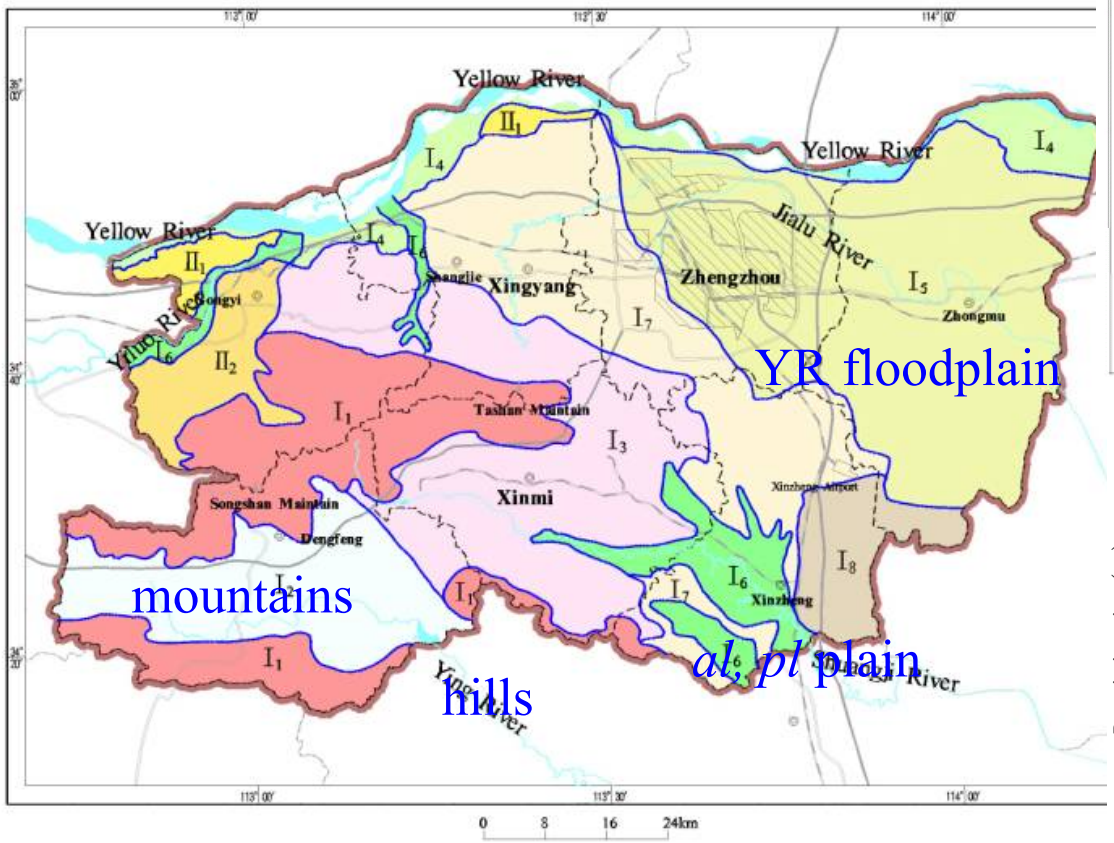
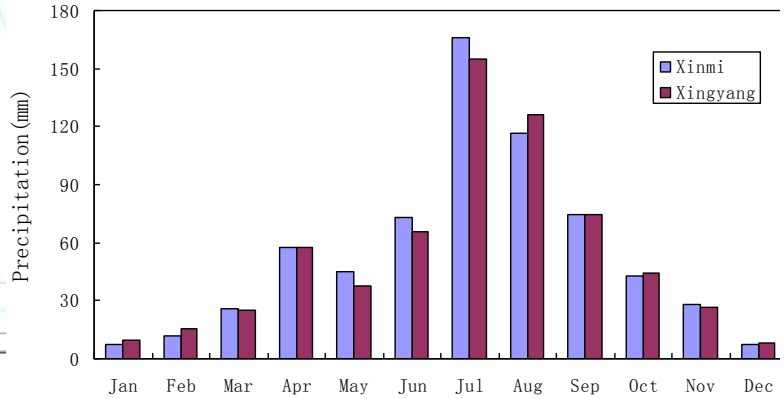
Groundwater Governance in the Zhengzhou region, China

