussions. One example is strategic environment impact assessment. Its methods have evolved over the past forty years, useful international experience and international collaboration exist, including with Chinese colleagues. Perhaps it is an idea

to look into its potential for the kind of governance issues that the SPS River Basins focuses on.

Anders Jagerskog (World Bank) comments that basically the same challenges appear everywhere, sometimes with added national issues. Transboundary basins carry extra issues. He alerts to the circumstance that donors (the Bank's Board of Directors) are currently asking for more attention to be given to global public goods. In relation to water, this goes beyond concern for water per se and includes relations with, for example, biodiversity, river resilience and conflict.

A supporting comment from the floor underlines that it will be critical to generate the revenue streams to get the necessary systems in place.

Gerry Galloway observes that while there is considerable insight represented in the room and through the recorded addresses, 'no prophet is honoured in his own town'. International visits and peer support are often surprisingly effective in getting pre-existing insights acknowledged and acted upon.

Li Yuanyuan sums up the discussion in five points:

- Keep thinking strategically, seeing the forest rather than the trees
- consider all factors and assets
- consider both natural systems and man-made systems.
- keep the long-term perspective; minimize disasters; consider past, present and future, based on multiple scenarios.
- consider all the people, all the benefits and all interventions including economy and finance.

Points emerging from the event as a whole

A number of insights from the meeting seems pertinent to the future work of the SPS. Almost all of these were tabled by multiple participants, in different words and using different examples.

1. The spatial organisation of river basins remains key to integrated approaches from source to sea, with a 100-year horizon, etcetera. This was identified by the SPS early on. During the New York Water Week, it was voiced repeatedly in various events, with geographic focus ranging from regional seas to megacities. Specifically, pleas were made for marrying sectoral planning systems and for matching land-oriented and marine-oriented planning systems.

2. For effectively managing basins as a system, content and governance should be brought together. Classical instruments for this exist, and it would be valuable to investigate how these instruments have evolved and how they can be, or are being, redeployed in integrated river basin management.

   Strategic Environment Assessment is a case in point. Although a long-standing system, it is evolving. For large and complex systems such as river basins in times of climate change it may be worthy of repositioning as a tool to map out issues and responsibilities and establish a framework for future reference and follow-on decisions.

3. The concept of 'managing river basins as a system' must be understood dynamically. Perceptions of what the basin system is, and its key functions to be safeguarded, have in many cases evolved since the time the term was first used. A striking example is the Mississippi, where a 'systems approach' was officially endorsed in 1927, but with reference to shipping only.

   Current understanding of the term, worldwide, involves steeply increasing socio-economic pressures, biophysical variability, and material flows and dependencies between basins.

4. In river basin management current challenges are daunting, and expectations of even the most ambitious policies must therefore be realistic.

   For some issues the very best that could be achieved at global scale would be a halt to the increase of the problem. Nutrient loading is one example. Against this background, it is necessary to keep thinking strategically and consider all people affected, all issues and all relevant scale levels.

5. While this meeting was being held in connection with the second-ever water conference, changes in sediment flows are emerging as the hardest issue. That is because of the combined effect of large dams, especially for non-fossil power generation or pumped storage, sand mining, human-induced soil subsidence and, at the same time, sea level rise. In other words, integrated management of river basins requires that the development of new energy infrastructure considers a broad spectrum of environmental goods, including biodiversity and sediment flows that are needed to prevent the world's deltas from disappearing.

6. The SPS would be well-advised to consider cases on the Southern hemisphere, too. This is a matter of credibility in view of North-South economic relations such as in mining, and Africa being the next continent with massive issues in management of its river basins. In other ways, too, cases in the global South will broaden the informative basis of the SPS.

7. In regional collaboration for managing river basins, a number of common issues are becoming clear from this event and from meetings earlier this season:

   - An explicit and concrete obligation to collaborate is needed and should typically come from the top of government and require active reporting
   - Communication is key to overcome fragmented responsibilities (see presentation by Gerry Galloway and comments by Hans Mommaas)
   - Uncertainty needs to be embraced, not hidden. This is about the inherent uncertainty of, for example, regional climate change in combination with the necessarily long time horizon of this work. Planning needs to consider multiple scenarios and strategic flexibility in mind. Explicitly addressing uncertainties may require modernization of the culture of government in many places.
   - Path dependencies are an important factor. These relate to collaboration/distribution of responsibilities as well as physical circumstances/hard infrastructure. Typically, we think about path dependencies as inherited from the past. It is useful to also think about the new path dependencies we are now unavoidably creating.

8. As an overall framework, various speakers reminded of what said at the Rotterdam seminar of the SPS, namely that after an era of physical circumstances of a location dictating its social and economic possibilities, followed by a few centuries of hard engineering dominating the environment in favour of urbanisation and production, the challenge of the next decades is to establish a new balance between economy and environment in many places of the world. Management of river basins in times of climate change is one of the clearest examples of this challenge. One addition voiced at the current event is that, meanwhile, there is a duty to minimize disasters.

9. Management of river basins in times of climate change faces interconnected challenges at multiple scales and thus requires coordinated approaches at multiple scales. In his presentation for the Rotterdam seminar, Li Yuanyuan suggested three levels, each with its specific focus.

   At the current event, a number of speakers underlined the importance, and potential, of strategy development at the landscape scale – for example, a delta. Discussion afterwards reminded that for large river systems the discourses around upper, middle and lower reaches can be very different, in terms of complexity as well as topics. Source-to-sea approaches should speak to the issues in focus and pragmatically and consistently work towards a comprehensive understanding and agenda.

10. The bottom line for the SPS is that it remains necessary to maintain an open, case-based line of work and to illuminate what works, where, and under what circumstances.

Attachments

Event programme and speakers' affiliations

Date: 20 March, 10:30-12:30 EST. Venue: Water House (666 Third Avenue, New York City, 21st floor). In-person event, not on-line. Simultaneous translation between English and Chinese provided. Approximate number of participants: 60

Master of Ceremony: Robert TANSEY (Senior Policy Advisor, China & Global Policy Lead, Degraded Lands and Restoration, TNC, he/him)

Overview Remarks

Hans Mommaas (Netherlands Commission for Environmental Assessment, Chair; Special Advisor of CCICED; former Director-General of PBL, he/him)

LI Yuanyuan (Vice President, General Institute of Water Resources and Hydropower Planning and Design (GIWP), China; President, International Water Resources Association (IWRA), he/him)

LI Xiaojiang (President Emeritus, CAUPD, Special Advisor of CCICED and co-leader of Special Policy Study, PR China, he/him). Recorded address. Mr. Li Xiaojiang provides a ten-minute overview of SPS River Basins.

The Geography of Future Water Challenges: Bending the trend

Willem Ligtvoet [Programme Leader International Water, PBL; he/him]

Addresses highlighting challenges, opportunities and cases of governing river basins as a system

Nicole SILK (Global Director for Freshwater Outcomes, TNC, she/her)

Gerry GALLOWAY (emeritus Professor, University of Maryland, and former Commander, Mississippi Basin, US Corps of Engineers, he/him)

LV Xiaobei (Vice Director, Shenzhen Institute of CAUPD, she/her) Recorded address

Brief discussion

Jodie Bignall (CEO, International River Foundation, she/her)

HUANG Yan (Deputy Chief engineer, Changjiang Water Resources Commission, she/her), recorded address

Hans MOMMAAS (Netherlands Commission for Environmental Assessment, Chair; Special Advisor of CCICED; former Director-General of PBL, he/him)

Final discussion

- Provisional recapitulation in keywords; what should be carried forward?
- Discussion (audience and speakers)

Summing up and closure

Prepared presentations

LI YuanYuan

SPS-LED EVENT AT NEW YORK WATER WEEK:

MANAGING RIVER BASINS AS A SYSTEM

Open meeting of Special Policy Study of CCICED

High-Quality Development of River Basins and Adaptation to Climate Change

Water House, 20 March, 10:30-12:30 EST

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International Water Resources Association
IWRA

Challenges and Solutions of Integrated River Basin Management

LI Yuanyuan

President, International Water Resources Association (IWRA)

Vice President, General Institute of Water Resources and Hydropower Planning and Design (GIWP), China

Content

- Challenges Facing
- General Approaches
- Key Measures

Challenges Facing

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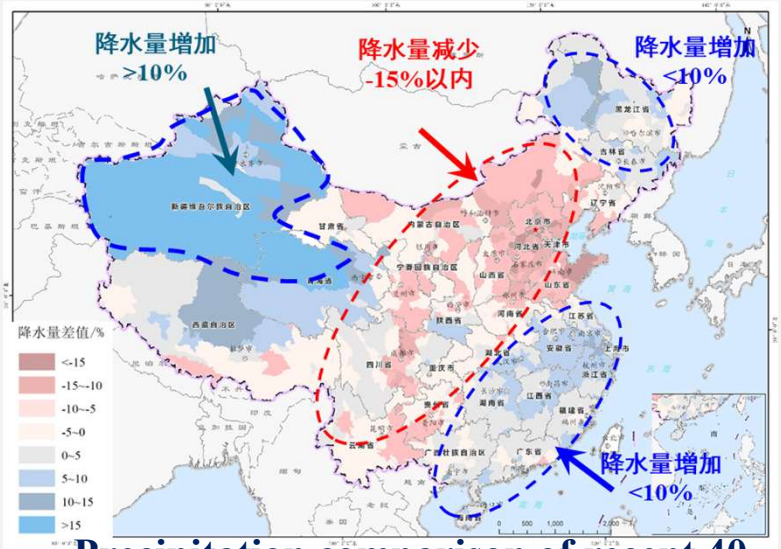
International Water Resources Association IWRA

☐ Impacts of climate change, load intensity to water and spatial variation

- Runoff and water recourses changes due to climate change together with human activities, and uncertainty increased.
- Water abstraction amount and pollution load to the nature water system increased.
- Land spatial layout change aggravated pressure on water resources, flood risk and eco-environment continuously.



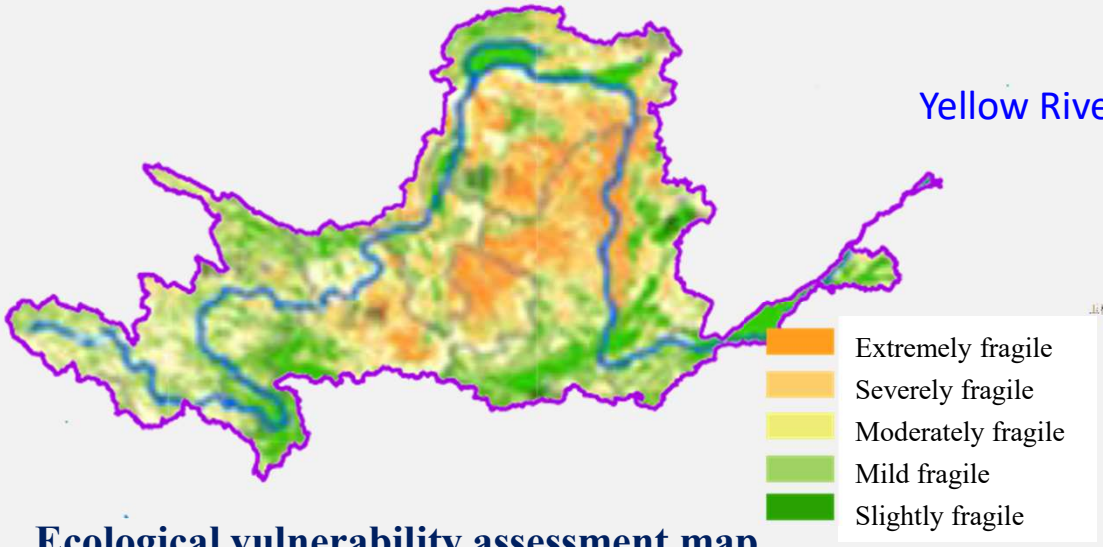
Precipitation comparison of recent 40 years (1980-2016) and history (1956-1979)

City flood distribution in recent two years

Challenges Facing

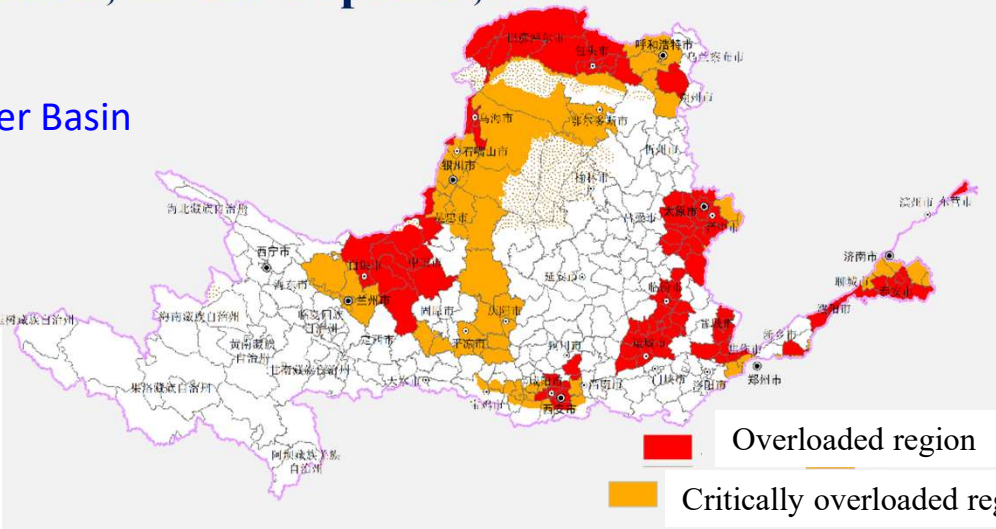
☐ Inner-basin regional conflicts intensified

- Due to the differences in eco-environment protection requirements and social-economic development demands, there are huge conflicts of water demand among difference regions in basins.
- Water risk transfer from upstream to downstream, from tributary to mainstream, including water scarcity, flood, water pollution, invasive species, etc.



Ecological vulnerability assessment map

Yellow River Basin



Locates of the overloaded or critically overloaded regions

Challenges Facing

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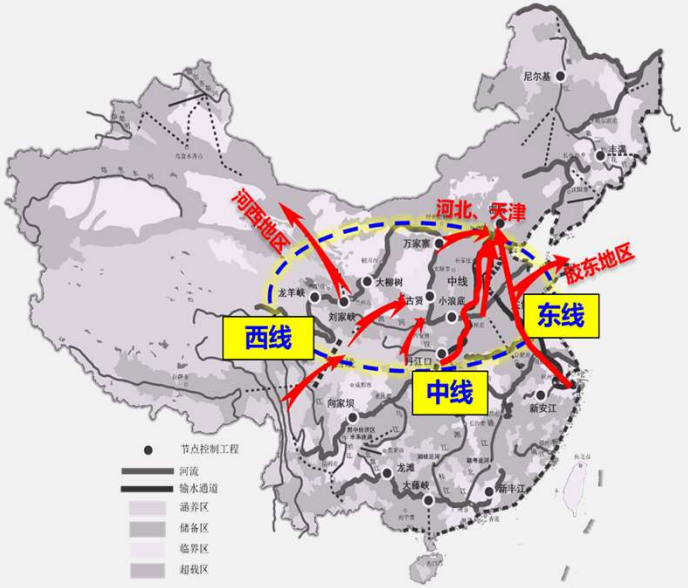
☐ Cross-basin linkage increased

Due to topography and landform of territory , overall river direction and water flow directions are intersecting with material flow and economic flow (energy, crop, etc.) , which break the boundary of river basins, and change internal and external relationships of river basins.

River system
East to west

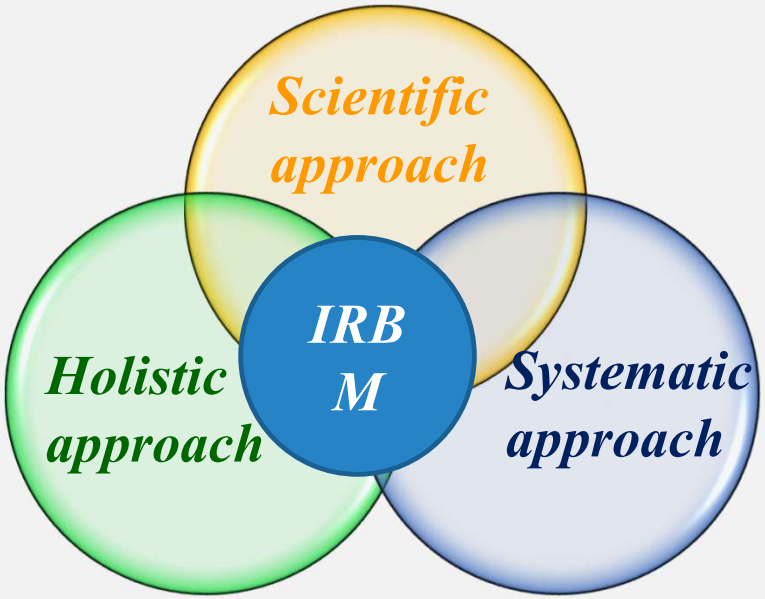
Main logistics channels distribution
Cross-cutting



Water Transfer Project
South to North

General Approaches

- **Scientific approach.** Respect hydrological regime, eco-hydrological dynamics, water carrying capacity, river and lake health, risk and uncertainty , etc.
- **Systematic approach.** Embed IRBM into social-economic development, spatial regulation and eco-environmental protection as a complex system.
- **Holistic approach.** As key component of national security, water security is closely related to resource security, ecological security, food security, energy security, economic security, etc. and coordinate flood control, water supply, aquatic eco-environment protection.



Key Measures

- Set up integrated planning & policies
- Establish rational regulation framework
- Enhance smart river basin water management
- Consolidate stakeholder partnership

Key Measures

☐ Set up integrated planning & policies

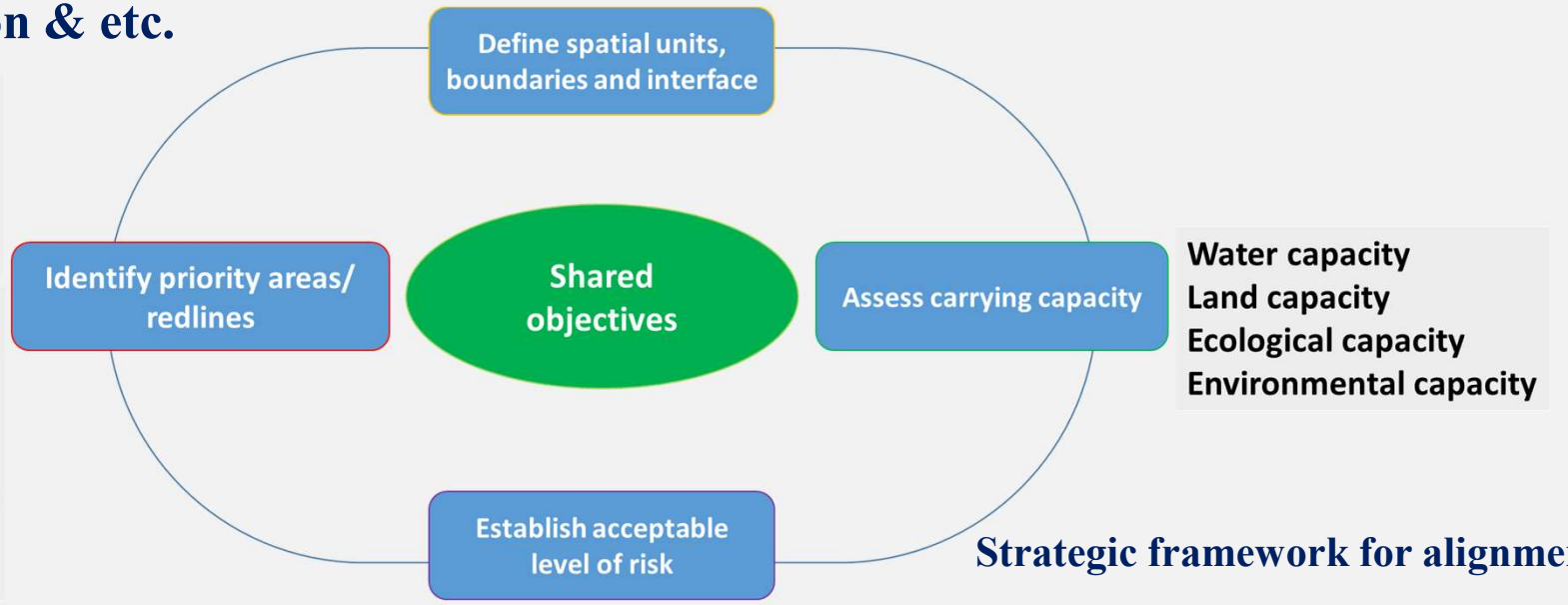
Accommodate & harmonize water planning & policies with:

- **water planning Vs socio-economical development planning, spatial planning, environment planning.**
- **Water planning Vs land, food, energy, urban planning & etc.**
- **Water-related function including flood mitigation, water allocation, water supply, aquatic protection & etc.**

Priority areas
- Agricultural modernization
- Urbanization
- Industrialization
- Ecological protection

Water redlines
- Total water use control
- Water use efficiency control
- Pollution discharge control

Land red lines
- Urban development boundary
- Ecological redlines
- Permanent basic farmland



Water capacity
Land capacity
Ecological capacity
Environmental capacity

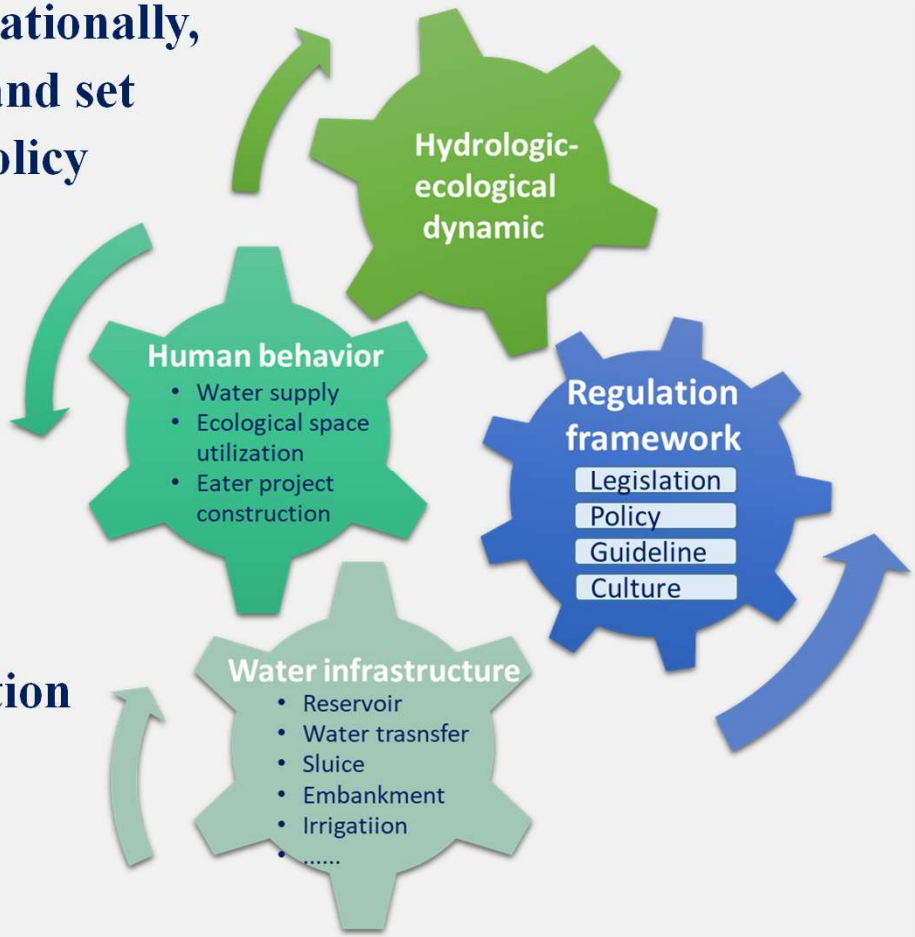
Strategic framework for alignment

General approaches

☐ Establish rational regulation framework

To regulate natural water flow and human behaviors rationally, it is urgent to establish unified regulation framework and set up standards, rules & regimes through legal system, policy guidance, technical guideline, and culture shaping.

- **Aquatic space & layout**
- **Water abstraction & allocation**
- **Ecological flow discharge**
- **Pollution load**
- **Flood risk mapping and control**
- **Water infrastructure safety, regulation & operation**
- **Etc.**



Key Measures

Enhance smart river basin management

- Promote multiple-element management on water, land, biodiversity, etc.
- Strengthen automatic real-time online metering and monitoring of all indicators, including water quantity, level, and flow
- Develop digital twin basin and water projects
- Carry out smart simulation, prediction, forecasting, and pre-manoeuvre

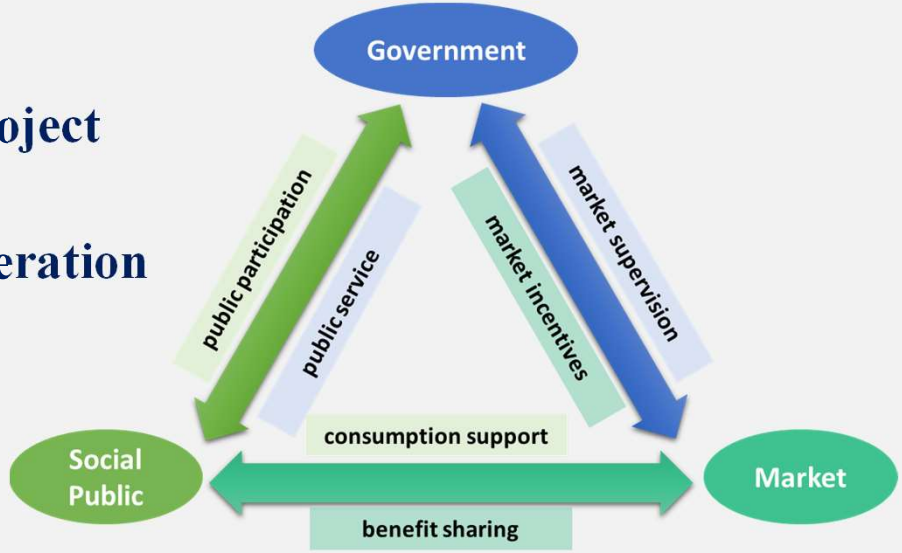
Projects dispatching system

Flood risk management system

Key Measures

☐ Consolidate stakeholder partnership

- **Government**
  - ➢ Strengthen basin scale legislation and enforcement
  - ➢ Improve uniformed mechanism for planning, regulation, management
  - ➢ Use prices, taxes and fees, water rights market and other economic means.
- **Market**
  - ➢ Support investors aiming at basin-target project and program
  - ➢ Promote government-bank-enterprise cooperation
- **Public**
  - ➢ Strengthen participation and supervision
  - ➢ Information sharing



Stimulate strength combination of government, marketing mechanism, and social public

United Nations 2023 Water Conference Side Event:

Resilient Rivers to Healthy Coasts for People and the Planet: An Integrated River Basin Management Approach

Date: **March 23, 2023, 15:30-17:00** (New York Time)

Venue: **Nature Hub**, 450 E 29th Street, 2nd Floor, New York, NY 10016; (212) 706-4100 info@apella.com www.apella.com

https://rksi.adb.org/events/resilient-river-basins-un-water-nyc/

Scan or Click to Register

Join via Zoom by clicking or scanning the QR code below:

Meeting ID:
974 4486 7472

Passcode:
MTG230324

United Nations 2023 Water Conference Side Event:

Title: ***Water-Economy-Ecology Nexus in a changing environment: A roadmap from New York to Beijing to Bali***

Location: **Inside UNHQ, Room 9**, Event ID: HQ137

Time: **18:30 - 19:45, 23 March**

https://www.iwra.org/un2023waterconference-side-event/

XVIII World Water Congress

Theme: Water for All: Harmony between Humans and Nature

City: Beijing, China

Date: September 11-15, 2023.

https://www.worldwatercongress.com/

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Thank You !

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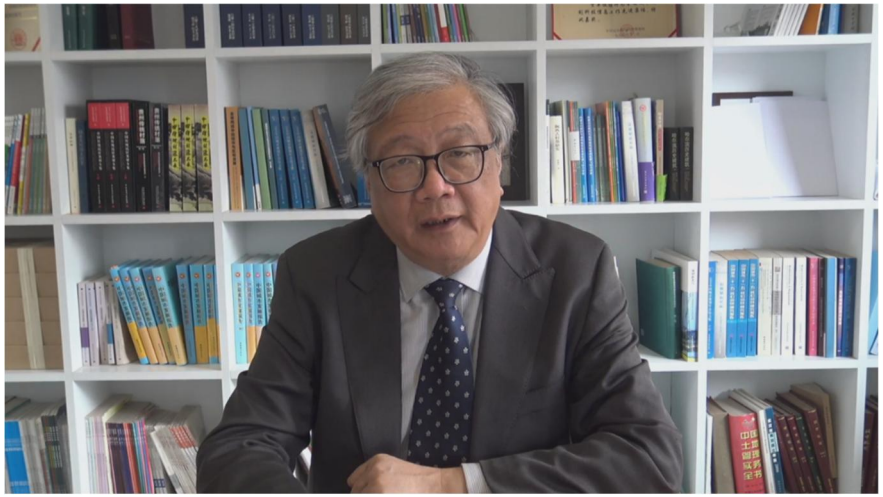

中国环境与发展国际合作委员会
China Council for International Cooperation on Environment and Development

流域高质量发展与气候适应研究——气候变化下的流域协同治理

Development of River Basins and Adaptation to Climate Change & Recommendations for River Basin Governance under Climate Change

研究进展

Research Progress Report

李晓江
Li XiaoJiang　CAUPD

中国城市规划设计研究院
CHINA ACADEMY OF URBAN PLANNING & DESIGN

Ⅰ. 研究目标 Research Objective

中国环境与发展国际合作委员会
China Council for International Cooperation on Environment and Development

□ 本期SPS重点研究内容

1.有针对性的学习借鉴国际经验。研究探讨其在中国流域的适用性和针对性。

2.从宏观和中微观两个层面研究流域的区域协同问题。宏观层面聚焦政策研究，关注国际与中国的区域协同治理历史；中微观层面聚焦案例研究，围绕案例流域的具体问题，讨论具有针对性的区域合作机制。

3.围绕上游次级流域、入海口地区、下游大湖地区三类地区开展案例研究，通过选择具有代表性的中国案例地区，并与莱茵河、密西西比河相应区域进行国际比较，探讨中国流域应当关注的问题以及相应的解决方案。

4.采取具体的基于问题解决的研究方法，对比国际经验，基于问题和相应解决方案，提出中国流域应当注意改进的区域合作建议。

□ Key research contents of this SPS

1.Learning from international experiences in a targeted way. Studying and discussing the applicability and pertinence in Chinese river basins

2.Researching on the regional synergy of river basins from the macroscopic and meso-microscopic levels. At the macro level, focusing on policy research and the history of international and Chinese regional cooperative governance; At the meso-microscopic level, focusing on case studies, and discussing targeted regional cooperation mechanisms around the specific issues of the case basins.

3.Carrying out case studies around three types of areas: the upper sub-basins, the estuary areas, and the lower Great Lakes areas. By selecting representative Chinese case areas and making international comparisons with the corresponding areas of the Rhine River and Mississippi River, and discussing the problems that should be paid attention to in the Chinese river basins and corresponding solutions.

4.Adopting specific research methods based on problem solving, comparing international experience, and putting forward suggestions for regional cooperation that should be improved for river basins in China based on problems and corresponding solutions.

Ⅱ.报告提纲初步方案(35 pages)
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中国环境与发展国际合作委员会
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1. 执行摘要 (1)

2. 环境和背景 (1)

3. 治理历程、问题和挑战(4)

3.1 国际上流域治理问题与挑战—荷兰团队主导、TNC投入 (2)

3.2长江流域治理历程与挑战—中规院主导 (2)

4. 重要支流实证分析与协同策略—中外合作(6)

4.1 中方：嘉陵江流域 (2)

4.2 荷兰和TNC：国际流域 (2)

4.3 中方+外方：协同策略All: (2)

1. Executive Summary (1)

draft by Wilfried ten Brinke w/ Review by CAUPD, TNC & Dutch Team

2. Setting & Background (1)

Fernando

3. Co-governance History, Key Questions and Challenges (4)

3.1 Study on the Co-governance History of the international cases – Dutch Team w/ TNC Inputs (2)

3.2 Study on the Co-governance History of the Yangtze River – CAUPD (2)

4. Empirical analysis on key branch areas, and its regional coordination governance mechanisms – Comparative study conducted collaboratively by the entire research team (6)

4.1 CAUPD: Jia Ling Jiang River Basin (2)

4.2 Dutch team and TNC: international river basins (2)

4.3 All: Coordination Mechanisms (2)

Ⅱ.报告提纲初步方案(35 pages)
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5. 大湖流域实证分析与协同策略—中外合作(6)
5.1 中方：太湖流域(2)
5.2 荷兰和TNC：国际流域 (2)
5.3 中方+外方：协同策略(2)

6. 入海口地区实证分析与协同策略—中外合作(6)
6.1 中方：珠江口地区 (2)
6.2 荷兰和TNC：国际流域 (2)
6.3 中外合作：协同策略 (2)

7. 能源转型 (1)-BobT
8. 农业现代化(1) -BobT
(按照Scott建议将“再生农业”调整为“农业现代化”)

9. 跨领域问题，包括性别和公平考虑 (1)
中规院主导，CCICED顾问审查

5. Empirical analysis on great lakes, and its regional coordination governance mechanisms – Comparative study conducted collaboratively by the entire research team (6)
5.1 CAUPD: Taihu Lake Basin (2)
5.2 Dutch team and TNC: international river basins (2)
5.3 All: Coordination Mechanisms (2)

6. Empirical analysis on estuary areas, and its regional coordination governance mechanisms – Comparative study conducted collaboratively by the entire research team (6)
6.1 CAUPD: The Coastal Zone of Zhujiang River Estuary (2)
6.2 Dutch team and TNC: international river basins (2)
6.3 All: Coordination Mechanisms (2)

7. The Energy Transition (1)-BobT
8. Agriculture Modernization (1)-BobT
(Based on Scott’s idea, exchange regenerative agri. to agri. modernization)

9. Crosscutting issues including Gender and Equity considerations (1)
CAUPD w/ CCICED consultant review

Ⅱ.报告提纲初步方案(35 pages)
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10. 流域协同治理机制 (3)

11. 对中国和其他地区的适用启示 (1)

12. 政策建议 (4)

10. Coordination Mechanisms (3)

11. Applicable Insights, for China and elsewhere (1)

12. Recommendations (4)

Note:

最后三章（10. 11. 12.）为本期流域SPS的主要产出内容，其具体分工需在前期充分研究基础上制定，因此暂不进行分工，需待其他报告章节有初步成果时，在讨论其主要内容与分工方案。

Chapter 10, 11, 12 are the main outputs of this research. Suggest to assign drafting leads and divide labor after all the rest chapters have sufficient research progress and preliminary outputs.

附件 ANNEXES

1) 中国流域三个典型案例的实证分析与协同策略报告（中规院主导）

2) 国际大河流域协同治理案例研究报告（荷兰团队主导，TNC支撑）

3) 农业现代化（再生农业）和能源转型分析报告（BobT）

1) Report on the empirical analysis and cooperative governance strategy of three typical cases of Chinese river basin (CAUPD)

2) International case study report on river basin cooperative governance mechanisms (Dutch team w/ TNC Inputs)

3) Report on agricultural modernization (including regenerative agriculture) and energy transition (BobT)

Ⅲ．流域协同治理历程研究——以长江为例 Research on the Process of River Basin Cooperative Governance——Taking the Yangtze River as an Example

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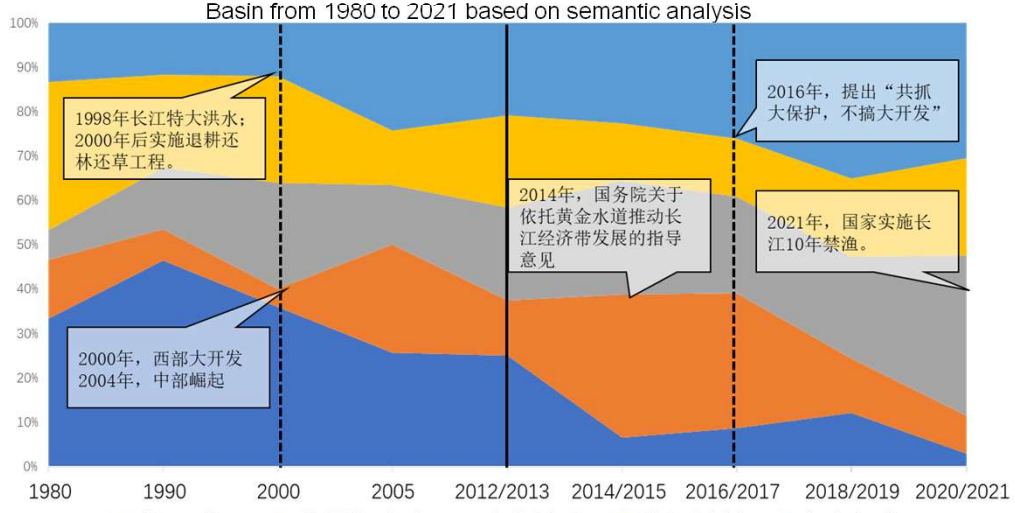
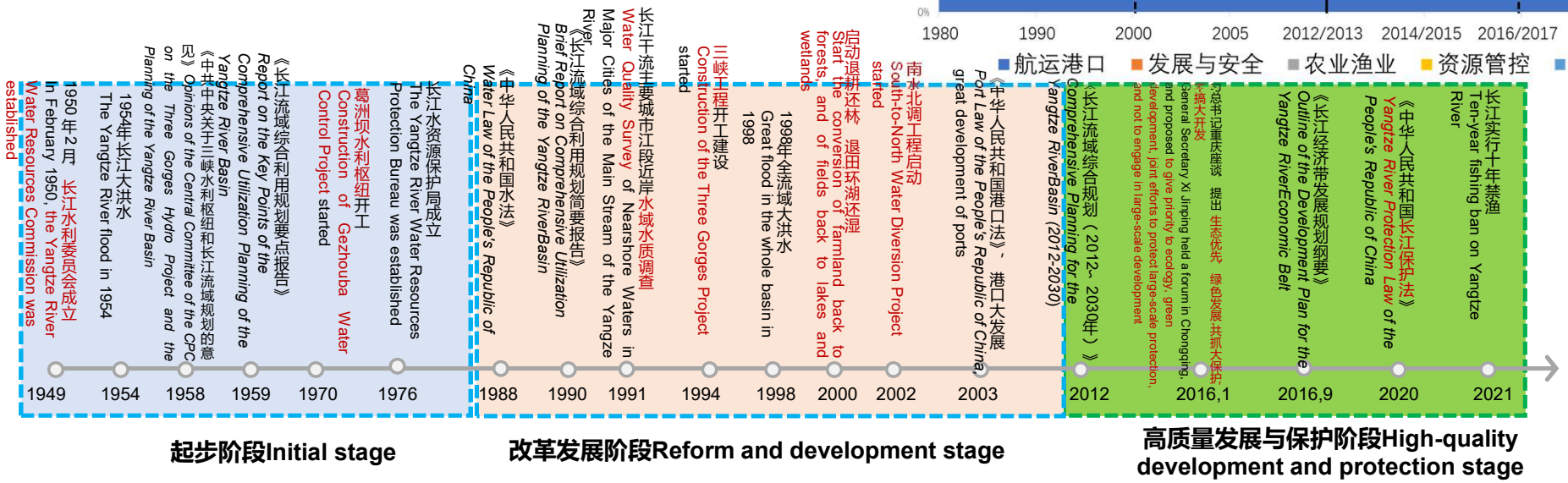
- **综合政策事件定性分析和基于政策文本语义分析定量分析，初步将长江流域治理历程划分为三个阶段。In combination with the qualitative analysis of policy events and the semantic analysis and quantitative analysis based on the policy texts, the governance process of the Yangtze River Basin is initially divided into three stages.**
- 起步阶段（建国后至1978年改革开放）Initial Stage (after the founding of the People's Republic of China to the reform and opening up in 1978)
- 改革发展阶段（1978年至2012年）Reform and Development Stage (1978-2012)
- 高质量发展与保护阶段（2012年至今）High-quality Development and Protection Stage (2012 to present)

基于语义分析的1980—2021年长江流域不同主题政策文件占比变化
Changes in the proportion of policy documents with different themes in the Yangtze River Basin from 1980 to 2021 based on semantic analysis





Ⅲ．流域协同治理历程研究——以长江为例 Research on the Process of River Basin Cooperative Governance——Taking the Yangtze River as an Example

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□ 长江流域正处于以“生态优先、绿色发展”为核心导向的高质量发展与保护阶段The Yangtze River Basin is in the stage of high-quality development and protection centered on "ecological priority and green development"

- 把保护和修复长江生态环境摆在首要位置，除航运、水利发电、港口开发等议题外，将水资源调配、水污染治理、水生态修复、生物多样性保护、岸线资源有序利用作为流域保护的重点。Putting the protection and restoration of the ecological environment of the Yangtze River at the top of the list, in addition to shipping, hydropower generation, and port development and other issues, water resource allocation, water pollution control, water ecological restoration, biological diversity protection, and orderly use of shoreline resources are all important aspects of the river basin protection.

开展沿江地区化工企业专项整治和污染治理
Carrying out special rectification and pollution control of chemical enterprises in the area along the river

长江流域“十年禁渔”范围
The scope of the "ten-year fishing ban" in the Yangtze River Basin

Ⅲ．流域协同治理历程研究——以长江为例 Research on the Process of River Basin Cooperative Governance——Taking the Yangtze River as an Example

中国环境与发展国际合作委员会
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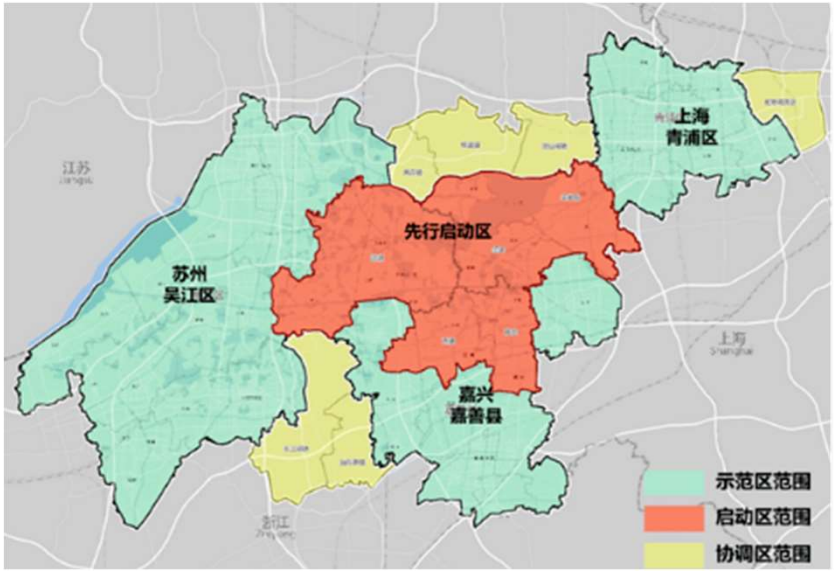
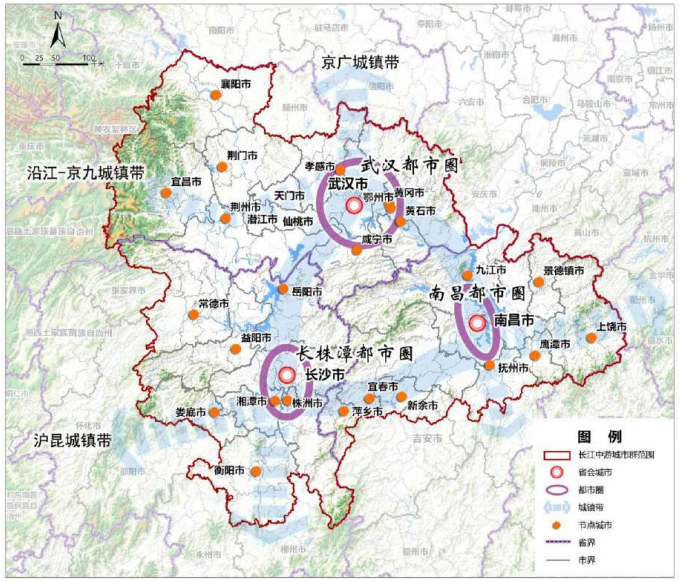
- **针对长江流域治理面临的新问题，流域治理协调机制正在转变In view of the new problems faced by the governance of the Yangtze River Basin, the coordination mechanism of the Yangtze River basin governance is changing**

- **加强立法保障**：2021年3月，《长江保护法》正式施行，提出国家建立**长江流域协调机制**。Legislative guarantee: In March 2021, the *Yangtze River Protection Law* was officially implemented, proposing that the country establish a **coordination mechanism for the Yangtze River basin**.
- **增设政府机构**：建立 “推动长江经济带发展领导小组”体系，国务院其他部门新增长江管理机构。Addition of government agencies: Establish the "Leading Group for Promoting the Development of the Yangtze River Economic Belt" system, and other departments of the State Council have added a new Yangtze River Management Agency.
- **深化次区域合作**：长三角、成渝、长江中游等次区域深化流域协调发展与保护合作。 Sub-regional cooperation: The sub-regions such as the Yangtze River Delta, Chengdu-Chongqing, and the middle reaches of the Yangtze River will deepen cooperation in coordinated development and protection of river basins.



