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The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries: Cambodia, China, Indonesia, Laos, Malaysia, Papua New Guinea, the Philippines, Sri Lanka, Thailand, and Viet Nam. Its goal is to strengthen local capacity for the economic analysis of environmental problems so that researchers can provide sound advice to policymakers.

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Water Woes : Why Water Quota Systems in China are Not Working

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In many parts of Southeast Asia, farming, industry, commerce and urban communities compete for dwindling water supplies. Some countries have tried to deal with this problem and share water efficiently and fairly by using tradable water use quotas. Such systems have not, however, been easy to implement.



A summary of EEPSEA Research Report 2005-RR8, *Barriers to Water Markets in China's Heihe River Basin* by Junlian Zhang, College of Resource and Environment, China Agricultural University, No.2 Yuanmingyuan West Road, Beijing, 100094, China.

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“It is clear that the system...”

➡ A new study from China has looked at the performance of the country's first tradable water use rights (WUR) system in Zhangye City. It found that the system was encountering significant problems. One of the underlying issues is the financial insecurity of farmers. There are also problems with the system itself, which encourages a “use it or lose it” attitude to water consumption. The study concludes that water use quotas and trading in China must go hand in hand with social and administrative improvements if it is to succeed.

A Parched City

Zhangye City is in Gansu Province. The city is 42,000 km² in size and has a population of 1.264 million people. There are 260,000 hectares of farmland around the city.

Zhangye City is severely short of water. It is located in one of the driest zones in the world and is mainly watered by the Heihe River. Almost all the water from the Heihe is currently extracted for irrigation and this has caused widespread desertification.

Agriculture uses 95% of all available water, but there are only 9,937 cubic meters of water available per hectare of farmland - 29% of the average figure for China. There is not enough water for industrial and commercial needs and this is hampering economic development.

One of the reasons for this water scarcity is the fact that the efficiency of water use is very low. Farmers continue to plant water-intensive crops and use old, inefficient irrigation methods. Water use efficiency in Zhangye's agriculture

sector is between 20-30%, far lower than in developed countries, where it averages around 70%.

The Government's Response

The government reacted to this situation by setting up a pilot project in early 2002 to try to find the best way to encourage water conservation and to effectively allocate water resources. The project involved the construction of a water-saving irrigation system, the installation of water metering and the establishment of the water use rights (WUR) system under investigation.

Under the WUR system, every water user gets a water quota fixed by the government. Water quotas (from the Heihe River) are allocated proportionally to all water users based on their respective historical usage. In the agricultural sector, this is

Adherence to water quotas in five irrigation areas in Zhangye City

Irrigation area	% of groundwater quota to total water quota	% of households whose actual water use is more than their water quota		
		Total water	Surface water	Groundwater
Hongshuihe	4.1	2.6	0.8	23.8
Daman	35.0	78.1	1.7	98.1
Liyuanhe	24.2	37.6	1.2	87.3
Maying	21.3	23.7	0.9	67.5
Luotuo Cheng	83.8	76.4	1.3	81.7

based on farmland area. Water users get water according to their quotas by paying fees to the water agencies. They must completely utilize their water quotas or sell them. Otherwise, they are forfeited. WUR can be sold, temporarily or permanently.

is not working well."

Getting Information About The System

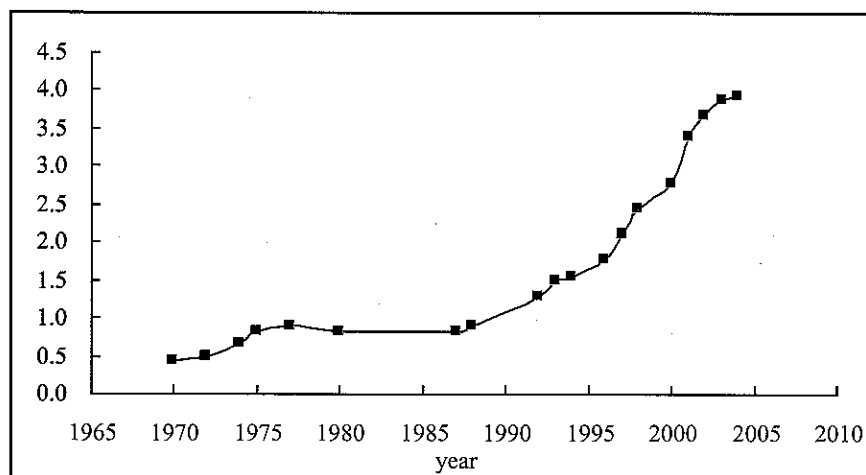
The success or failure of the WUR system is significant for China's overall water conservation efforts. Because of this, Junlian Zhang, from the China Agricultural University, Beijing, aimed to find out how well the system was operating and to see what barriers were standing in its way.