Menggui JIN
School of Environmental Studies
China University of Geosciences
Wuhan, Hubei 430074, China
Email: mgjin@cug.edu.cn

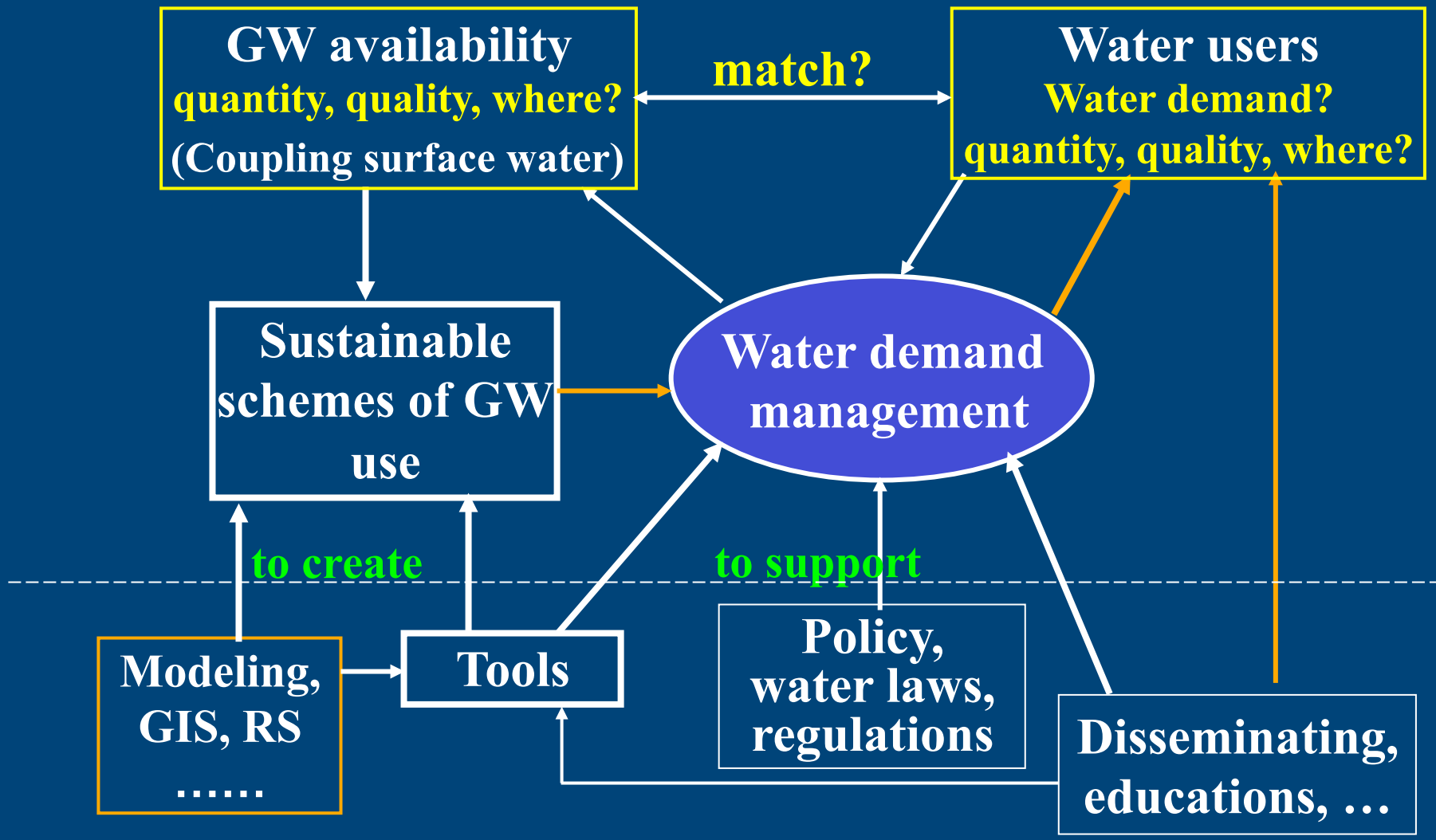
Background of Zhengzhou



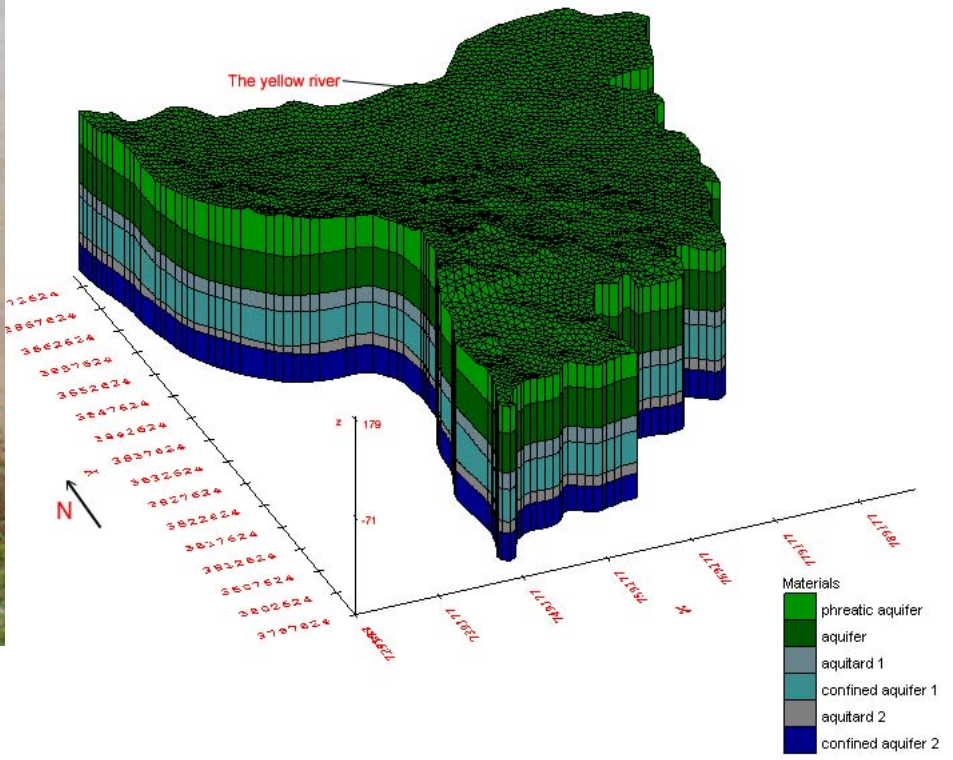


Zhengzhou Municipal Region has an area of 7,446 km^2.
Population 9.10M (2011); GDP 491.27 billion RMB(2011).
Mean annual precipitation 633 mm (575-700 mm).

- Key issues for GWG (Jin,2007)



- **Field investigation, sampling, interview with water users and government officers, database creating, and numerical modeling, …**



