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# ***Progress of River Restoration in China***

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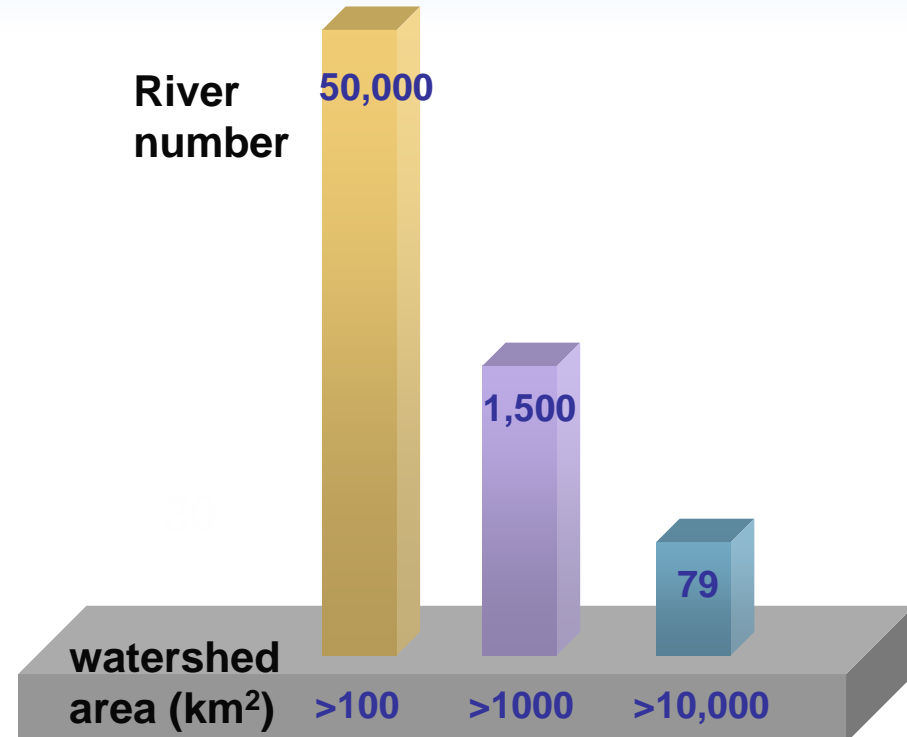
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# ***1 Introduction***

# 1 Introduction



**Total river length: 430,000 km**

**Total area of lakes: 80,000 km<sup>2</sup>**

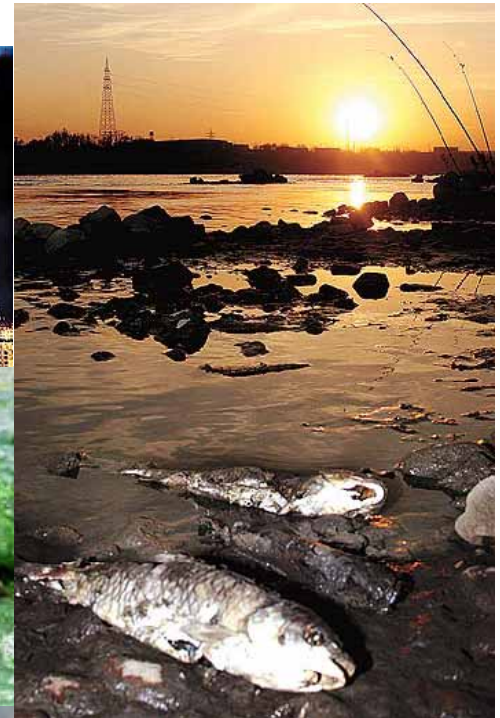
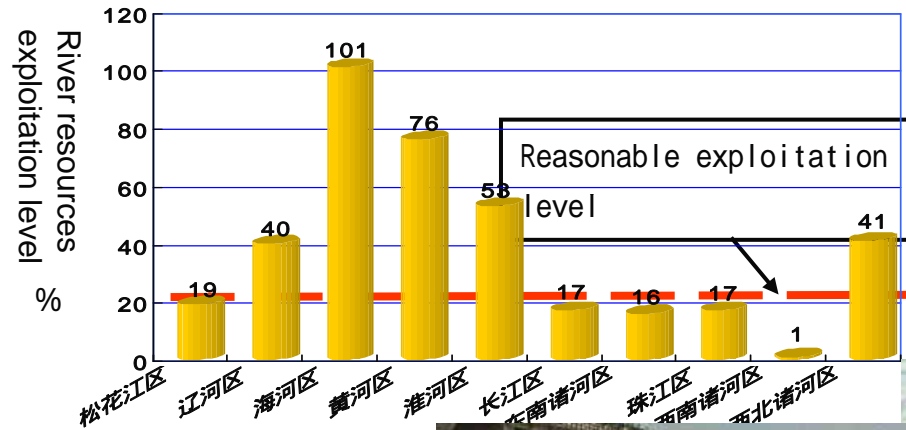
**Total area of wetlands : 38,485,500 hm<sup>2</sup>**