长三角生态绿色一体化发展示范区位置
The location of the demonstration zone of green and integrated ecological development of the Yangtze River Delta



长江中游城市群空间格局
Spatial pattern of urban agglomeration in the middle reaches of the Yangtze River

Ⅲ．流域协同治理历程研究——以长江为例 Research on the Process of River Basin Cooperative Governance——Taking the Yangtze River as an Example

- **应用“间断—平衡”理论，选取两个重大事件作为案例，分析事件对长江流域治理政策的影响**
- **Two cases were selected for case studies on policy evolution of Yangtze River Basin governance with Punctuated-Equilibrium Theory**

- 1998年长江大洪水 Case1:The 1998 Yangtze River Flood
- 2016年《长江经济带发展规划纲要》Case 2:《The outline of the Yangtze River Economic Belt Development Plan》in 2016

长江流域重大事件影响政策演变案例分析框架表 The framework for case studies on the evolution of policies influenced by major events in the Yangtze River Basin

重大事件 Major Event	变化前政策图景 Policy image Before	变化后政策政策 Policy image After	政策场域 (Policy Venus)	政策工具转变 Policy Change
案例1：1998年长江大洪水 Case1：The 1998 Yangtze River Flood	流域治理以经济发展为核心； 流域防洪重点以干流为主，支流防洪建设相对不足	流域治理开始重视开发与保护的统筹； 防洪更加重视干流与支流、上下游之间的协同。	水利部长江水利委员会、国家计委（发改委）、建设部、农业部、国土资源部、国家林业局； 流域各省市政府。	治理政策：实施全国性退耕还林政策 区域协作机制：要求“江湖两利”、“上中下游协调” 经济政策：中央加大对地方防洪设施建设、退耕还林财政投入.
案例2：2016年《长江经济带发展规划纲要》 Case2: 2016《The outline of the Yangtze River Economic Belt Development Plan》	流域治理提出经济发展与生态保护协调，但经济发展仍是优先事项	流域治理突出“生态优先、绿色发展”；要求“共抓大保护，不搞大开发”	推动长江经济带发展领导小组； 生态环境部、水利部长江水利委员会、发改委、自然资源部、交通运输部、国家林草局…… 流域各省市政府	法律与规划体系更加完善：《长江保护法》；系统的流域规划体系； 一系列保护专项行动：长江保护修复攻坚战行动计划、长江干流岸线整治、“十年禁渔”

Ⅳ.案例研究：中国案例选择
Case study：Case area of China

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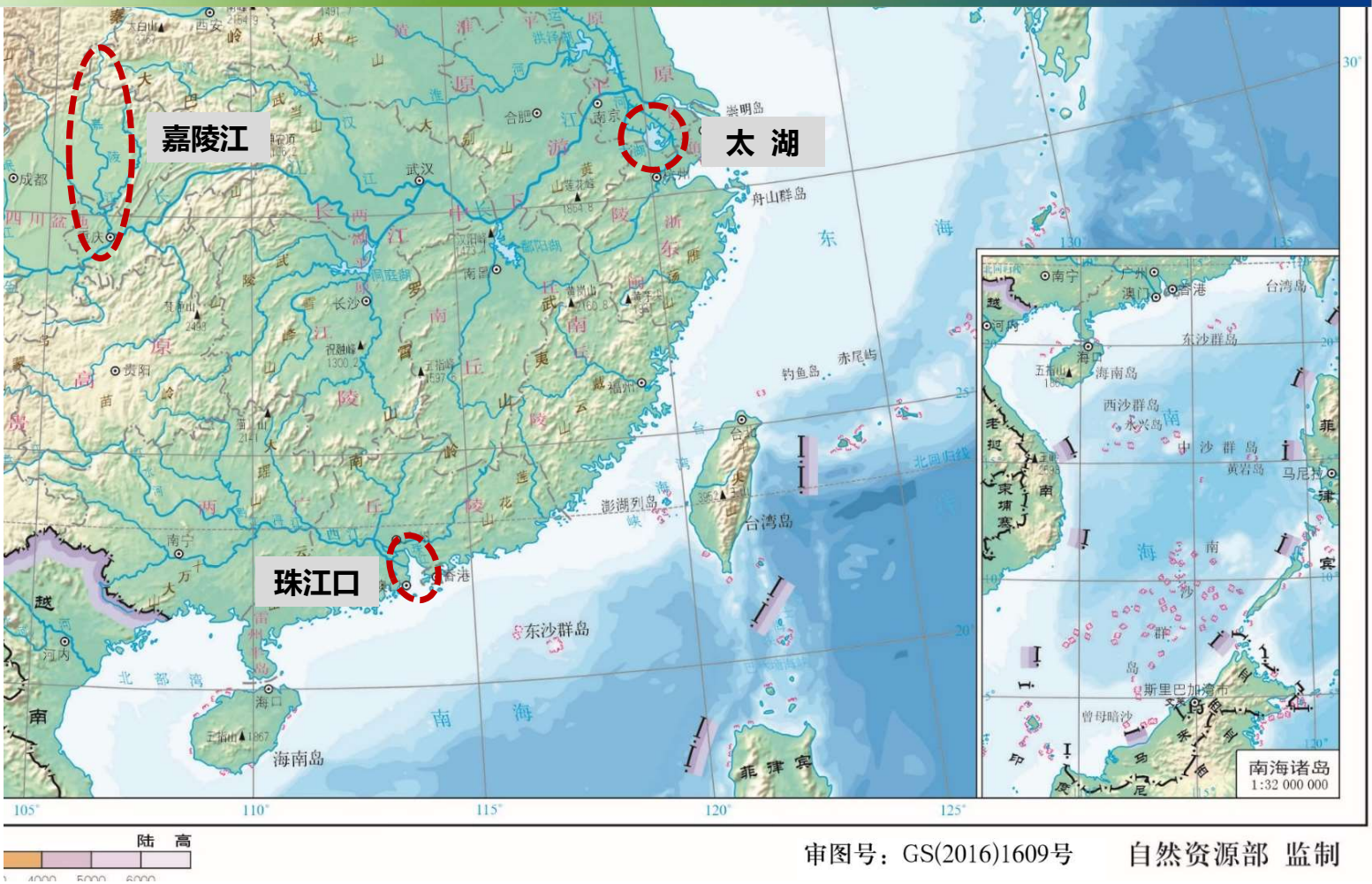
- **流域典型地区的实证研究 Empirical study in a typical areas of the basin**

- （1）重要支流Important Tributary：嘉陵江Jialing River
- （2）大湖地区Lake Area：太湖Taihu Lake
- （3）入海口地区Inlet area：珠江口Pearl River Estuary



Ⅳ.案例研究（1）：嘉陵江
Case Study (1): Jialing River

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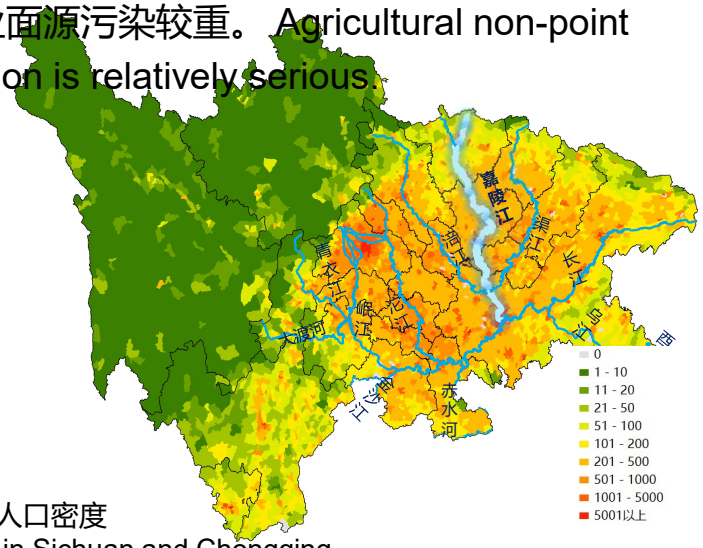
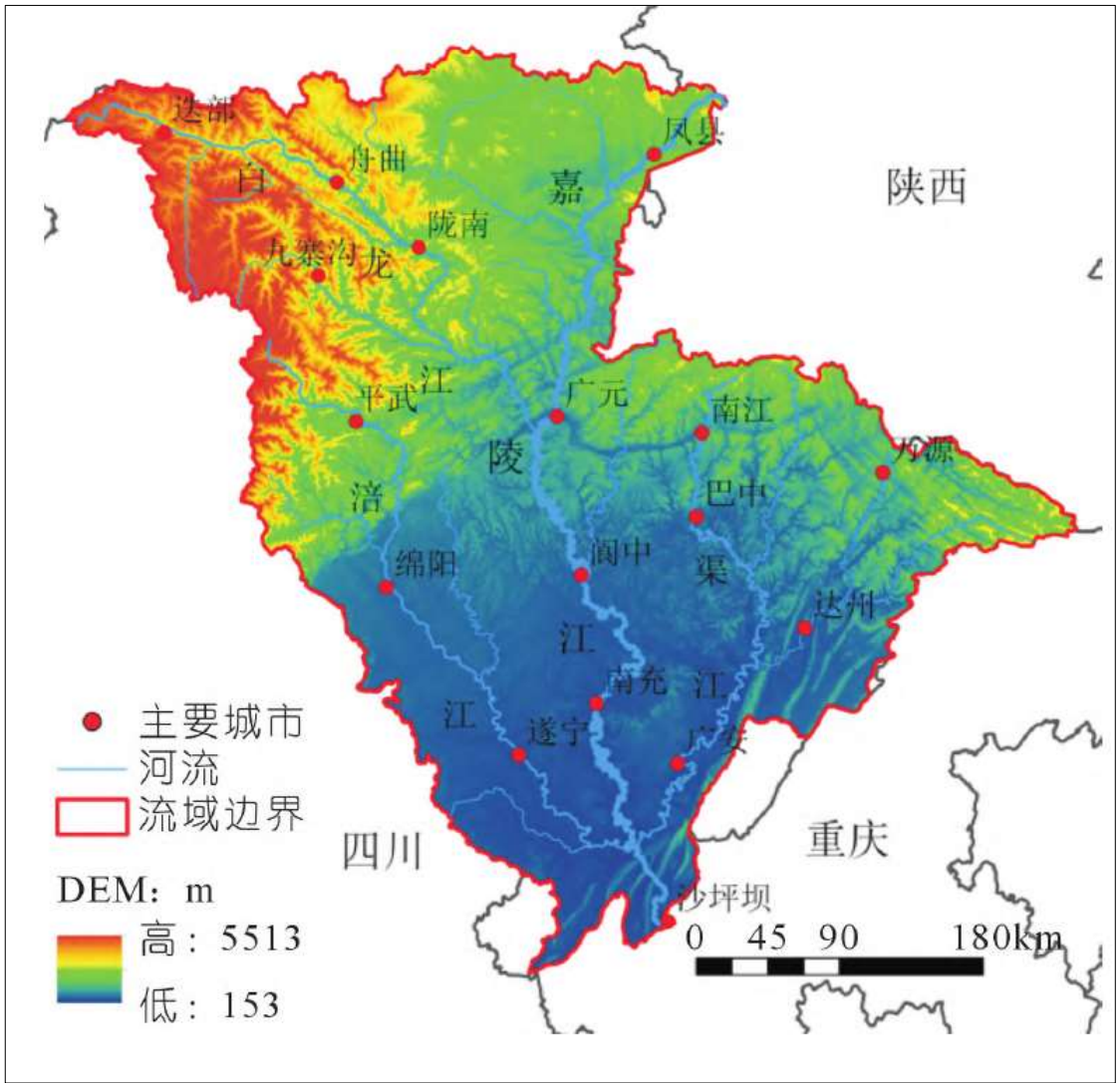
□ 长江上游重要支流 An important tributary of the upper reaches of the Yangtze River

- 跨四川、重庆两个省市 Crossing Sichuan Province and Chongqing City
- 传统农业区、人口密集，洪旱灾害频发，对粮食安全、城市防洪安全等影响较大 Traditional agricultural areas, densely populated, frequent floods and droughts, have a greater impact on food security, urban flood control safety, etc.
- 农业发展农业面源污染较重。 Agricultural non-point source pollution is relatively serious.



川渝人口密度
The population density in Sichuan and Chongqing



Ⅳ.案例研究（2）：太湖流域
Case study（2）：Taihu Lake Basin

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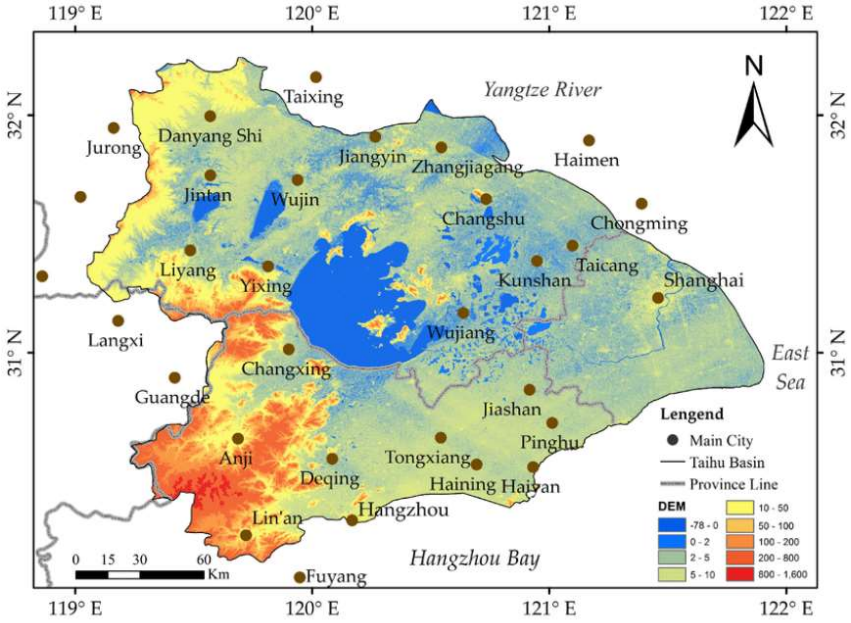
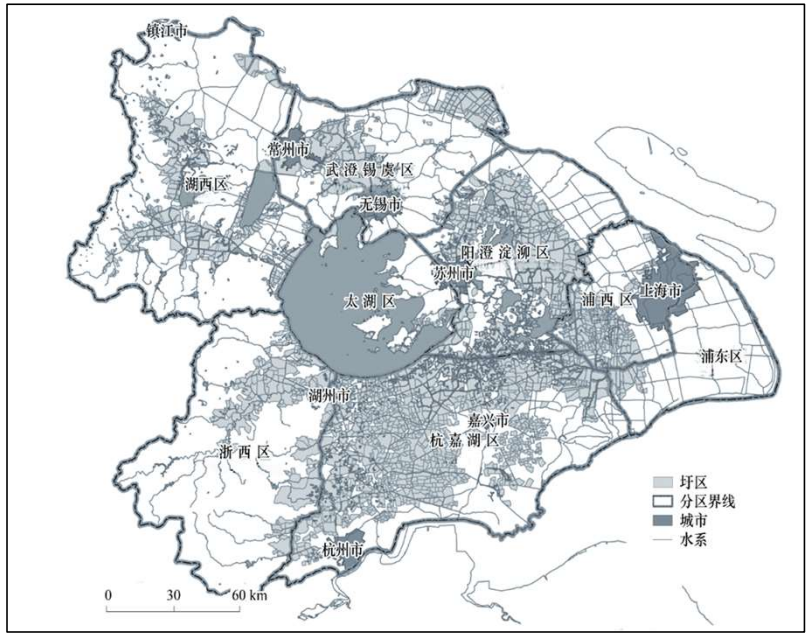
- 典型的平原河网地区，太湖平均水深不足2.0m
- 人口、经济高密度地区。经济规模占中国的1/10，人口密度达1831人/平方公里
- 延续千年的水利、农业耕作。
- 圩区调度各自为政，流域与区域洪涝矛盾统筹难度不断增大。

- A typical plain river network area, with the average water depth of Taihu Lake less than 2.0m
- Areas with high population and economic density. Accounts for 1/10 of that of China, and the population density reaches 1831 people/square kilometer
- Water resources and agricultural cultivation that have lasted for thousands of years.
- Lack of coordination in polder draining off, and coordination between river basin and regional flood faces challenges.





Ⅳ.案例研究（2）：太湖流域
Case study（2）：Taihu Lake Basin

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重点问题1：洪涝问题协同治理
Key issue 1: Collaborative governance of flood and water-logging

已开展研究

- **方向1：洪涝问题协同治理**
- **面向超标洪水的流域调度现状体系研究：**基本形成流域—城市—圩区三级管理体系，初步建成流域层面智慧调度体系
- **面向极端降雨的圩区调度现状体系研究：**圩区自下而上建设，统一的调度规则是打破区域间行政藩篱的手段
- **方向2：海绵城市建设有序推进，城市化区域下垫面径流增加程度有所缓解。以全域海绵修复为导向的流域下垫面协同管控研究：**流域内基本均为试点示范城市（湖州除外），统筹工作基本在市县层级多部门间开展，流域协同事务相对较少

下步研究计划

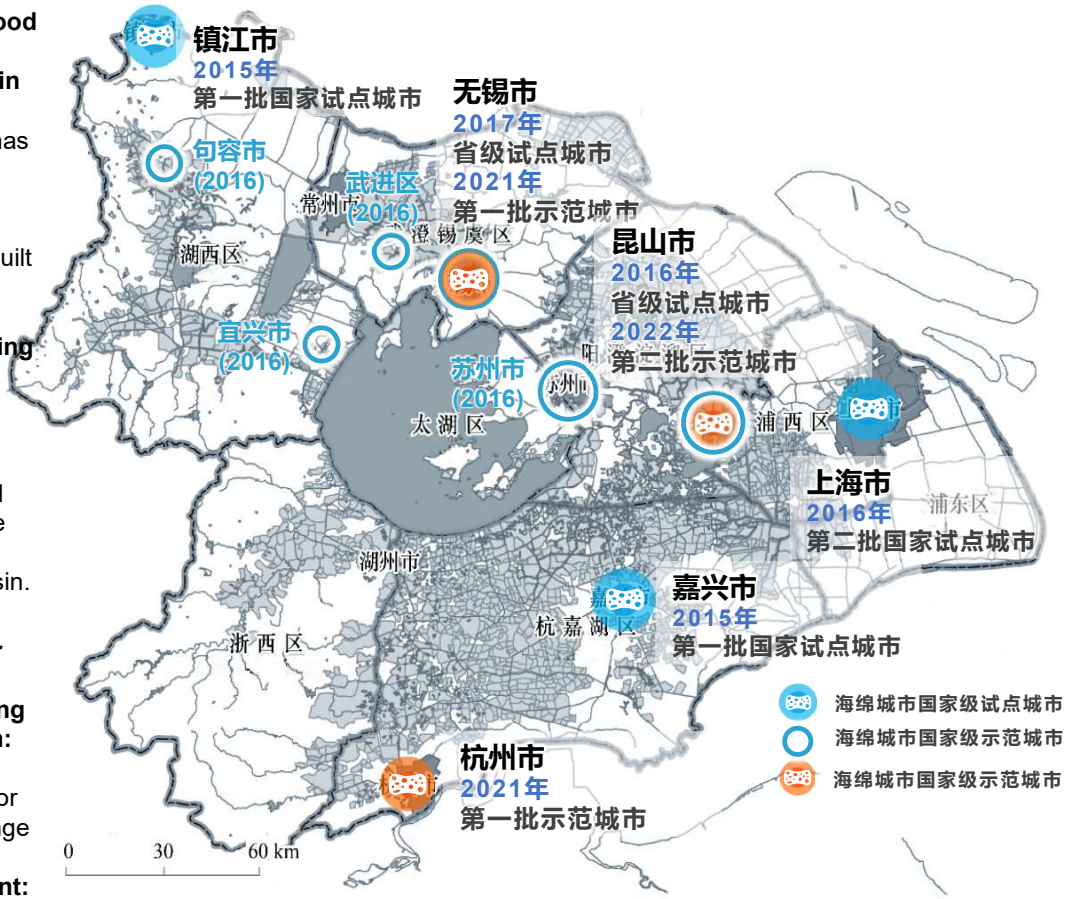
- **建议以流域水安全协同管理为重点研究方向**
- **面向区域一体化的流域综合调度管理体系研究：**围绕气候变化给流域治理带来的挑战，明确流域智能水网建设思路、建设原则等内容
- **基于网络化管理的城市（圩区）协同管控研究：**提出不同圩区间、圩区内部的调度权限、调度规则等内容

Research progress

- **Direction 1: Collaborative management of flood and water-logging**
- **Research on the current system of river basin regulation for excessive floods:** a three-level management system of river basin-city-polder has been basically formed, and an intelligent regulation system has been initially shaped.
- **Research on the current system of polder regulation for extreme rainfall:** the polder is built from bottom to top, and unified regulation rules can break regional administrative barriers.
- **Direction 2: Collaborative control of underlying surface of the river basin**
- **Research on collaborative control of underlying surface guided by whole-area sponge repair:** most cities are for pilot demonstration (except Huzhou), and the overall planning work is basically made among multiple departments at the municipal and prefectural levels, with fewer collaborative affairs in the basin.

Research plan for the next step

- **Take the collaborative management of water security as a focus**
- **Research on integrated river basin scheduling management system for regional integration:** clarify construction ideas and principles of the intelligent water network based on challenges for river basin governance brought by climate change
- **Research on collaborative control of cities (polder areas) based on network management:** propose the regulation authority and rules of different polder sections and polder areas



太湖流域海绵城市建设（下垫面改善）分布图

Ⅴ. 太湖流域重点问题（2）：农业面源污染
Taihu Lake Basin Key Problem 2 - Agricultural Non-point Source Pollution

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重点问题2：农业面源污染协同治理
Key issue 2: Collaborative governance of Agricultural non-point source pollution

已开展研究

■ **污染负荷结构分析：农业面源污染占比大，氮磷污染逐步增加**

- 农业面源污染对 COD、氨氮、总磷、总氮四项指标污染物的贡献度最大，分别占总污染负荷的**50%、44%、58%、43%。**

■ **已开展协同治理措施**

- 流域水环境治理顶层设计、建立流域综合治理体系、农业面源污染治理关键技术与应用

下一步研究内容

■ **将农业面源与减污降碳相结合**

- 开展对化肥减量、有机肥替代等绿色有机农业的研究

■ **共同富裕背景下，污染协同治理与农业农村现代化相结合**

- 结合乡村振兴，开展农村生态价值转换的研究，包括EOD模式研究、生态种养、智慧农业等内容

Research completed

■ **Analysis of pollution load structure：Large proportion of agricultural non-point source pollution**

- Agricultural non-point source pollution is the biggest contributor to COD, ammonia nitrogen, total phosphorus and total nitrogen, accounting for **50%, 44%, 58% and 43%** of the total pollution load respectively.

■ **Collaborative governance implemented**

- Top design of basin water environment governance; Establishment of basin comprehensive governance system; Key technologies and applications of agricultural non-point source pollution governance

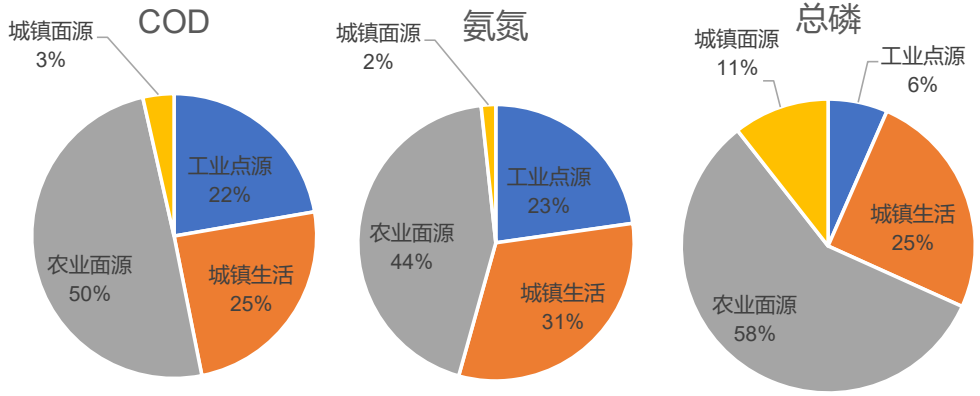
Research content for the next step

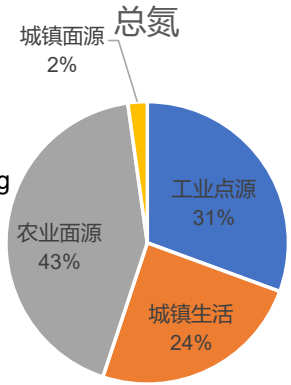
■ **Integrate agricultural non-point sources, pollution reduction and carbon reduction**

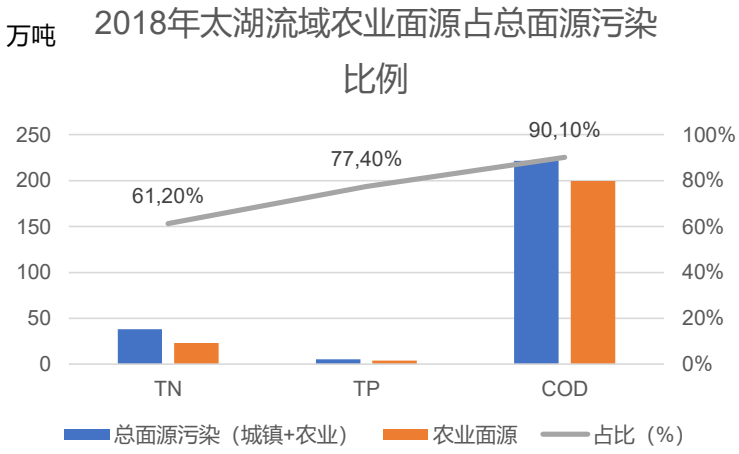
- Carry out research on green organic agriculture such as reducing chemical fertilizer and substituting organic fertilizer

■ **Integrate coordinated pollution control and agricultural and rural modernization under common prosperity**

- Based on rural revitalization, carry out research on rural ecological value commercialization, including EOD model research, ecological planting and breeding and smart agriculture.







Ⅳ.案例研究（3）：珠江口海岸带地区
Case Study (3): Coastal Zone Area of the Pearl River Estuary

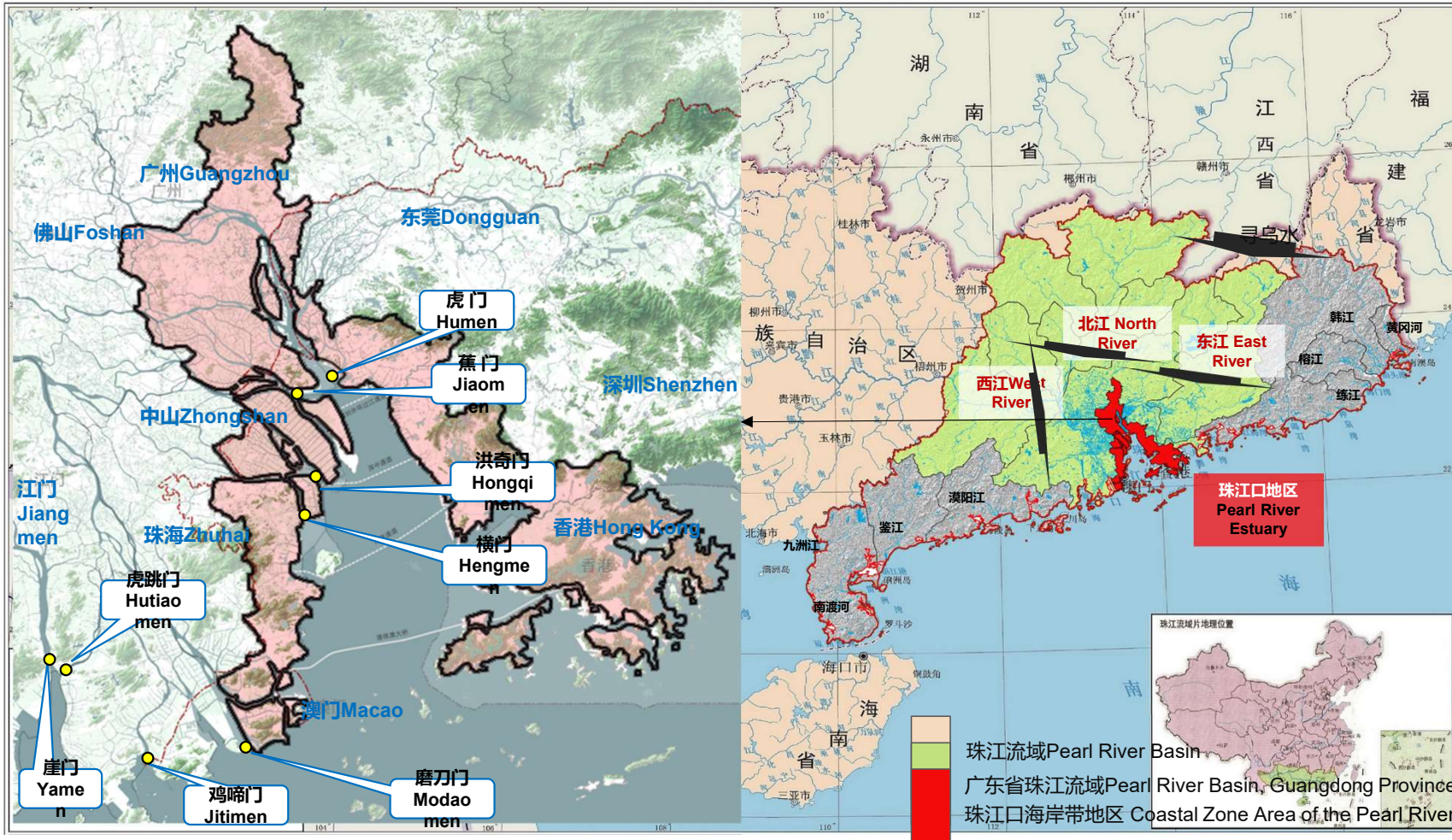
中国环境与发展国际合作委员会
China Council for International Cooperation on Environment and Development

Protection and governance of the coastal zone area of the Pearl River Estuary under regional collaboration

珠江流域 Pearl River Basin
珠江流域总面积45.37万平方千米。The total area of the Pearl River Basin is 453,700 square kilometers.

广东省珠江流域地区 Pearl River Basin, Guangdong Province
承载全省85%的城镇经济总量、80%的污染负荷和67%的水资源需求。It bears 85% of the province's total urban economy, 80% of the pollution load and 67% of the water resource demand.

珠江口地区 Pearl River Estuary
包括8个城市，是中国城镇分布最密集，人口最密集的地区，8市人口密度2500人/平方公里(2021年)。Including 8 cities, it is the most densely distributed and densely populated area in China, with a population density of 2,500 people per square kilometer (2021).



Ⅳ.案例研究（3）：珠江口海岸带地区
Case study（3）：Coastal Zone of the Pearl River Estuary

重点问题（1）：生物多样性协同保护
Key issue 1: collaborative protection of biodiversity

■ 当前研究进展：

1. **识别了珠江口海岸带地区的生物多样性保护重要的廊道和区域。**
   - 包括9处国家、省、市级保护区，4条鸟类迁徙通道，4处尚无保护级别的红树林湿地和多处海洋生态红线。
2. **对红树林、候鸟、白海豚等指征物种的生态环境进行了初步评价。**
3. **梳理了政府、NGO、公众等多元主体在生物多样性保护方面的既有工作和成效。**
   - 包括深圳福田红树林基金会MCF、（香港）英国野禽与湿地基金会、深圳湾航道疏浚工程、深圳布须鲸事件等。
4. **提出了以划定统一生态保护区为抓手的生物多样性跨界保护的政策建议。**
   - 优化整合现有珠江口海岸带地区的各类生态保护区，如内伶仃岛—福田国家级自然保护区、环大鹏湾海洋自然保护地等。

■ Current research progress:

1. Key corridors and areas for biodiversity conservation in the coastal zone of the Pearl River Estuary were identified.

- Including 9 national, provincial and municipal nature reserves, 4 bird migration channels, 4 mangrove wetlands without protection level and several marine ecological red lines.

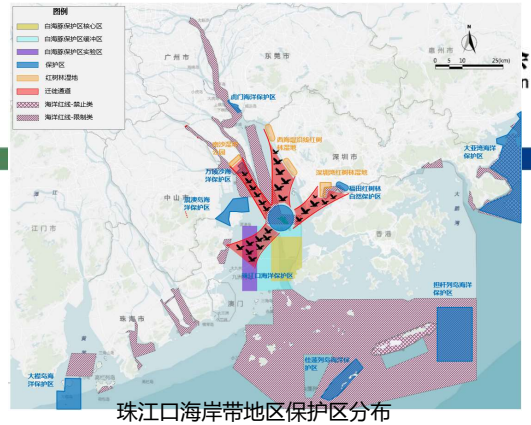
2. The ecological environment of mangrove, migratory birds, white dolphins and other indicator species was preliminarily evaluated.

3. Existing efforts and achievements of the government, NGOs, the public and other diverse subjects in biodiversity conservation were sorted out.

- Including Shenzhen Futian Mangrove Foundation MCF, (Hong Kong) Wildfowl and Wetlands Trust, Channel Dredging Project of Shenzhen Bay, and Shenzhen Bryde's whale Incident.

4. Recommendations for transboundary protection of biodiversity were made, with the delimitation of a unified ecological protection zone as the starting point.

- Optimize and integrate all ecological protection areas in the coastal zone of the Pearl River Estuary, such as Noi Ling Ding Island - Futian National Nature Reserve, and Dapeng Bay Marine Nature Reserve, and so forth.



珠江口海岸带地区保护区分布
Distribution of protected areas in the coastal zone of the Pearl River Estuary

深圳湾行航道疏浚一期工程的公众反馈
Public feedback on Channel Dredging Project of Shenzhen Bay Phase I

深港共建自然保护区的范围示意
Schematic diagram of the scope of the Shenzhen-Hong Kong Co-built Nature Reserve

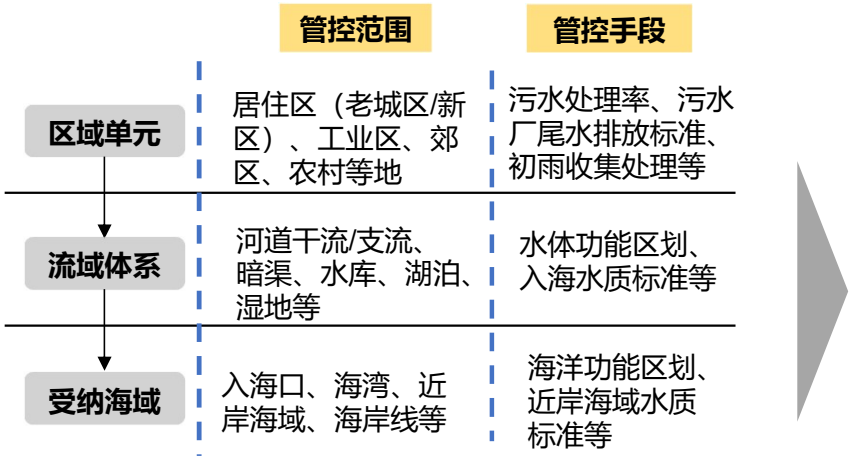
Ⅳ.案例研究（3）：珠江口海岸带地区
Case study（3）： Coastal Zone of the Pearl River Estuary

中国环境与发展国际合作委员会
China Council for International Cooperation on Environment and Development

重点问题（2）：珠江入海口的污染系统治理
Key issue 2: systematic governance of pollution of the Pearl River Estuary

■ 当前研究进展：

1. **系统梳理了2010年以来珠江口海域水污染变化过程与结果。**
   - 包括污染物高强度集中排放，局部水体水污染严重。
2. **提出以流域为单元，开展水污染区域协作和治理的初步思路。**
   - 通过“区域—流域—海域”逐级管控，构建海陆统筹的水环境分级分类治理模式，加强环境污染防治区域联动，减少陆域污染物入海量。市级层面，基于海洋环境容量，提出河流入海污染物总量控制要求，建立控制单元等。



■ Current research progress:

1. The changes and results of water pollution of the Pearl River Estuary since 2010 were systematically summarized.
- Including intense and concentrated pollutant discharge, and serious pollution in local water bodies.

2. A preliminary idea of regional cooperation and treatment of water pollution with the river basin as the unit was proposed.
- Through the level-by-level control of "region-river basin-sea area", build a hierarchical and classified management model of water environment with integrated land and sea, strengthen the regional linkage of prevention and control for environmental pollution, and reduce land pollutants entering the sea. Municipally, based on the capacity of the marine environment, propose the total amount control requirements of pollutants from rivers into the sea, and set up the control unit.

将海岸带划分为海岛区、湾区、沿海区、沿江区、沿河区5种类型，构建水环境分级分类治理模式：

Divide the coastal zone into island area, bay area, coastal area, riverbank area and riverside area to build a hierarchic and classification management mode for water environment:

沿海区、湾区：

开展入海口、海湾环境治理。有效控制养殖、工业规模。

沿江区、沿河区：

基于流域统筹，**强化陆源污染物管控治理。**

海岛区：

岛内及周边构建生态屏障，完善自身生态系统结构。

Ⅳ.案例研究（3）：珠江口海岸带地区
Case study（3）： Coastal Zone of the Pearl River Estuary

中国环境与发展国际合作委员会
China Council for International Cooperation on Environment and Development

下一步研究计划 Research Plan for the Next Step

1. 珠江口海岸带地区的生物多样性协同保护问题
Cooperative protection of biodiversity in the coastal zone of the Pearl River Estuary

- 开展福田红树林基金会MCF调研。
- Investigate MCF.
- 延续原有思路，从区域协作视角，继续研究生物多样性保护与跨境协同治理问题和近年来的新变化，如暗夜保护区的湾区实践等。
- Renew the study on biodiversity conservation, cross-border collaborative governance, and new changes in recent years from the perspective of regional cooperation based on original thinking, like the Dark-Sky Reserve in the Bay Area.

黑天空示意：雷肯比肯斯国家公园

2. 珠江入海口的污染系统治理问题
Systematic governance of pollution in the Pearl River Estuary

- 开展珠江水利委调研
- Perform investigation by the Pearl River Water Resources Commission
- 在现状演进和区域协同的框架建议基础上，补充以下几方面研究：
- Add researches on the following scenes based on the current situation evolution and regional coordination framework:

分析现有污染来源的结构（如城镇/工业/农业）；
1. Analyze the structure of existing pollution sources (urban/industrial/agricultural);

总结减少污染的总体思路和主要措施；
2. Summarize the overall thinking and main measures to reduce pollution;

重点研究如何通过陆海统筹，实现污染的系统治理
3. Focus on how to achieve systematic management of pollution through the integration of land and sea

研究如何再海岸地区保护中实现降污与减碳的协同
4. Study how to realize the synergy of pollution reduction and carbon reduction while protecting coastal areas

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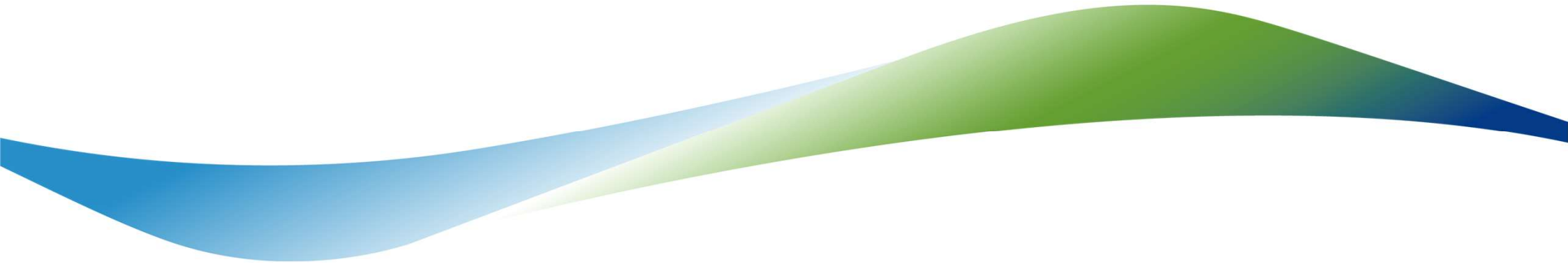
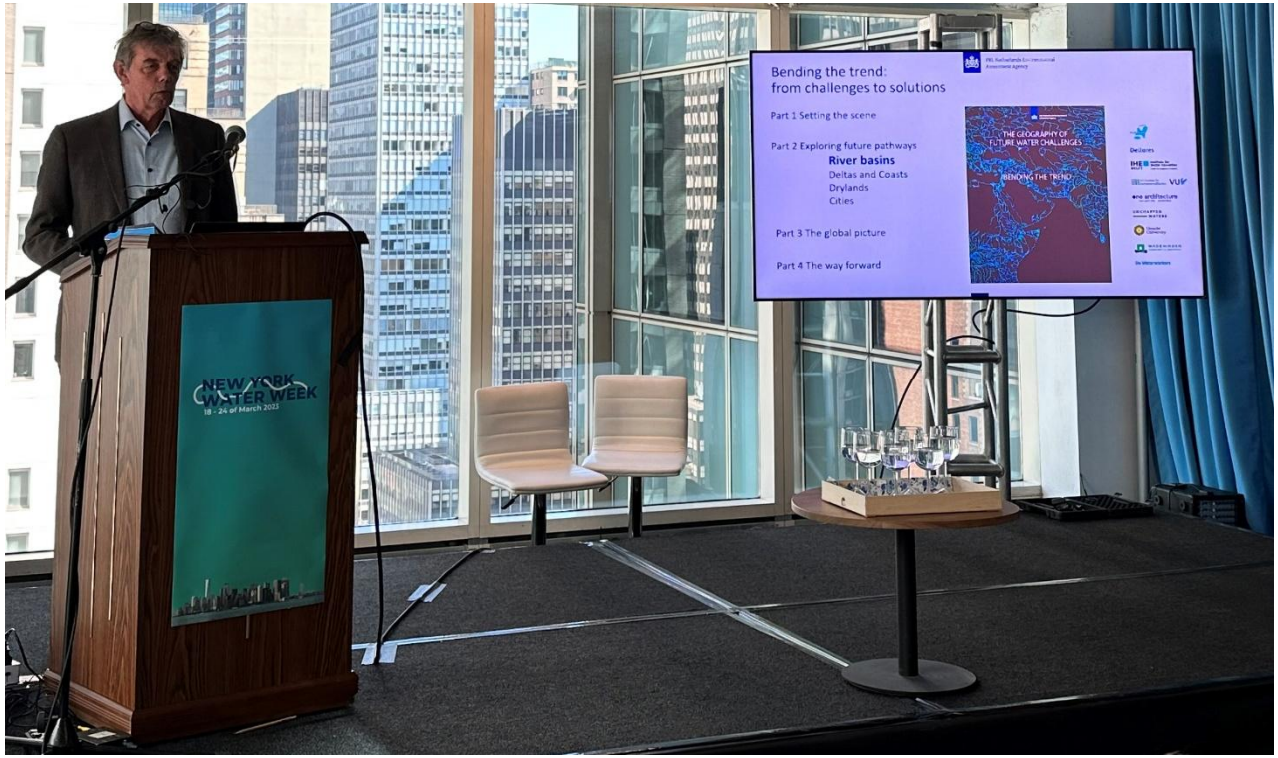
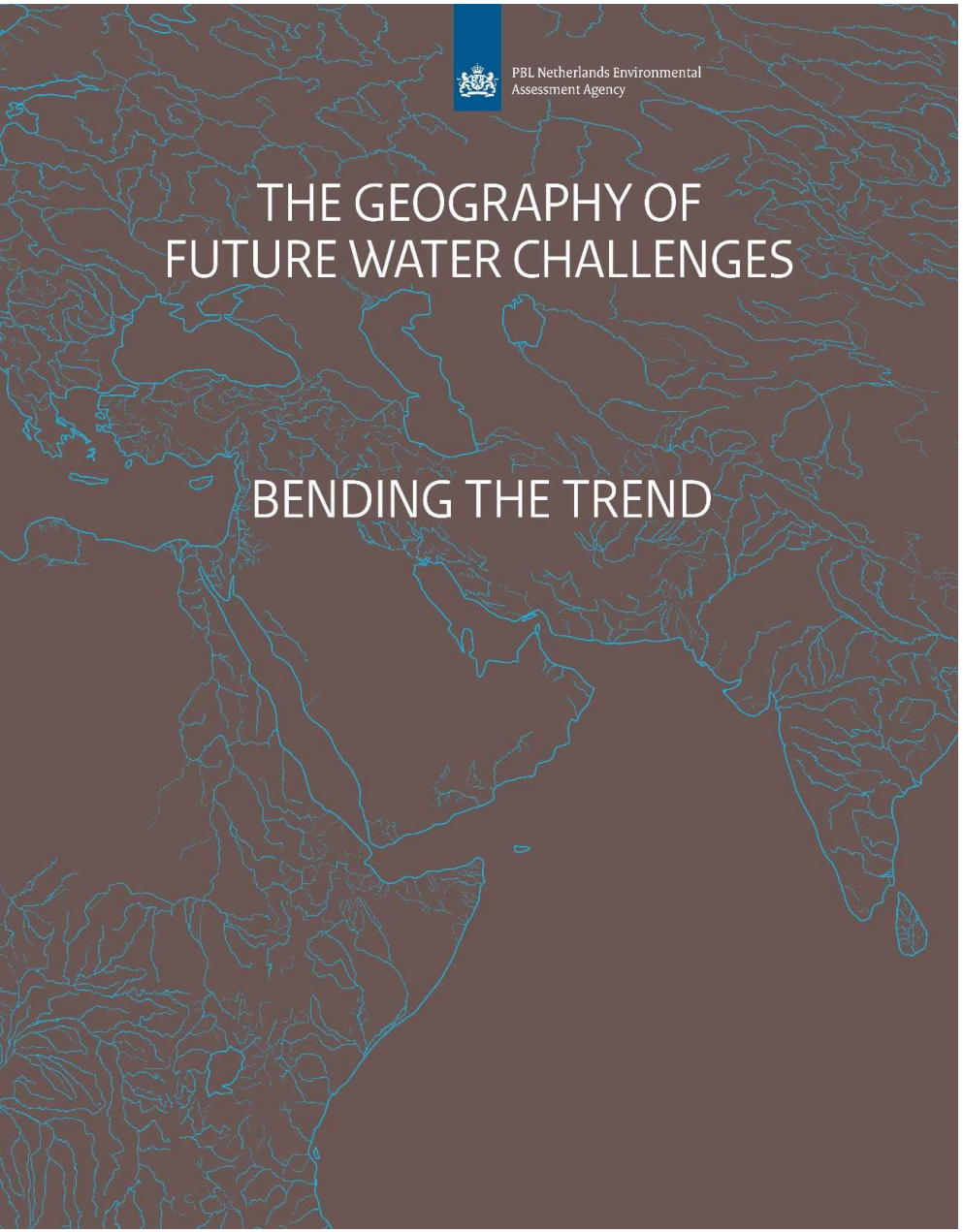
请批评指正，谢谢
Thank You for Listening!