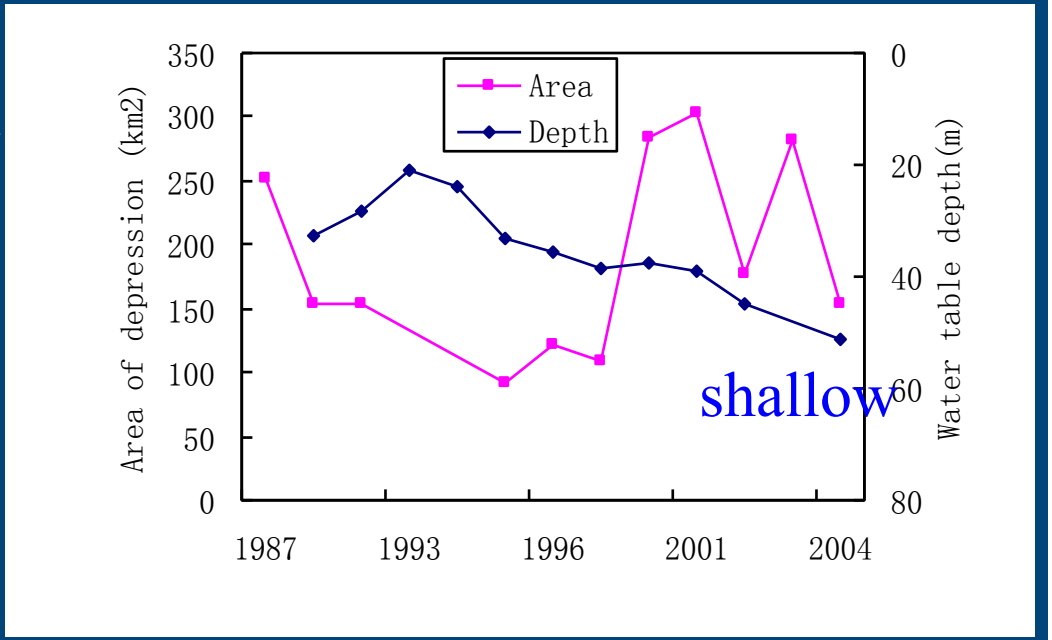
中国地质大学水资源研究所
Institute of Water Resources, CUG

Water situation of Zhengzhou

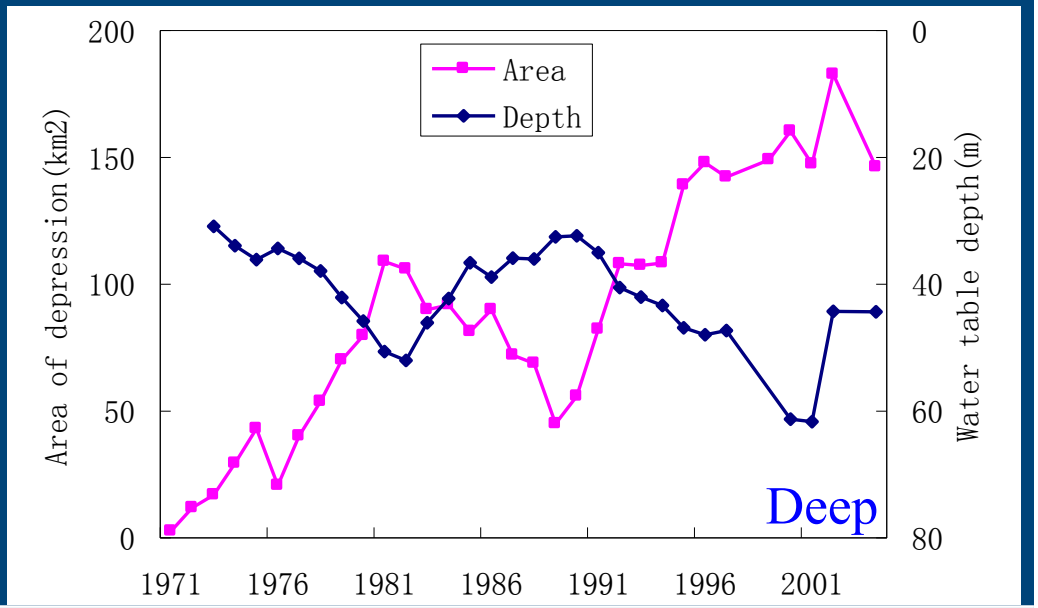
- Total water resources is $1.40\times10^9 m^3/yr$. Per capita water is less than 190 m^3
- Total water use was 1.6245 billion m^3 (2011), in which 0.99 billion m^3 from GW
- 43 K ha cultivated lands may be threatened by drought every year because of no water for irrigation in the west mountainous area.