# 1 Introduction

## ❖ Water problems



## ***2 National policy and regulation of Ministry***

## ***2 National policy and regulation of Ministry***

➔ Scientific concept of development

➔ Ecological civilization

➔ New thoughts for water resources management



## *Water Law of PRC(2002)*



**With respect to the exploitation, utilization..... of water resources ....., planning should be carried out:**

**in a comprehensive and systematic manner**

**with all aspects being taken into account**

**with emphases on multiple purpose uses**

**to allow full play to the multiple functions of water resources**

**rational allocation among domestic, industrial and ecological water users**



## *Water Law of PRC(2002)*

In the process of making planning of the exploitation and ..... of water resource,

**maintain a reasonable flow of rivers**

**maintain reasonable water level of lakes, reservoirs and groundwater**

**maintain the natural purification capacity of water bodies**



## *Environment Impact Assessment Law of PRC(2003)*



- to analyze, estimate and assess the environment impacts possibly caused by planned or constructed projects
- to propose countermeasure to prevent or alleviate adverse environment impacts
- environment impact assessment should be conducted on relevant planning of land utilization and exploitation planning of regions, watersheds and sea areas

## ***2 National policy and regulation of Ministry***

### **Regulations of Ministries**

**Ministry of Water Resources  
(MWP)**

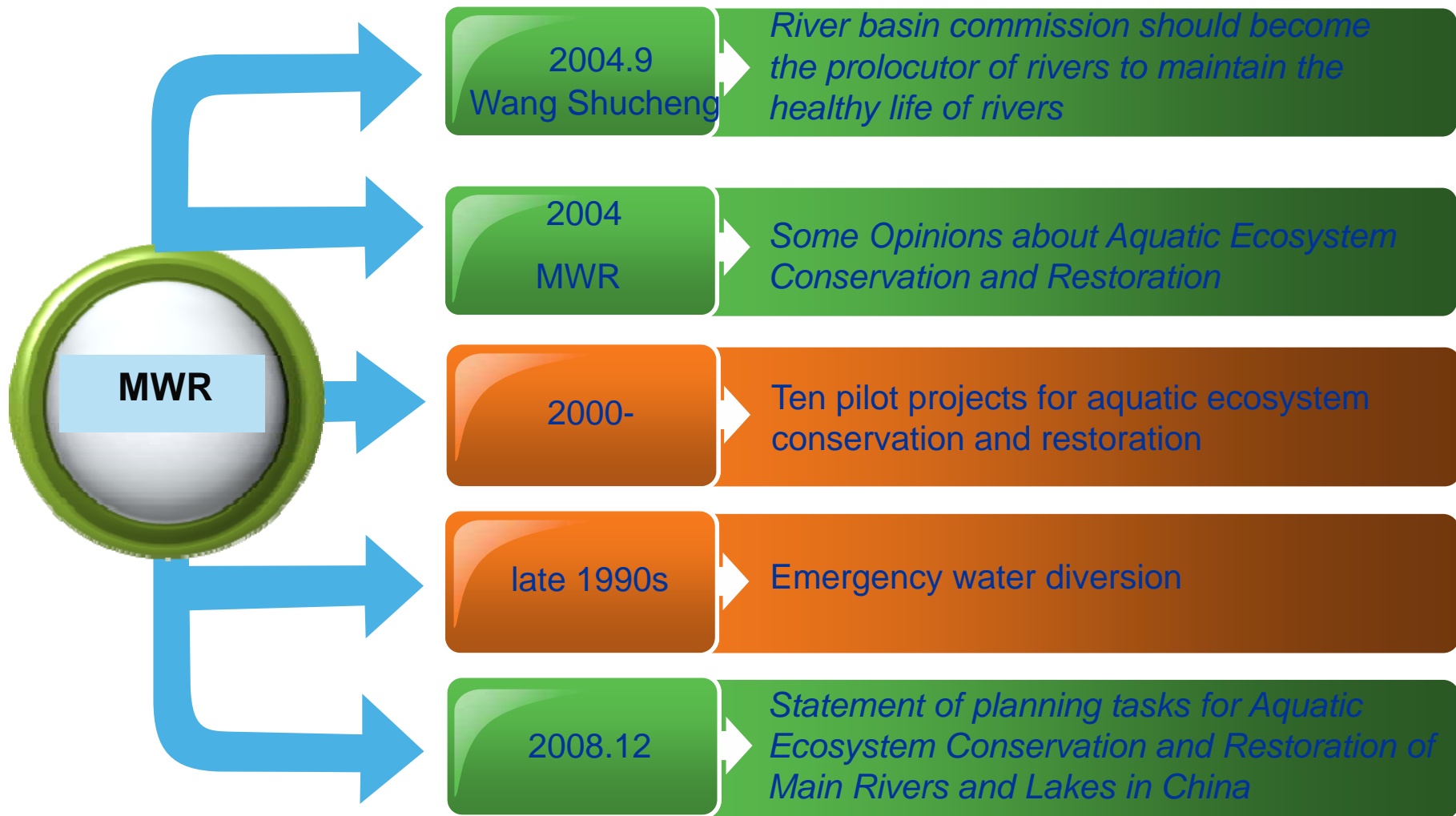
**Ministry of Environment Protection  
(MEP)**

**wetlands conservation**

**protection of special fish resources**



## Regulations of Ministries - **MWR**



## *Regulations of Ministries - **MEP***

*Letting rivers and lakes rest in peace and rehabilitate themselves*

*Guidelines for the Plan on the Protection and Utilization of National Resources of Biological Species*