Willem Ligtvoet





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Managing River Basins as a System

The Geography of Future Water Challenges

BENDING THE TREND

20 March 2023

Willem Ligtvoet
Arno Bouwman
PBL Netherlands Environmental Assessment Agency

Bending the trend: from challenges to solutions

PBL Netherlands Environmental Assessment Agency

Part 1 Setting the scene

Part 2 Exploring future pathways

River basins

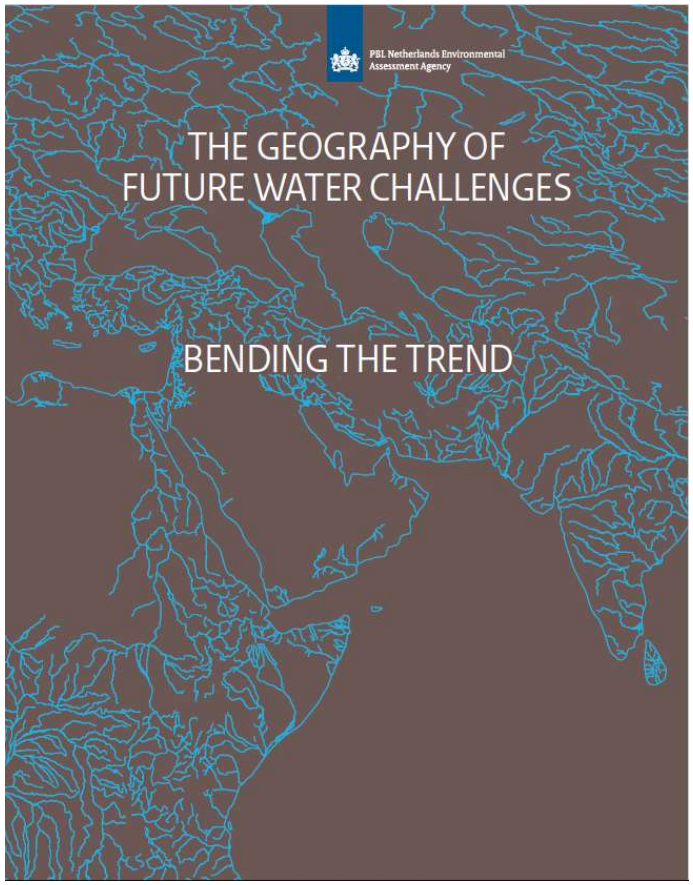
Deltas and Coasts

Drylands

Cities

Part 3 The global picture

Part 4 The way forward



BLUELAND

Deltares

IHE DELFT Institute for Water Education under the auspices of UNESCO

IVM Institute for Environmental Studies VU

one architecture new york city amsterdam

UNCHARTED WATERS

Utrecht University

WAGENINGEN UNIVERSITY & RESEARCH

De Waterwerkers

PBL Netherlands Environmental Assessment Agency

Future Water Challenges: system approach – four hotspot landscapes

River basins: the over-arching landscape

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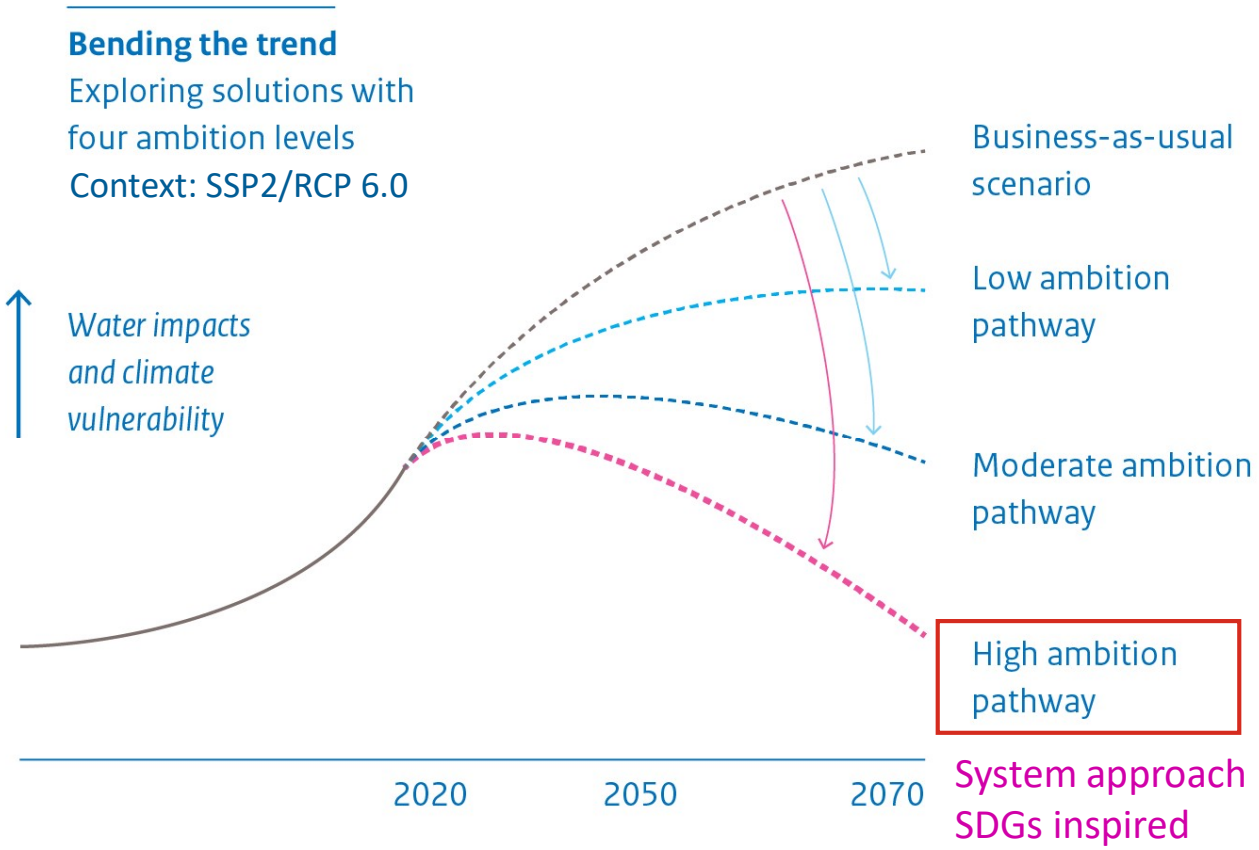
Bending the trend: exploring future pathways: *What can be reached?*



Source: PBL

Main themes

- Water for crop production
- Water pollution, sanitation and wastewater treatment
- Flooding from rivers and sea
- Renewable energy/hydropower
- Subsidence
- Ecological quality of freshwater ecosystems
- Water migration and conflict
- Water-secure and climate resilient urban development

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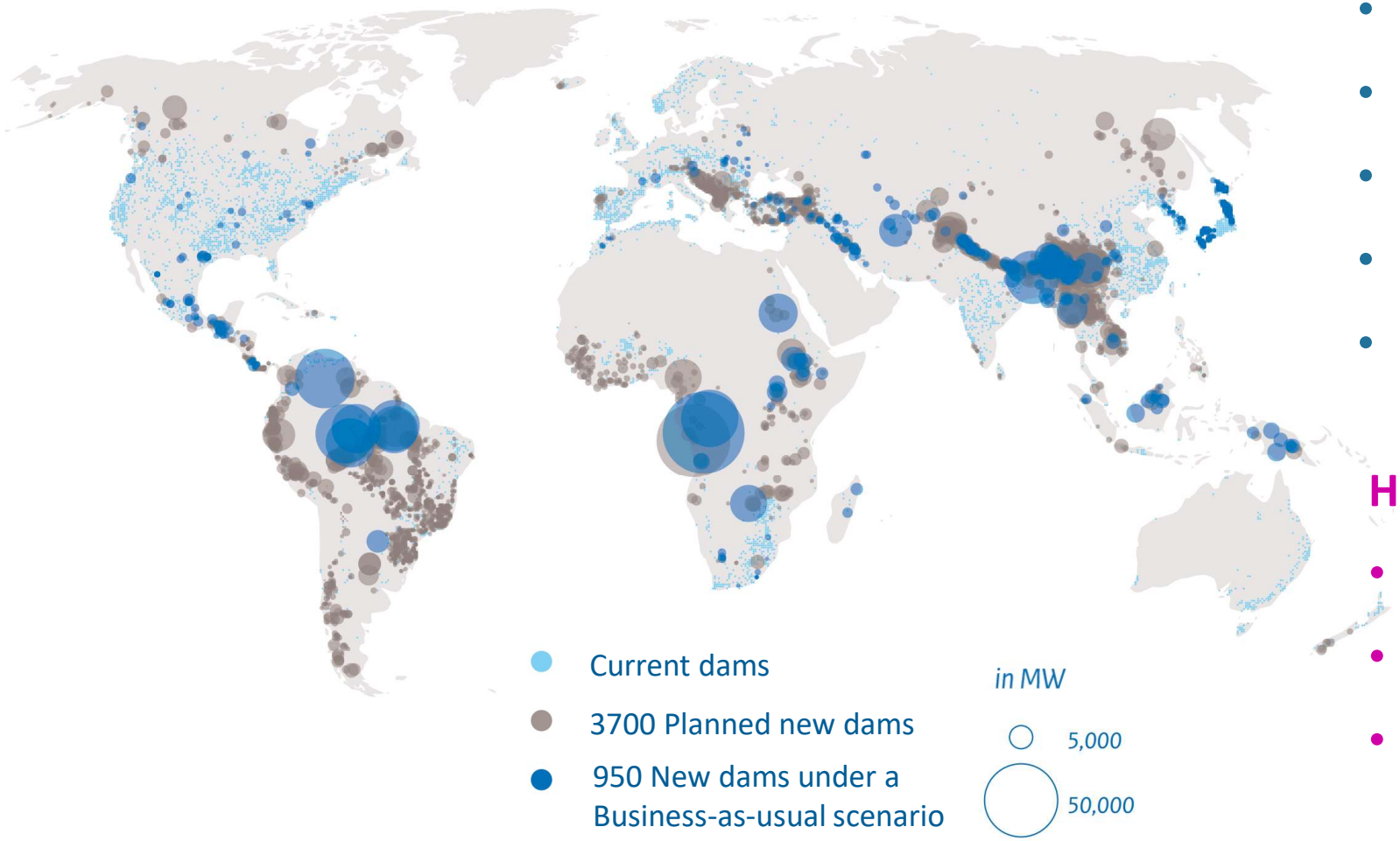
River basins: many more dams likely to be built



Negative implications for:

- water dynamics
- sediment flows
- fish migration
- ecological quality
- transboundary tensions

High ambition pathway

- Stand-still approach
- no large new dams
- >2100 small new hydropower facilities

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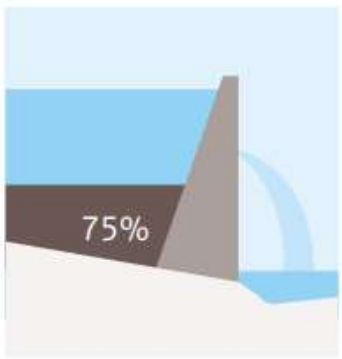
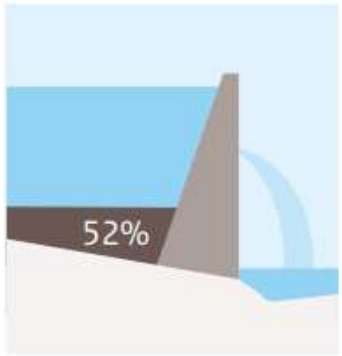
High ambition pathway:
stand-still → 50-75% of the sediment flow trapped behind dams

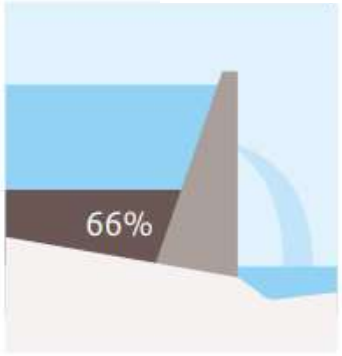
Upstream sediment trapped by dams in 2010
in %



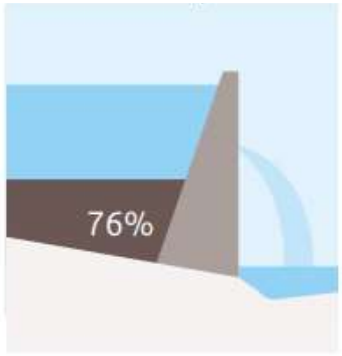
North America (including Mexico and Central America)



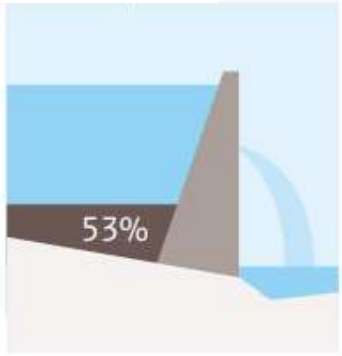
Europe



South America



Africa



Asia (including the Middle East and Turkey)

⇨ Many deltas face sediment starvation

High ambition pathway: nutrient emissions slightly reduced – 10% by 2070

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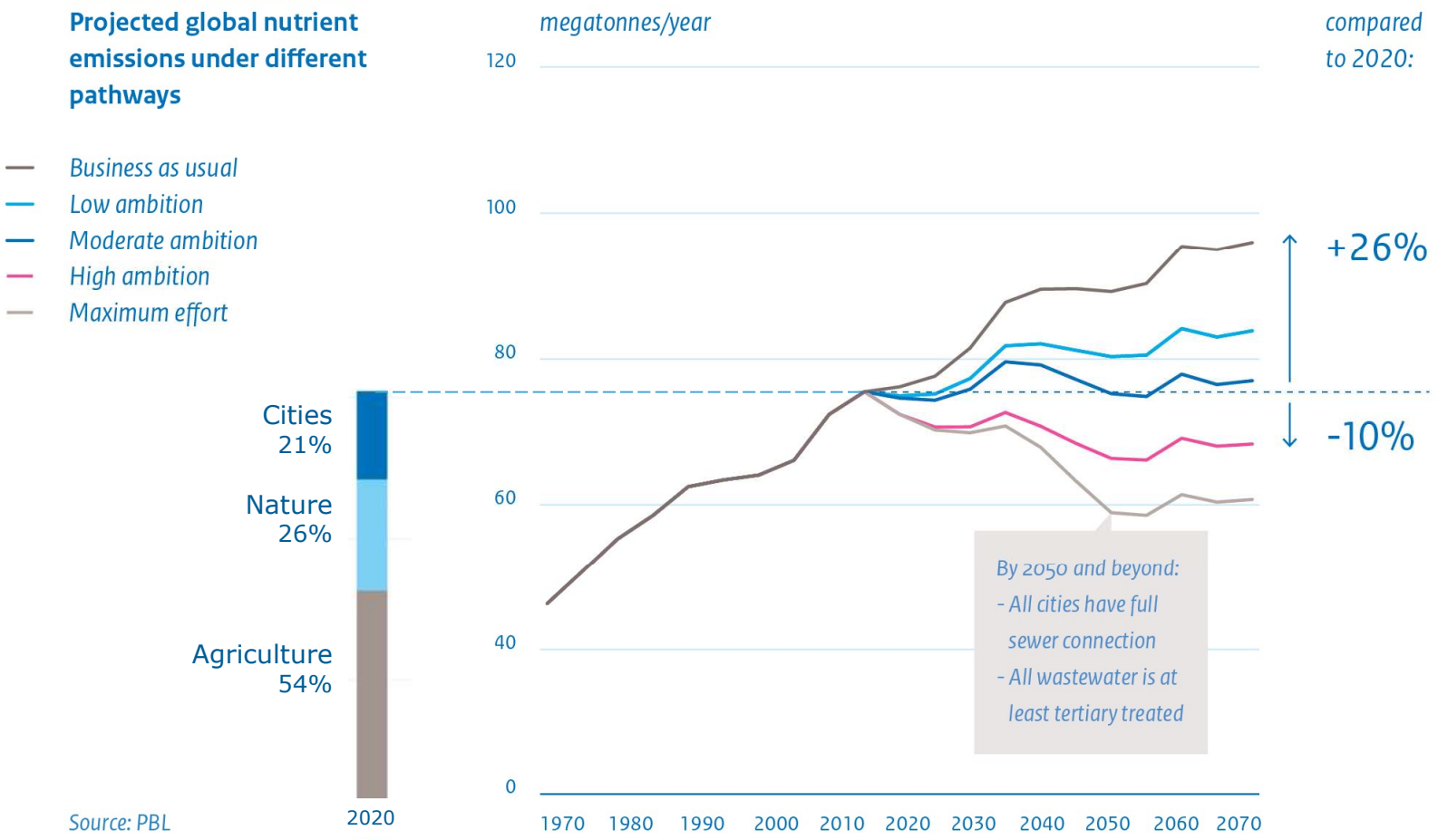
Projected global nutrient emissions under different pathways



Source: PBL

Result of:

- **Cities + 7%**
- **Agriculture - 17%**

High ambition pathway: nutrient emissions to coastal seas reduced in many regions

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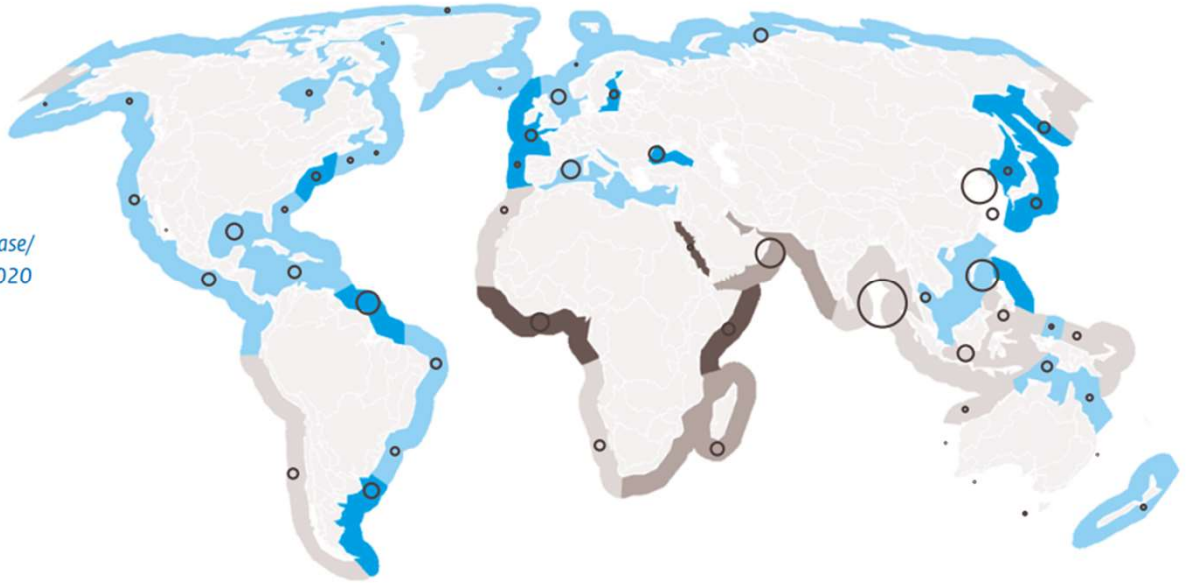
Business-as-usual scenario

High ambition pathway



Bending the trend: the global picture

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The high ambition pathway makes the difference

- Many risks related to water, climate and conflict can be strongly reduced
- Nutrient emissions and ecological quality: further deterioration halted
- Many synergies, but a wicked problem with hydropower
- Many co-benefits for the SDGs
- **The water sector cannot do it alone!**

SDGs, Business-as-usual scenario 2070

SDGs, High ambition pathway 2070

Positive
Negative
Conditional

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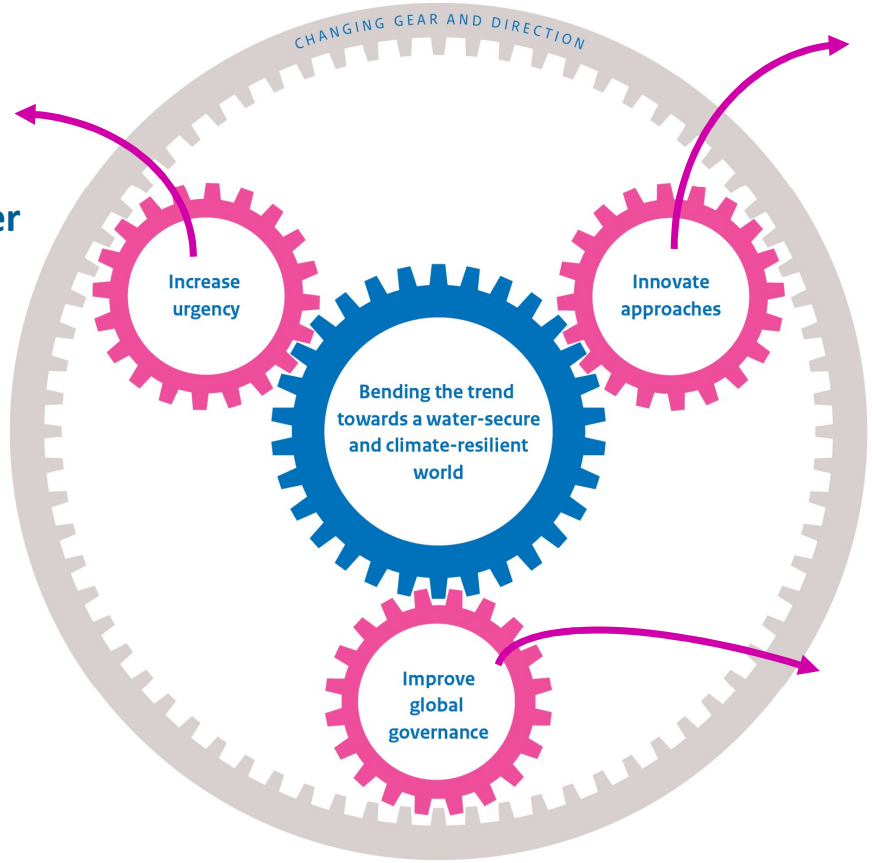
The way forward: radically different policies required*: nine turnarounds*

Increase urgency

1. Acknowledge the value and pivotal role of water
2. Valuing water: broaden the scope
3. Act now, but think and plan way beyond 2030



Source: PBL

Innovate approaches

1. Adopt a river-basin and eco-system based approach
2. Develop a high ambition pathway
3. Improve policy coherence across sectors

Improve global governance

1. Strengthen the global governance
2. Scale up and align global funds
3. Build a shared water agenda

Strengthening global governance: building a shared understanding

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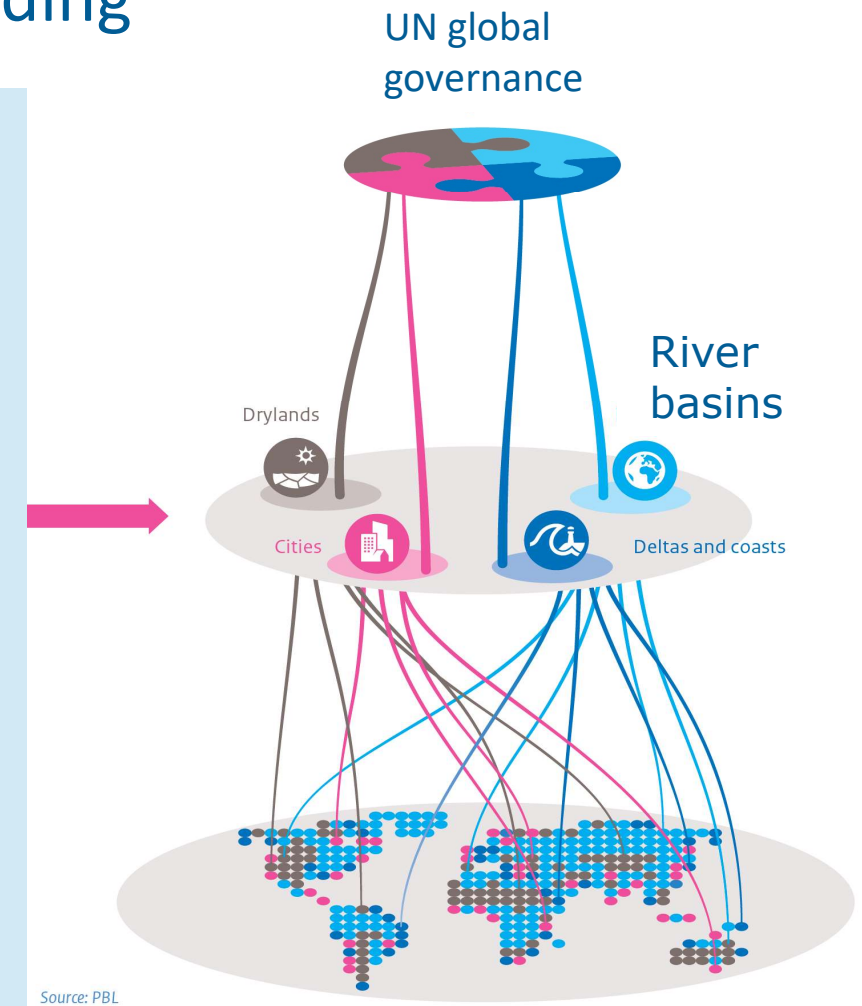
River basins deserve global attention and a shared understanding of:

* disruption by dams
* water use by sectors
* emissions to rivers and seas
* river flood risks
* wetlands and ecological quality
* transboundary conflict risk
* status of integrated river basin management
* climate robustness
* contribution to the SDGs



Coherent global goals, strategies and processes on water and climate related risks

Transnational collaboration and knowledge sharing

National/sub-national
- Institutions
- initiatives

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We should act now: if we wait for the perfect knowledge and time, we'll become specialists in waiting …

Thank you for your attention

QR report

Nicole Silk

1. The Nature Conservancy is pleased to work with our Dutch and Chinese partners to advance the importance of managing river basins as a system. The special policy study which brings us together today is in its second year, and we and our study partners look forward to sharing our findings with the appropriate action coalitions coming out of the Conference. This year, the theme of our river basins study is to recognize our responsibility from mountains to sea. The key research topic of the study year is the mechanism for regional cooperation. More on that in a moment. First, I'll give a little background on TNC and our commitment to the protection and conservation of freshwater resources around the world. how we are engaged in freshwater protection

2. The Nature Conservancy's mission is to conserve the lands and waters on which life depends. Our vision is a world where people act to conserve nature for its own sake and its ability to fulfill our needs and enrich lives. Today we work 79 countries, including every state of the US. Our work has been guided by science and tangible results.

   While water has always been part of what we do, as we look forward, we are struck by the urgency to do more to address the interconnected CRISES of biodiversity loss and climate change. Our goals for 2030 are ambitious and compelling for people, local leaders, carbon, land, our oceans, and of freshwater.

3. This urgency is most pronounced when it comes to freshwater.

   Globally, monitored freshwater populations have declined by an average of 83% since 1970, we've lost 64% of the world's wetlands since 1900, and only 37% of the world's longest rivers remain unimpeded and free-flowing. In addition, monitored populations of aquatic megafauna, like hippos and crocodiles, have declined by 88%, migratory fish by 76% and mega-fishes by 94%. This rate of loss is greater than any other biome.

   We also know that that a majority of people on Planet Earth will be subject to climate insecurity in the coming decades as a result of too little or too much water, with 50% of the world's human populations expected to be living in water stressed areas by 2025. We are already seeing patterns of precipitation becoming more unpredictable and regionally drier and wetter, exacerbating preexisting patterns of water abundance and insecurity.

4. Given this urgency, The Nature Conservancy has stepped up with bold goals for our work over the next 7 years: By 2030, we will *conserve 1 million kilometers of river systems and 30 million hectares of lakes and wetlands.* To succeed, we will work collaboratively with partners, really dig in together to identify and promote innovative solutions, and advance policies that improve the quality and amount of water available in freshwater ecosystems and to communities.

5. Today we are engaged in over 450 places around the world, working with a large portion of the river basin and freshwater management community – fisheries, hydropower, navigation, water utilities, agriculture companies and farmers, indigenous and local communities, and of course all levels of government. We believe our current portfolio gets us about half of the way towards our goals (we are currently verifying these numbers).

6. From the policy perspective, we are encouraging governments around the world to take action in support of healthy ecosystems for people and nature. Here at the UN Water Conference, our specific policy agenda includes these recommendations for delegates:

- #1 Take actions to ensure healthy freshwater ecosystems, watersheds and free-flowing rivers by implementing and coordinating the important existing commitments across Multi-lateral Environmental Agreements (MEAs) like Ramsar COP14, CBD CoP15 and COP27
- #2 Modify frameworks (national and subnational) to require consideration of nature-based solutions and natural areas as important water infrastructure when advancing public policy and investments in water management.
- #3 Reform water allocation and freshwater resource use rights, laws and regulations to acknowledge the realities of a limited precious resource in times of increased uncertainty, and in ways that increase justice and equity for all people.
- #4 Reform agricultural subsidies to align with nature-positive, climate-smart and regenerative outcomes that reduce pollution and the over-use of water within the agricultural sector and ensures the resilience and potential of farming and farm communities into the future.
- #5 Advance governance and partnerships to achieve the outcomes above based on access to open data as well as adaptive, inclusive decision making.

7. Turning to our shared special policy study focused on the management of river basins . . . we believe that the power of nature can enhance human resilience through enhancing the resilience of natural and inhabited ecosystems.

   We are confident that what we hear today will greatly inform that study. The study is in its second year, and we and our study partners look forward to sharing our findings with the appropriate action coalitions coming out of the Conference. This year, the theme of our river basins study is to recognize our responsibility from mountains to sea. These systems connect farms to forests, towns to fisheries, and land to sea. Truly, EVERY DROP CONNECTS US.

8. As the statement here notes, healthy freshwater systems have benefits for people far beyond just the provisioning of water. And if we want a future that includes rivers that are more than mere waterways, we must work together.

   We have worked with the Chinese Ministry of Water Resources on the New Green Line Project to advance biodiversity and environmental flows. We have also worked with the Three Gorges Corporation and have put forward a sustainable hydropower scheme to align human needs and river flows. In the present policy study year, we have responsibility for chapters on agriculture and the sustainable energy transition. We are working with the Ministry of Agriculture and Rural Affairs to expand regenerative methods that can greatly reduce non-point source pollution while ensuring long term productivity; we worked with the Yangtze River basin Fisheries Resources Management Commission to form the Mississippi-Yangtze EcoPartnership to help preserve the natural fisheries of the two great rivers. We have helped create urban stormwater markets that can reduce NPSP from cities. Regarding the sustainable energy transition, China is clearly leading on expanding wind and

solar power. We recommend that China deploy its ecological red line system to ensure comprehensive optimal use of land and water resources.

In closing, the challenge ahead of us is what is or are the “mechanisms for regional cooperation” that encourage collective action for our river basins and include a comprehensive vision for what results when these systems are well-managed. The Yangtze River Protection Law is a model worthy of consideration. Conceivably, the vision it imparts can be executed by provinces and municipalities alongside ministries and commissions, though likely there needs to be a body responsible for oversight, ongoing research, and possibly enforcement.

9. I would like to end by thanking you for the opportunity to share these thoughts today. I look forward to the discussions, and The Nature Conservancy looks forward to working with all here to advance comprehensive & integrated river basins management for people and our planet.

20 MARCH 2023

MANAGING RIVER BASINS AS A SYSTEM
以系统视角进行流域管理

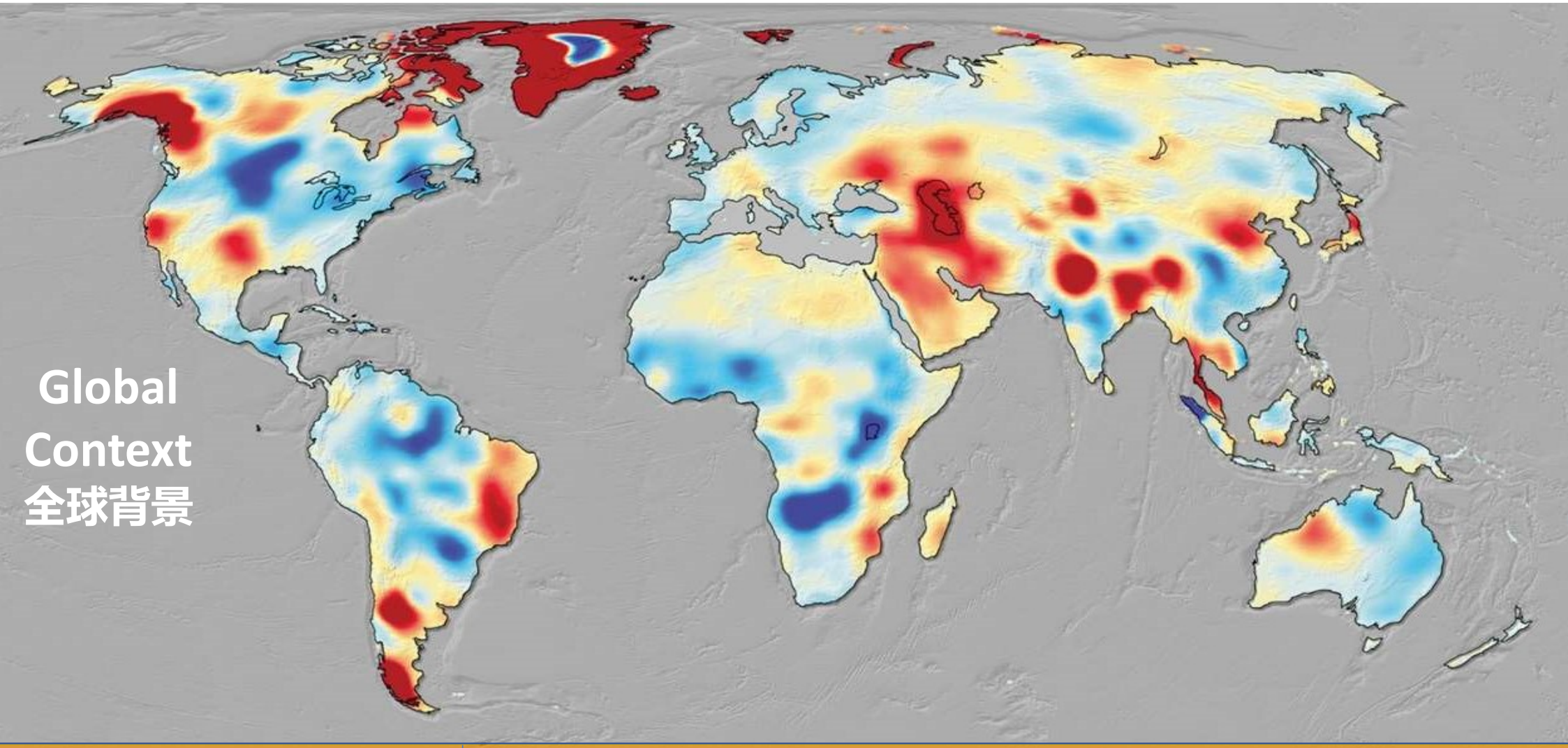
Nicole Silk
Global Director of Freshwater Outcomes

Jinsha River & Tiger Leaping Gorge, Yunnan Province, China
© Scott Warren

Our Goals for 2030
我们的2030目标

We have years, not decades, to take on the interconnected crises of climate change and biodiversity loss. We're finding the people and paths to make ambitious change

Carbon Emissions 碳排放	Helping People 助人	Our Oceans 海洋	Healthy Lands 健康陆地	Freshwater 淡水	Local Leaders 地方领导者



Global Context
全球背景

83% freshwater species loss
83%淡水物种丧失

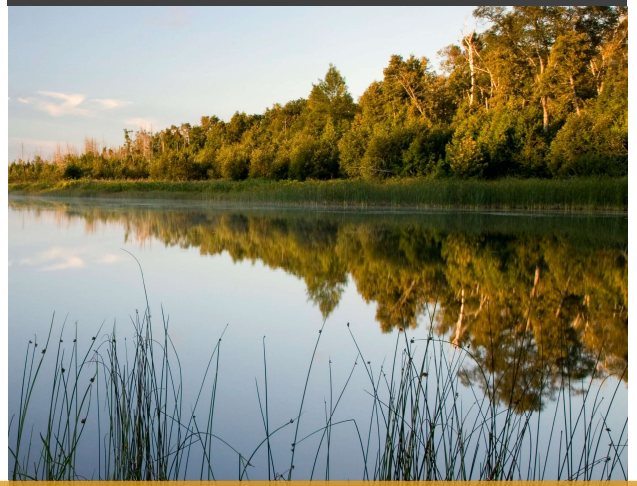
64% of the world's wetlands
64%全球湿地

50% in water stressed areas by 2025
2025年缺水地区占比将达50%

Our Freshwater Goals
我们的淡水目标

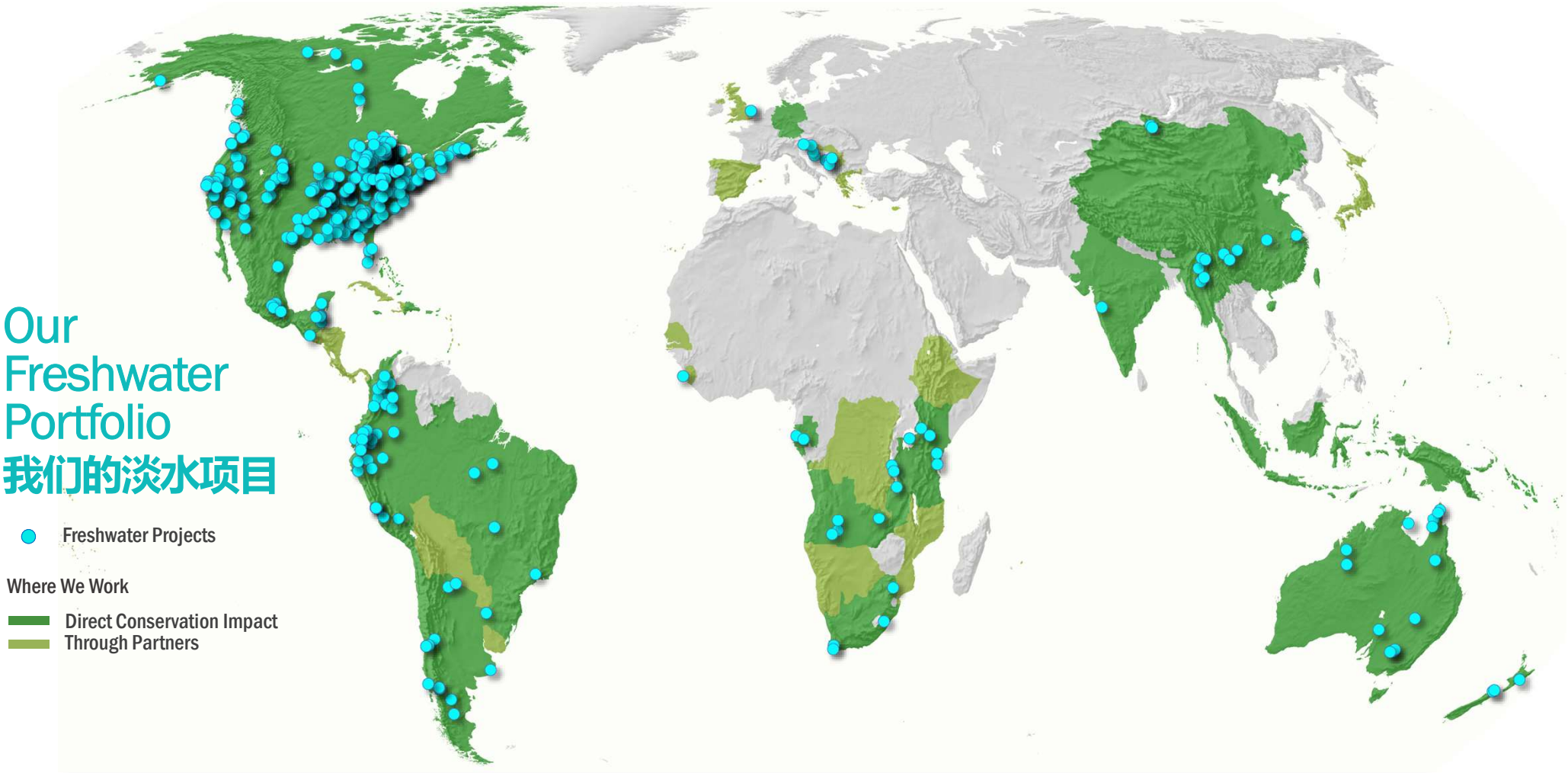
1M km
OF RIVER SYSTEMS
河流生态系统

30M ha
OF LAKES AND WETLANDS
湖泊和湿地



45M people
BENEFITING FROM HEALTHY OCEANS, FRESHWATER, AND LANDS
从健康的海洋、淡水和土地中受益

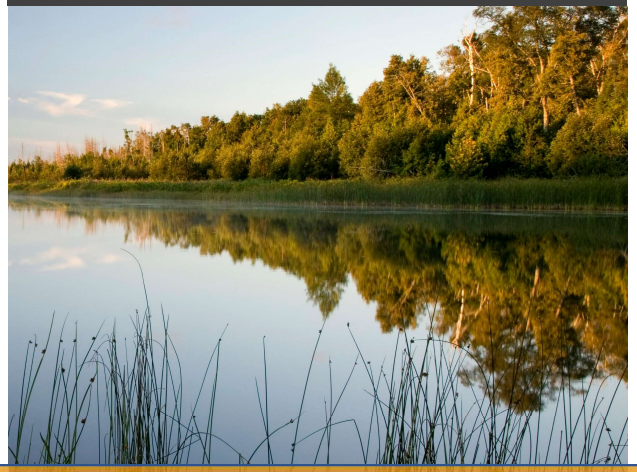
"We will conserve 1 million kilometers (621,000 miles) of river systems and 30 million hectares (74 million acres) of lakes and wetlands by engaging in collaborative partnerships, promoting innovative solutions, and supporting policies that improve the quality and amount of water available in freshwater ecosystems and to communities."


