

## Im Fokus

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### **“Water Feeding Water” – A New Type of Water Supply Association in Rural China**

### **„Wasser speist Wasser“ – Ein neuer Typ von Wasserzweckverbänden im ländlichen China**

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#### **Abstract**

State involvement in public service functions in Chinese rural areas has steadily decreased in the wake of reforms and the development of the private sector. A prominent example of this is the field of rural water supply facilities, where the life expectancy of a vast range of technical schemes failed to be more than a few years in most cases. At the same time, the bottleneck of dwindling water resources has become a major challenge. The experience of a foreign-assisted development aid project in Shandong province demonstrates an alternative grass-roots approach to the regulatory framework, which is normally provided in a top-down fashion by policies. The experimental establishment of the first rural water association in one township marked the beginning of a spin-off development creating similar associations in other townships in several other counties and culminated in the establishment of the first county-wide organisations. This innovation is now on the verge of serving as a model on a much wider regional scale. The paper analyses the long processes of implementation and their implications for economically efficient and ecologically sound water management in rural China.

*Keywords:* rural China, Shandong, water supply associations, water management, institution-building

#### **Introduction: The Crooked Path to Sustainability**

Rural water supply, especially the provision of hygienic drinking water and irrigation for three-fourths of China's population and their livestock, has long been a secondary issue, in the face of dwindling water resources in big cities and industrial areas and disputes over the environmental dangers of huge dam constructions or the pollution of rivers and seas. Although Chinese urban water supply has a history of more than 125 years, dating back to the first supply facility founded in Lüshun in 1879 (Zhang 2004), while Beijing is looking back

to more than 90 years of urban tap water supply (Sternfeld 2006) nothing similar has happened for the countryside. However, the availability of tap water is one of the most striking features of the rural-urban dichotomy, and irrigation makes up to two-thirds of total water consumption, with supply still falling short of demand. In Shandong province alone, for example, there was "a shortfall of 18 billion cubic meters per year for agriculture" already more than a decade ago (He 1991:39). Consequently, World Bank experts have recommended new approaches in water management, which are more efficient, if water is appropriately priced, as in a market-oriented economy "the long-run sustainability of irrigation and drainage will depend increasingly on self-financing entities" (Nyberg & Rozelle 1999:72). Prime minister Wen Jiabao, himself a qualified geologist, stressed the vital importance of water management during an inspection tour to the project "Diverting water of the south to the north", where Shandong plays a crucial role:

In the case of food or energy shortage there is still the possibility of imports; in the case of water shortage however, relying on imports would be impossible. Therefore water is of the highest value. In order to solve the problem of water resources, it is crucial to [...] set up a water-charge system in accordance with the laws of the market economy. (Fang 2001)

A purely market-oriented approach, however, which takes into account mainly the economic output of advantaged industrial and agricultural areas and urban centers, does not tackle the problem for the majority of the rural population. In the wake of reforms and development of the private sector, state involvement in public service functions in Chinese rural areas has constantly decreased. However, a sometimes resented absence of administrative commitment in management and maintenance of technical devices was felt long before. A prominent example is the field of rural water supply facilities, where life expectancy of a vast range of technical schemes, such as equipment for drinking water and irrigation purposes, in most cases did not operate without difficulties significantly longer than the first few years in function. At the same time the bottle-neck of dwindling water resources along with deteriorating environmental conditions has become a major challenge. How to deal with this growing challenge under the current circumstances, when top-down solutions are neither applicable nor welcome any more by user-groups?

As a solution to the aforementioned requirements, an economically reasonable and ecologically sound management approach which is applicable also in



marginalized areas has recently been initiated in a bilateral developing aid project. This is a first account on field work experiences gained in this respect. As contribution to the national Chinese Poverty Alleviation Programme, the Sino-German Food Security Programme Shandong (in short: FSP Shandong) has been jointly implemented since 1988 by the Bureau of Water Conservancy of Shandong Province and the German Agency for Technical Co-operation (GTZ). The project region covers large parts of the central Shandong mountainous areas, which is influenced by a monsoon climate, with heavy rainfalls concentrated in the summer months and extended dry periods during most of the year. Soil erosion and water shortage have been some of the main causes of poverty. The project aimed at ensuring the drinking water supply for people and domestic livestock, improving production and living conditions by the regulation and afforestation of small water-catchments with a total area of 638 km<sup>2</sup> as well as by irrigation and infrastructural measures (roads and electricity). To protect the water resources from over-exploitation, a water balance survey was carried out covering 87% of the total project area. After more than a decade of implementation, which could be called "the crooked way to sustainability", approximately 1.5 million people were profiting directly from the project by the end of the assistance in 1999. The term "sustainability" refers to:

the extent to which the partner organizations and target groups are willing and able to self-reliantly continue and further develop the innovations effected by the project. (GTZ 1997:307)