*Guidelines for the Plan on National Key Ecological Functional Protected Areas*

*National Ecological Regionalization*

*Policy of total amount control*



## *Main natural conservation regions*

China had established 2358 nature conservation regions of various types and grades.  
The total area of conservation regions has amounted to 148,943,000 hm<sup>2</sup>



**Changbaishan**



**Qinghaihu lake birds**



**Dafeng elk**

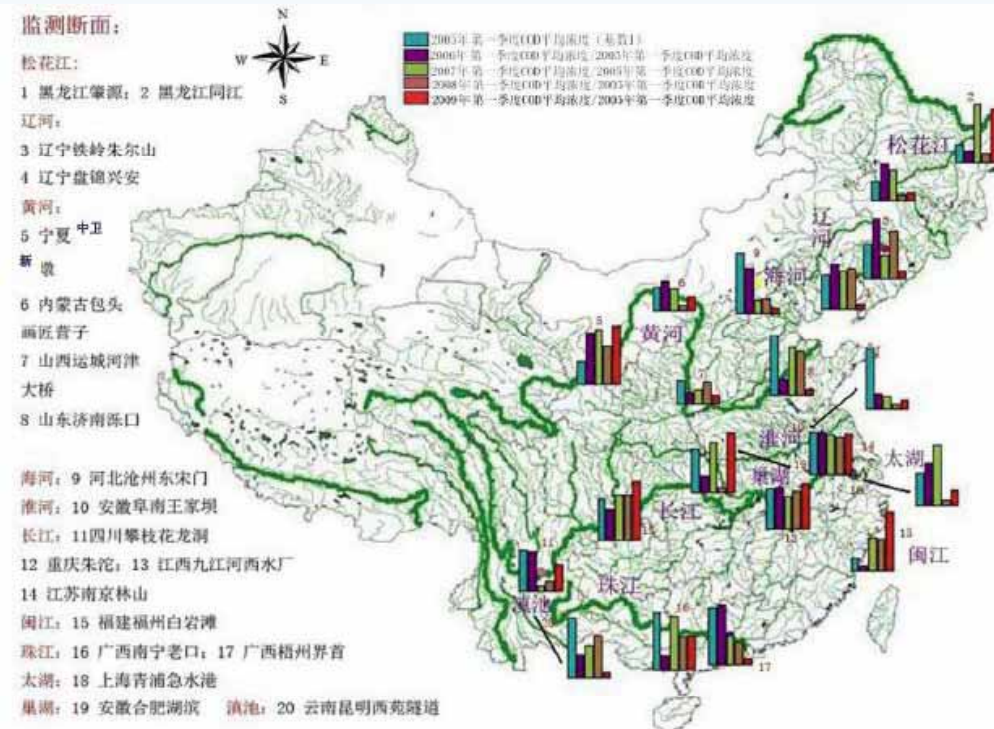


**Zhalong Wetland**



**Sichuan panda**

## Policy of total amount control of pollutants



COD concentration  
of key sections in  
the first quarter of  
2005-2009

- chemical oxygen demand (COD) concentration is decreased from 2005 to 2009 because of the policy of total amount control .
- By 2010, 70 percent of urban sewage will be processed before being discharged and COD will drop by 10 percent from the 2005 level.

## *Regulations of Ministries -*

### wetlands conservation

- 1992: acceded to the Convention on Wetlands of International Importance Especially as Waterfowl Habitat*
- 1992:six Chinese wetlands became the first set of international important wetlands*
- 2000: Chinese Wetlands Conservation Action*
- 2006: The first national wetland resources survey*





5 types:

- ❖ Coastal wetlands,
- ❖ River wetlands,
- ❖ Lake wetlands,
- ❖ Swamp wetlands,
- ❖ Reservoir and ponds wetlands (constructed wetlands)