Declining of water level and increase of depression cones

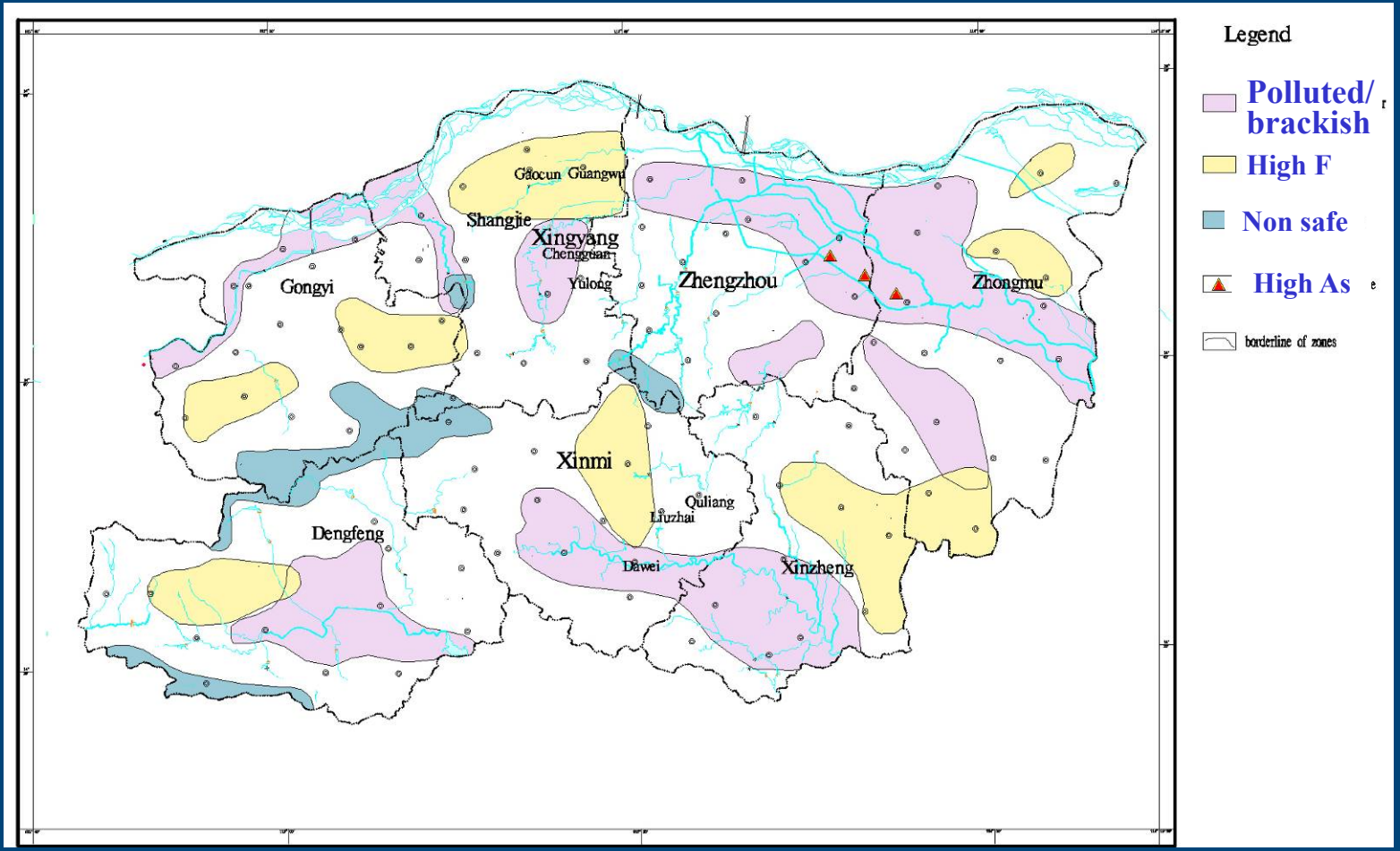
- Area of depression cone & deepest water table for shallow aquifers (Guomian 3)
- declined 30m (50m)