The title "Water feeding water" (*yi shui yang shui*) of this article is synonymous to the term "sustainability". It indicates the aim of full recovery of the costs of operation and maintenance, including the costs of simple reproduction and for maintaining the capital stock; provisions for depreciation and major repairs. This paper will analyse the long process and different phases of implementation and its implications for an economically efficient and ecologically sound water management in disadvantaged rural areas.

### **Phase of Controversy – Tradition versus Innovation (1988-1994)**

The crooked path to sustainability which consisted of three major phases started with a period of controversy. A major problem of the FSP from the very beginning was, on the one hand, the task of supporting the poorest and most marginalized segments of the eleven counties and, on the other, of ensuring the technical quality and sustainability of the water supply facilities. As one local

agricultural handbook mentions in 1986, many former water supply systems had been left unfinished, construction quality and standards were bad, and reservoirs threatened to break or lacked equipment to be of any use (Yishui 1986:143). Not only were construction costs in these remote areas higher, the number of beneficiaries was also lower than the average, adding to quite disadvantageous cost-benefit relations. The contribution of users to a long-term operation system was – as in many cases elsewhere in rural China – at best minimally adequate for routine operation and maintenance, but insufficient to cover periodic repairs and the rehabilitation of system structures or future improvements. Farmers, according to Rozelle & Nyberg, “cannot be expected to conserve water or alter their cropping patterns when effective water costs are low or unrelated to the amount used” (Nyberg & Rozelle 1999:73).

The introduction of a rational system of water pricing, demanding the installation of water meters for volumetric measuring, was in the beginning strongly opposed, not only by farmers, but also by project personnel of the responsible water conservancy institutions at various levels. It took several months of ardent discussions until this first step in improving water use efficiency could be made. In addition, up to that time, the design, construction and handover of small scale rural water facilities did not have to follow any defined standards, these only being set up on the initiative of the FSP. Even the promotion of hygienic water sometimes met objections: “People are used to boil drinking water anyway [...]” was the most common argument. This argument of course does not take into account biological laws and the lack of fuel. E.g. only at least ten minutes of boiling water at 90 degrees, usually not the case kills the hepatitis virus. Discussions reflected the observations of Harvey, according to which “in changing the world we change ourselves and that we cannot change ourselves and our society without changing our environmental condition” (Harvey 2001:228).

The first phase of water management in the FSP Shandong targeted single villages, according to the tradition of “one village, one well”. The standards, however were new and for rural Shandong nearly “revolutionary”: Operators (*guanshuiyuan*), responsible for the collection of water charges, operation, maintenance, minor repairs and regular measurement of the water table, on which they took notes used for the water balance survey of the provincial Hydrological Station, were trained. Measurements of water quality were undertaken by the Township Water Conservancy Stations (*xiangzhen shuilizhan*) twice a year. The protection zone No. 1 (10 meters in diameter around every well/water source)



was established for the first time in rural Shandong. Step by step local partners could be convinced to promote the concept of "compound projects" (*liancun gongcheng*) (in German "Verbundanlagen") – one project for two or more villages. This was another difficulty, because villages mistrust each other and prefer to keep their independence. As usually many more villages applied for projects than could be supported, those willing to cooperate were served first.

At the beginning of the project, FSP schemes were easily recognized from a long way off, because of their special features and the protection zone. After a few years this had changed. In 1995 the project office of Yiyuan county decided to build or upgrade its domestic water schemes, which up to that time had only had a life span of three to five years. From that time on 747 rural water supply facilities in the county (15% of which were entirely FSP projects), were managed according to FSP standards. Other areas replicated the approach. Even two well-off townships in Zibo district (Hongshan and Longquan, both south of Zechuan), to which Yiyuan belongs since 1990, adopted FSP management and construction regulations (Yiyuan 1995).

This, however, still did not solve the problem of high construction costs and consequently high water charges for small, distant villages, which could not even be connected to a neighboring place.