## Main international important wetlands

# 中国 国际重要湿地分布图

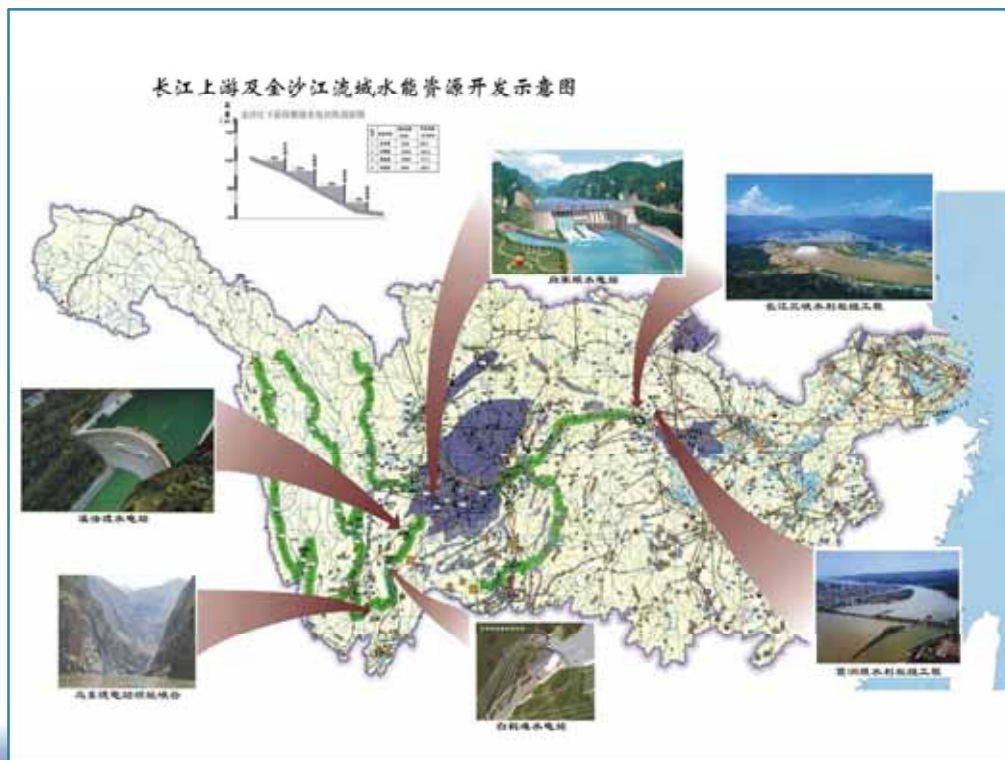


- ❖ 36 natural conservation regions are listed in international important wetlands table of Ramsar Convention



## Regulations of Ministries -

- ❖ Aim : To take into account both hydropower exploitation and the protection of specific fish resources
- ❖ National nature reserve for precious, rare and endemic fish species in the upper Yangtze River was established in April of 2005
- ❖ The nature reserves are divided into core, buffer and experimental zones.