- Area of depression cone & deepest water level for deep aquifers (Guomian 3)
- declined 30m (60)



Distribution of lower quality of GW



- **Shallow GW in many areas of Zhengzhou has been polluted or lower quality.**

Safe drinking water for rural people

- 1.5 M people can not drink safety water(2006).
  - 621 K drinking polluted water;
  - 361 K drinking brackish water;
  - 233 K drinking high fluorine water;
  - and 4.35 K drinking high arsenic water.
- Government launched a project to solve the drink water problems by drilling deep well and rainwater harvest years ago.

Institutions related to GW in Zhengzhou

- Water Resources Bureau of Zhengzhou:
  - Water Resources Management Office - urban GW
  - Irrigation, Drainage and Rural Water Supply - rural GW
  - County-level of Water Resources Bureau
- Environmental Protection Bureau of Zhengzhou
- Henan Institute of Environmental Geology Monitoring
- Zhengzhou Water Supply Corporation
- Municipal Bureau of Zhengzhou
- Yellow River Conservancy Commission

Institutional problems of GWG

- MWR has been officially authorized to manage both groundwater and surface water since 1998, but the problems still remain:
- Separate management of GW quantity and quality
- Separate management of urban area and rural area
- Overlapped management of some functions
- Lack of good communication among different departments

Laws and Regulations

- **The six laws related to GW:**
  - water law of PR China
  - environmental protection law of PR China
  - law of PR China on the prevention and control of water pollution
  - flood control law of PR China
  - law of PR China on water and soil conservation
  - administration of water abstract licensing and collection of water resources charges
- 14+ regulations or policy documents since 1994
- **But there are no detail item on GW governance except the regulation on water abstract licensing and water saving irrigation.**

Water abstract licensing-rural

- By the regulation, most of water abstract needs getting license
  - Many irrigation wells have not got the water abstract license.
- The regulation (version 2006) emphasized that users who fight a drought of agriculture need not applying license.

Water abstract licensing-urban

- has been carried out strictly in urban areas. New tube wells have been forbidden in some over-exploited areas.
- IC card system are used to control well pumping for more than 10, 000 tube wells.

IC card irrigation system

- IC card system to control well pumping for irrigation in Xinzheng, Zhongmu… .

Reasons for low efficient water management

- Water use rights not-well-defined (esp. GW),
- Low water prices, or electricity-cost-only of GW abstraction
- Poor consciousness on water-saving practices
- Insufficient investigation and understanding on GW in the area
- Weak public awareness of GW knowledge
- Poor communication/big gaps between researchers, users and managers on water resources (esp. GW)

Suggestions to GW Governance in Zhengzhou

- Efficient use of allocated water from Yellow River and SNWTP
- Changing cropping patterns and industry structures,
- Adapting water saving technologies,
- New wells should be issued based on sustainable schemes of GW use
- Reforming water pricing or subsidy
- Enhance public awareness of groundwater

Summaries

- GW pollution and over-exploitation need to be efficiently controlled urgently. These need further research on both technical and non-technical aspects. It needs efficient approaches for GW governance.
- GW governance institutions need to be coordinated
- Sustainable GW development and governance is a complex systems engineering.
- Our proposed schemes/ planning of GW development should be user friendly, easy to be understood on the basis of well investigation and well consideration of user’s demand.

Summaries

- **To achieve sustainable use of GW needs efforts from all of the world (scientists, decision makers and all individual water users)**. The most important things are:

  To enhance public awareness and knowledge of GW; and to create a work desk for better communication among water managements, planners, decision-makers, scientists, water users and others to exchange ideas and knowledge and reduce the gaps between different parties.

Acknowledgements

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Thank you very much