Our
Freshwater
Portfolio
我们的淡水项目
Freshwater Projects
Where We Work
Direct Conservation Impact
Through Partners

Our Freshwater Goals
我们的淡水目标

1M km
OF RIVER SYSTEMS

30M ha
OF LAKES AND WETLANDS



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The Challenges

What We Strive For
奋斗目标

“More and more rivers and lakes are coming back to life, more and more river basins are recovering, and more and more rivers and lakes are bringing benefits and happiness to the people.”

“越来越多的河湖恢复生命，越来越多的流域重现生机，越来越多的河湖变成造福人民的幸福河湖。”

-- Speech by Mr. Li Guoying
Chinese Minister of Water Resources

Interview with journalists at the “Ministerial Channel” of 2022 session of national People’s Congress and Chinese People’s Political Consultative Conference

The Yangtze River northwest of Shangri-La, Yunnan Province, China
© Scott Warren


THANK YOU
The Nature Conservancy
Learn more at www.nature.org

Gerry Galloway

Digest of Organizational Collaboration in the US Mississippi River Basin

The Mississippi River basin drains 41% of the contiguous United States and provides 32% of the nation's agricultural land (Figure 1). Most of its flows to the Gulf of Mexico come from the Upper Mississippi, Missouri, and the Ohio River basins. A smaller, yet significant amount, comes from the Arkansas, White and Red River basins in the southern portion,. The Lower Mississippi River Basin serves as a funnel, for flows from all the other basins into the Gulf of Mexico.

The Mississippi River and its tributaries provide approximately 10,000 miles of government maintained navigable waterways (Figures 2 and 3). Navigation in the upper Mississippi, Ohio and Red River basins is made possible by a series of locks and dams. Navigation on the Missouri River, the middle Mississippi, and the lower Mississippi is made possible by use of dikes, streambank control, and dredging.

Exploitation of the Mississippi basin began in earnest in the early 1800's and led to federal government assumption of responsibilities for maintenance of some form of navigation on major US rivers. As settlement took place in the basins, local governments took on the responsibility for providing flood control protection for those in the basin at risk. Since, under the US Constitution, all powers not specifically assigned in the Constitution to the federal government are reserved to the states, water management less navigation which was considered in early judicial decisions to be part of interstate commerce and thus a federal responsibility, is assumed by the states,

In 1879, the Congress established the Mississippi River Commission with broad oversight of activities involving the Mississippi River and assigning the Commission specific responsibilities for maintenance of navigation on the basin's rivers. In 1928, after a disastrous flood in 1927 throughout the lower Mississippi basin shut down navigation and caused millions of dollars in damages, the federal government assigned the Commission responsibility to manage with a systems approach, lower Mississippi River navigation and flood control and established a Mississippi River and tributaries project under which the federal government assumed responsibility for the construction of flood works in the lower Mississippi Basin in collaboration with the states located in the basin. In 1936, after major flooding throughout the United States, the federal government assumed responsibility for major flood control projects throughout the nation when the benefits of such projects exceeded the costs, but directed the execution of such works to be carried out on a project by project basis, and not assigning responsibility to any federal body to oversee basin level systemic efforts. At the same time and at the request of the states in the Missouri basin, the federal government took on responsibility for construction of six major dams on the mainstem Missouri River for flood control, irrigation, and flows to maintain the Missouri River navigation system, but not to serve as basin overseers.

In 1965, recognizing the challenges of trying to operate major water systems that involved federal state and local agencies, the Congress enacted a water resource planning law that directed the establishment of river basin commissions in major basins and a water resources council to coordinate the activities of the federal government and the state governments in the water resources arena. In 1981, largely because of the complaints of states that basin commissions were interfering with their constitutional responsibilities, the President eliminated river basin commissions, and withdrew support for the water resources council. At the same time, increasing competition for water in the Missouri basin led the states in the basin to question the management of the river by the federal government even though the states could not agree among themselves, how the system should be operating. This led to lawsuits against the federal government and among the states which gave rise to federal judicial decisions that essentially told the states that the federal government would operate navigation and flood control dams on the Missouri until the states could work out a collaborative approach. The federal responsibilities, however, were for the operation of the dams and not systematic control of the basin's water activities as was being accomplished in the lower Mississippi basin by the Mississippi River Commission.

Today, the Mississippi basin faces significant management challenges to the achievement of cooperation and collaboration among all the entities involved in water, resources development, flood protection, navigation, and environmental sustainment. At the top of the list (Figure 4) is the federal system under which the United States operates and which cedes to the states responsibility for most water resources activities. States also face challenges with collaboration within the states, depending on the nature of the states' constitutions and the provisions in those constitutions for self-government at lower levels within the state. In some states, cooperation, and collaboration among all government levels, and with non-governmental organizations is high. In others it is somewhat strained. A second challenge is the upstream-downstream problem faced throughout the world. On tributaries that exist entirely within the boundaries of a given state, the state is

able to control most activities. In other circumstances, where the states share flows, both too little and too much water rapidly become the basis for disagreement if not conflict.

More recently, urban flooding has brought attention to the sharing of responsibilities within the state for managing flood waters and passing them on to others in their region. States are just beginning to discuss pluvial, flooding, and how the disposition of flood flows should be handled.

At the same time as the challenges are increasing, the public is becoming more involved in decision-making. No longer is the public willing to have government at any level dictate solutions without full consideration of the available options by those who will be affected. This includes having to deal with environmental needs and to recognize social justice and related gender inequities that have occurred in the past and the means to overcome these past problems.

Perhaps, the entry of 21st century communications and social media transmission of information is providing a method of improving coordination and collaboration among governments, non-governmental organizations, and the public in determining what actions need to be taken. It appears that collaboration will require new communication structures and approaches and a wide sharing of input to decisions. Artificial Intelligence (AI) will offer the public at large and the underrepresented in particular, the opportunity to know more and be better able to join in collaborative efforts.

The need for collaboration and broad participation in decision making is apparent, but how it will be obtained is still an open question. Given the public interest and the public‘s new access to information, wise use of social media, and modern communication techniques can provide for increased collaboration, and hopefully better decision-making. Such efforts are underway in the Mississippi basin.

Special Policy Study on High-Quality Development of River Basins and Adaptation to Climate Change
China Council for International Collaboration on Environment and Development

Integrated Management of the Mississippi River:
Building a Collaborative Approach

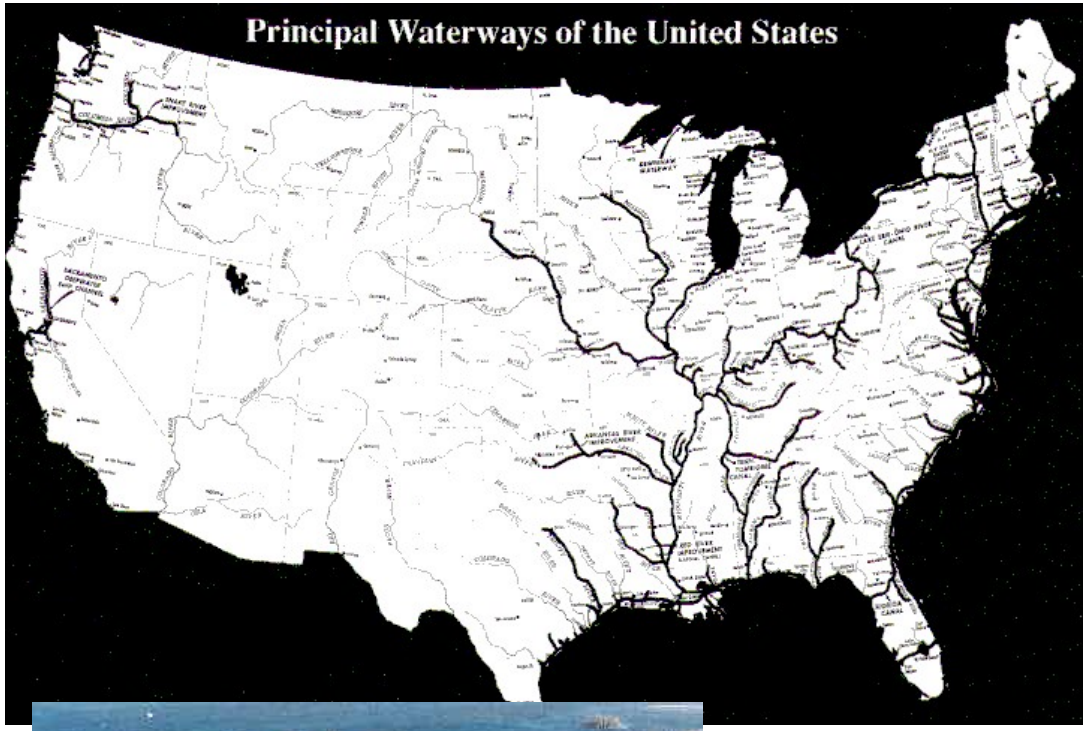
March 20, 2023
New York

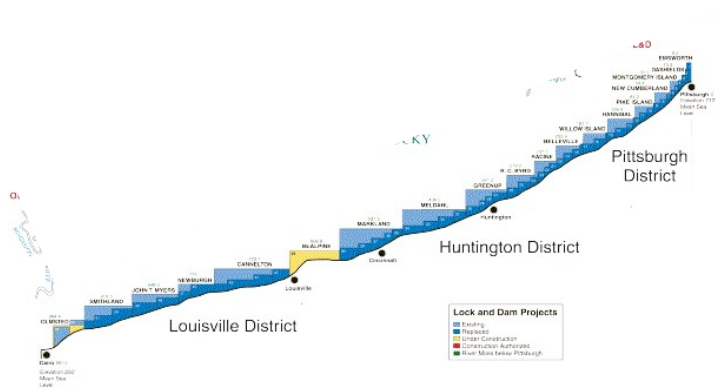
Gerald E. Galloway, Jr., PE, PhD
Emeritus Research Professor of Engineering
University of Maryland

The Mississippi Basin Drains 41% of the Contiguous United States

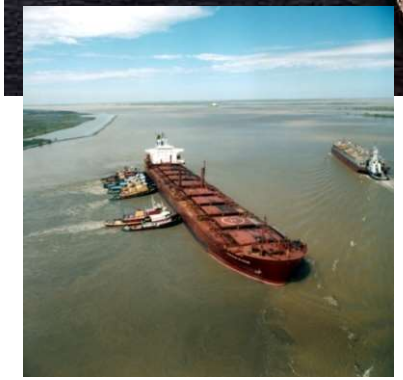
Mississippi River
Length - 3730 km
Average flow – 12,700,000 m^3/s
Max Flow -85,000 m^3/s

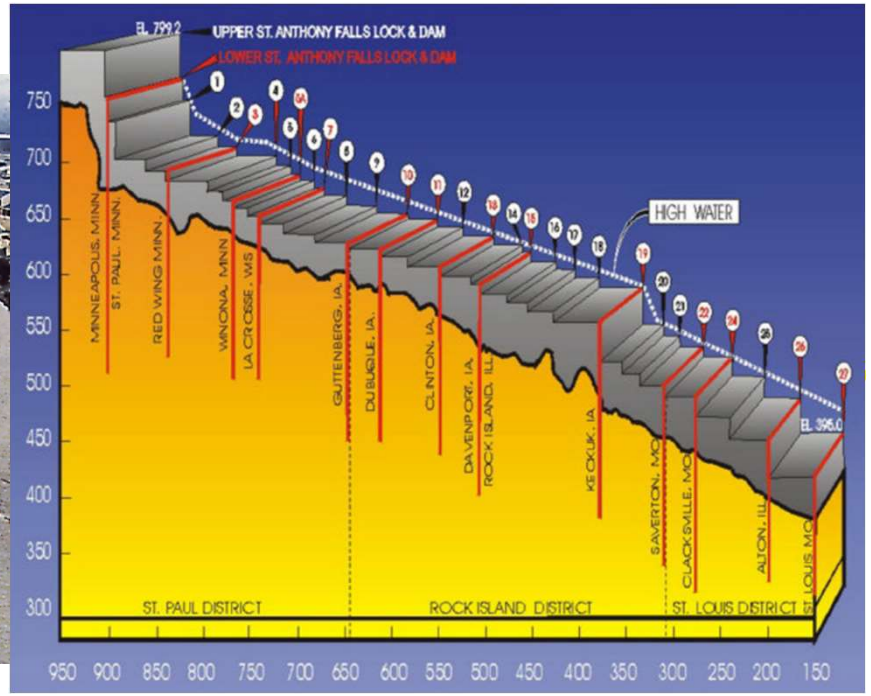
Mississippi River Basin
3.1 million km^2
32% of total US farm acreage





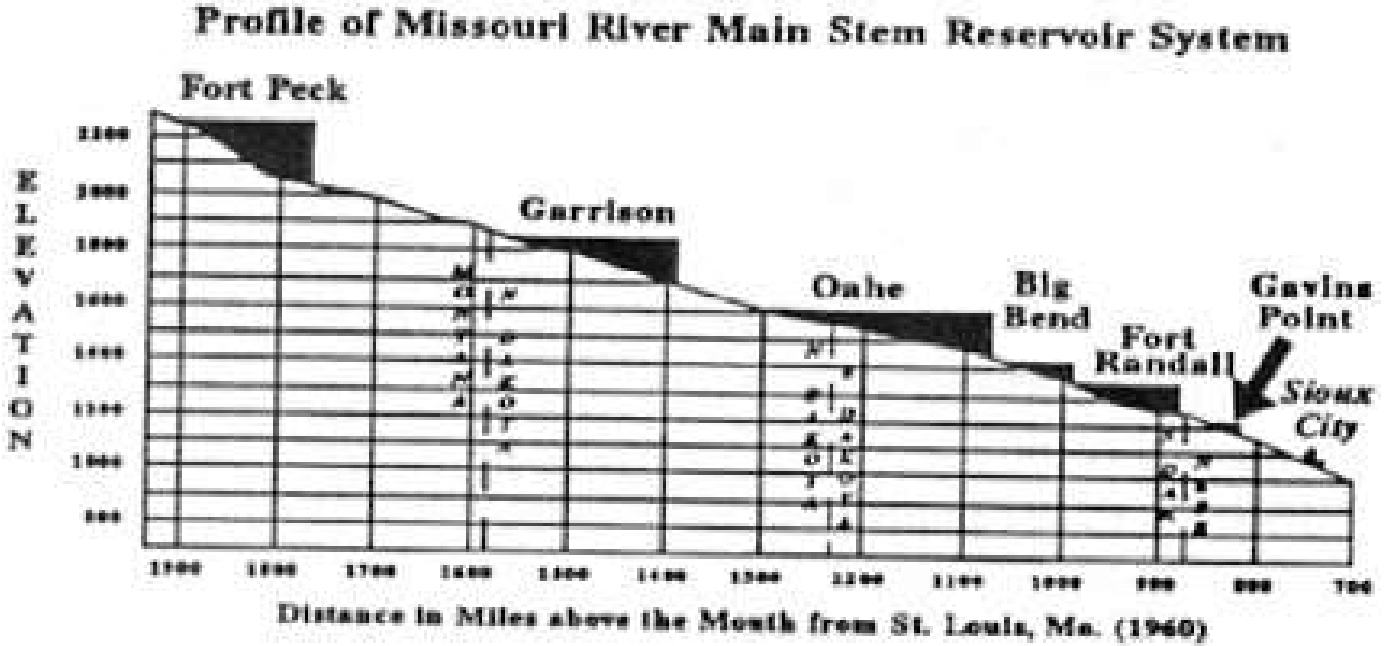
Ohio River





Upper Mississippi River

Upstream Dams on the Missouri Provide Navigation, Irrigation, Hydropower, Flood Control and Environmental Benefits



Challenges to Collaboration

- Federal Government – Divided Responsibilities at Federal, State and Local Level
  - State Water Rights
- Upstream – Downstream Differences
- Communication and Public Participation
  - Social Networking; Environmental Justice; Sectoral Competition; Equity
- Cooperation Building Collaboration


谢谢
Thank You
谢谢


谢谢
Thank You
谢谢

LV Xiaobei

区域协作下的
珠江口海岸带地区保护与治理

Protection and Governance of the Pearl River Estuary Coastal Zone under Regional Collaboration

中国城市规划设计研究院

China Academy of Urban Planning and Design

吕晓蓓

Lv Xiaobei

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1 基本认识Basic Understandings—— 研究对象 Research Objects

■ 珠江流域 Pearl River Basin

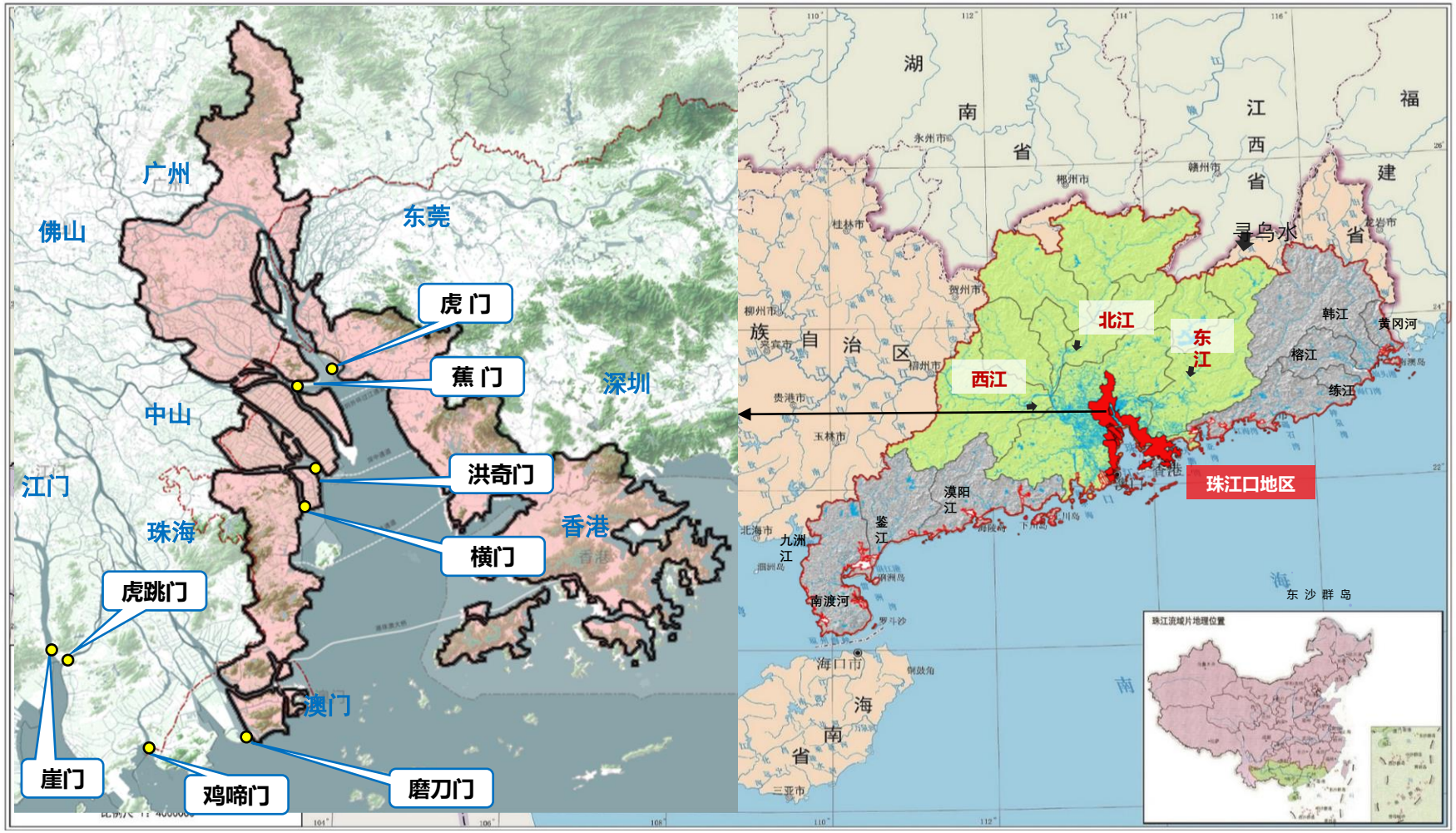
珠江是中国径流量第二大的河流，流域总面积约45.37万平方千米，其中中国境内流域面积44.21万平方千米。 The Pearl River is the second largest river in China in terms of runoff, with a total basin area of about 45.37Km², including a basin area of 44.21Km² within China.

■ 广东省珠江流域地区 Pearl River Basin in Guangdong Province

广东省珠江流域承载全省85%的城镇经济总量、 80%的污染负荷和67的水源需求。The Pearl River Basin in Guangdong Province carries 85% of the province's total urban economy, 80% of the pollution load and 67% of the water demand.

■ 珠江口地区Pearl River Estuary

珠江由八大口门入海, 分布香港、澳门、广州、深圳、东莞、中山、珠海、江门等八个城市，是中国城镇分布最密集，人口最密集的地区。The Pearl River enters the sea from eight major gateways, and is distributed in eight cities, including Hong Kong, Macau, Guangzhou, Shenzhen, Dongguan, Zhongshan, Zhuhai and Jiangmen, which are the most densely distributed and populated areas in China.



1 基本认识Basic Understandings—— 研究对象 Research Objects

■ **珠江口海岸带地区**

Pearl River Estuary coastal zone area

指珠江口地区海陆交互关系最密切的地区，向海至广东省领海基线，向陆至沿海第一个县（区）级行政单元。It refers to the area with the closest interaction between sea and land in the Pearl River Estuary, seaward to the baseline of Guangdong Province's territorial waters, and landward to the first county (district) level administrative unit along the coast.

■ **总面积：4972Km²**

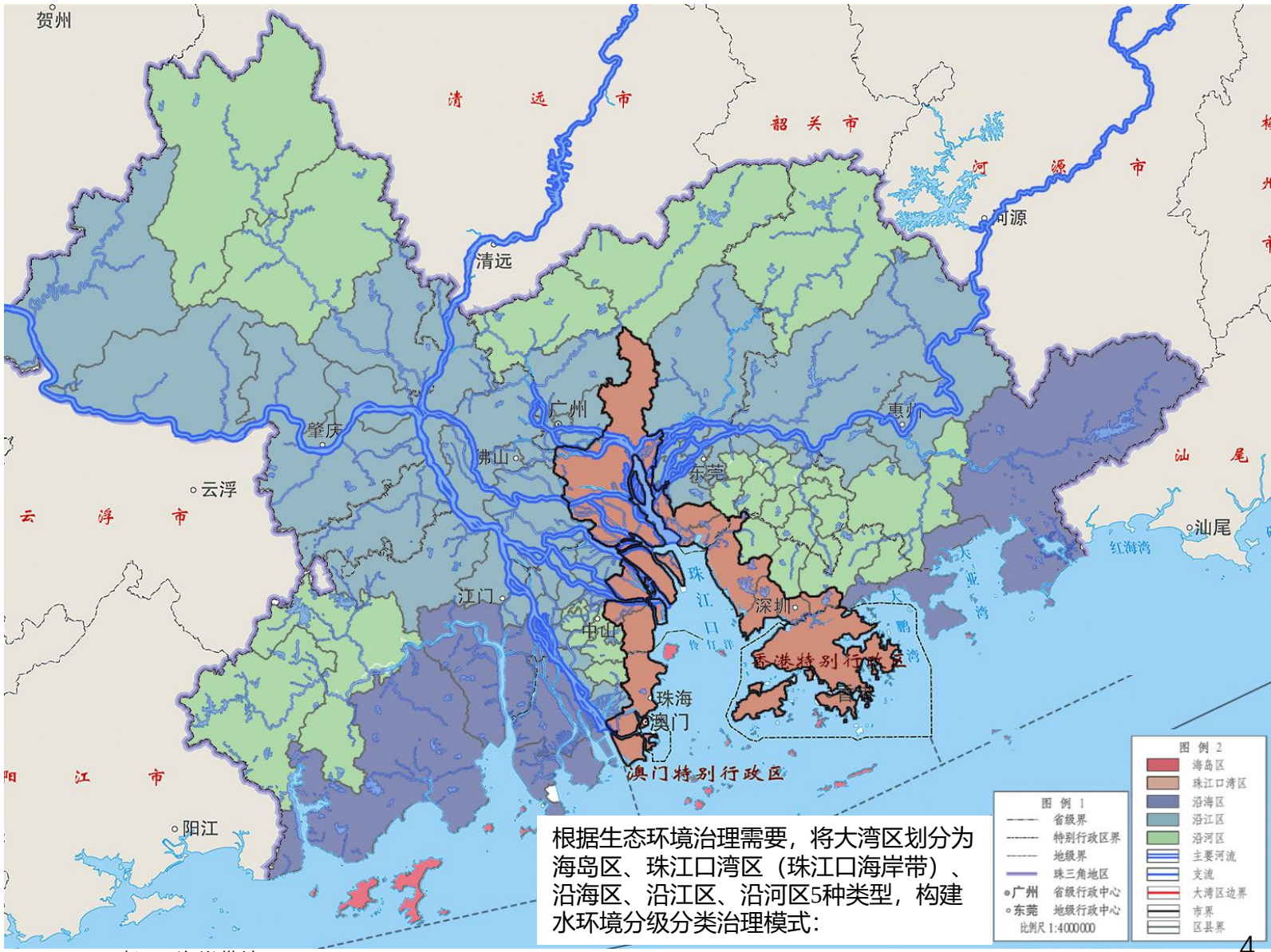
Total area： 4972Km²

占沿海七市总面积的30%，海岸线总长4100公里

■ **常住人口：3012万人(2018)**

Resident population： 30.12 million

占沿海七市（深圳、广州、东莞、中山、珠海+香港、澳门）常住人口总量的45.8%



根据生态环境治理需要，将大湾区划分为海岛区、珠江口湾区（珠江口海岸带）、沿海区、沿江区、沿河区5种类型，构建水环境分级分类治理模式：

珠江口海岸带地区

来源：《粤港澳观察蓝皮书2018》

1 基本认识Basic Understandings—— 自然地理条件 Natural Geographic Conditions

■ **全球重要的鸟类迁徙通道之一**

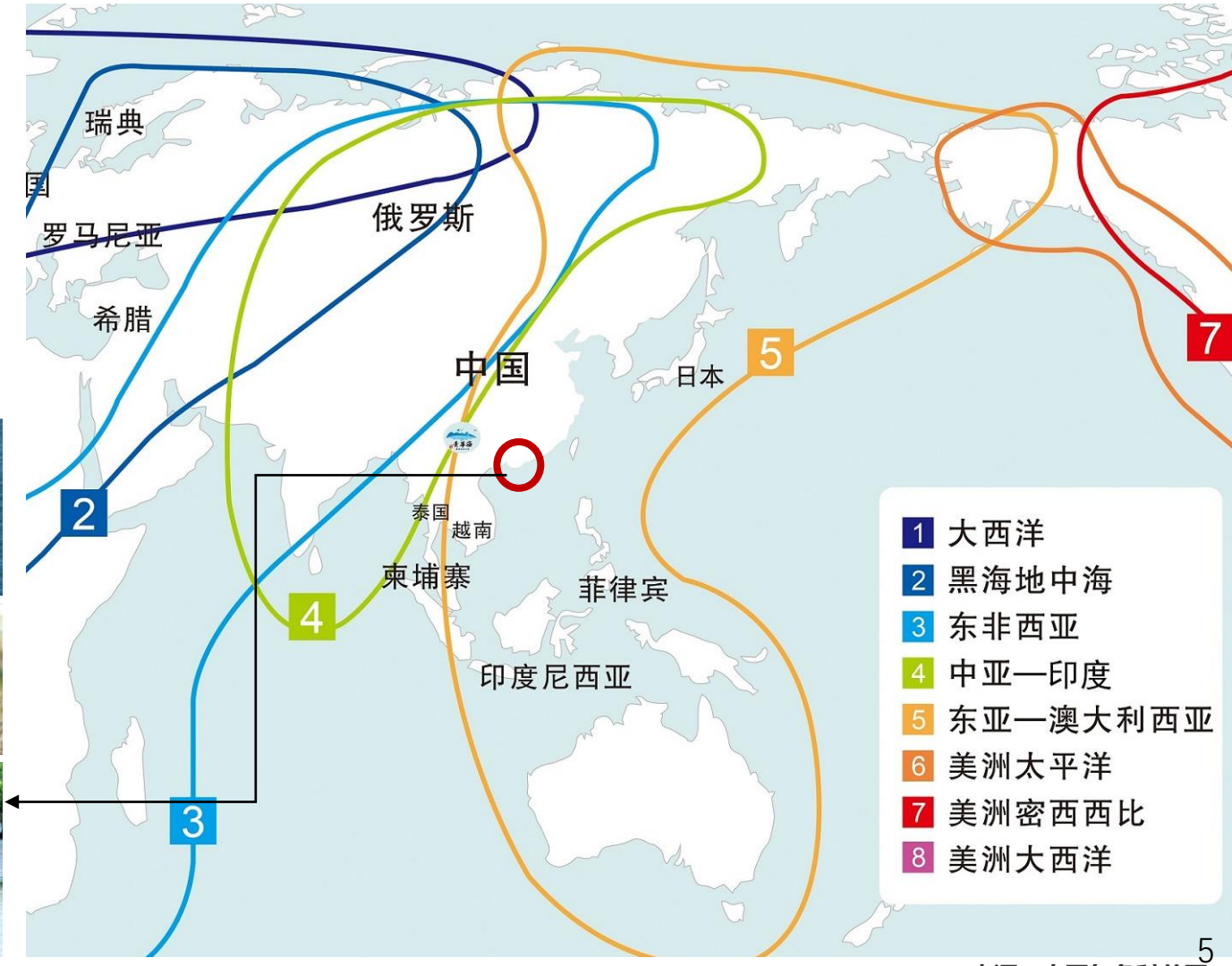
One of the world's most important bird migration corridors

每年冬季仅停留在珠江口深圳湾地区的水鸟就达到55000只，全年水鸟数目逾10万只。（来源：观鸟协会）

Every winter, there are 55000 waterbirds staying in the Shenzhen Bay area of the the Pearl River Estuary alone, and the number of waterbirds throughout the year is more than 100000.

■ **黑脸琵鹭等多种全球濒危的珍稀鸟类在此栖息**

The Platalea minor and other rare and endangered birds inhabit here（来源：www.ramsar.org）。



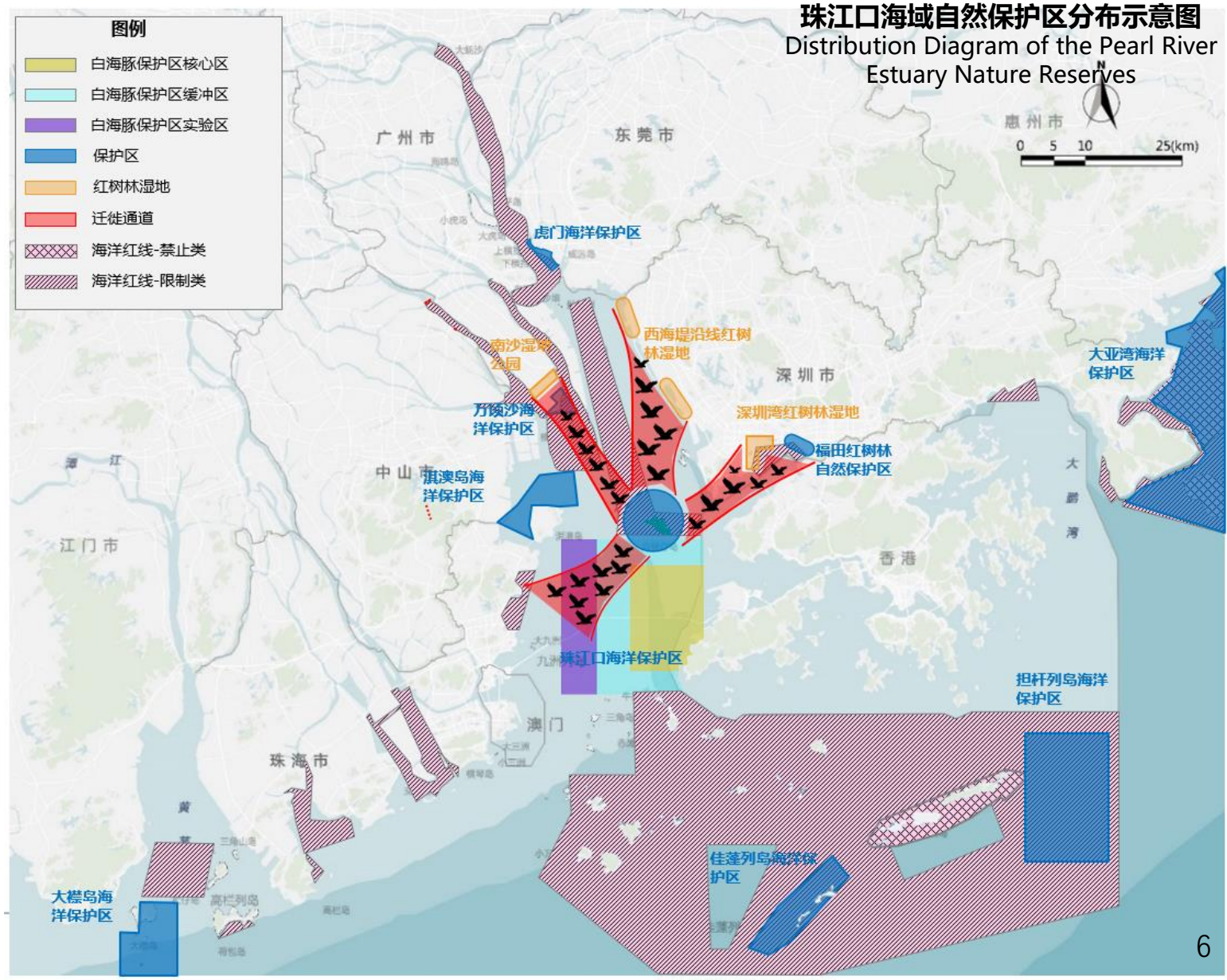
来源：中国气象科普网

重要的自然保护区
Important Nature Reserves

- 珠江河口、近岸海域及海岛地区分布有9处重要动植物保护区，重点保护红树林以及中华白海豚、猕猴、黄唇鱼、马氏珠母贝、紫海胆等特殊物种
- There are 9 important animal and plant reserves distributed in the the Pearl River estuary, coastal waters and island areas, focusing on the protection of mangroves and special species such as Sousa Chinensis、Bahaba taipingensis、Anthocidaris crassispina.

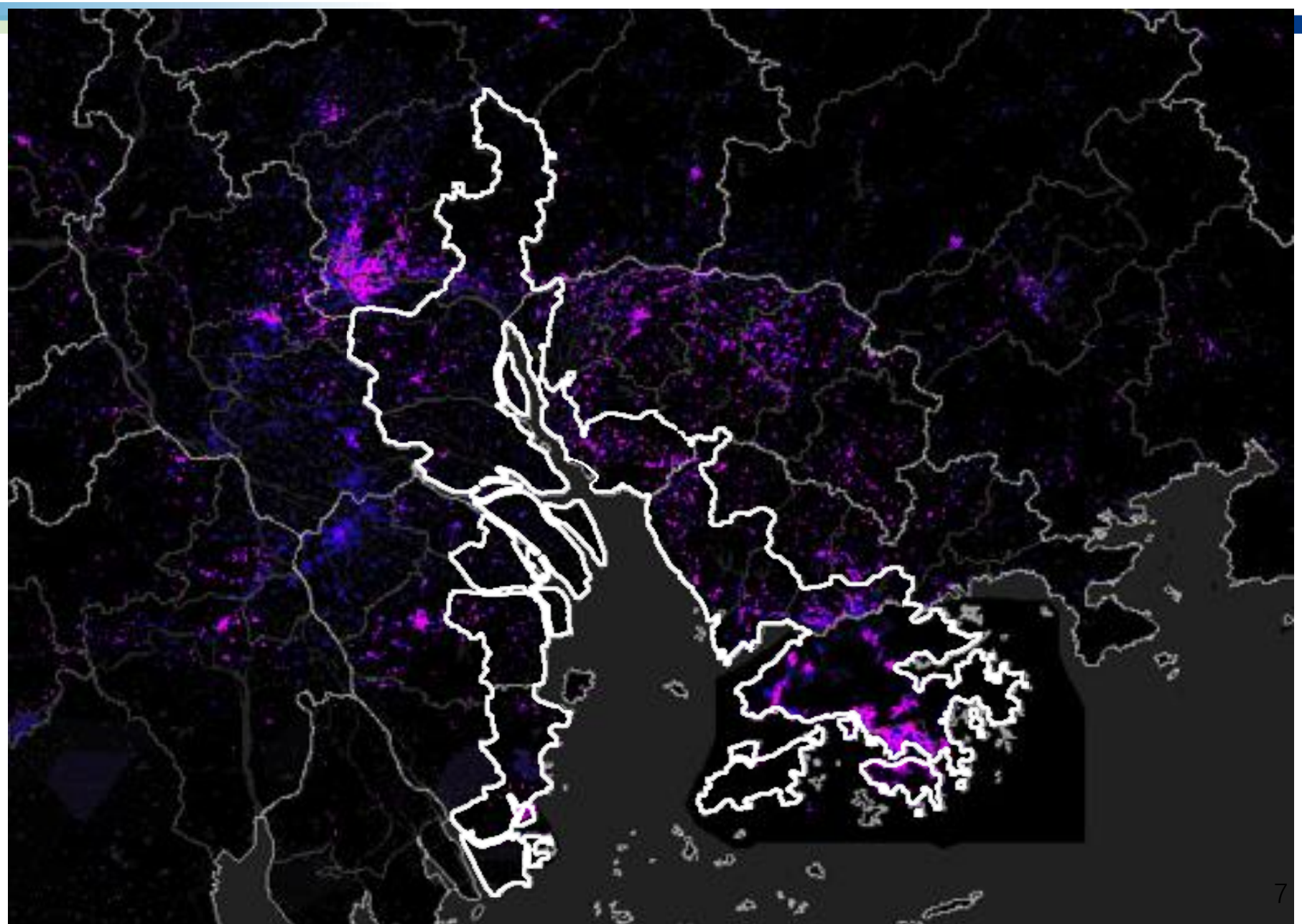
中华白海豚 Sousa Chinensis

珠江口海域自然保护区分布示意图
Distribution Diagram of the Pearl River Estuary Nature Reserves



1 基本认识Basic Understandings—— 人口分布情况 Population Distribution

- 珠江三角洲地区自古以来是重要的人类栖息地，自上世纪八十年代以后，它作为中国对外开放的重要窗口，城镇化工业化加速发展。
- The the Pearl River Delta has been an important human habitat since ancient times. Since the 1980s, as an important window for China's opening up, the industrialization of urbanization has accelerated.



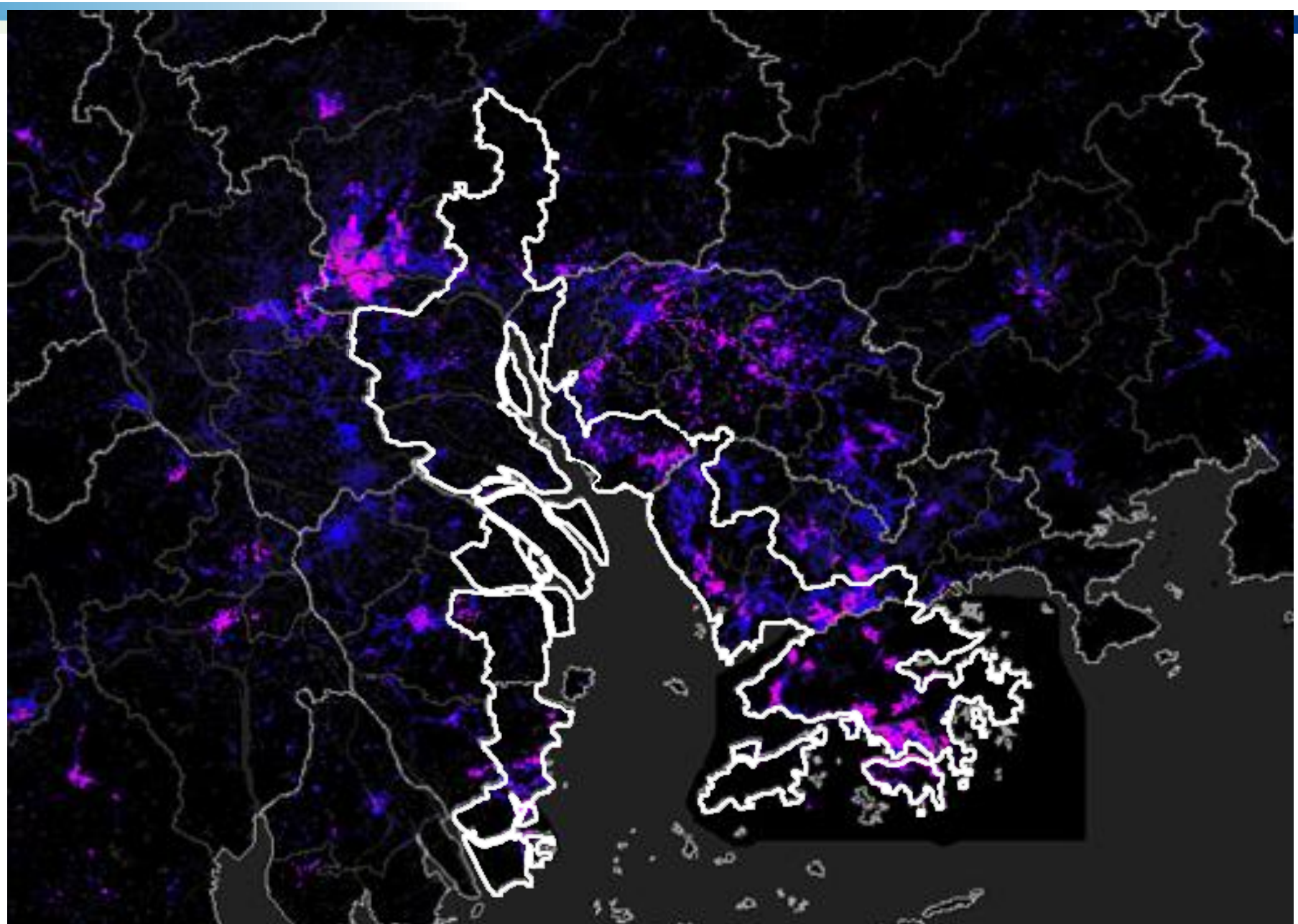
大湾区人口分布-1980

Population Distribution in the Greater Bay Area-1980

Source：GHSL

1 基本认识Basic Understandings—— 人口分布情况 Population Distribution

- 1980年代以来珠江三角洲地区的城镇建设不断由内陆地区向海岸线推移，人口也向湾区集聚。
- Since the 1980s, the urban construction in the the Pearl River Delta has been moving from inland areas to the coastline. The population is also clustering in the Bay Area.