白鲟

*Psephurus gladius*



达氏鲟

*Acipenser dabryanus*



胭脂鱼

*Myxocyprinus asiaticus*



长薄鳅

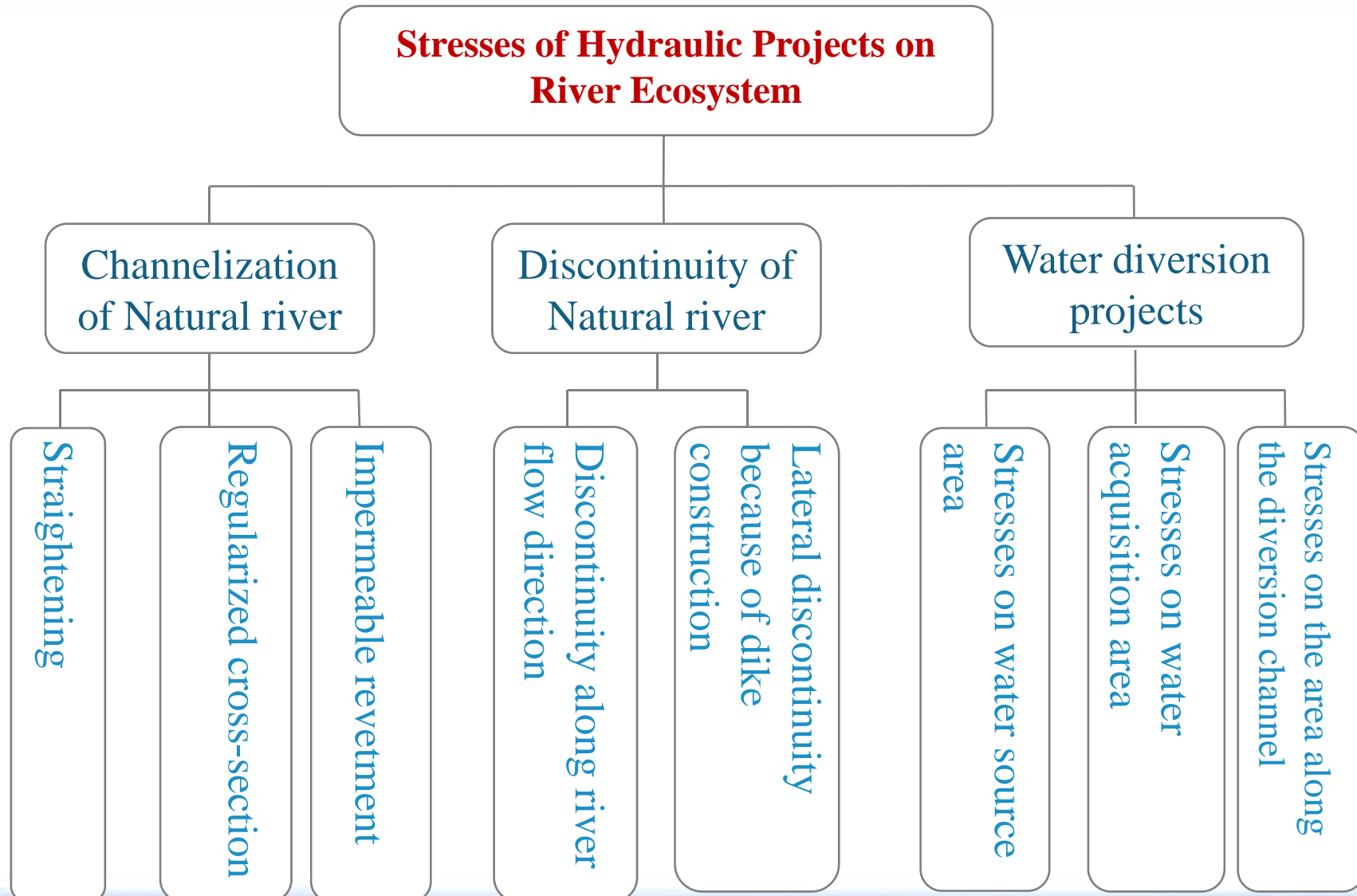
*Leptobotia elongata*

# ***3 Progress in river restoration theories and technologies***

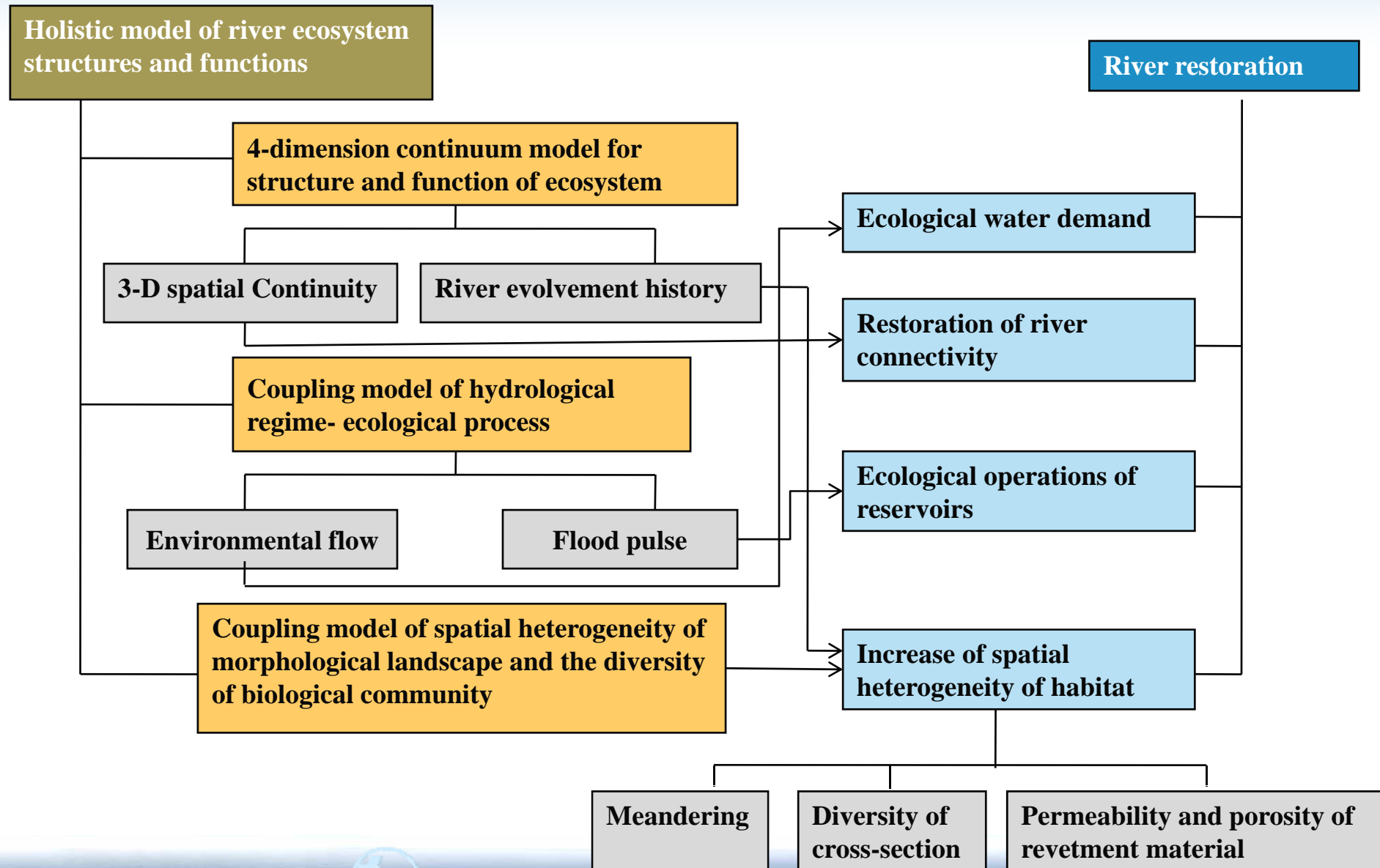
## *Stresses of Hydraulic Projects on River Ecosystem*