Information was gathered from secondary sources and from surveys carried out in five irrigation areas. Four of these were selected randomly. One area - Hongshuihe - was specially selected as an area for analyzing WUR quota trading because a pre-survey had shown that its WUR system was operating well (a prerequisite if trading is going to happen at all).

Around 800 farmers and 300 water agency officials were interviewed for the study. Information was gathered on the characteristics of the irrigation areas and farmer households. Farmers and local officials were also asked for their opinions about the WUR system and quota trading and about their willingness to accept the system. Finally, respondents were asked which barriers they thought were really holding up the system's implementation.

Why Is The System Failing?

Almost all of the farmers interviewed knew about the WUR system and were



The average number of irrigation wells in the sample villages (1970–2004)

aware of their own water quotas. However, when it came to the implementation of the scheme, there were problems. Farmers ignored their groundwater quotas and adhered only to their surface water quotas. Indeed, as the government has gradually reduced farmers' water quotas (in order to transfer irrigation water to industrial, commercial and ecological uses), many farmers have simply reduced the amount of surface water they use, while increasing the amount of groundwater they extract.

This partly explains why the WUR system was found to be working well in the Hongshuihe irrigation area. In this region, irrigation water comes mainly from a small reservoir and groundwater is scarce and deep. Water quotas are generally adhered to in Hongshuihe. In the four other irrigation areas, the opposite is the case. Here a significant percentage of irrigation water comes from ground water and farmers withdraw

groundwater without considering their groundwater quota limits.

What Are The Barriers To WUR?

In the meantime, Zhangye City's water table is dropping, oases are shrinking and wells are drying up. Obviously, the WUR system will not work well and the aims of the experimental project will not be achieved unless groundwater quotas are strictly adhered to.

Why is the WUR system not being implemented properly? There were no geographical or technical barriers because good water engineering and infrastructure in the region allows water to be easily redistributed to almost all water users. Historical and cultural barriers were also not present because there is a long history and culture of allocating water by quotas in China. Indeed, over 96% of farmers welcomed the WUR system, provided that the government did not

reduce their water quotas, and over 87% thought that the WUR system was similar to past water quota systems.

The main barrier to the system seemed to be the fact that farmers in Zhangye City are poor and are naturally concerned about the income they get from their farmlands. Over 98% of the farmers were not willing to adhere to water quotas if they did not get enough water for their crops. Officials were concerned that monitoring and constraining farmers' irrigation water use would lead to conflicts and disturbances – as had already been the case. The farmers' concerns were compounded by the fact that there is no social security system for farmers in most areas in China. In addition, farmers' non-agricultural jobs are not fixed and lack security.

Another problem is that, at the local level, government water agencies charge for the administration and management of water use. Due to local government budget constraints, all the expenses, including salaries, of the agencies depend on the water fees charged ... which are in turn, related to the amount of water used. The water agencies therefore have no

incentive to force farmers to adhere to groundwater quotas.

What About Water Trading?

In 2003, there were 13 WUR quota trades in the Hongshuihe irrigation area. This indicates that water quota trades are still few and far between and that the WUR quota trading system is not being well implemented. There were a number of reasons for this: Farmers had concerns about the financial risks associated with growing less water-intensive cash crops such as alfalfa. It was also found that water buyers had trouble buying water use rights from farmers with small land parcels (the norm in this region). Moreover, farmers were reluctant to sell water to the government, fearing that it would reduce their water quotas and divert irrigation water to other sectors.

How To Make The WUR Work

Many of the problems associated with the WUR system were found to be social and administrative. To deal with these, the study recommends a number of strategies; in particular it advises that the government should

set up a rural social security system to provide a financial "safety net" for farmers. This should make them more willing to stick to their water quotas, even if it means reducing their farming income. It also recommends that water quotas should be fixed for a long term, such as 30 to 50 years, to stabilize the system so that farmers have more confidence in it. It also suggests that the government provide incentives to farmers who plant crops that need less water and that it should draw up policies to encourage farmers to enlarge the land area under their management.

The study also recommends that the revenue collected by local governments and water agencies no longer depend on local water usage. Instead, policies should encourage these bodies to drive for water conservation. They should also set aside a budget to buy farmers' surplus or saved water when the farmers fail to sell it in the market. Through these policy changes, the "use it or lose it" attitude could be eroded and farmers could be encouraged to save water.

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