1. IWRM in China

2. Irrigation water management for IWRM

3. Practices in Ganfu Plain Irrigation District

4. Perspectives
IWRM in China

Water scarcity and drought

Flood disaster

Water environment degradation
IWRM in China

- Legal framework for IWRM

First step: Combination of river basin management and regional administrative management
IWRM in China

- Legal framework for IWRM

Combination of river basin management and regional administrative management

- Water Pollution Control Act (2008)

Allocation of water, rights and permits
- Watershed management
- Water use efficiency
- Water protection
Outline

1. IWRM in China
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Irrigation water management for IWRM

- A large proportion of water consumption
- Water losses in many aspects

- Agricultural, 65.0%
- Industrial, 22.2%
- Domestic, 11.7%
- Ecological, 1.7%
Irrigation water management for IWRM

- A large proportion of water consumption
- Water losses in many aspects

Leak through pipes or seepage through canals
Evaporation during transportation
Surface runoff
Deep percolation
Irrigation water management for IWRM

- Continued construction and water-saving transformation of large-scaled irrigation districts

- Improved irrigation infrastructures

- 1998-2020
- 456 Large-scaled irrigation districts (>20,000 ha)
- More than 5200 medium-scaled (667-20,000 ha)
- More than 1 B small size (<667 ha)
Irrigation water management for IWRM

- **National Water-saving Strategy**

  - **North:** Saving water and reducing GW abstraction
  - **Northwest:** Saving water and increasing efficiency
  - **Northeast:** Saving water and increasing food production
  - **South:** Saving water and reducing pollution
Irrigation water management for IWRM

Liuyuankou Irrigation System

- Shallow groundwater table causes a lot of evaporative water losses
- How to quantify regional evaporative losses?
- How to improve unreasonable irrigation management?

Continuous pumping and insufficient recharge lead to decreasing groundwater depth and increasing pumping cost.
Liuyuankou Irrigation System

- We proposed a distributed method for computation of regional groundwater evaporation
- A new strategy for conjunctive use of surface and ground water is proposed to reduce evaporative losses

3 BCM/year can be saved and reduce 36% of water diversion from the Yellow River

Irrigation water management for IWRM

Yujiang Xiong, Shizhang Peng, **Yufeng Luo***, et al. A paddy eco-ditch and wetland system to reduce non-point source pollution from rice-based production system while maintaining water use efficiency. Environmental Science and Pollution Research, 2015, 22(6): 4406–4417


Irrigation water management for IWRM

Lahsa River Basin

- Pengbo Irrigation District
- Moda Irrigation District
- Pangduo Dam
- Zhikong Dam
- Lahsa City
- Moda Irrigation District

- How to understand the complex water-power-environment nexus?
- How to adapt to reduced irrigation water availability?

Experience from Nepal might be helpful
1. IWRM in China

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Practices in Ganfu Plain Irrigation District

- **Physical geography**
  
  **Location:** the downstream delta of Gan River and Fu River in the north-central Jiangxi Province. Crosses Nanchang City and six counties

  **Water source:** Fuhe River

  **Downstream water body:** Lake Poyang, the largest fresh water lake in China

  **Crops:** Two seasons irrigated lowland rice

  **Climate:** Subtropical humid monsoon with hot and wet summer and cold and dry winter
Practices in Ganfu Plain Irrigation District

- **NPS control**
- Urban water supply source
- Prevention of eutrophication in Poyang Lake
NPS control

- Rice straw
- Pesticide package waste
- Aquaculture water

Low water level:
- Lake Poyang

Variation tendency of eutrophication index
• A three-defense line system for NPS control

First defense line
Source control of non-point source pollution

Alternate dry and wetting for rice  \(\rightarrow\)  base fertilizer and secondary fertilization

Second defense line
Purification by irrigation-controlled drainage

Third defense line
Purification by artificial wetland system
Practices in Ganfu Plain Irrigation District

- A three-defense line system for NPS control

Before and after images showing decreased turbidity in water quality after implementation of the defense line system.
Practices in Ganfu Plain Irrigation District

- **Water landscape construction**
  - a. Fuhe Oxbow ecological construction
    - Sustain original river configuration
    - Artificial wetland and ecological pond sewage treatment technology for rural sewage treatment
Practices in Ganfu Plain Irrigation District

- Water landscape construction
  - Fuhe Oxbow ecological construction
Practices in Ganfu Plain Irrigation District

- Water landscape construction
  b. Ecological construction of trunk canal bank
    Transformation of the 5th and 6th trunk cannal function:

    - Field irrigation
    - Environmental water supply

  ♦ Ecological bank protection
Practices in Ganfu Plain Irrigation District

- **Water landscape construction**
  - b. Ecological construction of trunk canal bank

- **Artificial Floating Island**
  - Chinampa
  - Plant roots
  - Contact materials
  - Insects
  - Birds
  - Amphibians
  - Fish
  - Micropopulation
Practices in Ganfu Plain Irrigation District

- **Informatization of irrigation district**
  
  a. **Information acquisition and transmission system**
     
     Install video surveillance system and flow measurement facilities
  
  c. **Information center construction**
     
     Improve network data security handling system including firewall, information dispatching center, etc.
  
  b. **System operation software**
     
     Flow measurement softwares and real-time data transmission software
  
  d. **Information branch center construction**
     
     Add computer equipment
Practices in Ganfu Plain Irrigation District

- **Infrastructure construction**

  *Before*

  *After*

  - sod revetment
  - Precast block of hexagonal concrete block
Practices in Ganfu Plain Irrigation District

- Infrastructure construction
  - Water diversion sluice modification
    - Roof waterproof
    - Chamber decoration
    - Replace gate hosit

Zhoufang Gate
Increasing public awareness

Water Culture activities

- Publishing *Jiangxi Water Culture Journal*
- Regular cultural activities, Jiangxi Water Conservancy Osmanthus Festival
Practices in Ganfu Plain Irrigation District

- **Increasing public awareness**

Ganfu Plain Irrigation District Museum

- Sculpture
- Video room
Practices in Ganfu Plain Irrigation District

- **Increasing public awareness**
  - Water education
  - Water S&T demonstration
Practices in Ganfu Plain Irrigation District

- Increasing public awareness

Recreational Facilities

- Sunrise seeing inlet
- Water culture corridor
- Eggret Bay Villa
- Tennis court
Toward to modern irrigation district (2020-2030)

- Further improvement of irrigation infrastructure
- Improving management through modern technologies
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Perspectives

- More involvement in UNESCO programmes and activities to learn and share
- Cooperations under the Belt and Road Initiative
About 30 participants from:
Cambodia, Laos, Myanmar, Thailand, Vietnam
Thank you very much

Terima kasih

谢谢

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