### 3.1 Stress mechanism of hydraulic engineering on river ecosystem and river restoration models



### 3.1 Stress mechanism of hydraulic engineering on river ecosystem and river restoration models





# Long-Term Ecological Effects of Large Dams on the Important Living Resources

Effect degree, characteristics and area

Important living resources and protection strategy

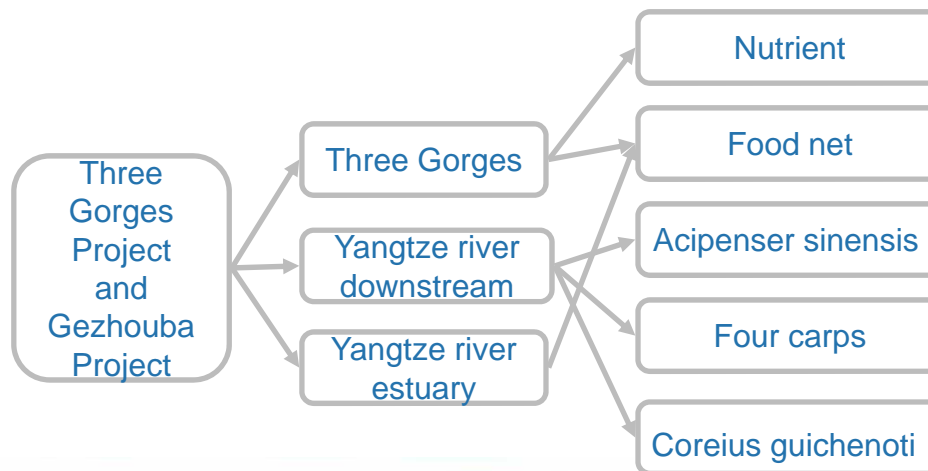
Method of sustainable utility of water resources and living resources

Research objectives

Large dams

Impact area

Important living resources



2009-10-9



China Institute of Water Resources and Hydropower Research

The website displays the title "大型水利工程对长江流域重要生物资源的长期生态效应" (Large Term Ecological Effects of Large Hydraulic Engineering on Important Living Resources in Yangtze Basin). It features a navigation bar with links such as "首页" (Home), "新闻动态" (News), "科学文档" (Scientific Documents), "在线文献库" (Online Literature Library), "学术论坛" (Academic Forum), "成果发布" (Results Release), "资料库" (Data Library), "项目信息" (Project Information), and "GIS平台" (GIS Platform). The main content area includes sections for "新闻动态" (News), "项目信息" (Project Information), "研究成果" (Research Results), "科技论坛" (Science Forum), and "GIS平台" (GIS Platform). The right sidebar contains a "系统登录" (System Login) section, a "通知公告" (Notice) section, and a "联系我们" (Contact Us) section.

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## 3.2 Ecological water demand



Liu Changming  
( 1999 )

Yan Denghua  
( 2007 )

Lian Yu  
( 2008 )

- put forward the principles of balances in four aspects
- worked out the framework to study ecological water demand under water use competition
- adopting the principle and methodology of landscape ecology
- established the models to assess environmental water demand of the Yellow River Delta

### 3.3 River health assessment



#### Healthy life of the river

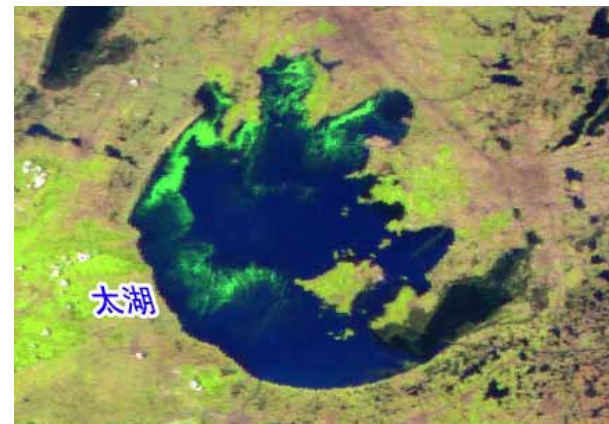
- no dyke breaches
- no depletion
- no pollution exceeding the standards
- no rising of the riverbed



Yellow River

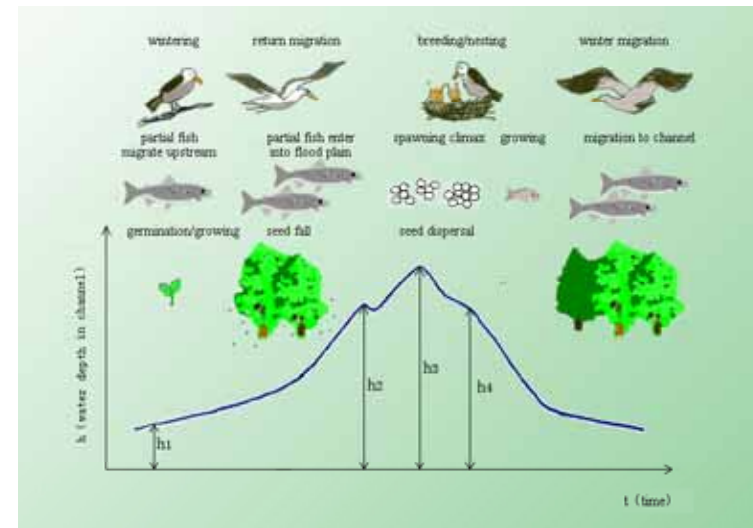
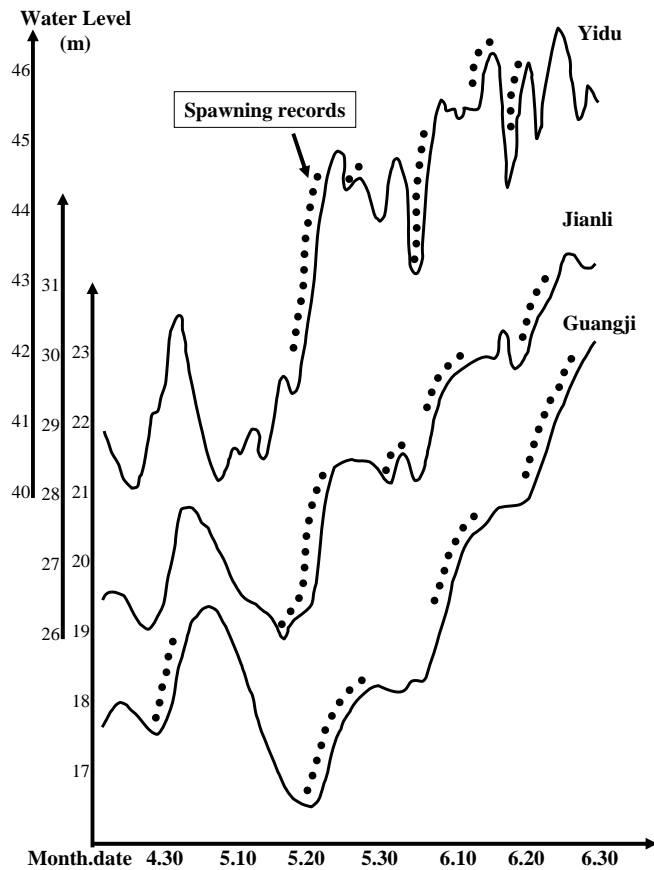