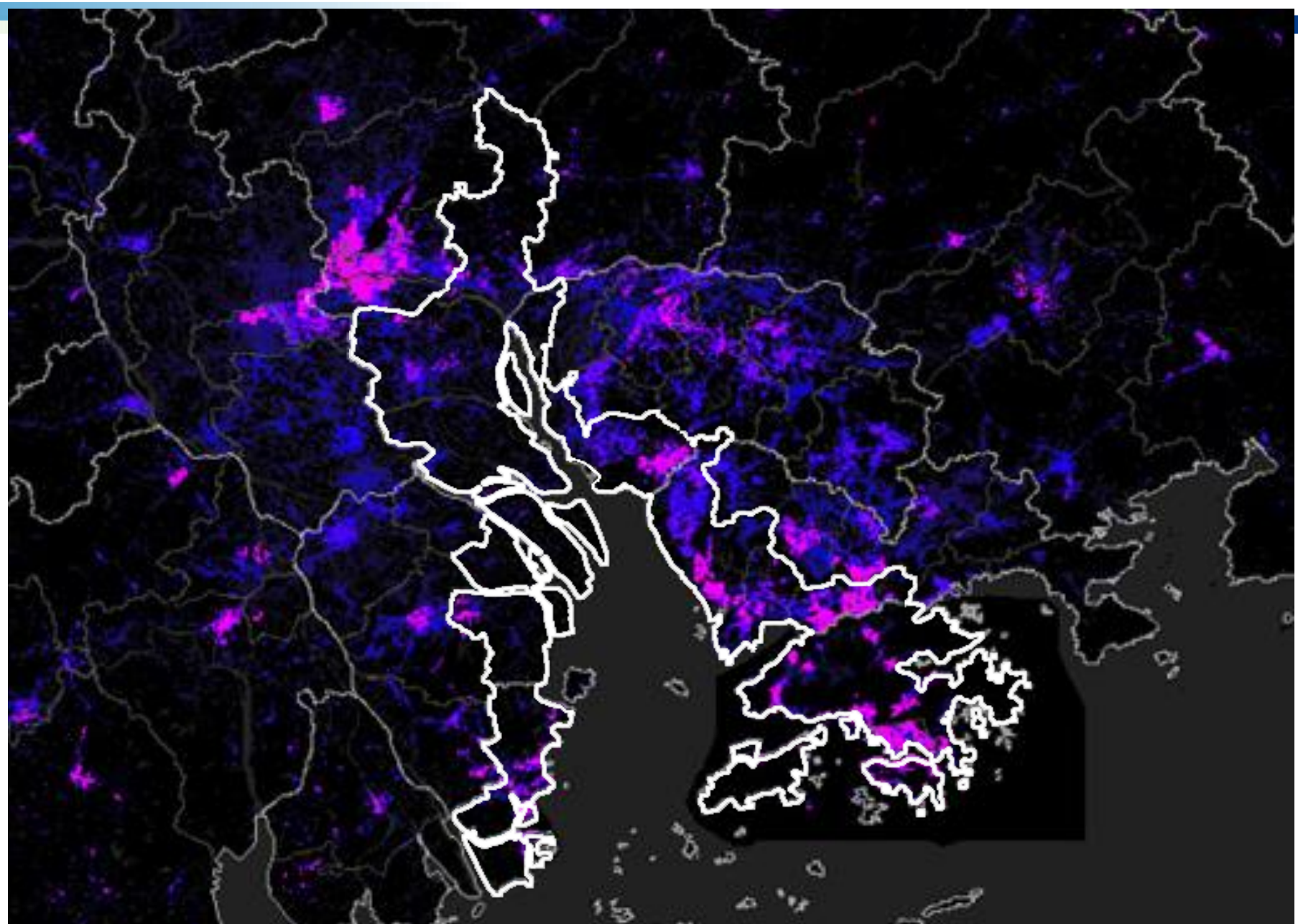


大湾区人口分布-1990

Population Distribution in the Greater Bay Area-1990

Source：GHSL

1 基本认识Basic Understandings—— 人口分布情况 Population Distribution

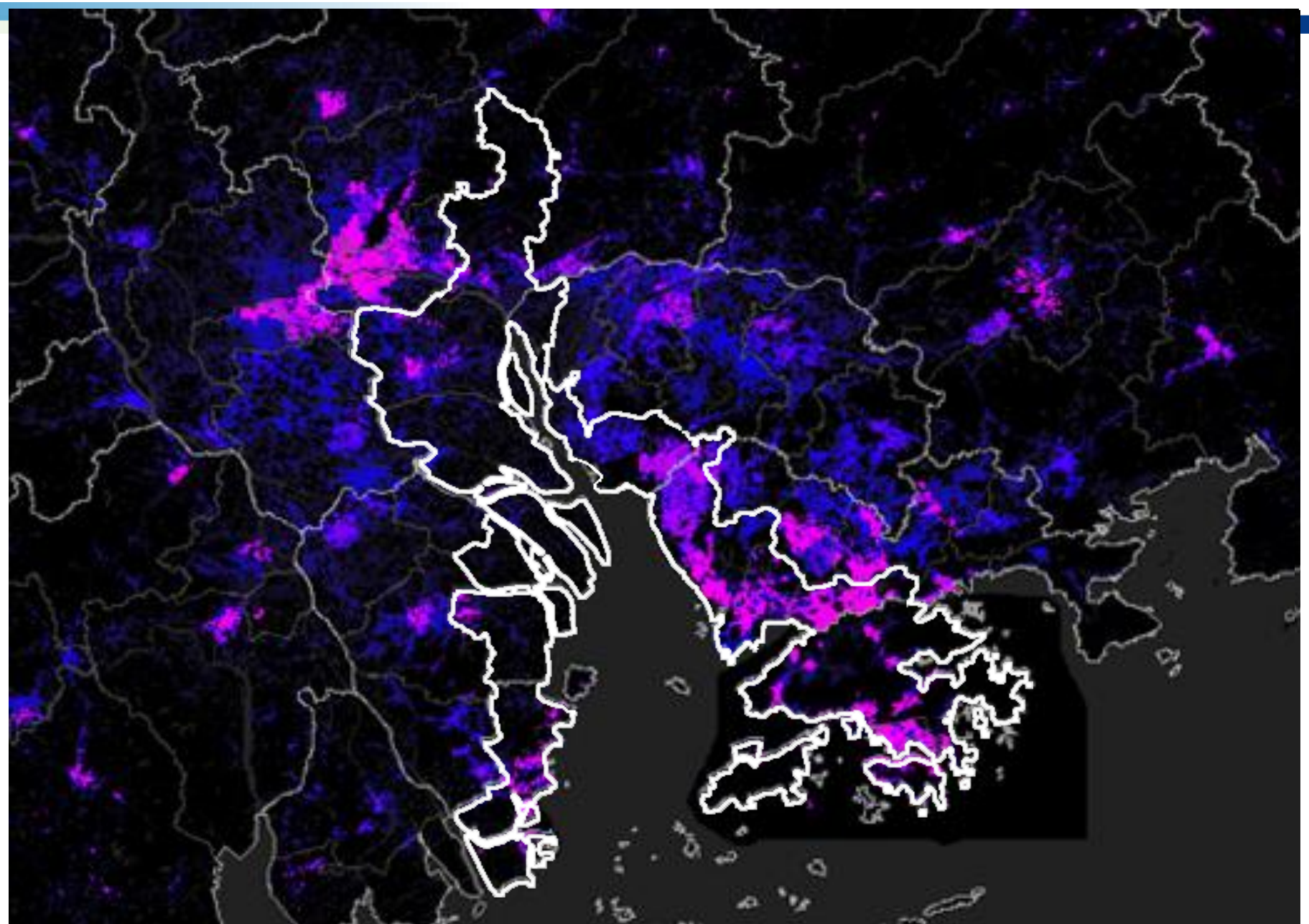


大湾区人口分布-2000

Population Distribution in the Greater Bay Area-2000

Source：GHSL

1 基本认识Basic Understandings—— 人口分布情况 Population Distribution

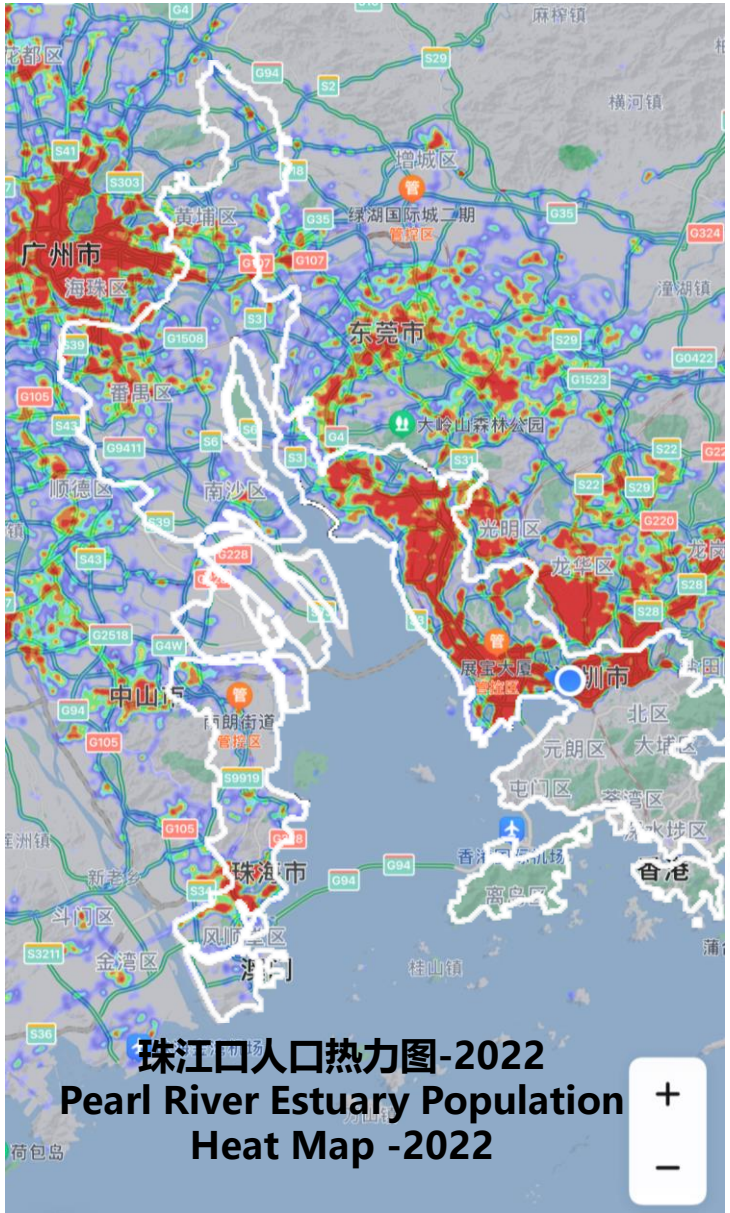


大湾区人口分布-2015

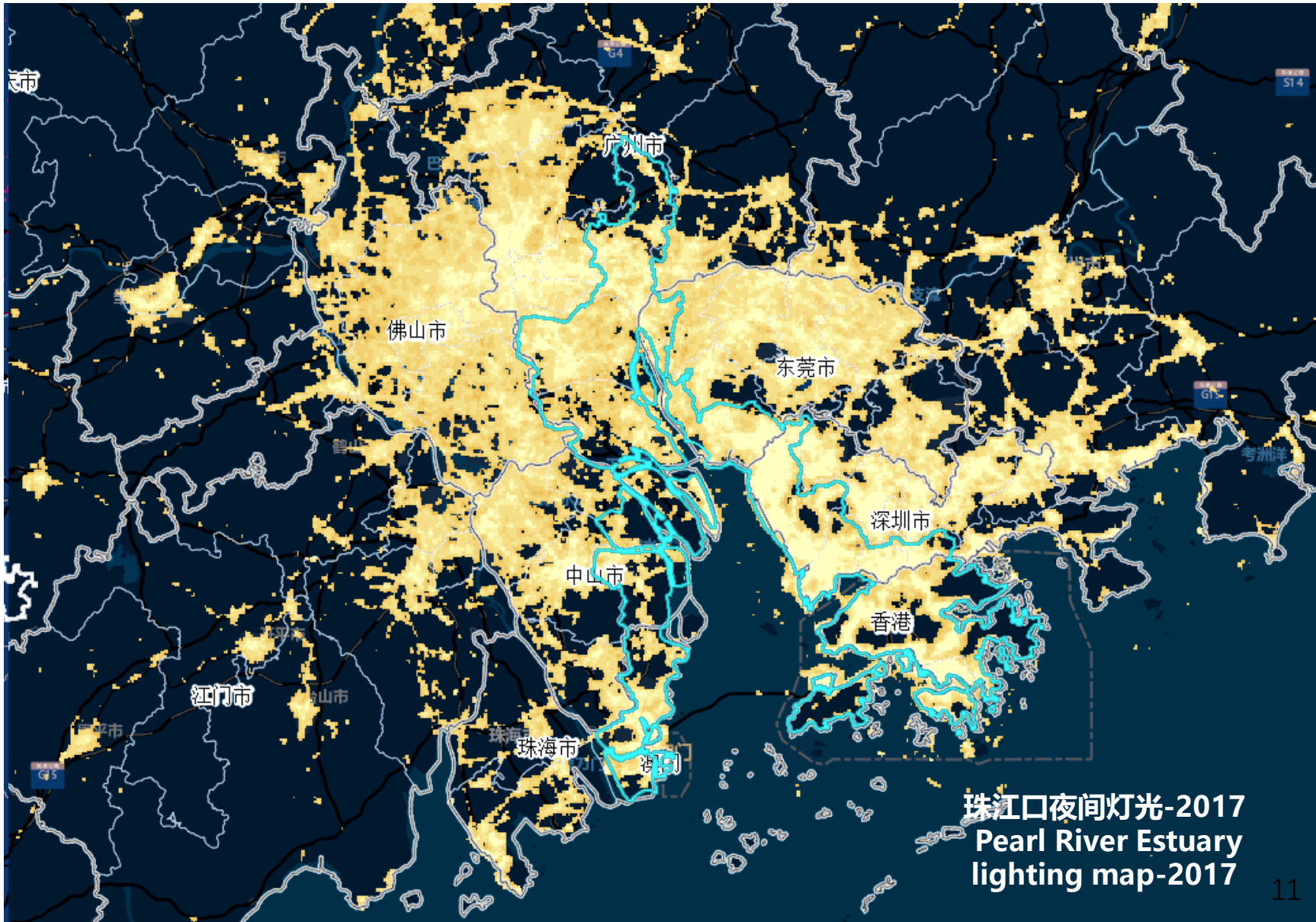
Population Distribution in the Greater Bay Area-2015

Source：GHSL

1 基本认识Basic Understandings—— 人口分布情况 Population Distribution



珠江口人口热力图-2022
Pearl River Estuary Population Heat Map -2022

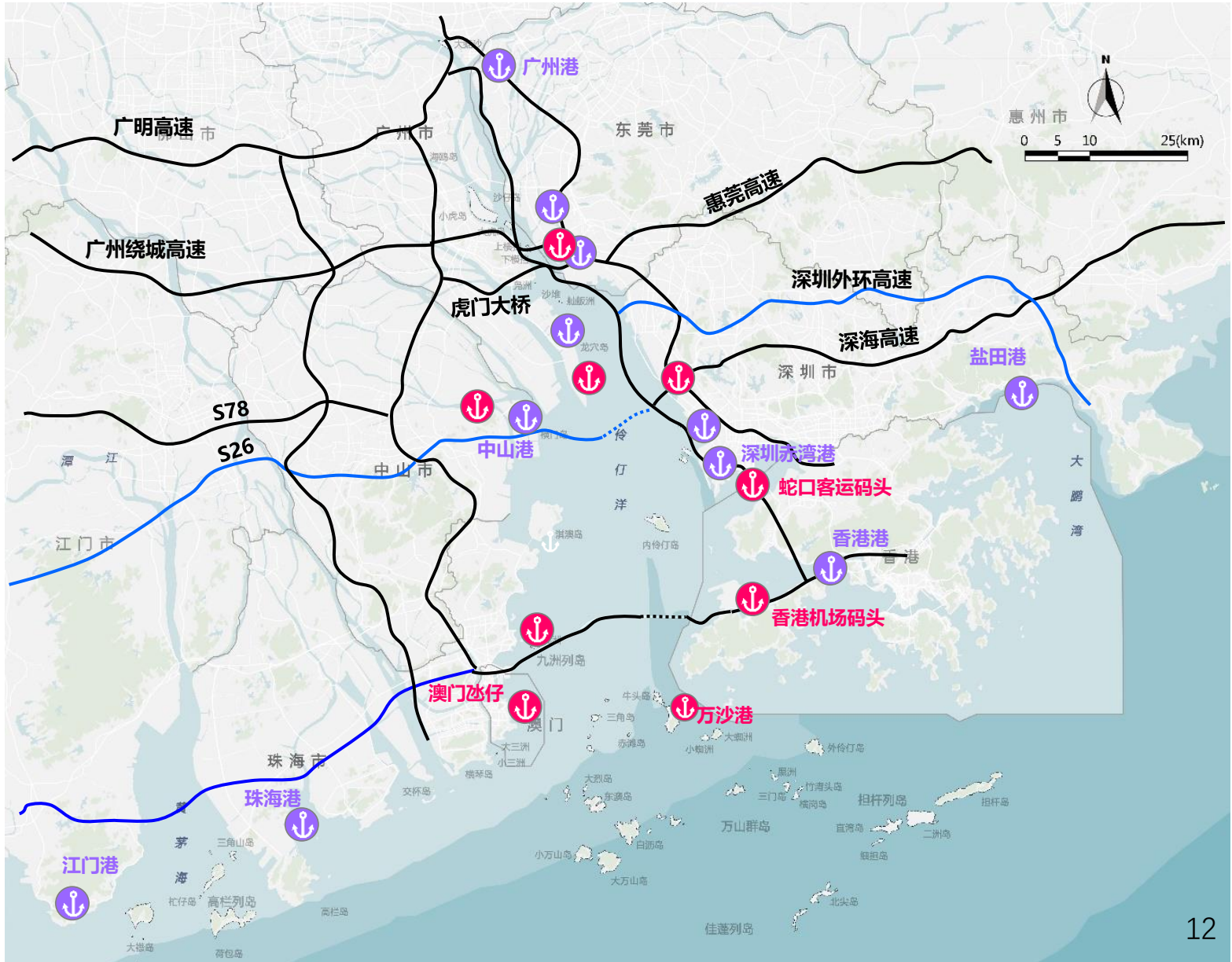


珠江口夜间灯光-2017
Pearl River Estuary lighting map-2017

1 基本认识Basic Understandings—— 交通基础设施建设 Transportation Infrastructure

- 珠江口地区分布大量港口等重大基础设施，有大量的产业地区集聚。
- The Pearl River Estuary region is distributed with a large number of ports and other major infrastructures, and there is a large concentration of industrial areas.

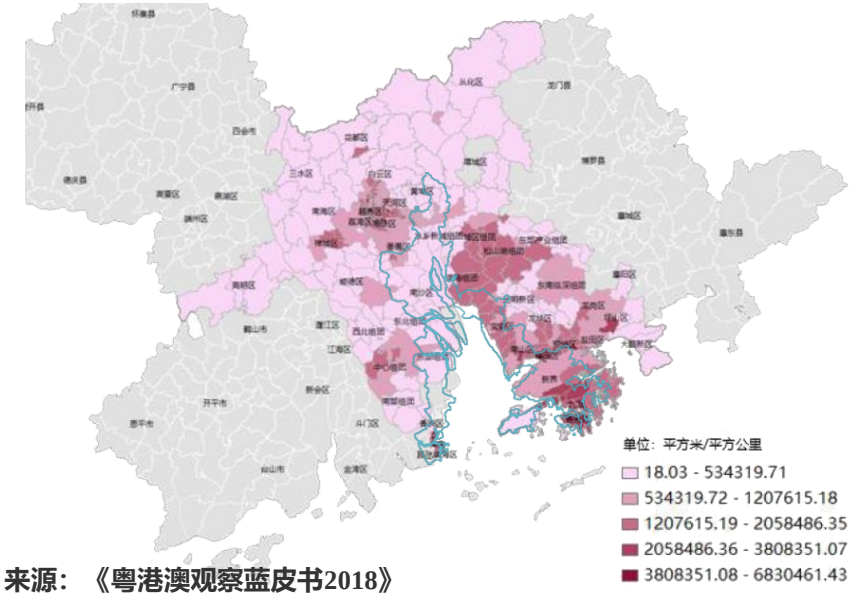
- 珠江口地区也是近年来城市基础设施建设的热点地区，包括正在建设的多条跨江交通通道。
- The the Pearl River Estuary area is also a hot spot of urban infrastructure construction in recent years, including a number of river crossing traffic channels under construction.



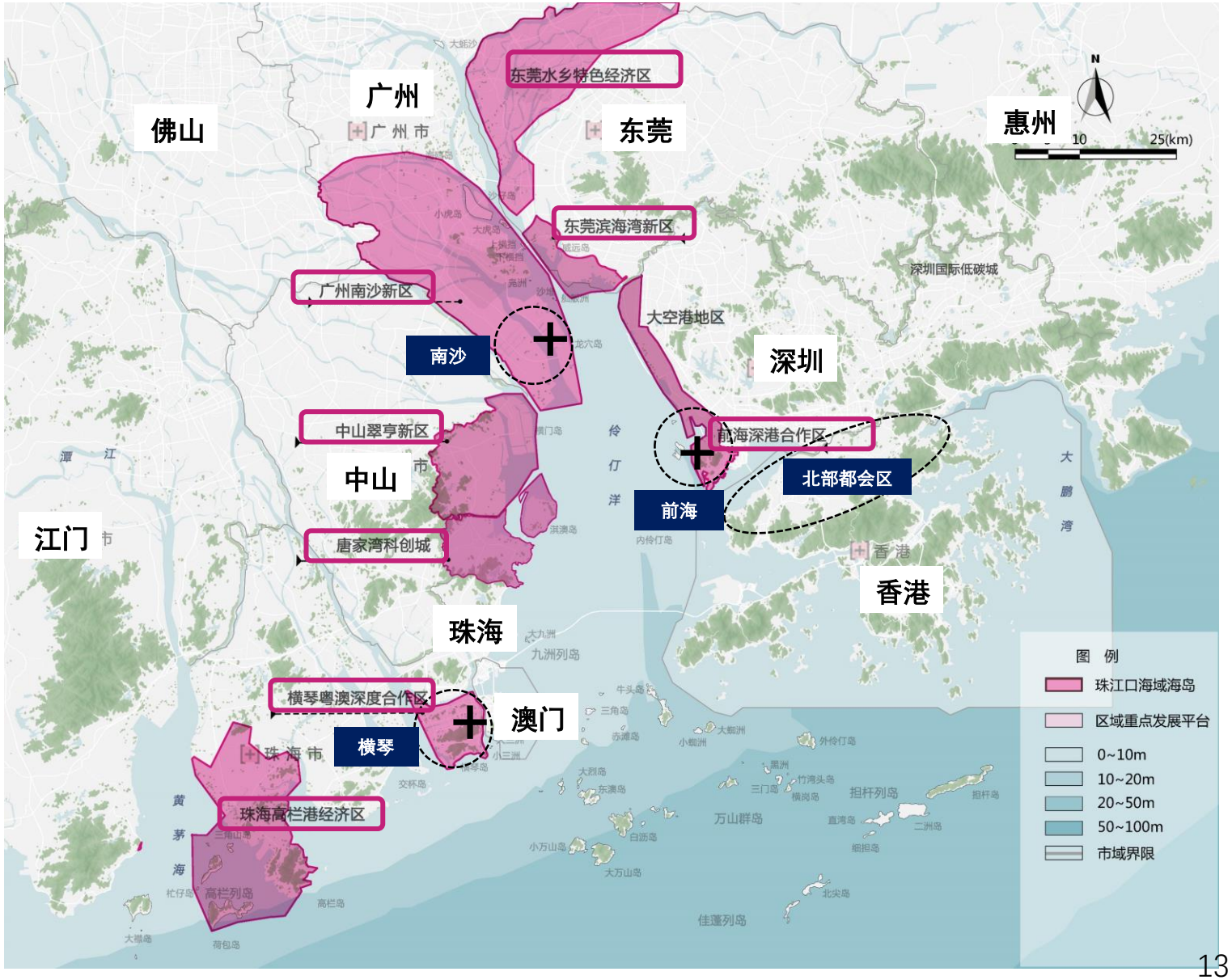
未来城镇和人口增长的地区

Areas of future town and population growth

- 珠江口每个城市规划的重要战略发展区几乎全部分布在珠江口海岸带。 almost all the important strategic development areas planned for each city of the Pearl River Delta are located in the coastal zone.
- 其中包括三个粤港澳区域合作发展的新城区：前海、南沙、横琴。Including three new urban areas for the development of regional cooperation : Qianhai, Nansha and Hengqin.

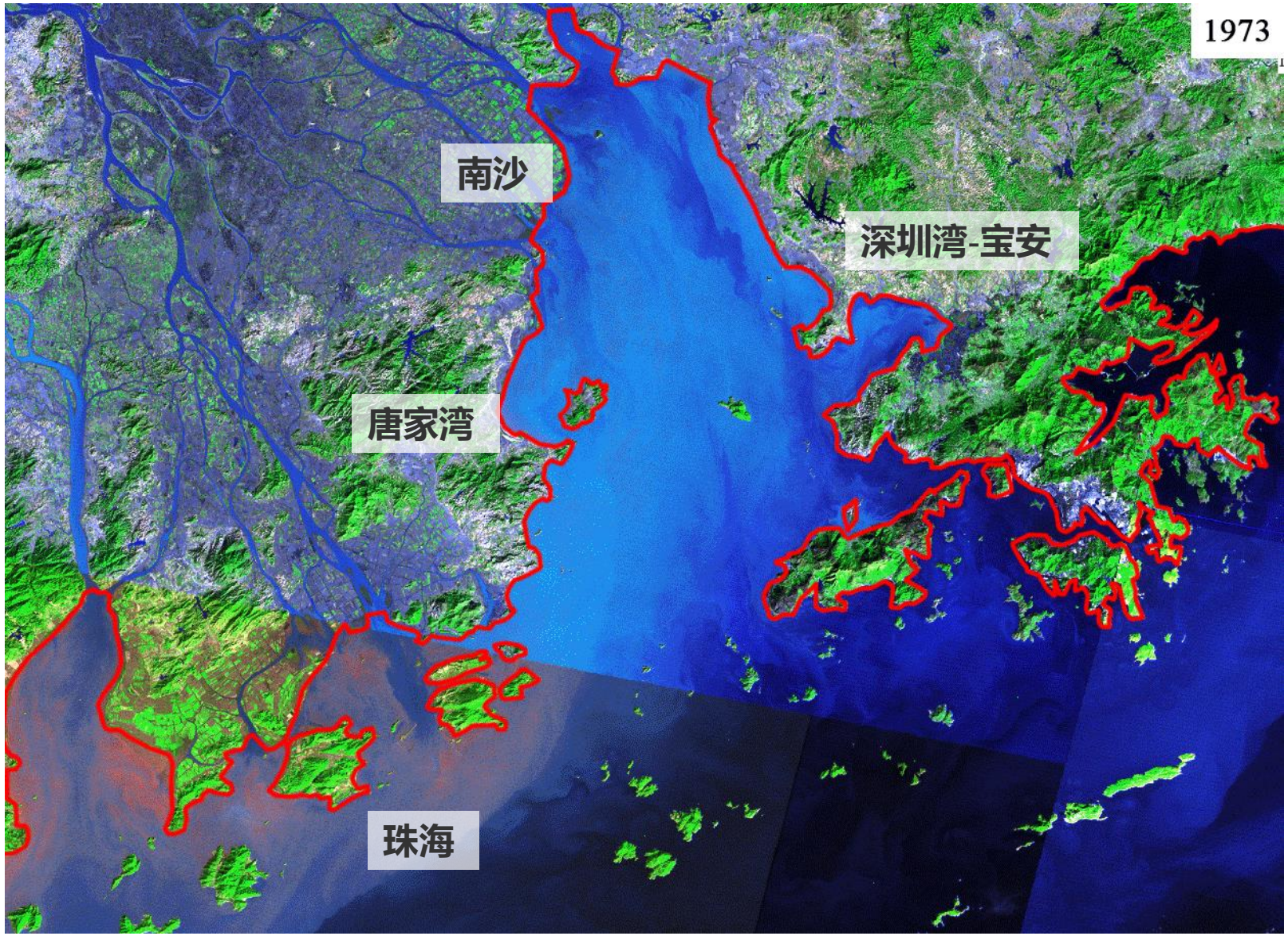


来源：《粤港澳观察蓝皮书2018》



快速工业化和城镇化推动城镇向海发展
Rapid industrialisation and urbanisation drive towns to the coasta Zone.

- 据不完全统计，1973年~2017年，珠江口海域面积缩减了15%，填海面积居世界前列。
- According to incomplete statistics, from 1973 to 2017, the sea area of the the Pearl River Estuary was reduced by 15%, and the reclamation area ranked first in the world.

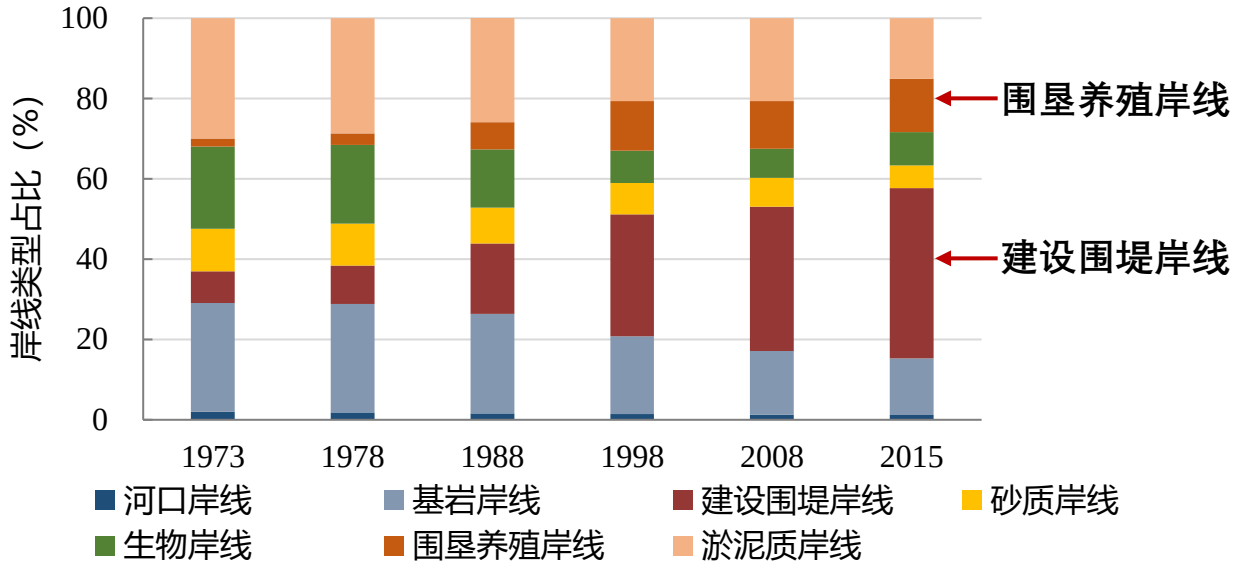


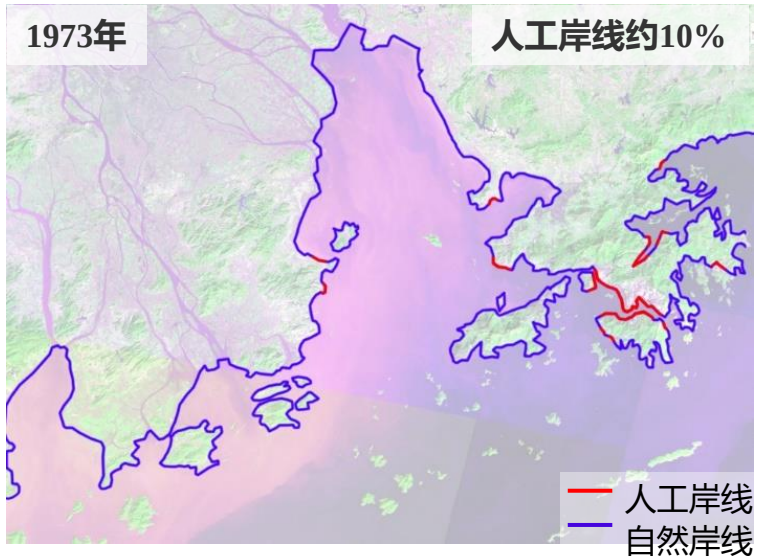
■ 人工岸线快速取代了自然岸线

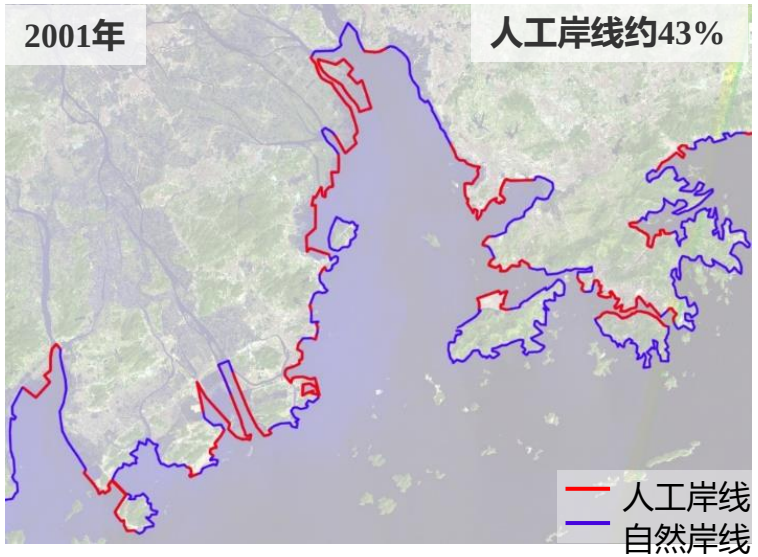
The proportion of artificial shoreline is rapidly increasing.

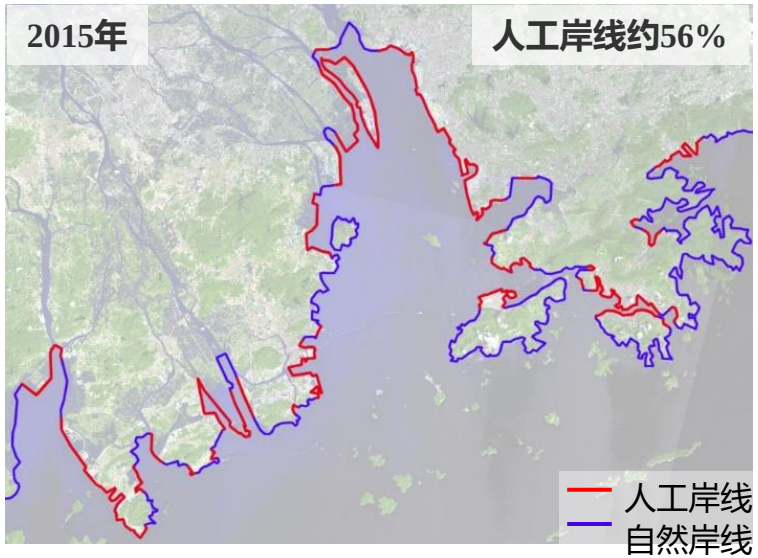
1973年~2015年，人工岸线占岸线总长的占比从7%上升至47%；自然岸线占比则由46%萎缩到21%。

From 1973 to 2015, the proportion of artificial shorelines in the total length of the shoreline increased from 7% to 47%; The proportion of natural shorelines has shrunk from 46% to 21%.







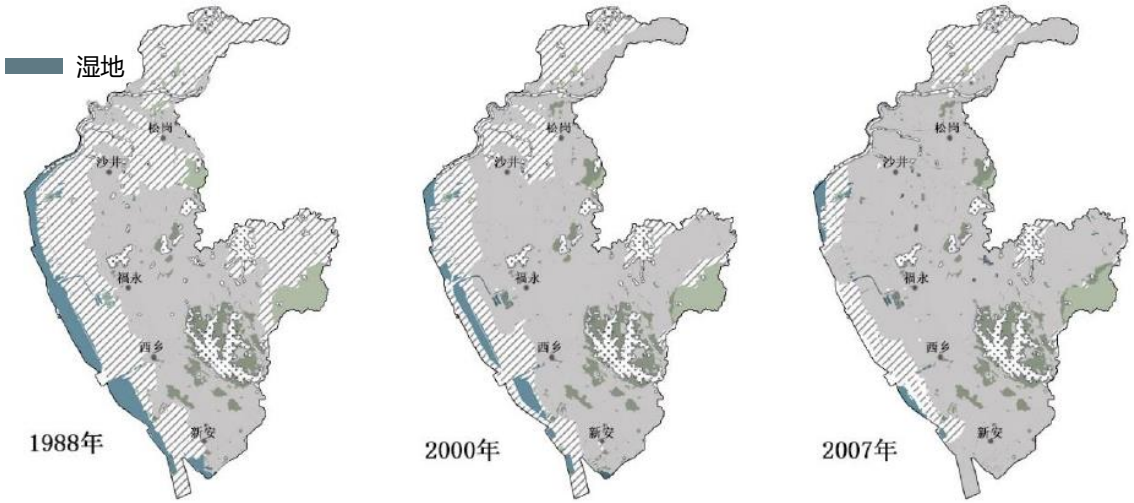


1973~2015年珠三角岸线类型变化

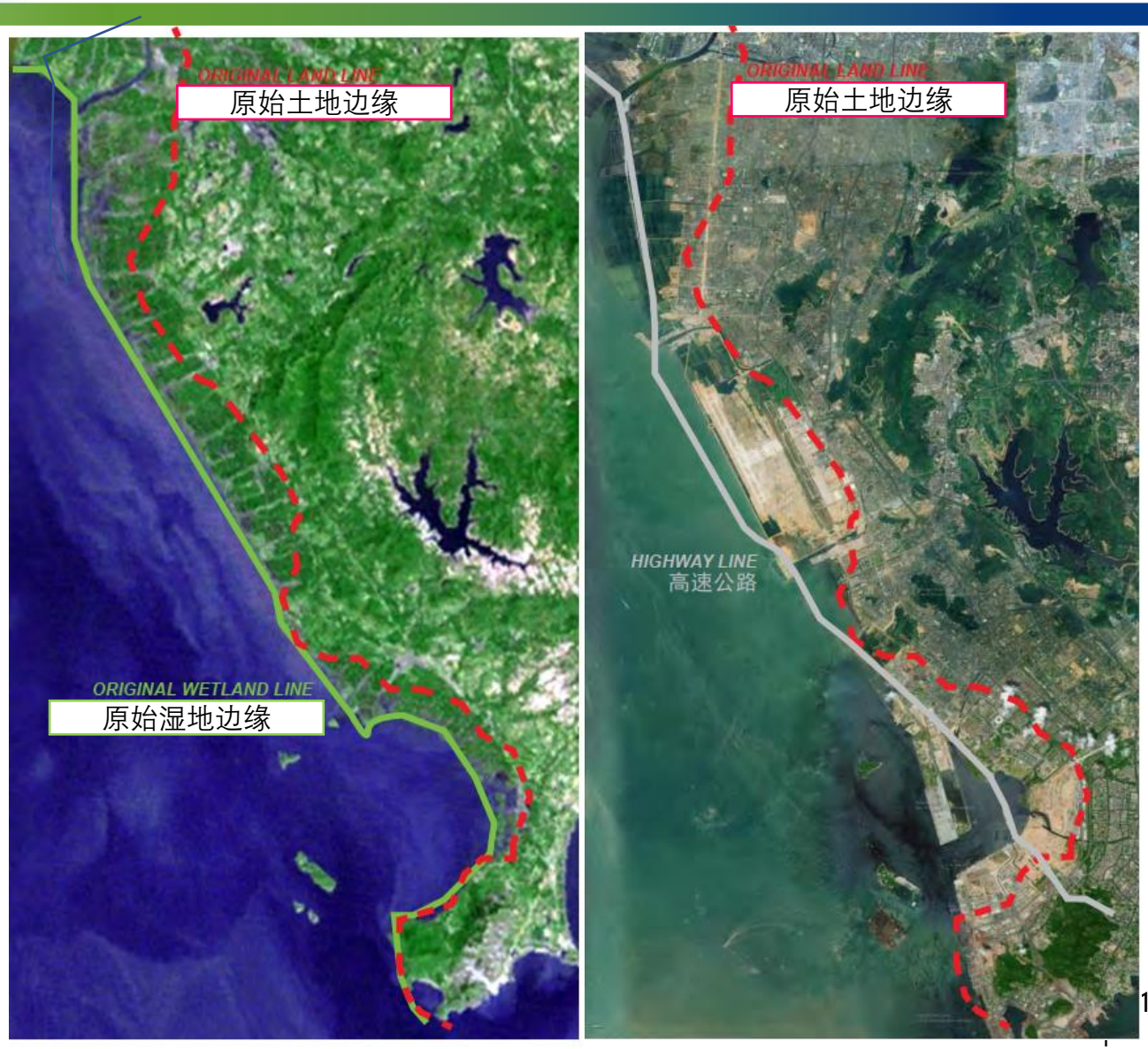
2 风险挑战Risks & Challenges—— 生态系统遭到破坏 Ecosystem destruction

湿地面积持续退化
Continued degradation of wetland areas

- 水污染与海岸工程致使部分城市的滨海湿地面积持续退化
- Water pollution and coastal engineering cause the continuous degradation of coastal wetland area in some cities
- 近年来，通过设立红树林保护区和生态修复，部分湿地得到恢复
- In recent years, some wetlands have been restored through the establishment of mangrove reserves and ecological restoration



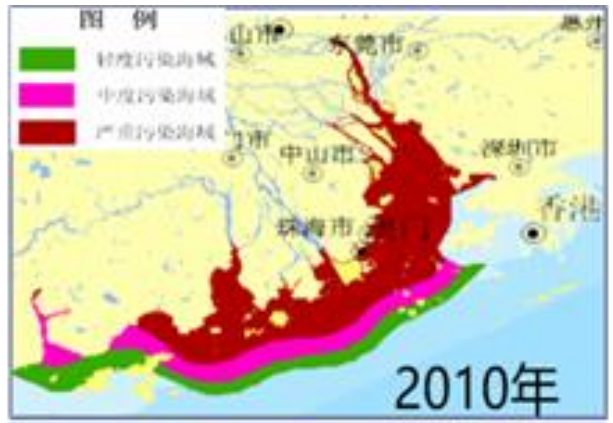
深圳西海岸地区湿地变化 Wetland changes in the west coast area of Shenzhen

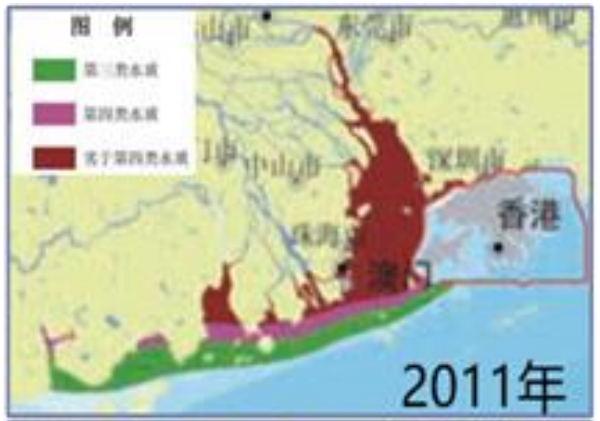


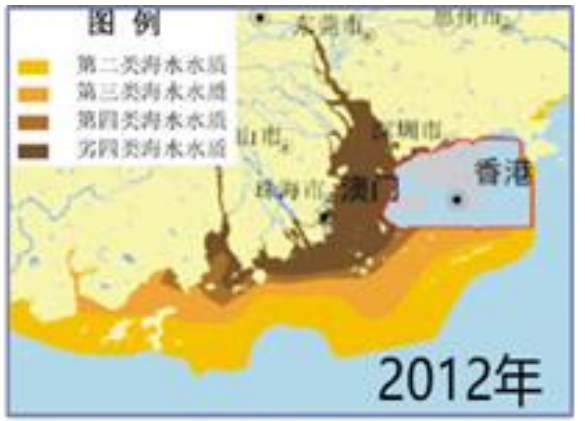
海岸地区原始湿地岸线和人工岸线的变化情况 Changes between pristine wetland shorelines and artificial shorelines

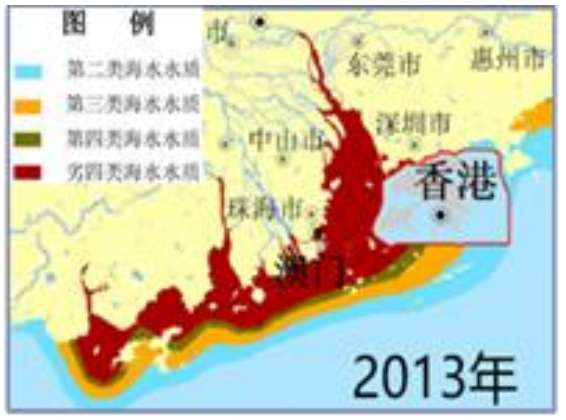
2 风险挑战Risks & Challenges——水环境污染 Water Environment Pollution

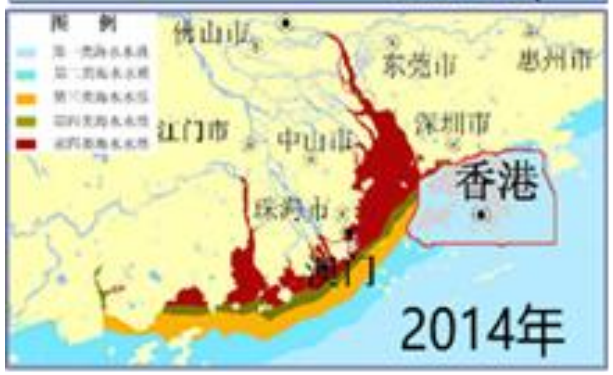
- 城镇污染物的高强度集中排放，加上城市污水网管收集率和处理率均不高，造成了珠江及其支流的局部河段污染，最终污染近岸海域。
- The high intensity and concentration of urban pollutants, combined with the low collection and treatment rates of urban sewage network pipes, has resulted in the pollution of local sections of the Pearl River and its tributaries, ultimately polluting near-shore waters.