### Phase of Reform and Experiments (1994-1999)

Yinan county chose another management approach to Yiyuan, this time at the township level. Yinan county has an area of 1,808 km<sup>2</sup>, 896,467 inhabitants, 28 townships, 978 administrative villages and 1,498 natural villages (Sun 2000:14). The introduction to a so-called "Wasserzweckband"<sup>1</sup>, a Water Supply Association (*gongshui xiehui*) (in short: WA), before and during a study tour to Germany, inspired visiting engineers in solving the technical and economic dilemma of

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<sup>1</sup> For the definition of this popular type of a community of joint security ("Solidargemeinschaft") see Wasser: If a municipality (city or township) does not possess sufficient personnel, capital or know-how in the sector of drinking water supply, several municipalities might join in a "Wasserzweckverband". It has a statute and as a rule, politicians or mayors of the region are members of its Board of Control. In the former GDR, water supply and sewage often combined in one "Zweckverband", many of which are still to be found in the new federal states of Eastern Germany and have considerable synergetic effects. This kind of municipal self-government is to the benefit of the commune's own interests and guarantees independence from profit-oriented interregional or international big organizations.

comparably low-cost facilities for better-situated villages with many inhabitants, but expensive solutions for scattered mountain hamlets with only a few dozen inhabitants. In April 1994 the township of Andi in Yinan county, the “cradle of Shandong revolution”, situated at Shandong’s largest reservoir, established the first township-wide water supply association (Gong 1997:135-139). As management quality had differed markedly from village to village, the Township Water Conservancy Station took responsibility for the service system of all ten project measures (578 inhabitants per village on average, with a range of 330 to 1,730) which had been put into operation since 1988. Water fees were collected according to a unified system which relieved the poorest villages: the annual salaries of operators were now fixed according to village size (400 and 600 CNY per year) and divided into 60% basic salary and 40% incentives (Schmidt 1996:2). In exchange, the project contributed to a new water supply system for the township seat of Andi, which significantly enlarged the number of beneficiaries and reduced management fees. The Association was responsible for a unified management system, the supervision and training of personnel, mediation between villages, major repairs and the standardized collection of fees.

*Table 1 The impact of Water Supply Associations (evaluation in Pingyi 1997)*

	Before WA	WA established
Good management performance	65%	90%
Rate of water supply	70%	98%
Rate of water fee collection	60%	95%
Accumulation of water fee	390,000 CNY / year	650,000 CNY / year
Subsidy for very poor villages	None	Available

*Source: Y. Monschein.*

Pingyi was the following county to establish WAs on township level. Pingyi county has an area of 1,824 km<sup>2</sup>, 976,322 inhabitants, 26 townships, 1,046 administrative villages and 1,249 natural villages (Sun 2000:14). The need was felt, when analyzing project results in terms of accumulated funds to ensure future project operation. Actually accumulated water fees and designed requirements didn’t match for the following reasons: (cf. Jiao 1997:348)

- Farmers were not accustomed to pay more than electricity fees.
- The poorest and smallest villages, causing the highest project costs could



- not afford even higher than average water fees (3-5 CNY in comparison to 0.8-1.5 CNY/m<sup>3</sup>).
- The actual demand of water of 20 l per person/day was much less than projected (30 l per day/person and 20 l per day/livestock). Farmers tend to economize on water and even irrigate plants only for survival.
  - Lack or absence of supervision and transparency in collecting water fees contributed to mistrust towards collectors and low motivation to pay.
  - Lack of knowledge to make full use of the new facilities in terms of sideline production, increase of yields etc.
  - Lack of necessary check-up and maintenance still had a negative impact on life-span/durability of projects.