Pearl River



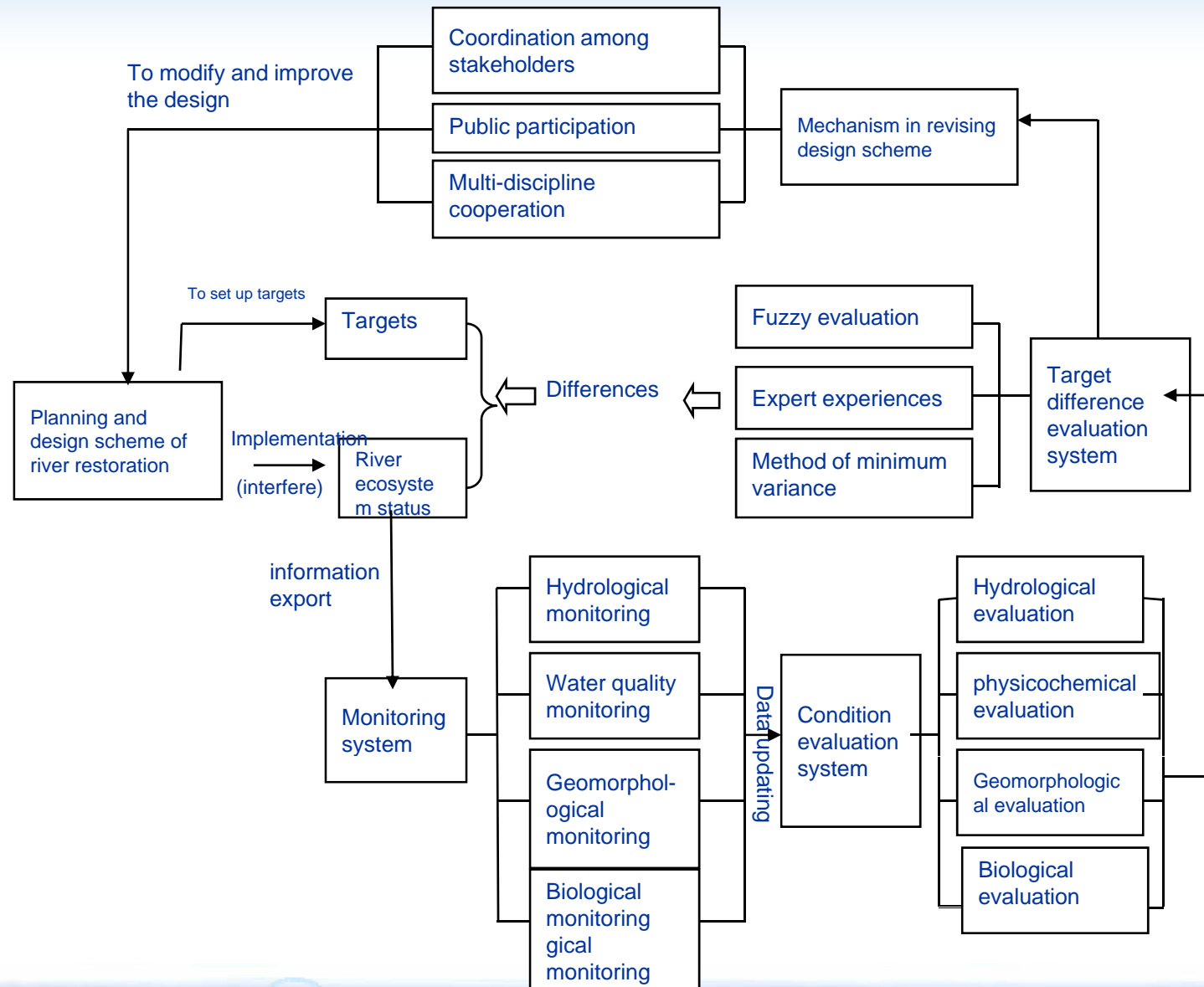
Taihu Lake

### 3.4 Ecological effect of flood pulse





### 3.5 Adaptive management of river restoration





# ***4 Typical cases of river conservation and restoration***



## *Water diversion to the Yellow River delta*



### **Aims**

stabilize and expand the estuarine wetland, improve the wetland ecosystem and protect the biodiversity

### **Activity**

13.56 Mm<sup>3</sup> water had been diverted to the Yellow River estuarine wetland

### **Effects**

The water area in the wetland is increased.  
Groundwater level is increased .  
Coastal freshwater supplement is increased.  
Appropriate runoff process can be produced .  
Land reclamation process can be expedited .