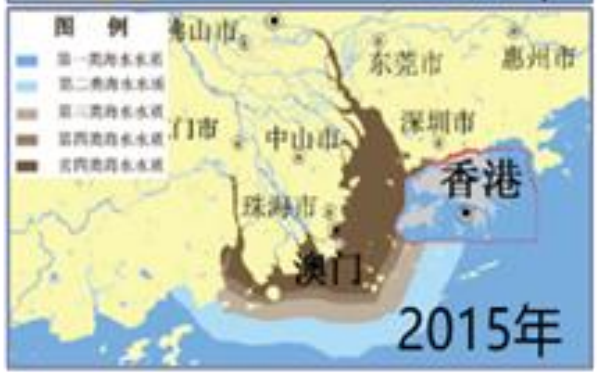


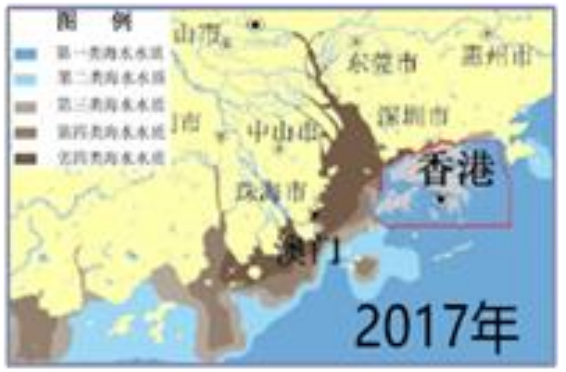










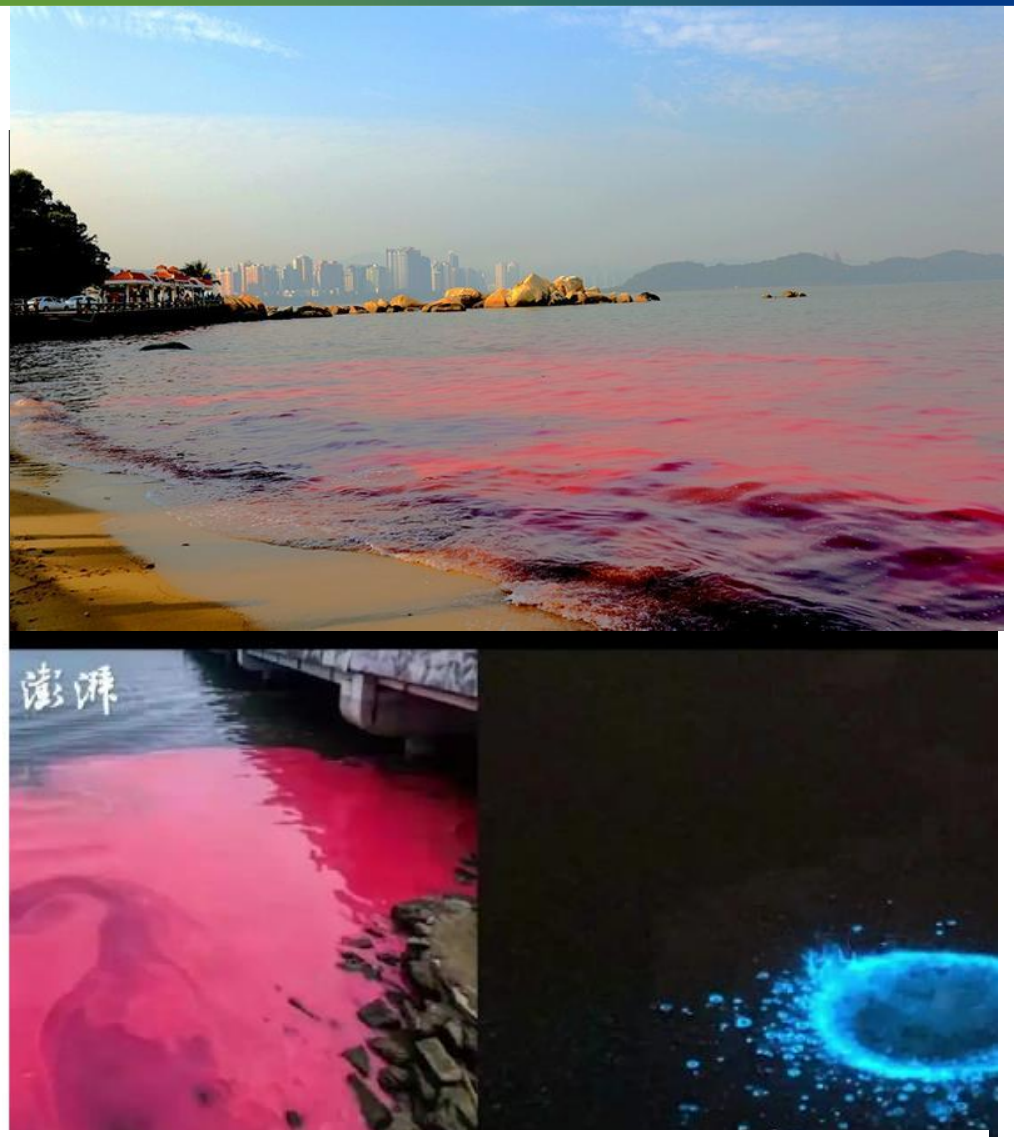


2010-2017年珠江口海域水质状况

2 风险挑战Risks & Challenges—— 水环境污染 Water Environment Pollution

- **近岸海洋垃圾：** Nearshore marine litter.
- **水质富营养化。** Water eutrophication.
- **赤潮：** Red tide.
- **海洋生态系统整体呈现亚健康状态**

The marine ecosystem is in a subhealthy state



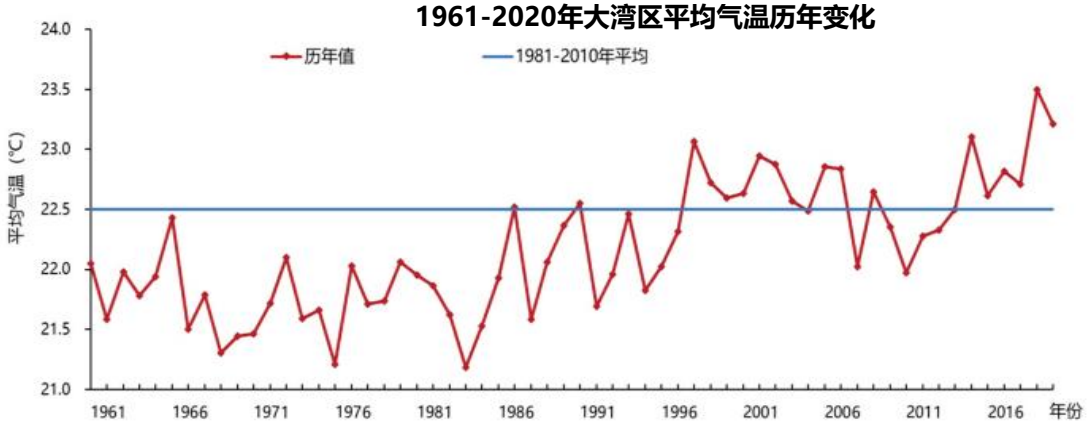
珠海海域2021年监测到的赤潮现象

2 风险挑战Risks & Challenges—— 气候变化引发的灾害风险
Climate change-induced disaster risk

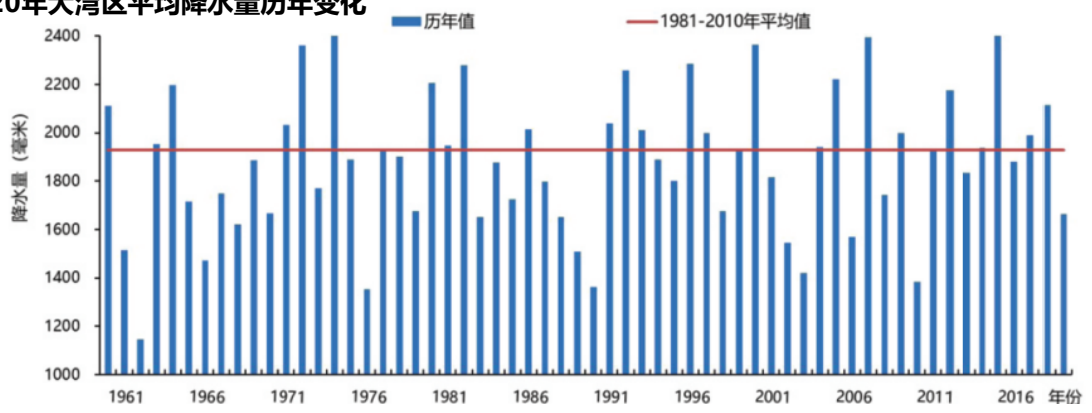
大湾区平均气温升高，高温干旱的灾害风险增大
The average temperature in the Great Bay Area has increased, resulting in an increased risk of high temperature and drought disasters

来源：《粤港澳大湾区气候监测公报2020》

1961-2020年大湾区平均气温历年变化



1961-2020年大湾区平均降水量历年变化



2021年各流域降水量与2020年、常年比较图

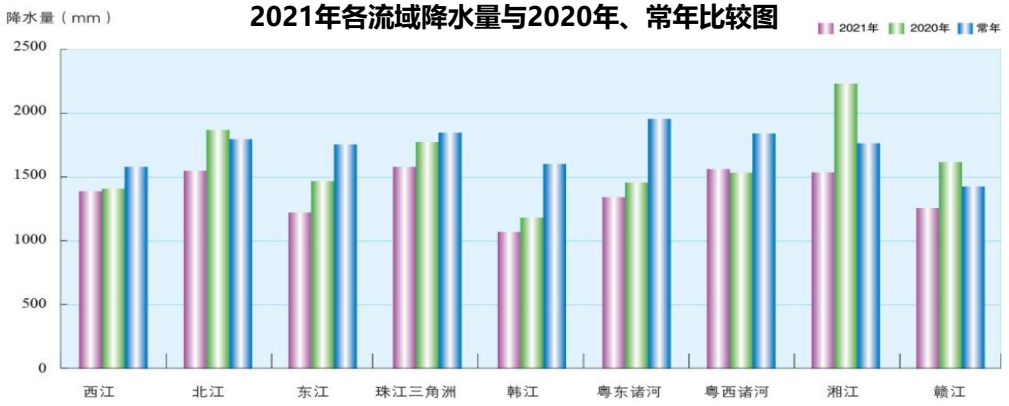


图2 2021年各流域降水量与2020年和常年比较图

2021年各流域地表水资源量与2020年、常年比较图

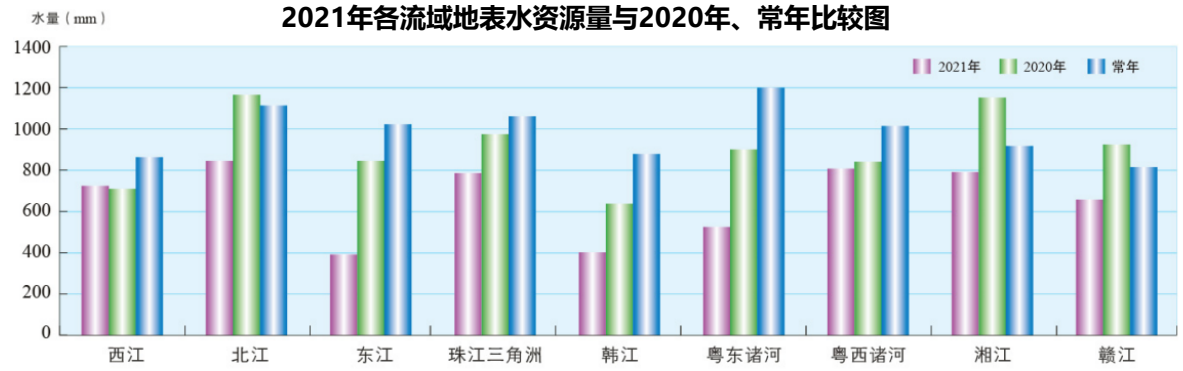
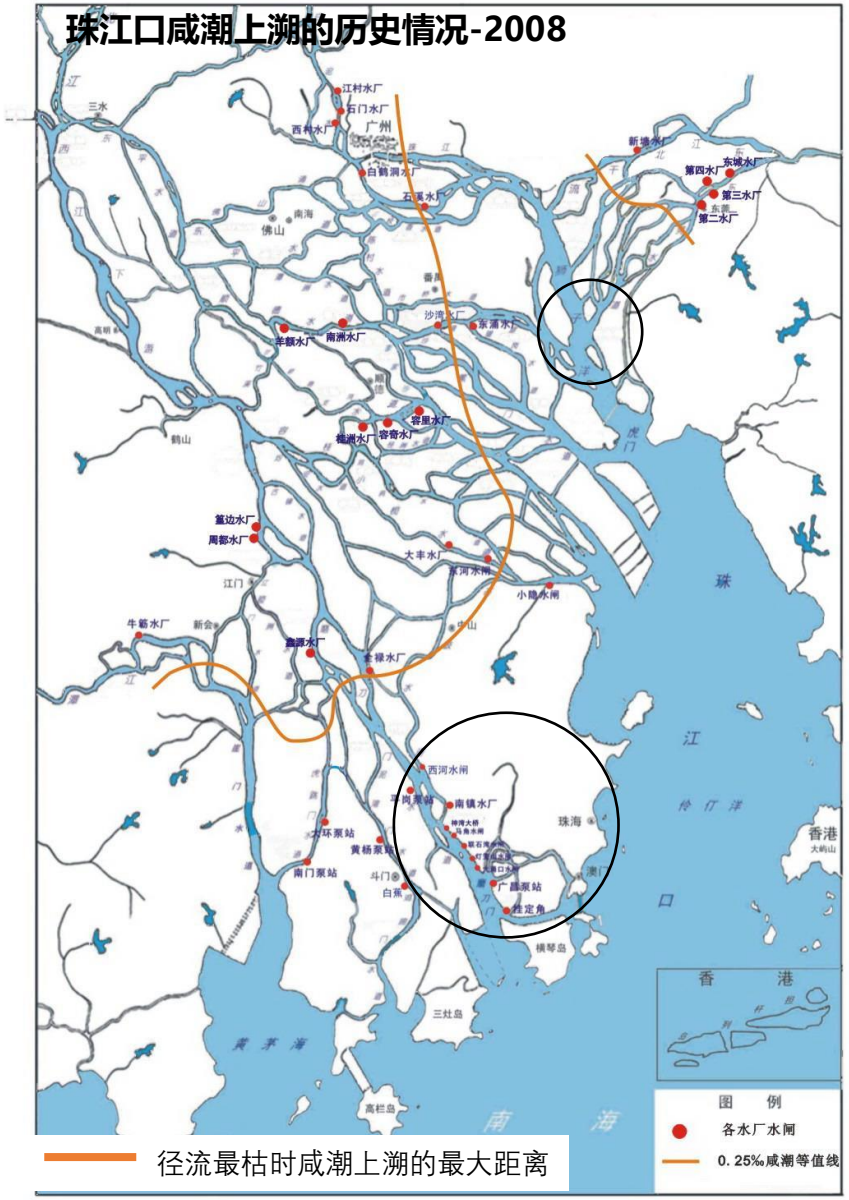


图7 2021年各流域地表水资源量与2020年和常年比较图

咸潮上溯威胁珠江口地区水资源供应
Salty tide upwelling threatens water supply

- 近 20 年来珠三角地区多次出现严重咸潮，特别是磨刀门水道更为严重。咸潮上溯问题迫使珠江口城市取水口不断向上游移动，严重影响珠江口地区城市用水安全，加剧了气候变化带来的水资源供需矛盾。
- In the past 20 years, the Pearl River Delta region has experienced severe salt tide many times. The problem of salt tide upstream has forced the urban water intakes in the the Pearl River Estuary to move upstream, which has seriously affected the urban water.



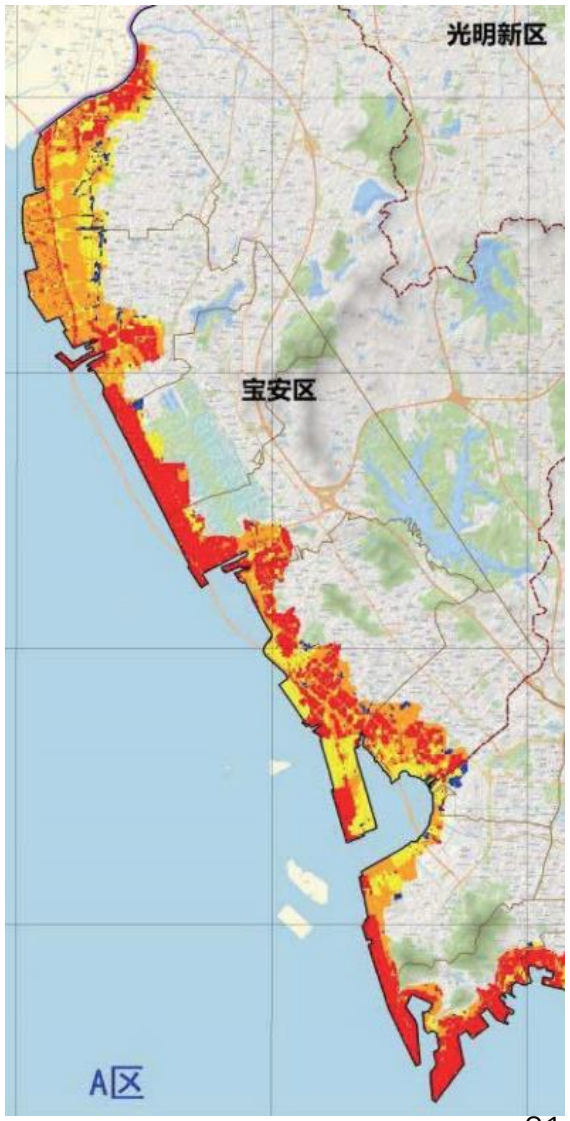
2 风险挑战Risks & Challenges—— 气候变化引发的灾害风险
Climate change-induced disaster risk

海岸带地区面临台风、海水入侵等海洋灾害风险

Coastal zone areas are at risk of marine hazards such as typhoons and seawater intrusion

930hPa（50年一遇）

910hPa（100年一遇）



883hPa（1000年一遇）

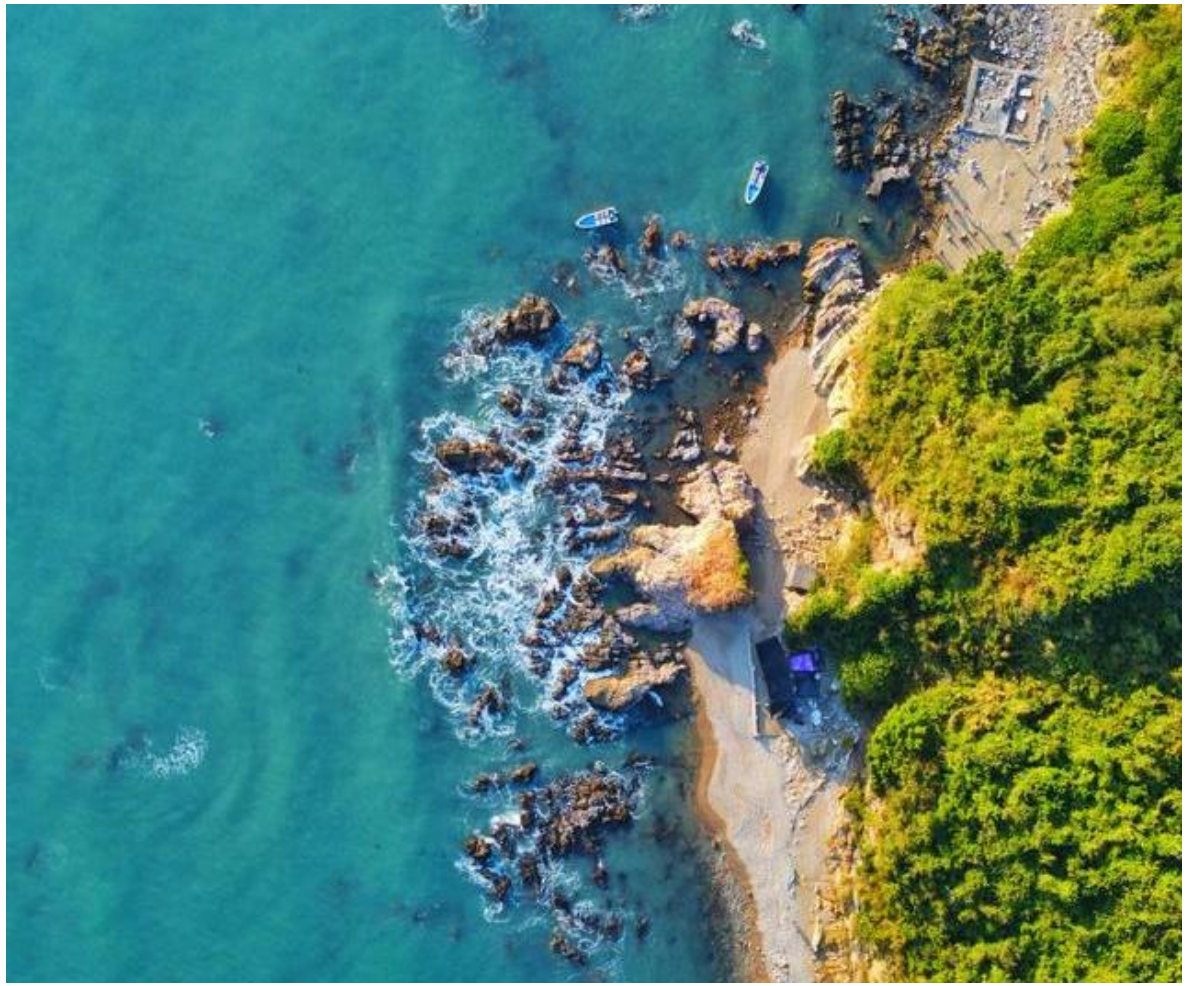
来源：国家海洋局南海预报中心

3 珠江口海岸带地区的保护与治理—— 政府举措 Government Initiatives

中国严格管控围填海、保护自然岸线，加强海岸带空间规划管理

The State strictly controls reclamation, protects natural shorelines, and strengthens spatial planning and management of coastal zones.

- 2018年，中国政府全面严格管控新增围填海项目审批；
- In 2018, Chinese government comprehensively and strictly controlled the approval of new reclamation projects.
- 2020年，国家出台《围填海管控办法》加强和规范围填海管理
- 2020，Issues Measures to Control Reclamation
- 2021年，建立实施海洋生态红线制度.
- 2021，The establishment and implementation of the marine ecological red line system.
- 部分省市开展海岸带专项规划
- Some provinces and cities carry out special planning for coastal zones.



3 保护与治理Protection & Governance——政府举措 Government Initiatives

在珠江口海岸带地区大力开展生态修复和环境整治

Vigorously carry out ecological restoration and environmental improvement in the coastal zone of the Pearl River Estuary

- 人工种植红树林，对海岸、沙滩、湿地等实施生态修复
- Artificial mangrove planting, ecological restoration of coasts, beaches, wetlands, etc.
- 对海域环境污染实施综合整治，
- Comprehensive regulation of environmental pollution of the sea
- 设立各类海洋保护区、建设滨海公园、
- The establishment of various types of marine protected areas, the construction of coastal parks,

珠江口地区人工种植红树林修复滨海岸线生态
Mangrove planting in the Pearl River Estuary to restore the ecology of the coastal shoreline

公众日益关注海洋生态保护问题

The public is increasingly concerned about marine ecological protection

- **2019年，在深圳湾鸟类栖息地区设立海上观光航线的提案，在其环境影响评价在向社会公开征求意见后，被市民否定。**
- In 2019, the proposal to establish a marine sightseeing route in the bird habitat area of Shenzhen Bay was rejected by the public after its environmental impact assessment was made available for public consultation.
- **2021年大鹏湾多年以来首次出现布须鲸，**引发了公众媒体对海洋生物保护的强烈关注。政府立即开展鲸豚保护联合行动，劝退相关海域的人类活动。
- The appearance of baleen whales in Dapeng Bay for the first time in many years in 2021 sparked strong public media attention to marine life conservation. The government immediately launched a joint cetacean protection campaign to discourage human activities in the relevant waters.

广东省、香港和澳门开展区域合作，2018-2021年连续三年共同发布粤港澳大湾区气候监测公报

Guangdong Province, Hong Kong and Macao to carry out regional cooperation and jointly publish the Greater Bay Area Climate Monitoring Bulletin for three consecutive years from 2018-2021.

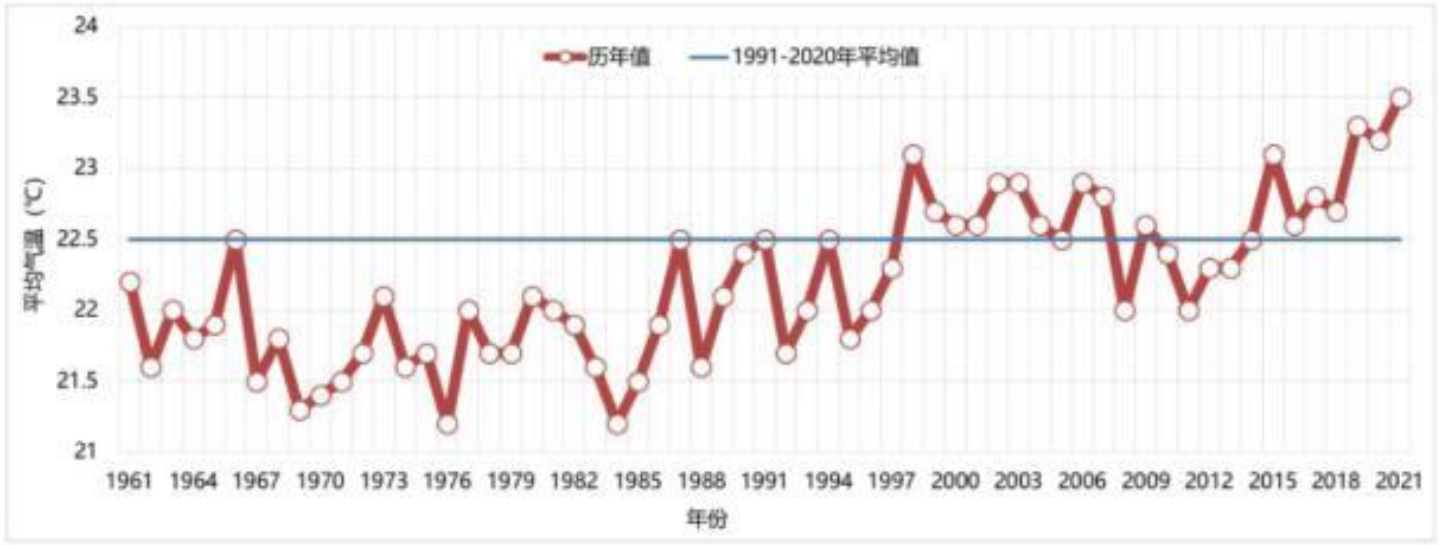
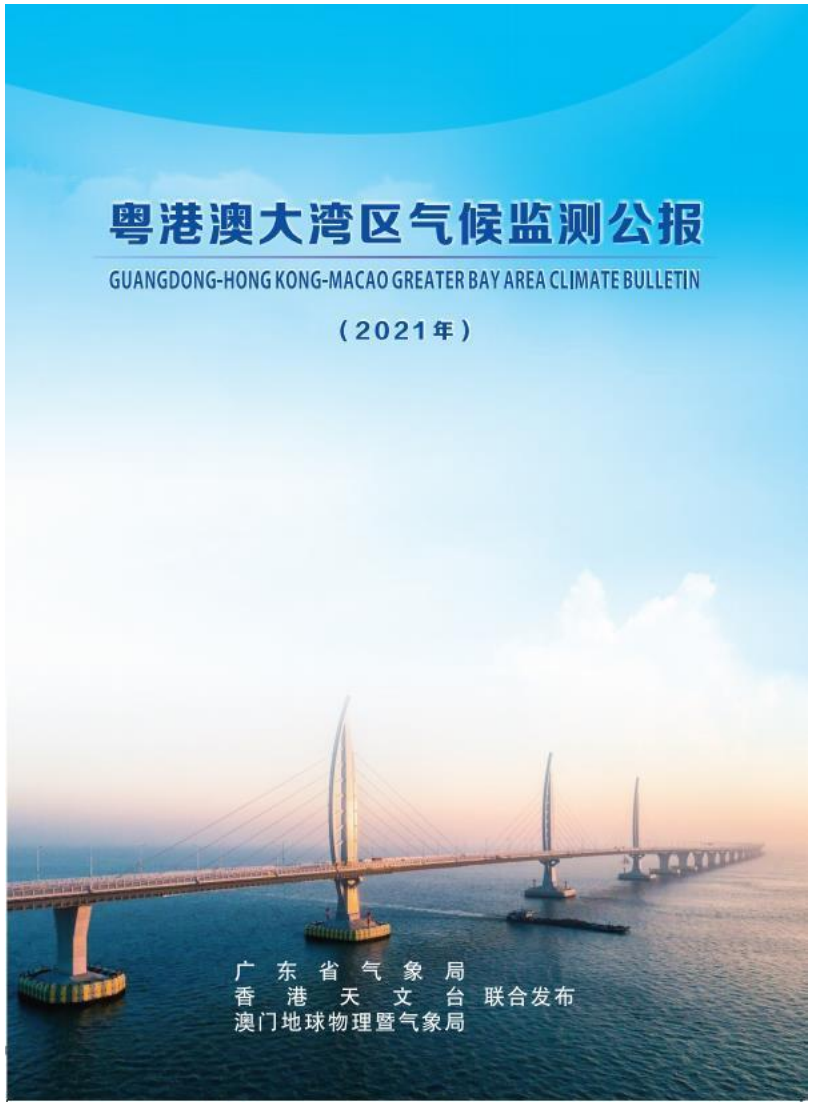


图1 1961–2021年大湾区平均气温历年变化（℃）



挑战：城市间的海洋水质监测标准尚未统一

Challenge: Marine water quality monitoring standards are not yet unified

地区	指标管控方式	指标类型	指标标准
香港	明确到各个分区	指标较多；主要为四个指标（溶解氧、总无机氮、非离子化氨氮、大肠杆菌），还包括一些内地没有的指标，如沉积物汞含量	较高；如大肠杆菌相关不超过610/100ml
内地	指标分级	指标相对较少	较低；如大肠杆菌相关不超过1000/100ml
澳门	没有海域管理权，只有使用权，海水水质标准采用国内标准		

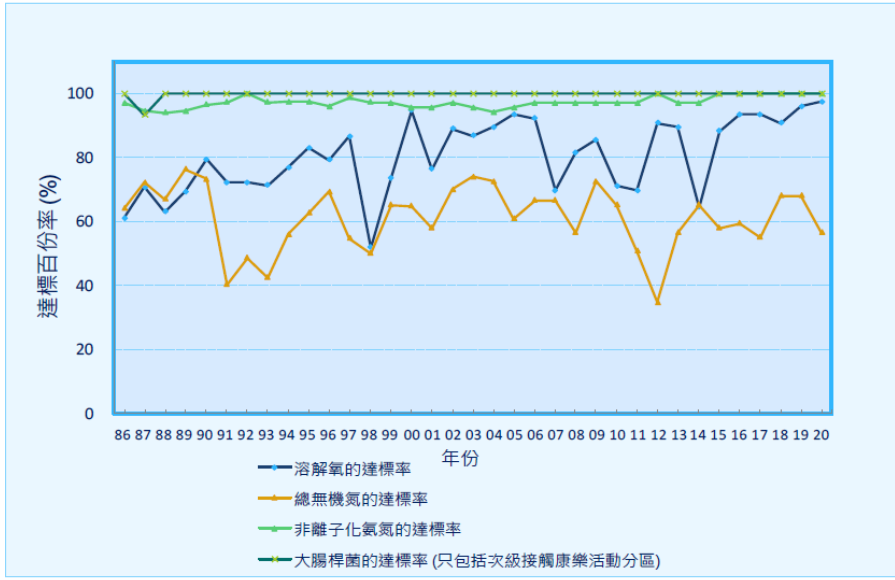


圖 2. 4 個主要海水水質指標達標率（1986-2020 年）

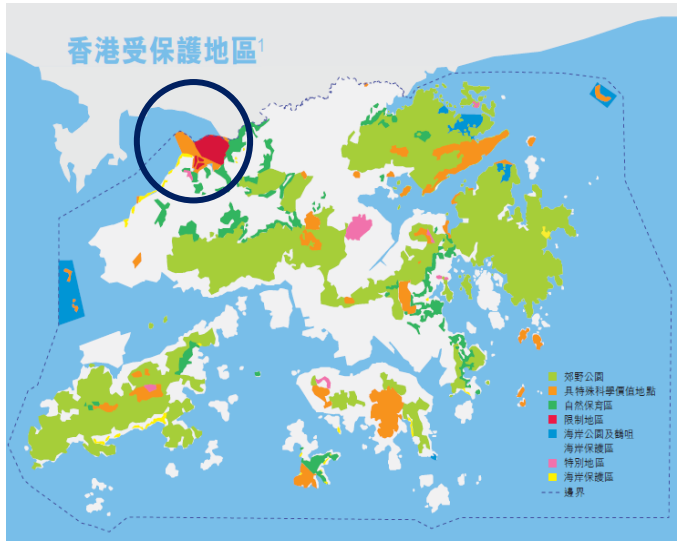
3 保护与治理Protection & Governance——区域协作 Regional Collaboration

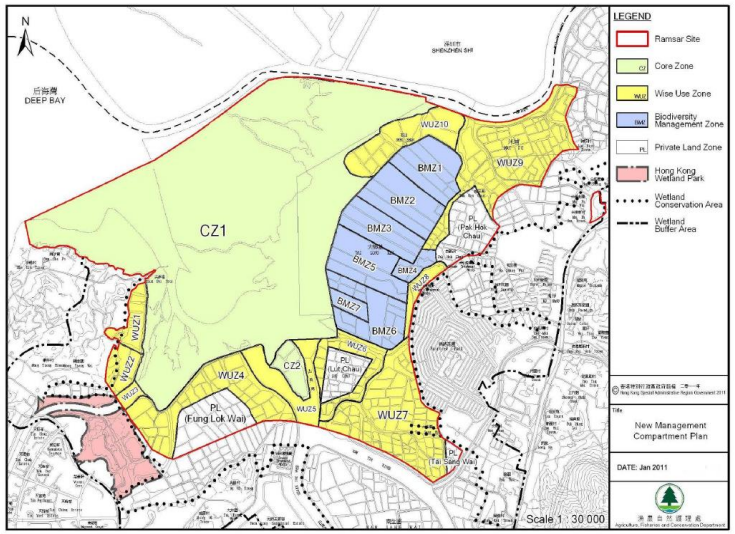
围填海建设和湿地保护等领域存在标准、方式和制度上的差异

Challenges: Differences in approach and level of mangrove wetland conservation

香港具有更为成熟的法律保障、公众参与及动态监测机制，而内地尚在起步阶段。深圳的红树林基金会等NGO组织已经率先在社会教育和区域合作中发挥作用

Hong Kong has more mature legal protection, public participation and dynamic monitoring mechanism. NGOs such as the Mangrove Foundation in Shenzhen are already taking the lead in social education and regional collaboration.





香港红树林保护地区的规划图则
Guideline Plan for Mangrove Conservation Areas in Hong Kong

深圳红树林基金会引导公众参与红树林保护
Guideline Plan for Mangrove Conservation Areas in Hong Kong

3 政策与建议 Policy Recommendations

将珠江口海岸带地区的保护与治理作为区域协作的重要议题Take the protection and development of coastal areas as an important issue of regional cooperative governance.

- 建立粤港澳大湾区河海联动的环境治理协作机制，统一污染物监测和控制标准。Establish a collaborative mechanism for environmental management in the Guangdong-Hong Kong-Macao-Great Bay Area with linkage between rivers and seas, and unify pollutant monitoring and control standards.
- 建立珠港口、桥梁、道路等大型基础设施建设在环境影响评估中的区域协调机制江口地区。Establish a regional coordination mechanism in environmental impact assessment for the construction of large infrastructure such as ports, bridges and roads in the Pearl River Estuary region
- 建立粤港澳大湾区港口联盟等，通过区域协作提升设施运行和服务效率，逐步减少大型基础设施建设对珠江口生态环境的影响。Establish the Guangdong-Hong Kong-Macao Greater Bay Area Port Alliance, etc., to improve the operation and service efficiency of facilities through regional collaboration, and gradually reduce the impact of large-scale infrastructure construction on the ecological environment of the Pearl River Estuary.

深圳盐田港

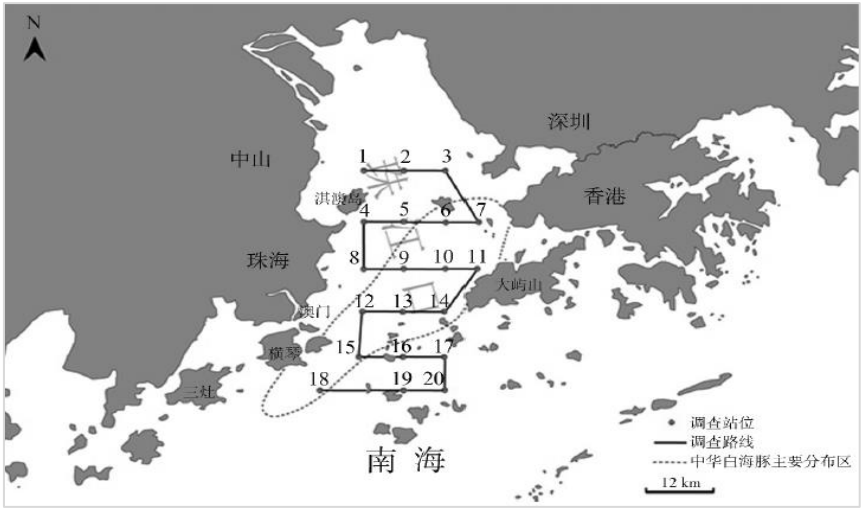
珠三角对外航线及城市群格局示意

建立生物多样性保护的跨界合作平台

Establish regional biodiversity conservation cooperation platforms for special and rare species

- 建立区域性的白海豚常规监测点，完善“**中华白海豚保护联盟**”的工作体系和协调机制
- 在珠江口海岸带地区共同探索划定“**黑天空保护区**”，共同保护鸟类栖息地

珠江口夜间亮度现状图



珠江口中华白海豚调查站位设置分布图

3 政策与建议 Policy Recommendations

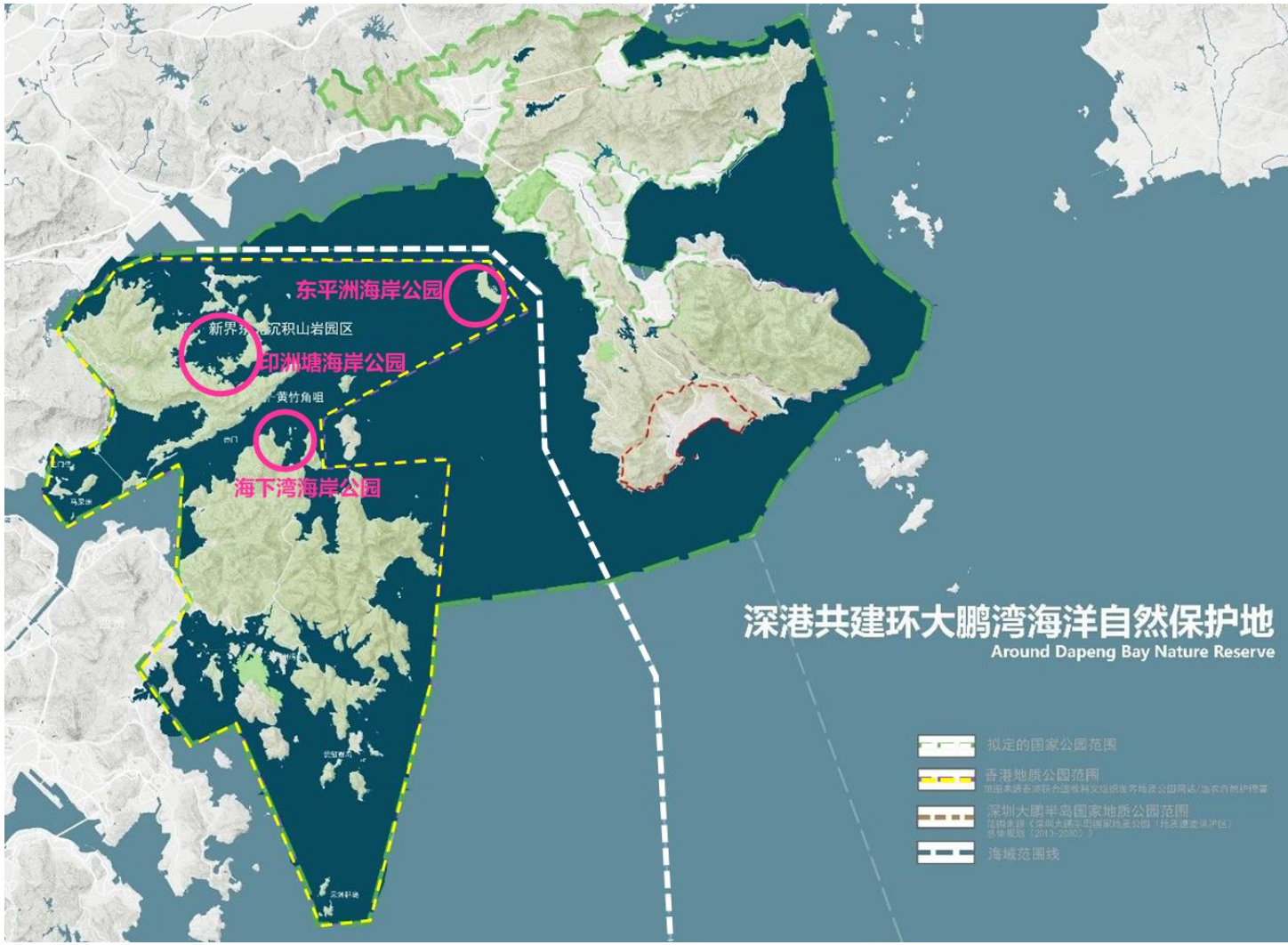
建立跨界合作的自然保护区，采取统一协调的生物多样性保护行动

Integrating nature reserves across borders to form a unified and linked regional cooperation conservation initiative

- **统一的自然保护区有利于保护完整的生态系统和生物栖息地**
- Unified nature reserves facilitate the protection of intact ecosystems and biological habitats

- **合作开展生物多样性动态监测、自然保护教育和公众参与行动。**
- Collaborate on dynamic biodiversity monitoring, nature conservation education and public participation initiatives

- **共同探索划定“暗夜保护区”，共同保护鸟类栖息环境**
- Jointly explore the designation of "dark night reserves" to protect the habitat of birds



The Vision of Shenzhen and Hong Kong cooperating to build a marine nature reserve around Dapeng Bay

3 政策与建议 Policy Recommendations

建立具有有统一标准和政策保障区域合作机制，增强区域应对气候变化的韧性和能力。

Establish a regional cooperation mechanism for coastal zone protection and governance with unified standards and policy guarantees to enhance regional resilience and capacity to cope with climate change.

- **合作开展区域海岸带地区保护与治理的规划**
- Cooperating in the planning of the protection and management of regional coastal zone areas.
- 协**调统一围填海和堤防建设等领域的技术标准**
- Harmonisation of technical standards in areas such as reclamation and embankment construction
- **形成共同应对气候变化灾害的区域合作应急预案**
- Formation of regional cooperation contingency plans for common response to climate change disasters


THANKS!

