

Water Scarcity and its Management in the Yellow River

Jon Barnett
Michael Webber
Mark Wang
Brian Finlayson



THE UNIVERSITY OF
MELBOURNE



Outline

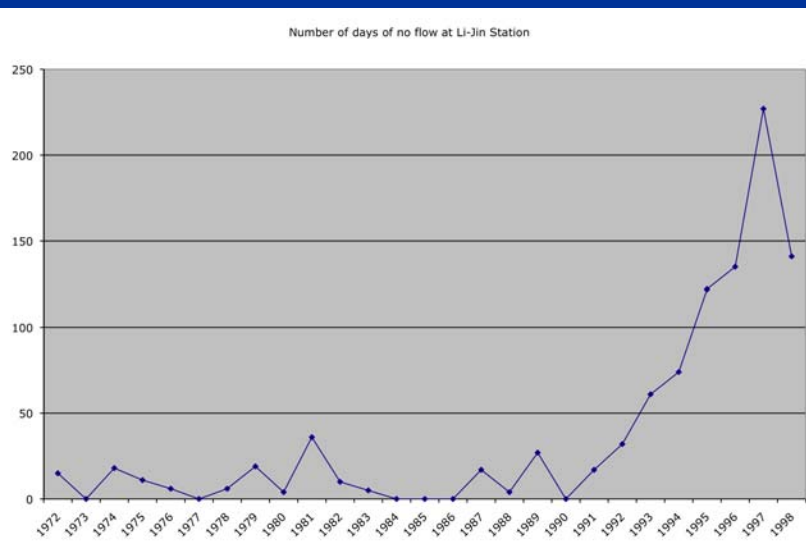
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The causes of scarcity

Water scarcity in the Yellow River basin:

- 500 m³ of water / person
- Increasing number of no-flow days 1990-1997
- Groundwater resources overdrawn (spatially uneven)



The causes of scarcity

Most analyses are quick to blame farmers, saying they use too much water, and use it inefficiently

- This is true, sort of: farming uses ~80% of YR water, but:
 1. Decisions about supply of water are often made outside the farming unit
 2. Losses from channels are the major losses (50-60% loss rate)
 3. Urban uses increased > 400% since 1980
 4. Industrial uses increased > 200 % since 1980 (and pollution diminishes effective supply)

The causes of scarcity

5. Changed geography of agriculture since 1980

- the N C Plain now produces 60% of China's wheat and 40% of its corn, (on 22% of China's cultivated land and 4% of its water)

Scarcity is caused by sustained rapid economic growth stimulated by the transition (1978+):

- water resource management institutions lagging
- not so much resource scarcity as scarcity of appropriate management

The three big ideas

Three prevailing approaches to managing water scarcity in the north have emerged:

1. Top-down / command and control style management
2. Large water infrastructure projects
3. Water pricing systems

Searching for magic bullets to complex policy problems

1. Management from above

After the 1997 no-flow event:

- all gates along the Yellow River now remotely controlled and monitored
- they can only be opened by the YRCC in Zhengzhou
- quota system to distribute water to users



1. Management from above

- The quota system is theoretically responsive to agricultural demands
 - requests from villages aggregate up through *tiao tiao* system to YRCC
- In practice farmers have little power, and their demand is not prioritised
 - get water when they get it
 - do not often get water when they need it
 - so increasing use of groundwater



2. Large water projects

Ten medium/large structures

- Latest and largest is Xiaolangdi dam
- 160,000 people / ~150 villages resettled thus far
- Ensures river flows to sea all year round



South North Water Transfer

- 50 years to complete at a cost estimated US\$58 billion



3. Pricing

ADB, World Bank, Aid agencies, some environmentalists, and to some extent YRCC advocate universal pricing of water

“Governments and civil society need to see water as an economic good” (ADB 2003)

Preconditions are lacking, such as:

- institutions that assign and enforce transferrable rights across millions of users
- a transparent system that all users understand and have access to information about
- infrastructure to meter and transfer water

3. Pricing

Farmers do not have the option of being more efficient users of water

- cannot store water
- already pay high volumetric prices - the cost of pumping can be 30x the official price of water

So, any price increase is effectively a tax on farmers for little return in water



An alternative idea

Address management systems and infrastructure, at the local scale (irrigation districts / city)

Develop simple markets first

- storage outside water gates, and pipe to fields
 - save 50% of water lost from channels
 - gives farmers control of irrigation scheduling
 - reduces pumping costs
 - more efficient use of water on-farms
- saved water or higher returns from its use

An alternative idea

But who pays for the infrastructure ?

- a) an organisation invests in return for the water saved, or
- b) irrigation collective borrows and repays:
 - by selling saved water to a city, firm, or the state
 - with income from higher yields or new crops

Requires a regulator to allocate rights and establish contracts

Not universally applicable, but might work in the lower Yellow River

Conclusions

- Analysis of the cause of scarcity is misplaced, not farmers but rather management institutions unable to keep up with rapid change since 1978
- Top down responses are inequitable (at least as far as farmers are concerned)
- Engineering responses are costly (economically and socially)
- Charging individual users is premature, and would be inequitable

Conclusions

Instead

- allocate rights to agglomerated entities (irrigation districts, cities..)
- widespread small scale technologies (pipes, small dams) to reduce losses and empower farmers
- simple markets and prices

More equitable, efficient and practical