## *Integrated management of Tarim River basin*



### ❖ 2001~2006, eight times

- from Bosten Lake to the lower reach of Tarim River
- the total water quantity: 22.75 billion  $m^3$
- Length of restored segment: 360km

### ❖ 2008

- from Akesu River basin
- the total water quantity : 0.2 billion  $m^3$



## *The training of urban lake and river system*

- ❖ Many cities of China have taken actions to make planning and practices on the environmental improvement of rivers and lakes.
- ❖ Beijing, Shanghai, Guilin, Wuhan, etc.

**Planning  
and  
design  
principles**

- **maintaining its natural meandering and width;**
- **Stones and wood-like concrete piles;**
- **porous and pervious materials and live vegetation for riverbank protection and erosion control.**

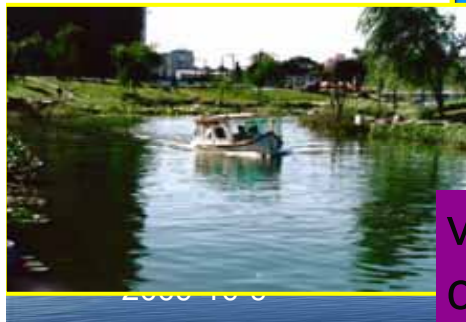
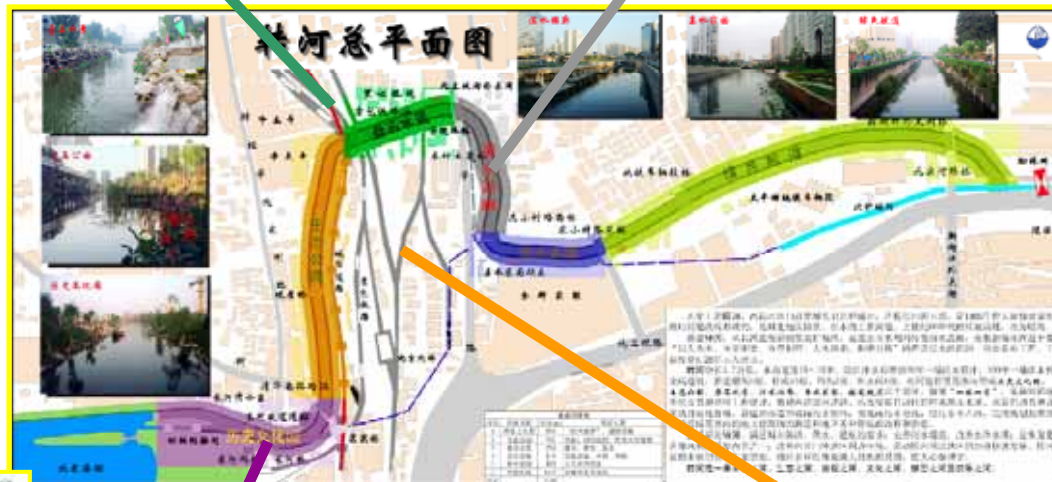


# Zhuanhe river environment improvement project, 2001-2003



stone and water  
sightseeing

riparian travel  
corridor



vegetated navigation  
channel

Ecological park





## *The training of urban lake and river system*



❖ Olympic Dragon-shaped Water system



## *Ecological restoration of rural rivers*

### ❖ Xinjiangtang River in Haining county in Zhejiang Province



- ❖ Natural river form
- ❖ Diverse cross-section
- ❖ Diversity of aquatic habitat
- ❖ Plant revetment
- ❖ Diverse plants for landscape enhancement



- Benefits of traditional hydraulic projects
- Water quality improvement
- Increase of biodiversity
- Cost saving of 1 million Yuan/km



## 5 Conclusive remarks

- ❖ Water pollution control should be put in top priority and then ecological restoration can be realized.
- ❖ The spatial and temporal scale issues need much concerns and long-term planning in river basin scale should be carried out.
- ❖ Monitoring and evaluation should be strengthened, esp. the coupling monitoring of fluvial ecosystem and river process.



## 5 Conclusive remarks

- ❖ **Studies still need to be conducted in project planning and operation technologies in order to achieve the objectives of ecological securities of river basins.**
- ❖ **It is suggested to carry out planning, design, construction and adaptive management of river training projects for the benefits of ecological conservation and restoration.**
- ❖ **Related technical standards and regulations for the planning and design of river restoration projects should be worked out.**



The image is a composite graphic. The top half features a light blue background with a faint, pixelated world map. Below this, a bright blue sky with white clouds is visible. In the center-right, there is a small, green, oval-shaped island with a single, rounded green tree. To the right of the island, a blue, oval-shaped object, possibly a satellite or a piece of debris, is shown in motion. The bottom half of the image depicts a deep blue ocean with white, stylized waves. The text "Thank You !" is written in a large, blue, sans-serif font with a white outline, positioned in the lower-left quadrant of the image.

Thank You !