Jodie Bignall

Huang Yan

River management for the high-quality development of the Changjiang River Basin

Yan Huang

Changjiang Water Resources Commission
Ministry of Water Resources
China

Contents

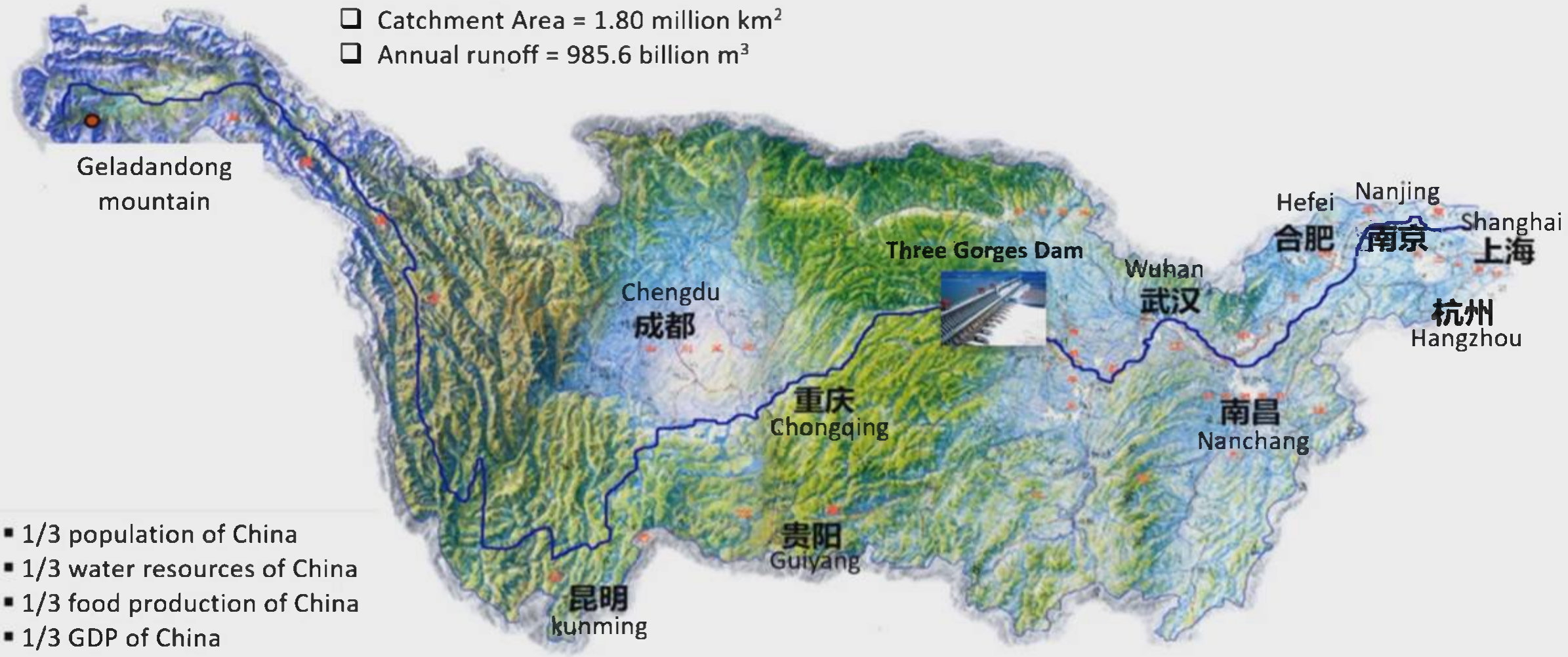
1. **Changjiang River Basin**
2. River basin management
3. Changes & Challenges
4. Nex Steps

1

Changjiang River Basin Introduction

Changjiang River – also known as Yangtze River

- Originates from Geladandong mountain of Qinghai-Tibet Plateau in southwest China
- River length = 6300km
- Catchment Area = 1.80 million km^2
- Annual runoff = 985.6 billion m^3



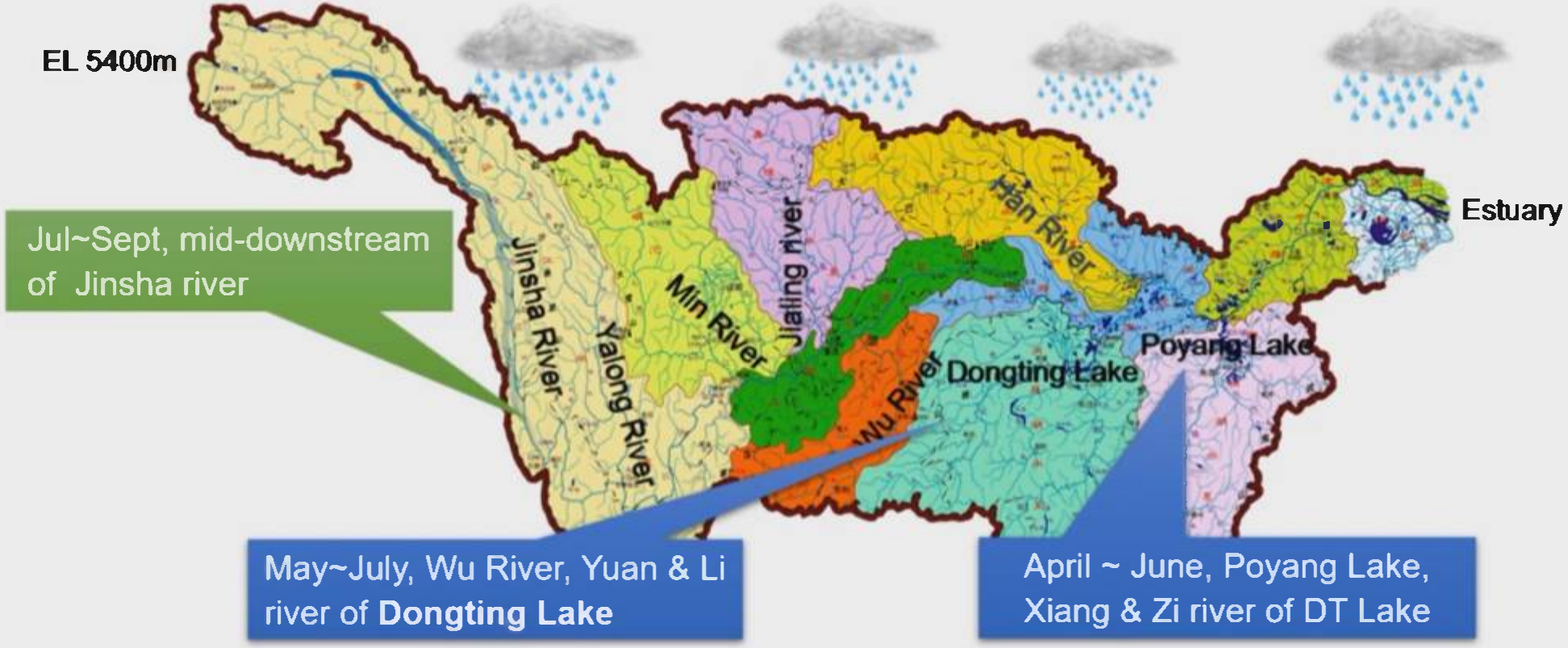
- 1/3 population of China
- 1/3 water resources of China
- 1/3 food production of China
- 1/3 GDP of China

Uneven spatial-temporal rainfall distribution

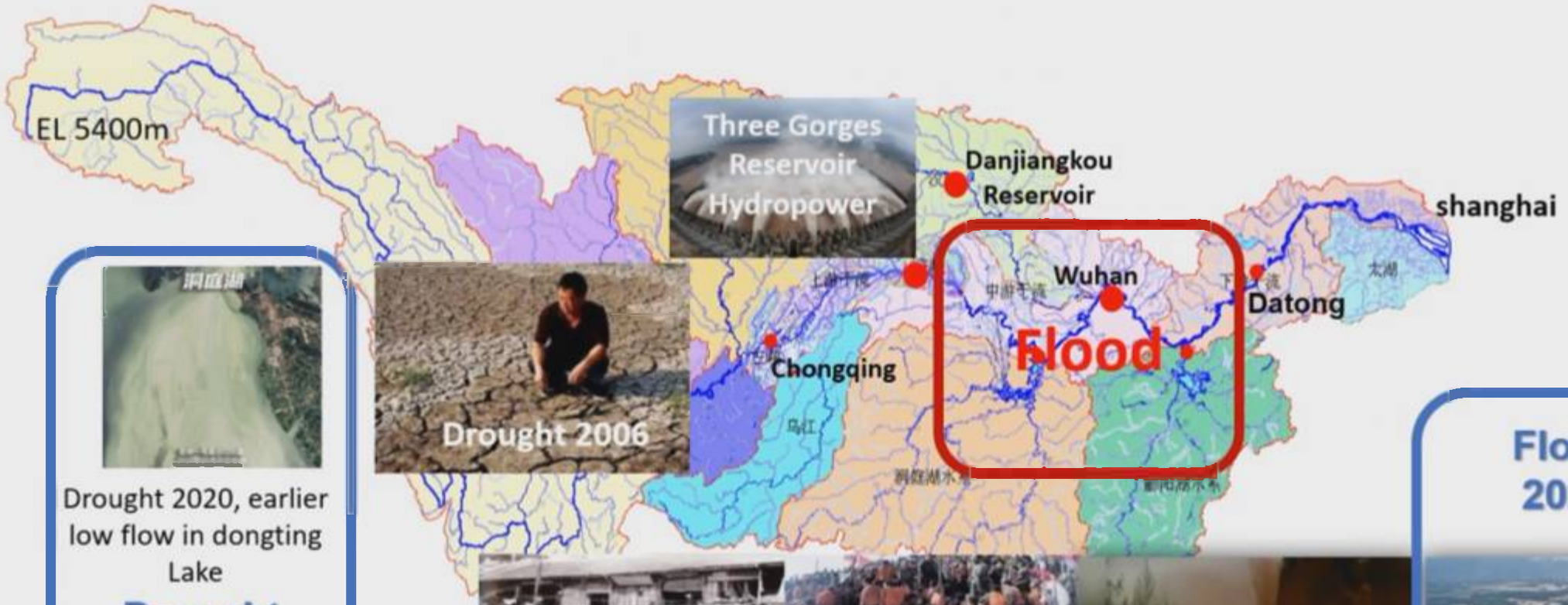
Wet season: May–October

Dry season: Nov-April

Earlier rainfall in the middle-lower reaches than the upper areas, in south than north



Suffers from frequent floods & drought

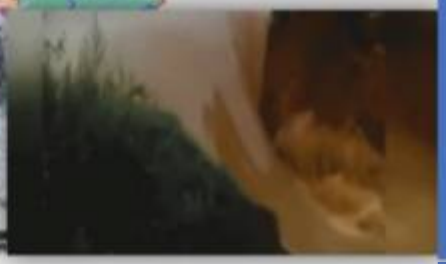


Drought 2020, earlier low flow in dongting Lake

Drought 2022

Flood 1935
145,000 dead

Flood 1998
Q_{wuhan}= 71100m^3/s



2016, flood in mid-downstream

Flood 2020

2020, basin scale large flood

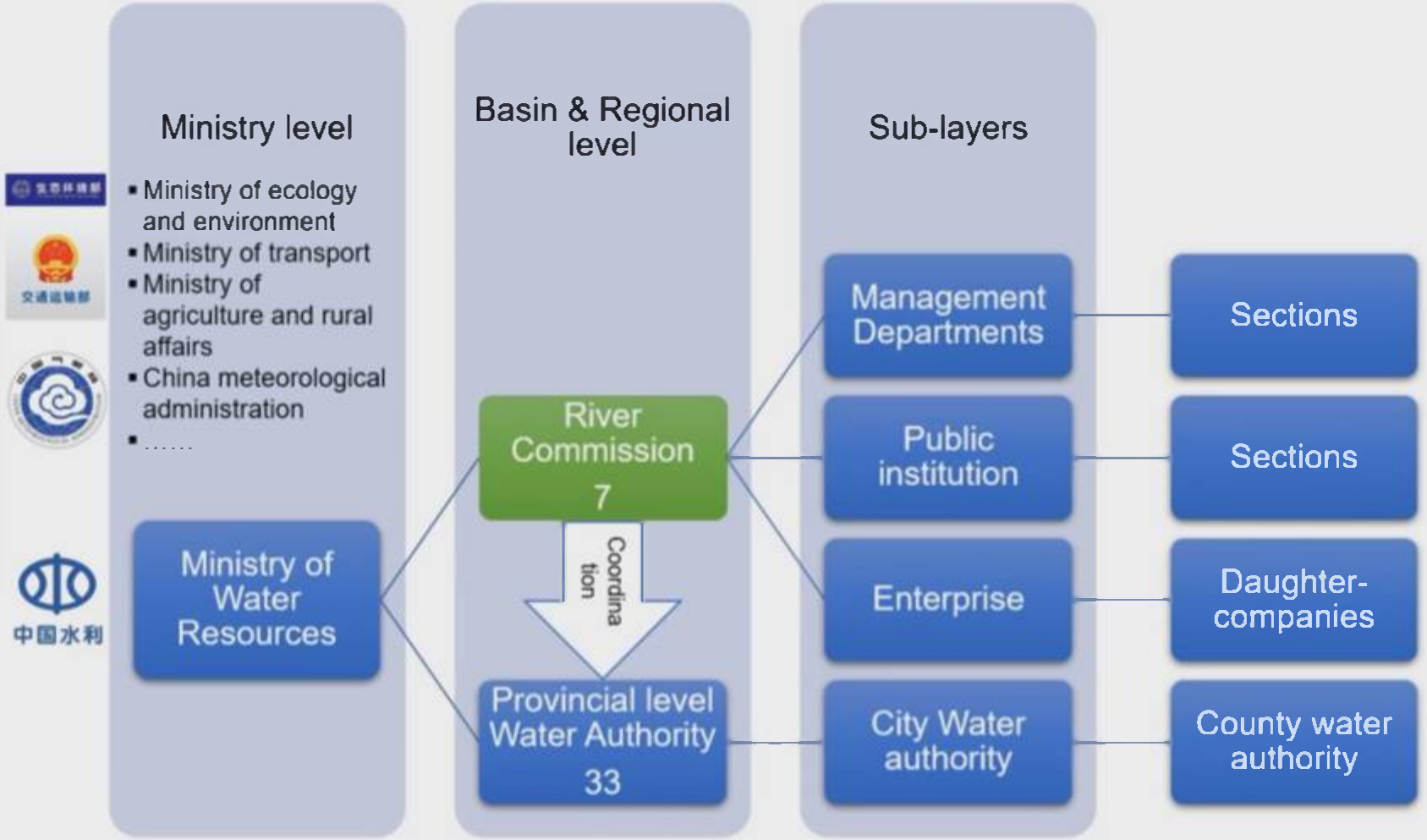
2

River basin Management

Practices & Progress

Institutional structure of River Management in China

- River is managed by **river commissions** and **regional water authorities**
- Under the administration of the Ministry of **Water Resources**
- **Incoordination** with relevant ministries.



Changjiang Water Resources Commissions (CWRC)

- 1 of the 7 river commissions in China
- Established in **1950**, located in **Wuhan**, **CWRC** is a **river basin authority** under the Ministry of Water Resources (MWR) of China.
- It performs **water administration** in the **Changjiang River Basin** and **rivers west of Lancang River**
- It is responsible for:
  - integrated water resources management
  - basin planning
  - flood control and drought relief
  - river course management
  - construction and management of large scale and key water project
  - river sand mining management
  - soil conservation
  - hydrology
  - scientific research…
- CWRC designed large scale water conservancy projects such as the Three Gorges Project and the South-to-North Water Transfer Project.

Administrative responsible area of Changjiang Water Resources commission

Three Gorges Project

South-to-North Water Transfer Project – middle route

Changjiang Water Resources Commissions (CWRC)

- 18 administrative and management departments & 20 institutions and enterprises subordinate to the CWRC
- ~18,000 staff providing technical support to river management and protection.

Changjiang water resources commission

Administrative and Management Department ← Technical support ← **Public services, institutions and enterprise**

Administrative and Management Department								Public services, institutions and enterprise						
River planning	Flood control and drought relief	Water resources management	Water saving and protection	River and Lake management	Water and soil conservation	Engineering Construction and Management	…	Bureau of Hydrology (BOH)	Changjiang River Scientific Research Institute (CRSRI)	Institute of Hydroecology (IHE)	Changjiang River Water Resources Protection Institute (CRWRPI)	Changjiang Institute of Survey, Planning, Design and Research (CISPDR)	Hangjiang Group	……

Master planning of Changjiang river basin – upgraded regularly

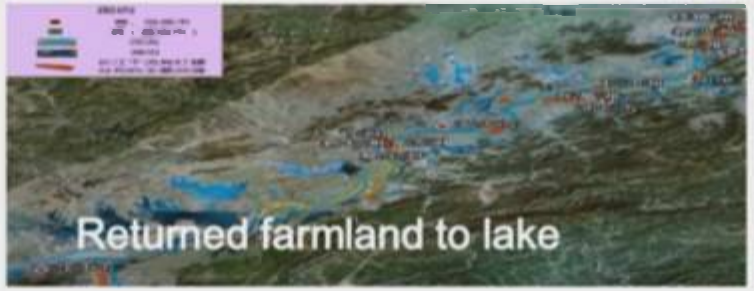
- Approved by the state council
- Guiding document for basin development & protection
- Update regularly:
  - ❑ 1st edit - 1956
  - ❑ 2nd edit - 1990
  - ❑ **3rd edit – 2012**
  - ❑ 4th edit – 2022, **flood & Drought** management

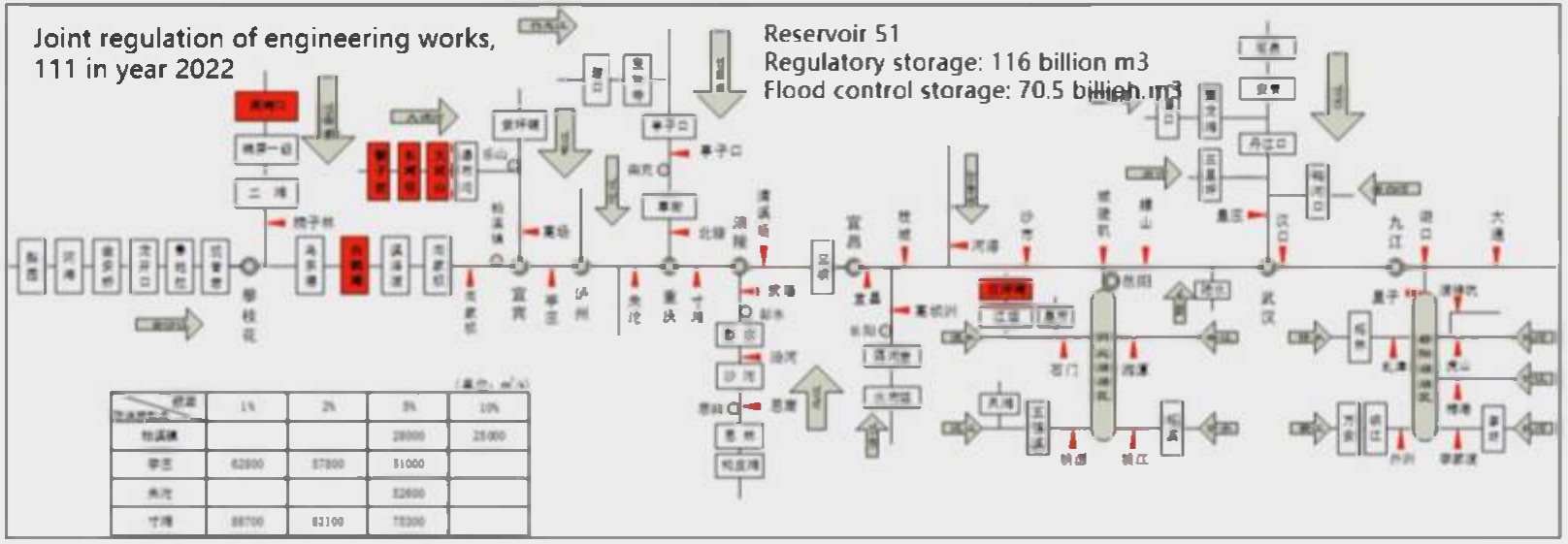
Planning of Changjiang River Basin

- **Flood management & hazard mitigation**
  - Flood Control
  - Waterlogging control
  - River regulation
- **Integrated Water Resources utilization**
  - Water resources assessment and allocation
  - Water supply
  - Irrigation
  - Hydropower
  - Inter-basin water diversion
  - Navigation
- **Protection of water, environment and ecology**
  - Water resources protection
  - Environment & ecology protection
  - Water & Soil conservation
- **Integrated basin management**
  - Planning management
  - Flood control & drought relief
  - Water resources management
  - Water resources protection
  - Water & soil conservative
  - River channel management
  - Project construction and operation management
  - Supervision and management of gauge cross section
  - Integrated operation of key engineering measures
  - Emergency response

Flood Management

- Developed flood management system
- Carry out real-time flood management through **joint regulation** of multiple engineering measures (dikes, reservoirs, retention basins etc. using DSS
- Provide technical guidance for flood control in regional level
- Carry out restoration and construction of flood control projects



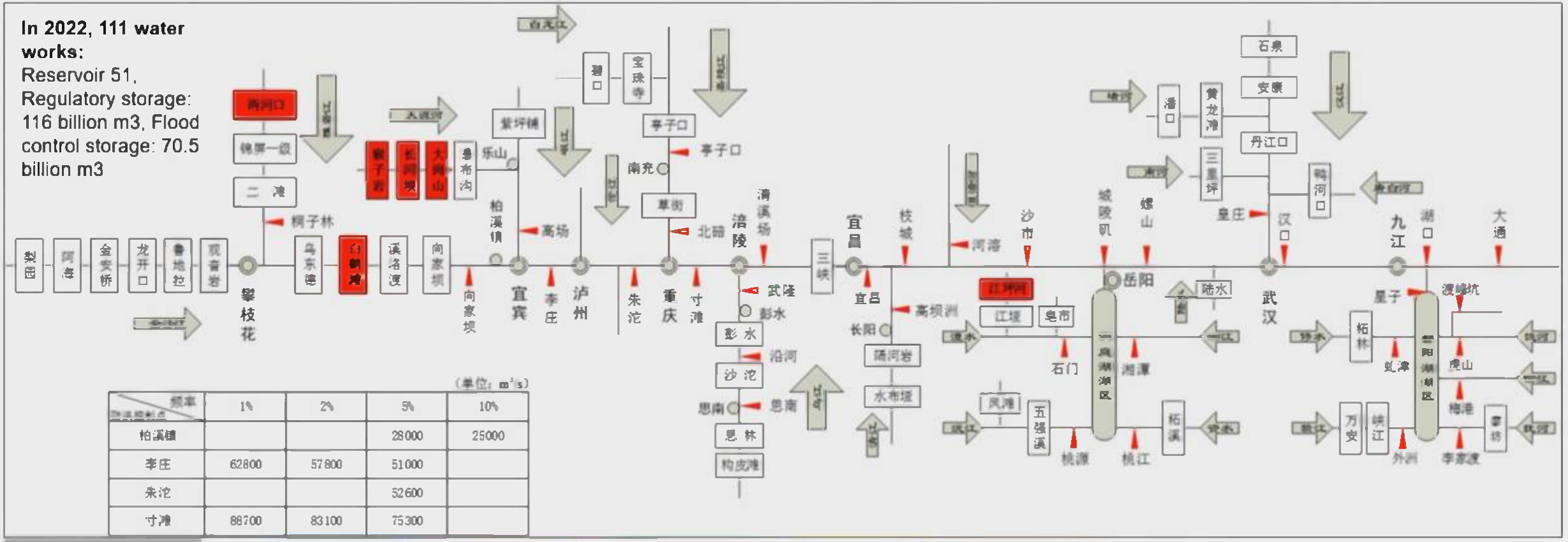


It has basically built embankments as the foundation, the Three Gorges Project as the backbone, other main and tributary reservoirs, flood storage and detention areas, and river regulation, and the engineering measures such as levelling the ridges for flood discharge, returning farmland to lakes, and soil and water conservation are combined with non-engineering measures for flood control. The flood control and disaster reduction system of the Yangtze River has significantly improved the flood control capacity.

Flood management – joint regulation of engineering works improved risk management capacity

Joint regulation scheme of engineering measures, increased projects gradually. Now there are 111 water projects involved.

In 2022, 111 water works:
Reservoir 51,
Regulatory storage: 116 billion m3, Flood control storage: 70.5 billion m3



（单位：m³/s）

频率 / 控制断点	1%	2%	5%	10%
柏溪镇			28000	25000
李庄	62800	57800	51000	
朱沱			52600	
寸滩	88700	83100	75300	

Annual Joint regulation scheme

年份	2012年	2013年	2014—2016年	2017年	2018年
水库数量	10	17	21	28	40

Start from 2019, not only reservoirs but also retention basins, pumping stations, water intake projects etc. were included in the scheme

Water Resources management – allocation & utilization

Established water resources allocation system

- Integrated water resources utilization system
- Water allocation system using reservoirs, intake and diversion projects, pumping stations etc.

Developed water supply and irrigation system

- 51,900 reservoirs, with total storage of 414 billion m^3, 368,000 water diversion projects, in 2021 total water supply is 207 billion m^3
- Built 156,000 irrigation areas with area of 16 million hectors,
- Irrigation water use efficiency is 0.52

Constructed inter-basin water diversion projects

- Constructed 1st phase of the middle route and east route of water diversion from south to north.
- Supply ~58 billion m3 water to Beijing, Tianjin, and provinces of Henan, Hebei, Jiangsu and Shandong etc.,

Large scale hydropower projects

- Installed capacity 237,000 MW (74% of China)

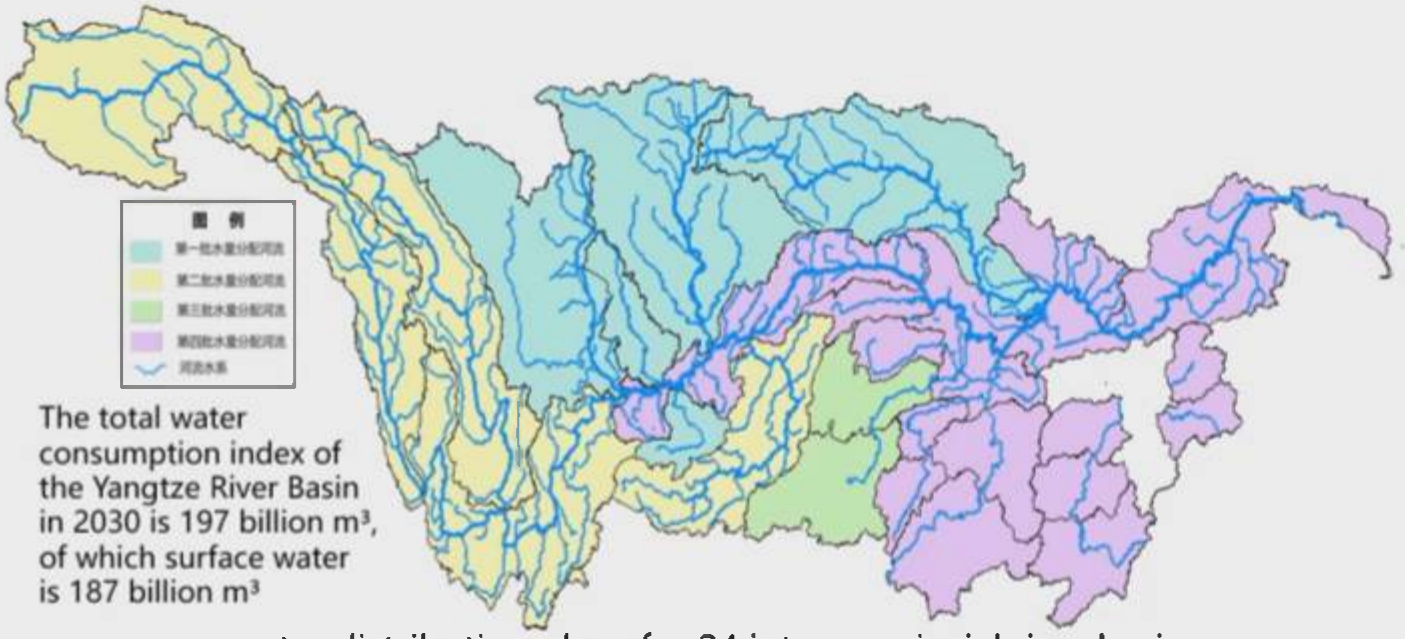
Shipping – golden waterway

- In 2017, Shipping mileage reached 71,000 km
- Cargo transport volume reached 4.7 billion t

Middle route (Phase I) of water diversion from Danjiangkou reservoir to north Chinam, provide 7~8 billion m^3 water

Promote Water Saving systematically

- Constructing water-saving society
- Verifying and register water intake projects (facilities)
- Water distribution of major inter-provincial rivers
- Promoted water management using **total consumption index (volume thresholds)** for each province / city / users in the basin
- Implementing the **rigid restraint system of water resources**: determine the development of city, land, people, and production considering the constraints of water carrying capacity



The total water consumption index of the Yangtze River Basin in 2030 is 197 billion m³, of which surface water is 187 billion m³

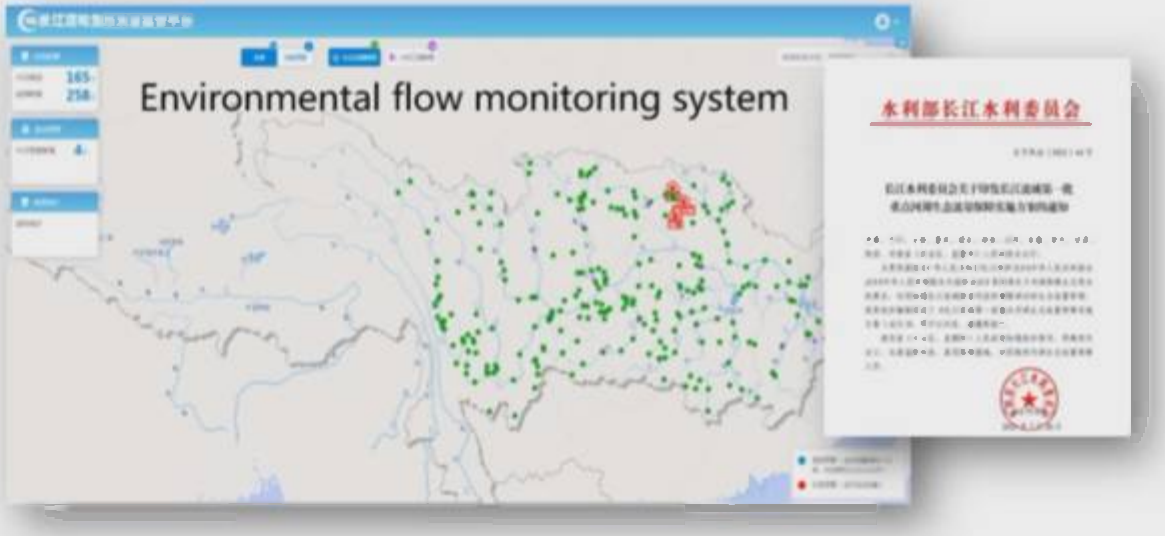
water distribution plans for 24 inter-provincial river basins

Water monitoring system

Planning and Designing Inter-basin Water Transfer Projects to Guarantee the Safety of Water Supply

Environmental protection and eco-system restoration

- Define and ensure **environmental flow** for all rivers
- Soil erosion prevention program
- Carry out ecological regulation using reservoirs to promote fish reproduction
- Zonal management facilitated with water environment protection quality bottom line
- Promote the treatment of point / non-point source water pollution
- Ensuring the safety of drinking water quality



Soil and Water Conservation Management

Improvement of Urban Water Conservancy – Wuhan Shahu

Ecological regulation at three gorges reservoir since 2011

Spatial system management of river channel & shoreline

River sand mining management

- Sand mining management, carry out secret visits and river inspections
- Pilot project of comprehensive utilization of dredged sand in waterway and silted sand in reservoir
- Establish management system for sand and gravel mining and transportation
- Promote illegal sand mining into criminal punishment, and strictly manage sand related ships

Sand mining management of river channel

Shoreline management of rivers / lakes

- Implement the General Plan for the Protection, Development and Utilization of the River Shoreline
- Carry out special inspection on the protection and utilization of the shoreline of the main stream
- Promote the implementation of the river / lake chief system
- Establish a coordination mechanism for the protection and utilization of the Yangtze River basin shoreline

Shoreline protection and utilization

Other management activities

Regulation of Water Works for multiple objectives

In total in 2022, included 111 engineering works into the joint regulation scheme, with 51 reservoirs providing 70.5 billion flood storage capacity

Achieved multiple objectives: flood control, water supply, ecology, navigation, hydropower etc.

Basin data monitoring and sharing

Perform measurement of hydro-meteorology, water quality, river morphology, sedimentation, soil and water erosion etc.

One info-platform, shared data with ministry, provinces level and other firms

Pursue full coverage basin monitoring

River protection cooperation

- Signed cooperation agreements with 11 institutions, local governments and important enterprises
- Established the River Governance and Protection Technology Innovation Alliance covering 50 departments and units
- Promote the establishment of cooperation mechanisms

Implementation of **Changjiang river protection law**

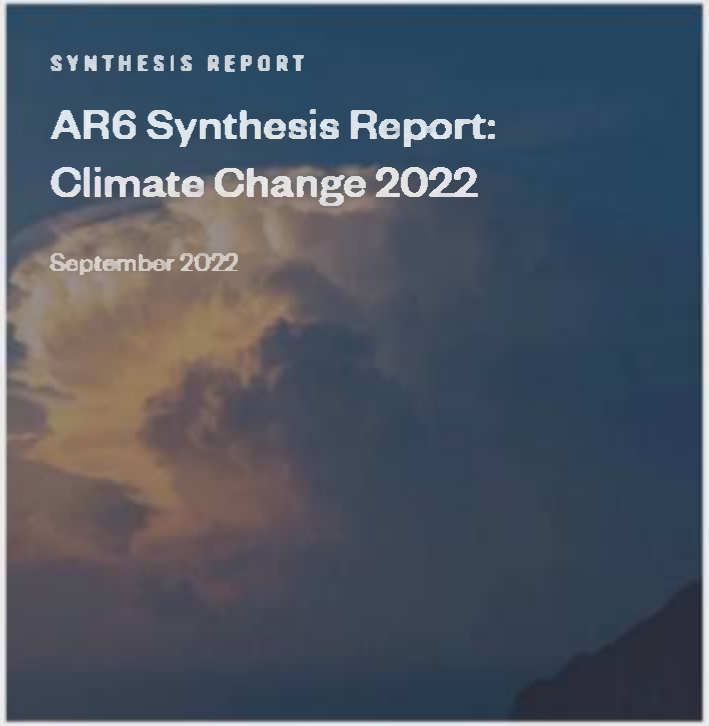
- Formulate corresponding implementation plan
- Improve the mechanism of coordinated and joint governance
- Promoting the construction of information sharing system

Changes & Challenges

Global climate will likely enter a period of significant changes in the future

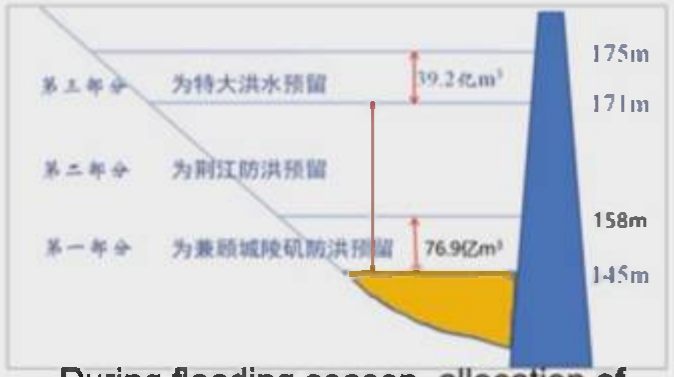
- **6th IPCC report**: the warming range of **land** will continue to be **higher** than that of the sea, and the warming range of the **Arctic** will be significantly higher than the **global average**. The warming rate of the lower troposphere in the Arctic is likely to exceed the global average.

- Other researches also agree that the global climate **will enter a period of significant change** in the future, record-breaking **extreme events will occur frequently**.



Operation of large-scale water project caused profound impact

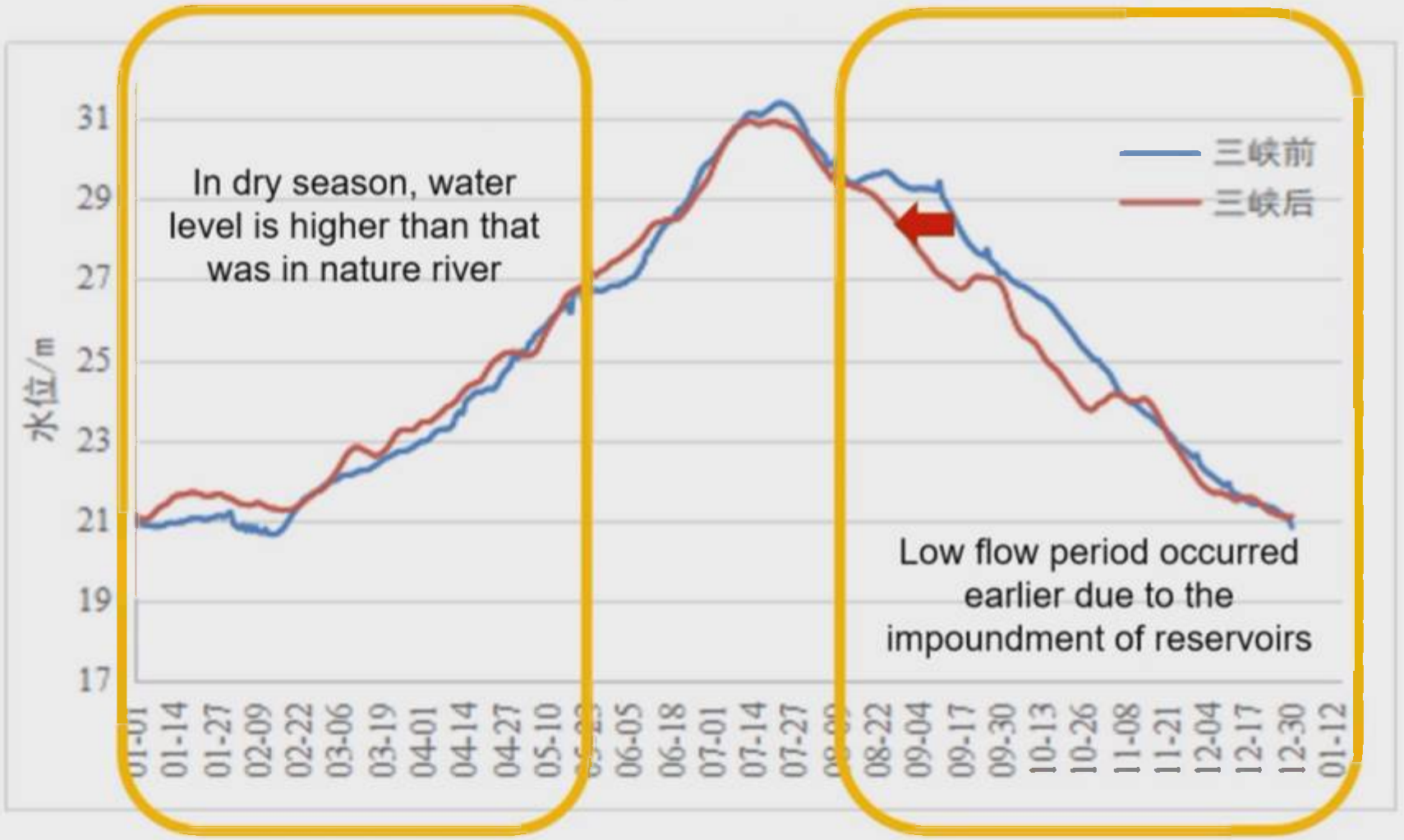
Impacts on the hydrological regime and eco-environmental system at the downstream areas



During flooding season, allocation of flood control storage for different protecting targets

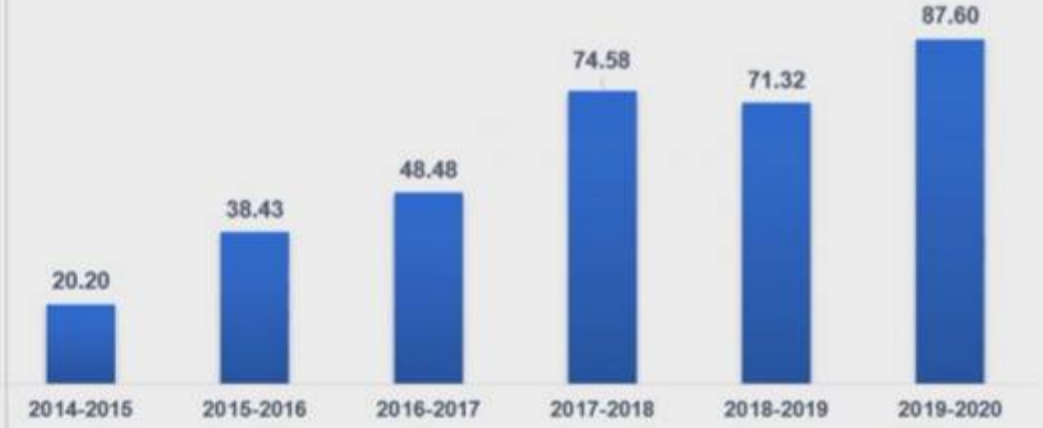
Operation of reservoirs upstream of three gorges reservoir

Water level at Chenglingji station – a gauge station at middle-downstream

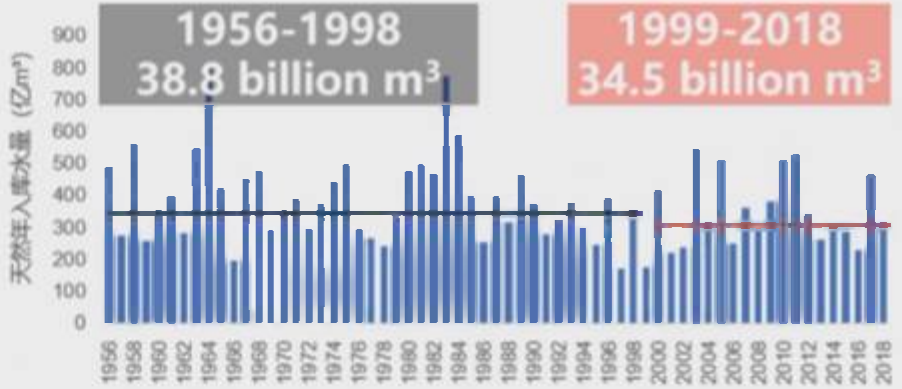


Increasing demand to the water network development – e.g. middle route

- More water is needed from North China.
- Runoff evidently decreased and dry years happened more often in Han River. Too much dependability to this project will not be wise.
- The currently under-construction follow-up Project - the water diversion project from the Three Gorges Reservoir to the lower reaches of the Danjiangkou Reservoir, will increase the water diversion volume from 9.5 billion m^3 to 11.7 billion m^3.



Water transferred from Danjiangkou reservoir to North China (100 million m^3)

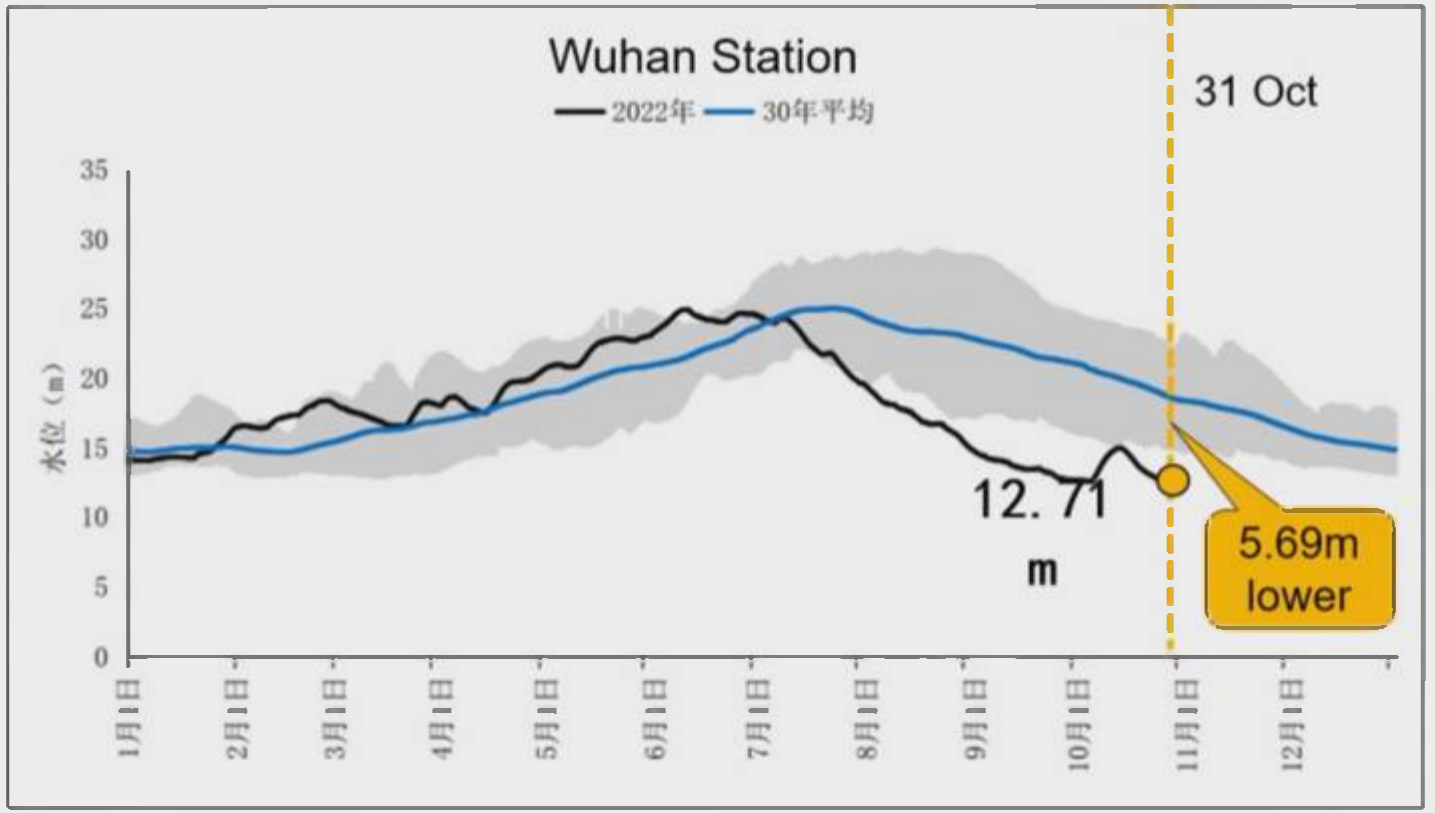


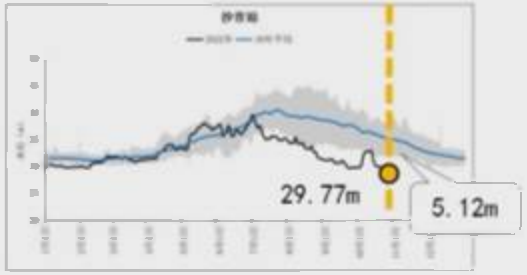
Declined reservoir inflow

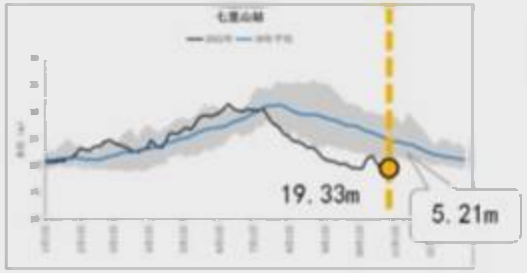
In 2022, basin-scaled drought happened but measures were limited

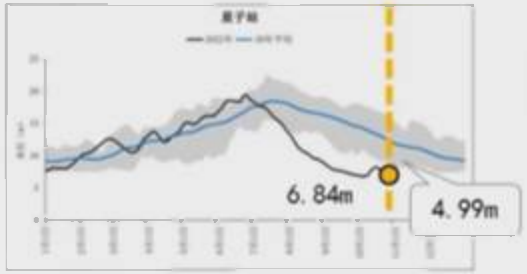
- Aug ~ Oct, 2022, the main stations in the middle and lower reaches of the Yangtze River recorded the lowest water levels in the same period in history since the measured records.
- Dongting Lake and Poyang Lake entered the dry season ahead of schedule on August 4 and 6, and the links between the river channel and Dongting Lake were cut off by an average of 3 months earlier than in the past 5 years.

Dry Poyang Lake









Weakness in flood prevention and mitigation

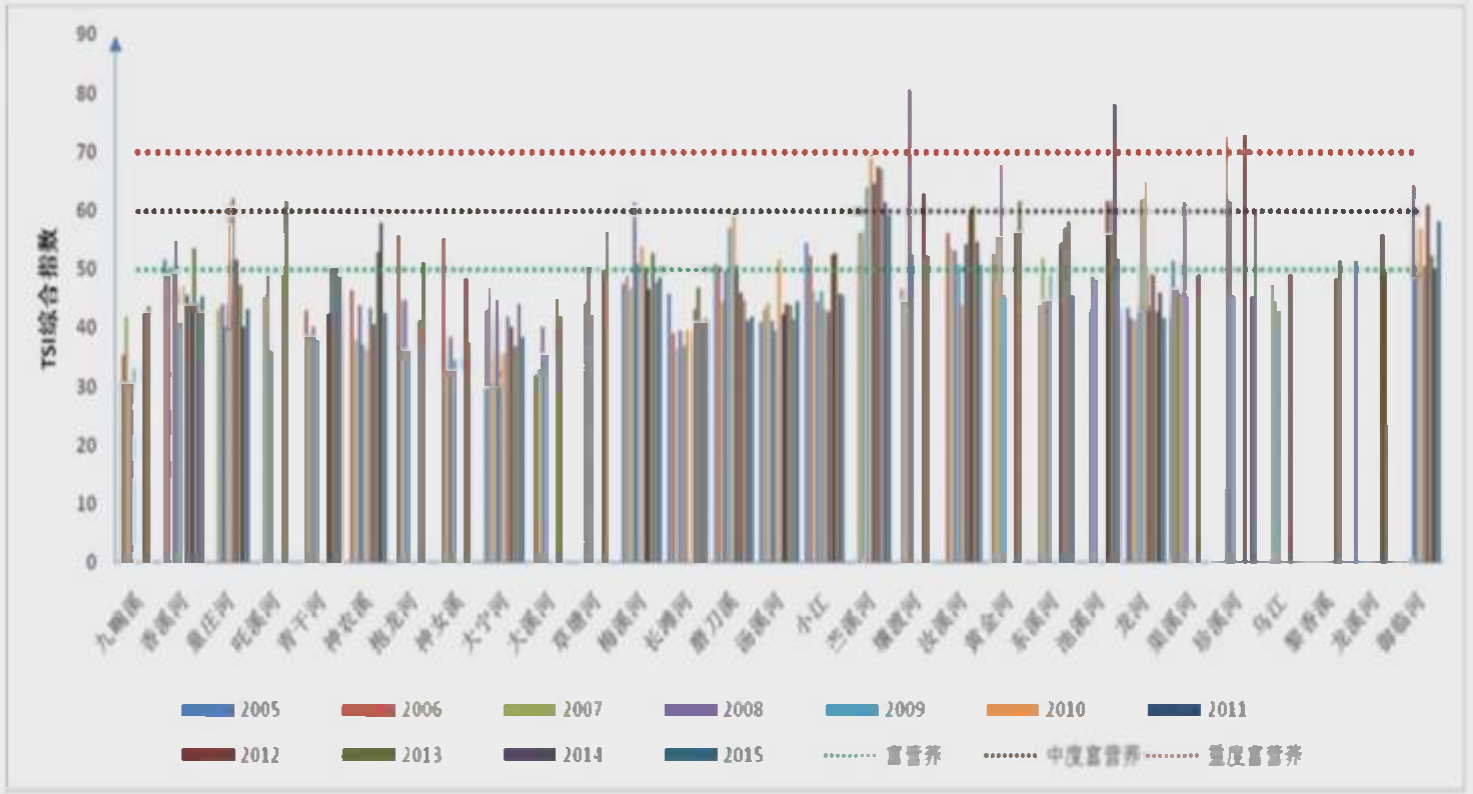
- Flood control **capacity** at some important tributaries and lakes remain **insufficient**
- The construction of flood storage and **detention area** is seriously **lagging** behind
- Difficulties to let flood pass through islands in the river where residents grow crops
- Flood control **standards** are low for small and medium rivers
- It remains difficult to predict **flash floods** in mountain torrent
- **Bank collapses** occur frequently in the middle and lower reaches of the main stream
- Non-engineering measures for flood control need to be improved – **digital twin river** is needed.

Water resources management system needs to be improved

The rigid restraint system of water resources has not been fully established	• The rigid constraint index system of water resources is not completed • The implementation of the “four determinations” (city, population, industry, landuse) policy is difficult
The ability of water resources allocation and regulation needs to be improved	• The contradiction between water sectors within the basin, inter-basin water transfer, hydropower development, and shipping etc. is increasingly apparent
The basic capacity for the intensive and safe use of water resources is not strong	• Complete and unified measurement, statistics, management measures and systems covering the steps of taking, using, consuming and disposing have not yet been formed
The monitoring system needs to be improved	• The scope and frequency of monitoring, time series and accuracy cannot support the management needs

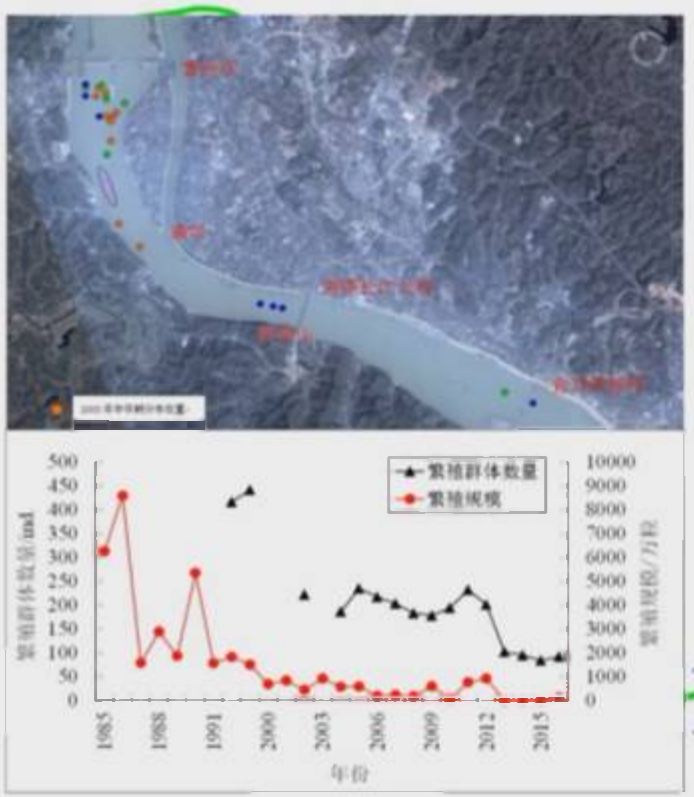
Eutrophication causes frequent algal blooms in some rivers/lakes

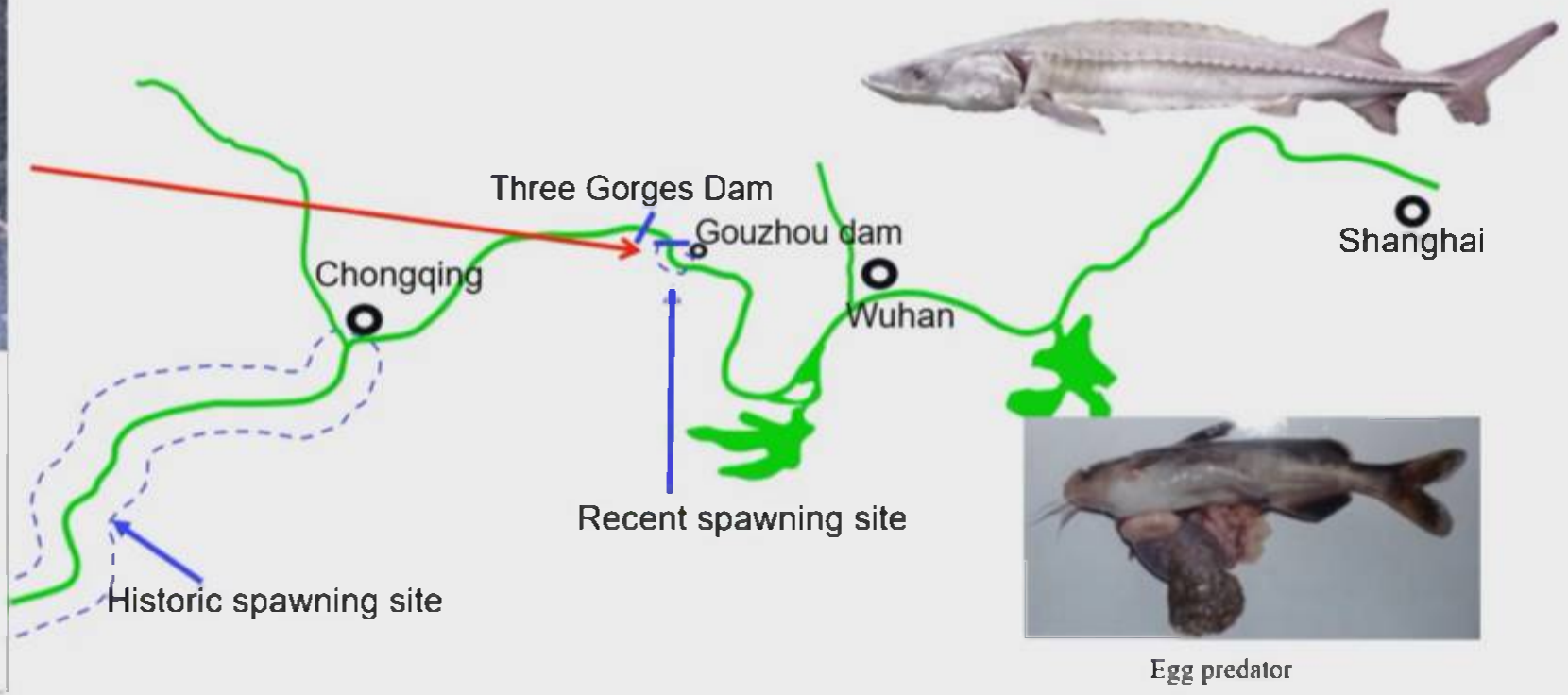
- The eutrophication level of 29 tributaries in the **Three Gorges Reservoir** area in the past 10 years shows that: 8 tributaries are eutrophic, and 21 tributaries are mesotrophic.
- Recent observation shows that risk of algal bloom is increasing in **Han River** – downstream of water diversion reservoir.



Biodiversity and resources decline

- The **Chinese sturgeon – a migratory fish**, no natural breeding activities have been found **since 2017**.



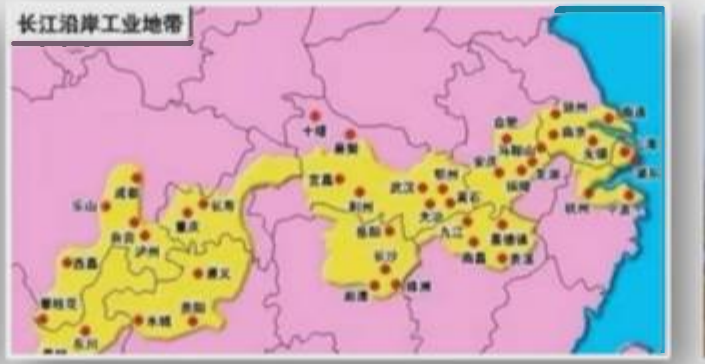


Egg predator

Difficulties in environment protection and eco-system restoration

- The guarantee system of **environment flow** is yet to be established.
- Lack of **monitoring system** of eco-system
- The **means** of ecological protection and restoration are relatively limited (artificial proliferation and release)
- The scope of ecological regulation yet to be further improved
- Water **pollution** remains serious and eutrophication occurs in 30% important lakes and reservoirs
- Risk of pollution to drinking water **source** is high: 30% of the enterprises with environmental pollution risks are located within 5km of the drinking water source.

Distribution of rivers and lakes with excess total phosphorus



There are more than 400,000 chemical companies along the river

Problems in the shoreline management of rivers & lakes

- Encroaching on river courses
- Reclamation of lakes,
- Illegal sand mining
- Water pollution

Green waterway construction needs to be further promoted

- The passage capacity of the main channel is insufficient, the upstream and downstream connections are not smooth, and the complexity of the channel evolution is intensified.
- The means of waterway construction to solve the problems of ecological and environmental protection are insufficient, the construction of ecological waterways is still partial and fragmented, and the protection measures for sensitive issues are needed.

Management capacity need to be improved

- The construction of the rule / law → to be strengthened
- Coordination and protection → to be deepened
- Hydroinformatics capability → to be improved
- legal status of planning → to be further enhanced
- Ecological compensation mechanism → to be established
- Emergency response capability → to be strengthened

Multi-objective coordination mechanism to be established

Next Steps

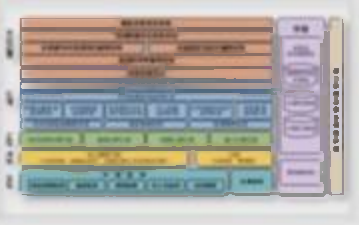
To-do list identified

1. Implement **Changjiang River Protection Law**
2. Improve **flood** management capacity: upgrade flood management planning and improve the flood control systems
3. Enhance **water saving** through promotion, education, monitoring etc.
4. Improve and optimize **water network** construction
5. Enhance water resources management using water resources as **rigid constraints** for social-economic development
6. Ensure **environmental flow** and promote eco-system **restoration**, improve monitoring and assessment capacity
7. Enhance **river bank** protection
8. Improve capacity on **joint regulation** of water projects
9. Strengthen the **coordination** and **cooperation** with water-related affairs
10. Strengthen the construction of the **legal system** for development and protection
11. Improve informatics capacity – develop **smart river** with the core of **digital twin river**
12. Construct Yangtze River **water culture**
13. Carry out **researches & capacity building**









Remarks

The Changjiang Water Resources Commission will continue working with relevant parties, to serve the protection & the high-quality development of the river basin.

Cooperation is warmly welcome!

谢谢

THANKS

Hans Mommaas

Netherlands Commission for
Environmental Assessment

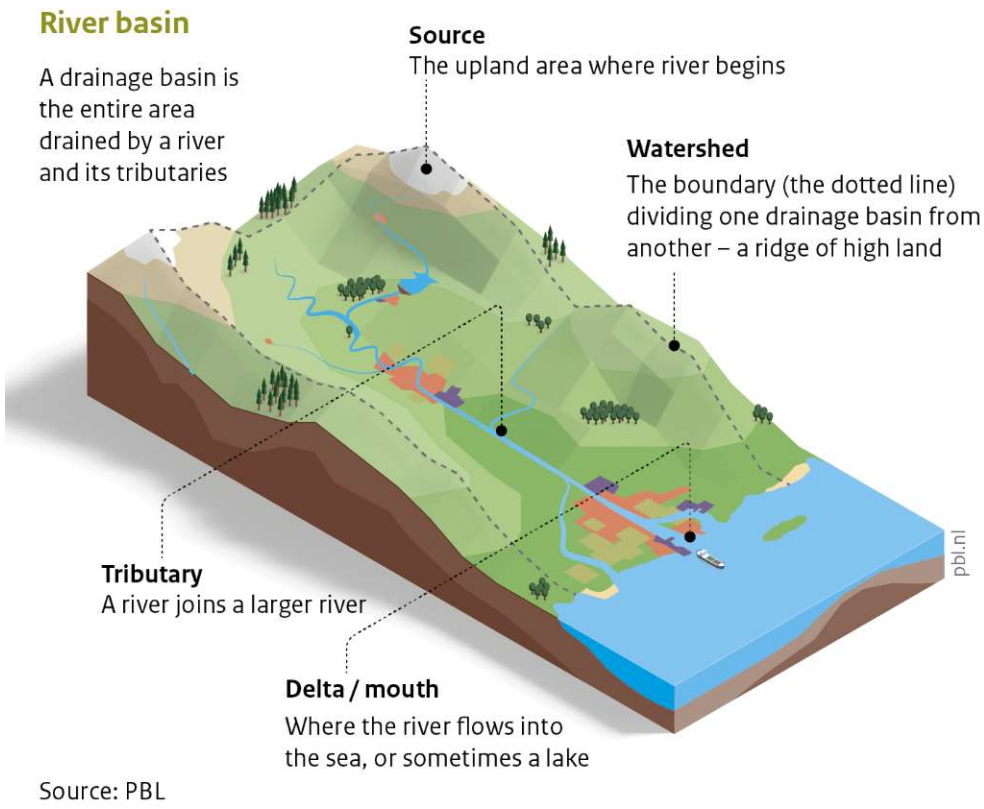
Comprehensive planning for sustainable river basin transformation

Prof. Hans MOMMAAS
Special Advisor NL China Council for International Cooperation on Environment and Development
Chair Netherlands Commission for Environmental Assessment / Ecological Authority
Tilburg University

New York, CCICED-SPS side event, UN Waterweek, March 20, 2023

river basins: arteries of civilization…
…where worlds meet…

water safety
fresh watersupply
sedimentation
biodiversity
fertile soils
agriculture
transportation
urbanization
industrialization
civilization



Source: PBL

RIVER BASINS AS INTEGRATING LANDSCAPE

All drylands are part of river basins, which are linked to deltas and coastal zones. Rivers, therefore, connect all hotspot landscapes through water and sediment flows from source to sea.

The world encompasses many river basins, large and small, many of them transboundary and shared by various countries. Today, approximately 40% of the global population is living in transboundary river basins.

focal point of poly-crises

melting glaciers

subsidence and sea level rise

salt water intrusion

slowing down of sedimentation

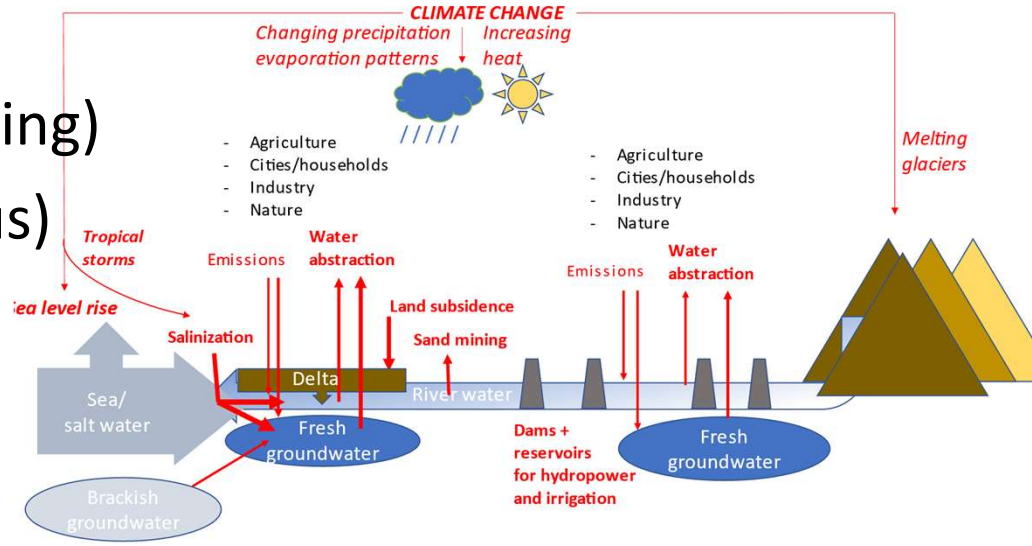
weather extremes (droughts and flooding)

water quality (nitrogen and phosphorus)

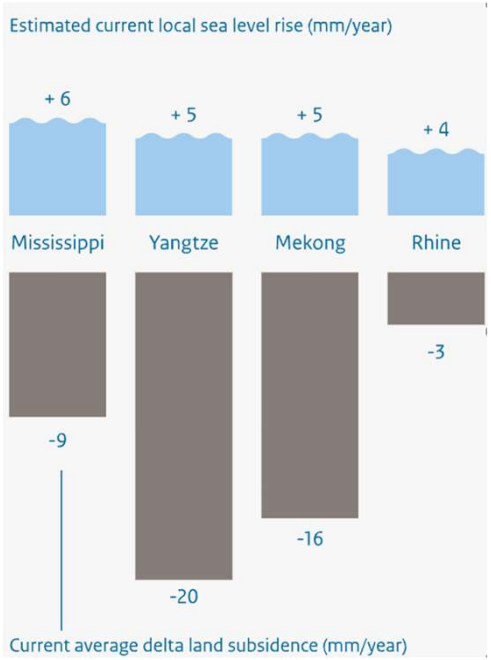
decarbonization

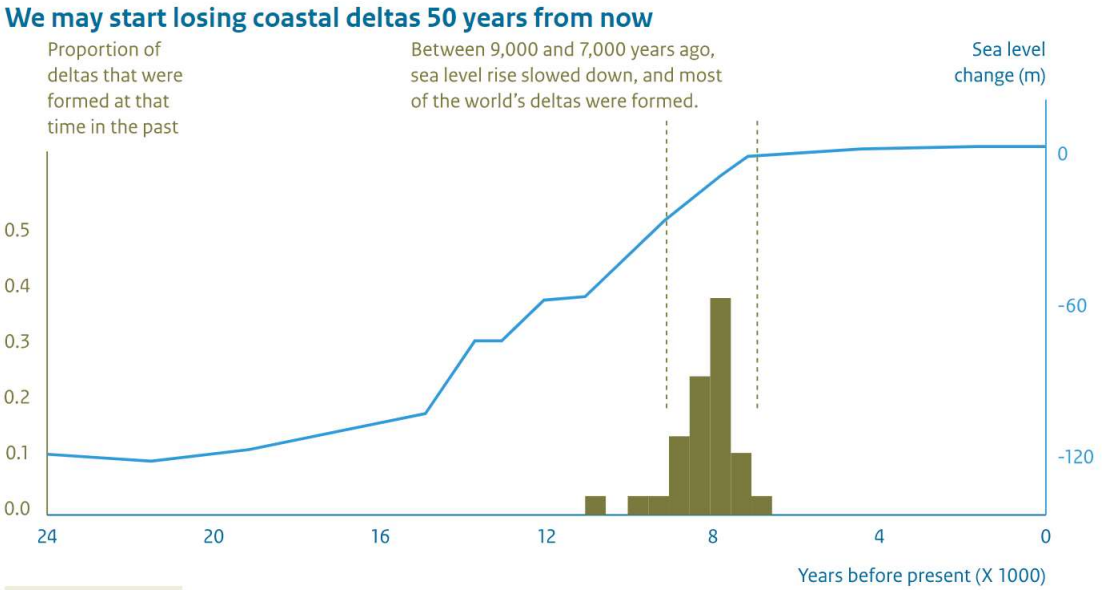
renewable energy (e.g. dams)

inequality and migration



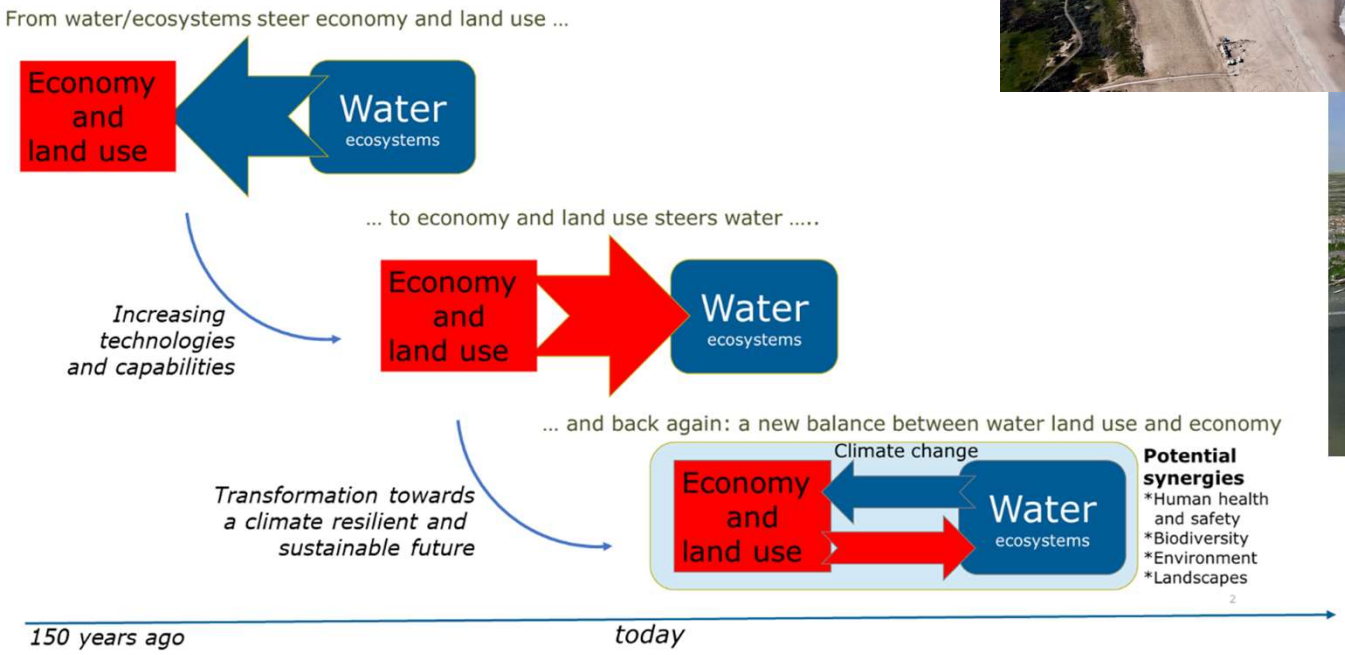
..bending the curve..



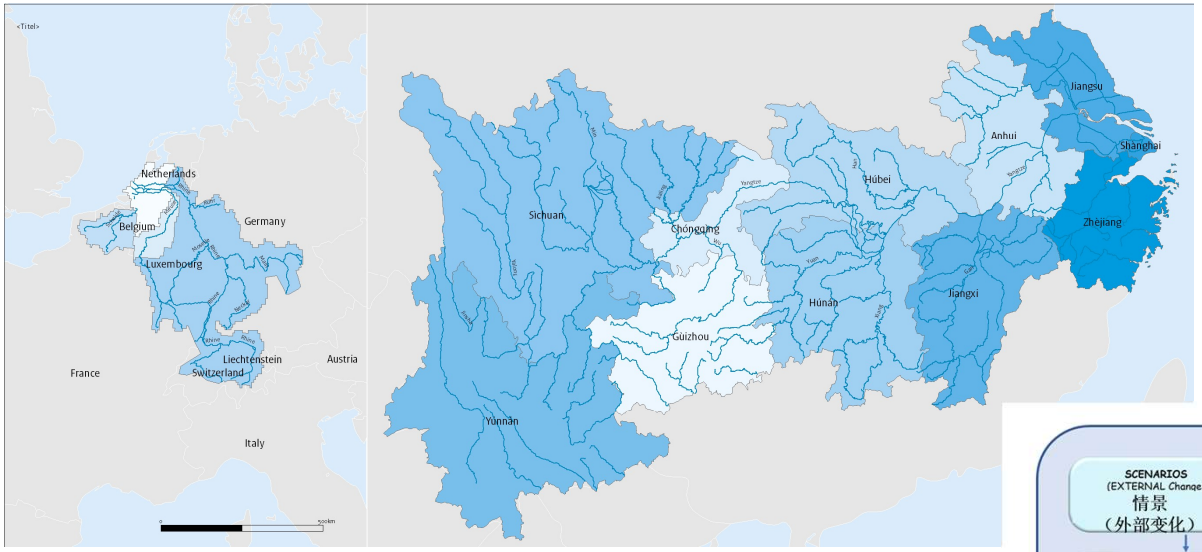


- nearing tipping points
- in need of paradigm shift
- more than sea level rise
- beyond sectoral silos
- towards integrated eco-system based approaches
- carried along by new narratives and icons

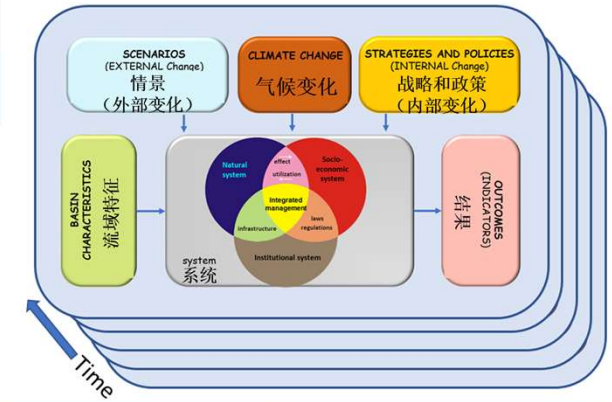
need for more comprehensive approaches



zooming in and zooming out…
…learning from comparisons in time-space



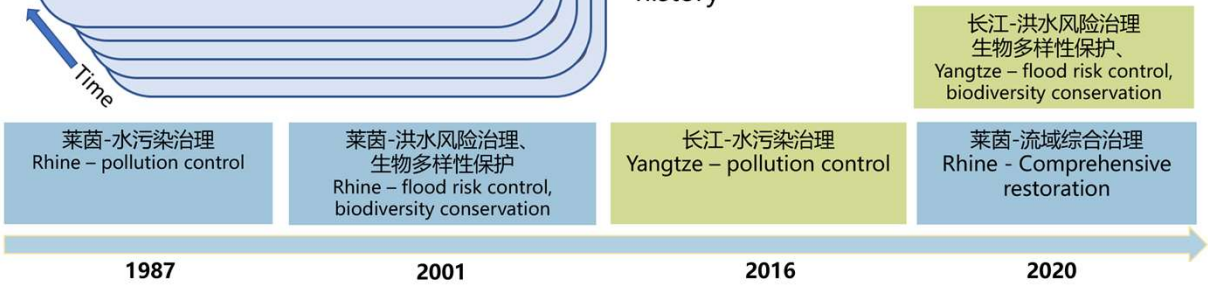
-urbanisation
-biodiversity loss and pollution
-climate change adaptation
-decarbonisation
->integrated spatial approach
->trade-offs sustainability <-> political sensitivities
->timing for the future



■ PBL提出的流域综合管理评估的概念框架
A conceptual Framework for River Basin Management Assessment developed by PBL

■ 关注气候变化这一重要变量
Concerning the climate change as the major variable

■ 长江莱茵的流域治理历程比较
Rhine-Yangtze comparison on management history



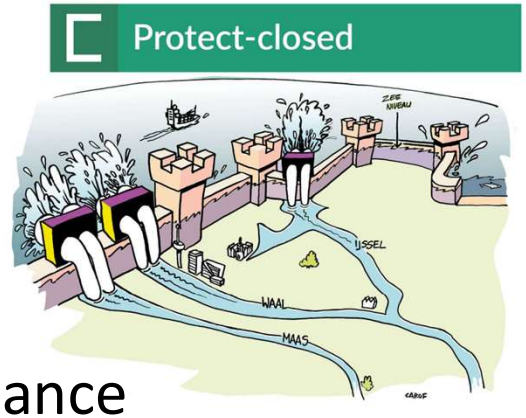
SPS: combining a global, case-based, open platform, knowledge-planning approach

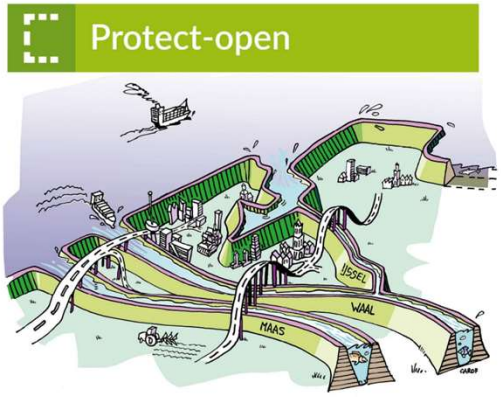
	Principle 原则	Possible research focus 可能的研究重点
2022-2023	Make good on your responsibility stretching from the headwaters to the coastal seas 从源头到沿海履行责任	Mechanisms for regional collaboration 区域合作机制
2023-2024	Adopt a 100-year perspective and plan your steps 根据百年愿景规划步骤	Proactive approaches to adapt to projected climate change and increase resilience 积极主动适应气候变化并提高韧性
2024-2025	Engage everybody who can contribute and develop a shared vision 人人参与，形成共同愿景	Organization of collaboration across multiple interests 基于多学科利益的协作组织
2025-2026	Adapt to climate change and other principal river stressors in every aspect of the management of river areas 在流域管理各方面考虑气候变化和其他主要压力源	Dealing with uncertainty of climate change, of other stressors, and of disasters 应对气候变化、其他压力源和灾害的不确定性
2026-2027	Continue to strengthen and innovate 持续加强和创新	Management approaches, knowledge programs, policy tools and forward-looking financing mechanisms, etc.; international exchanges 管理方法、知识计划、政策工具和前瞻性融资机制等；国际交流

中国环境与发展国际合作委员会
China Council for International Cooperation on Environment and Development

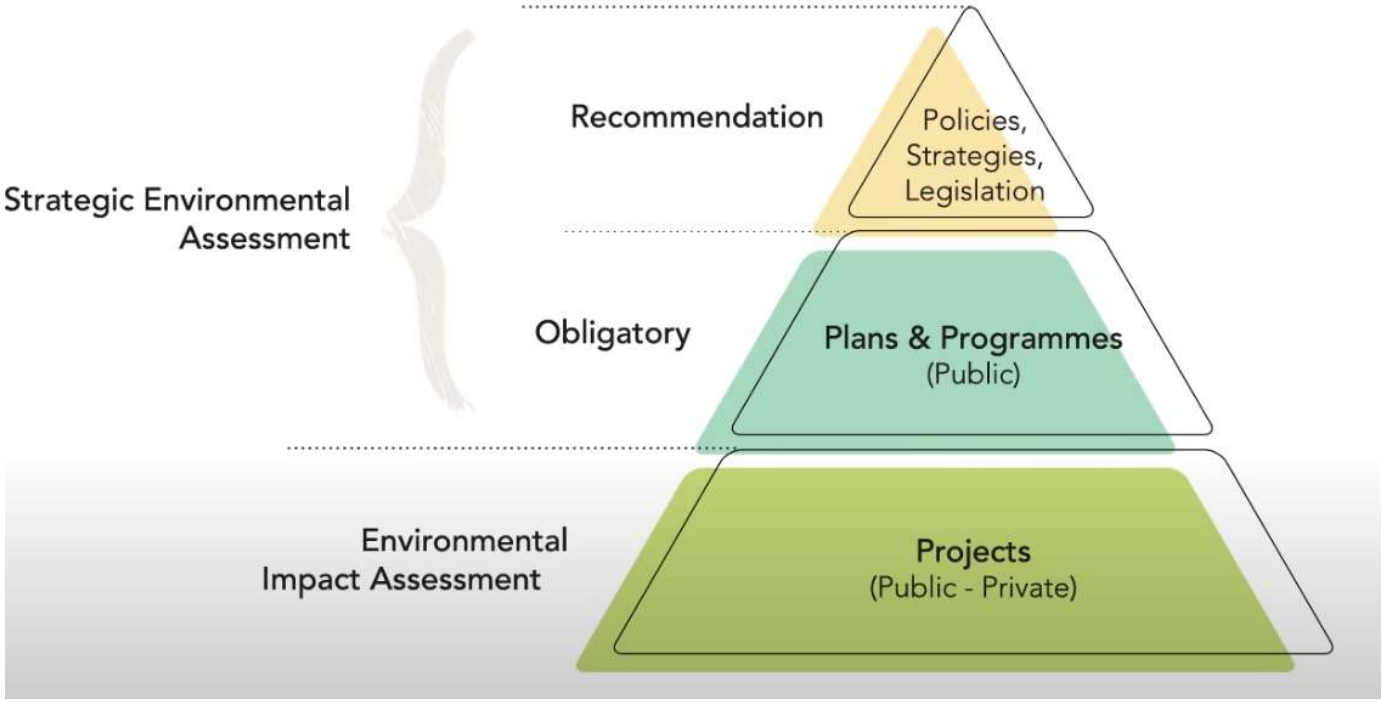
comprehensive planning informed by dynamic but robust knowledge-planning interfaces

- from source to sea (and back)
- from river to basin (and back)
- short-term ánd long-term
- ecological-economic-social-governance
- exploring path-ways
- learning mode ‘en route’



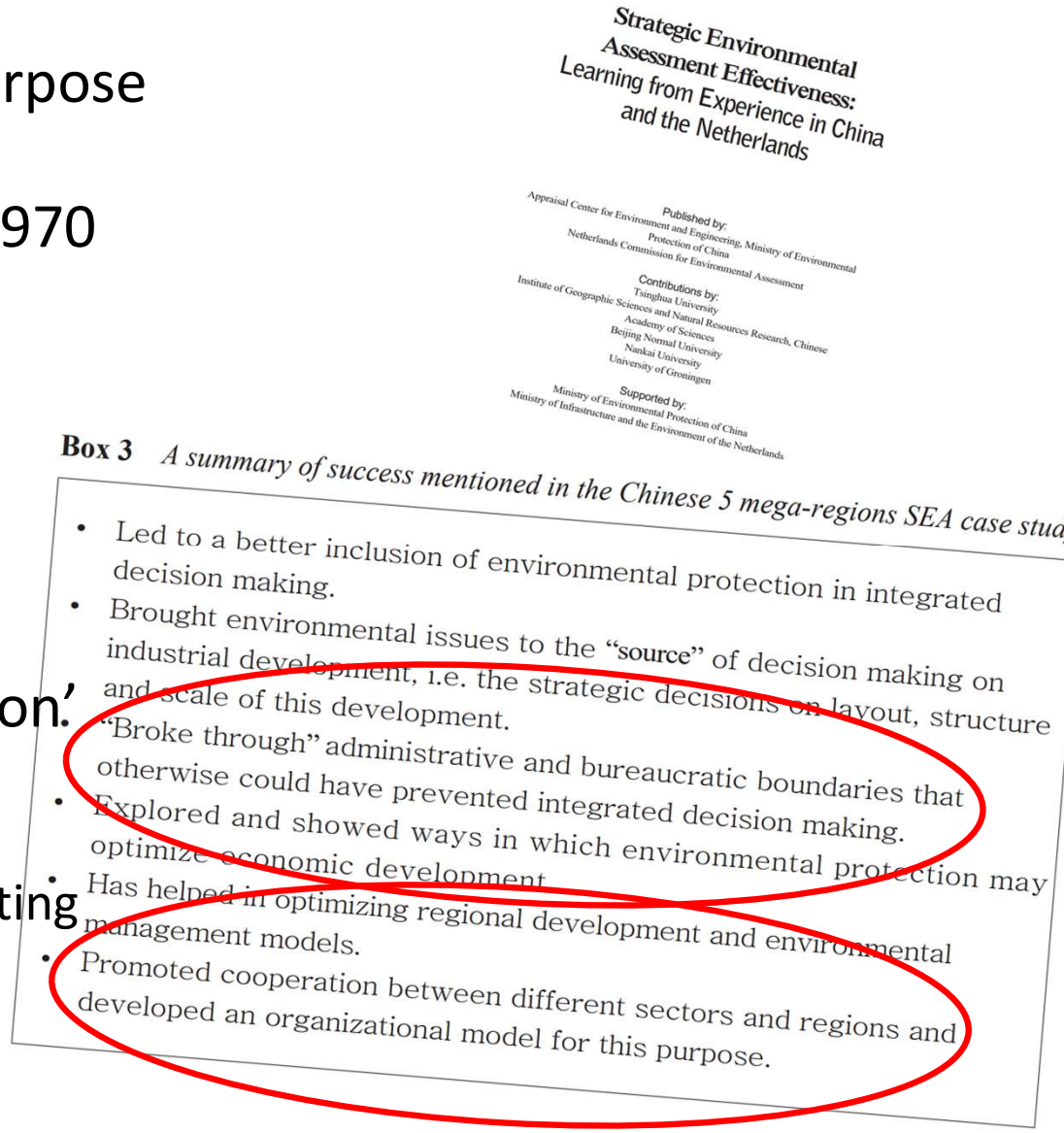


never waste a good knowledge-planning tool…
…Strategic Environmental Assessment



- a well established track record / fit for purpose
- combining expert knowledge with a solid institutional and planning position (e.g. 1970 US NEPA, 1985 EU EIA Directive, etc.)
- holistic environmental perspective
- short-term ánd long-term
- collaborative communication

- in view of river basins: ‘re-contextualization’
  - dynamic scope and scale
  - transboundary / multi-layered
  - from compliance to learning and agenda setting
  - stimulating and informing public debat



Strategic Environmental Assessment Effectiveness: Learning from Experience in China and the Netherlands

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Box 3 *A summary of success mentioned in the Chinese 5 mega-regions SEA case stud*

- Led to a better inclusion of environmental protection in integrated decision making.
- Brought environmental issues to the “source” of decision making on industrial development, i.e. the strategic decisions on layout, structure and scale of this development.
- “Broke through” administrative and bureaucratic boundaries that otherwise could have prevented integrated decision making.
- Explored and showed ways in which environmental protection may optimize economic development.
- Has helped in optimizing regional development and environmental management models.
- Promoted cooperation between different sectors and regions and developed an organizational model for this purpose.

Thank you – comments welcome

谢谢 —— 欢迎点评

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End of report

A short version of the report, without photos of the speakers and prints of their presentations, is available (0.5 MB)