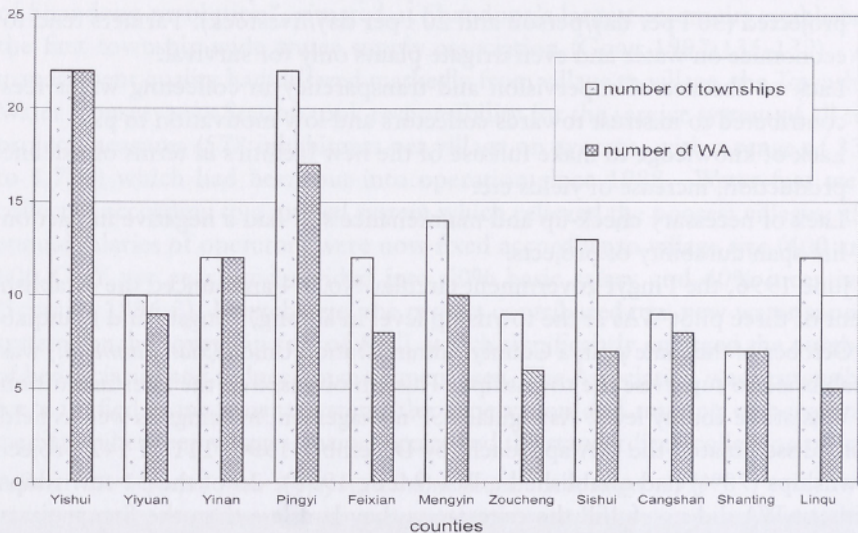
In June 1996, the Pingyi government circular No. 44 announced the establishment of three pilot WAs at the township level in Difang, Tongshi and Bianqiao. In October of the same year, a County Administration Union (*xian lianbehui*) was established to supervise the townships. This Union inspired the later institution of WAs at the county level. As regular FSP management meetings as well as field visits disseminated the WA approach, by December 1998, 111 of 142 project townships (78%) had established a WA (Meng 1998). 26 of the 31 townships without WA did not fulfill the criteria, as they had less than the five projects necessary to set up a WA. Nearly 50% of the WAs had sufficient reserves for major repairs (1% of investment per year). Gradually the principle purpose of "Construction is the beginning of management, management is the continuation of construction [. . .]" had taken shape.

### Phase of Vision (1999 onwards)

Previously, Linqu county which has an area of 1,833 km<sup>2</sup>, with 17 townships, 966 administrative villages and 869,500 inhabitants, was a typical example of what would happen despite obvious governmental efforts to solve the problem of an arid climate and drinking water shortage. Vaclav Smil was not the first to complain about the prevailing "mobilization mass-project mentality" and a generally displayed "bias toward project construction rather than good management" (Smil 1984:81, referring to Nickum 1981). Since 1984 Linqu county had invested a budget of 48.83 million CNY (17.83 million CNY of which were provincial funds) in the construction of 385 rural water drinking facilities for the same amount of villages and their 267,000 inhabitants. After a certain time of operation, however, 40% of the facilities were in disuse and another 60% suffered from technical

breakdowns (Qi 2006:174).

Figure 1 Township Water Supply Associations in 11 counties 1999



Source: Y. Monschein.

Since 1994, FSP projects have been financed in Linqu as well and managed according to FSP regulations (57 projects for 68,000 inhabitants and 53,000 livestock from 68 villages). Impressed by a visit to German Water Supply Associations in 1998, the county leader proposed setting up a county-wide WA, this being founded in autumn 1999. (For the period after 1999, this article draws heavily on conversations with and an article by Li 2004 and Qi 2006.) The organizational set-up has similarities with the Pingyi WA already mentioned: The highest WA organ, the General Assembly (of Representatives), which comes together once a year, is newly elected every three years and consists of village representatives. It elects the executive organ of the WA, the Administrative Committee, the Standing Administrative Committee and the Supervisory Board. The responsible county leader is Director of the WA. The Standing Administrative Committee assembles the leaders of the Bureau of Water Conservancy and of the Township Water Conservancy Stations. Members of the Supervisory Board, being directly accountable towards the General Assembly of Representatives, are



recruited from the People's Congress, the Bureaus of Civil Administration, Audit, Finance, Prices and Water Conservancy. The main task of the county WA consists in guaranteeing the "three unify" (*sange tongyi*, unified management of water fees, unified operation of supply facilities and unified management of staff). An article (Li & Cui 2001), which was published two years later in an organ of the Ministry of Water Conservancy, reflects a nationwide, supra-regional interest in the concept of rural water associations.

Every township employs staff responsible for the daily operation of facilities in that township. Every member unit installs a Water Management Leading Group (*guanshui lingdao xiaozu*), which guarantees a daily 24 hour water supply. After setting the amount of work required, on the basis of the volume of water supplied and the number of consumers, every project appoints one or more operators. The fees collected are kept in separate accounts for every village, which are managed by the financial department of the county WA. The expenditures paid for by the water charges collected mainly go to electricity, the salaries of the operators, and operation and maintenance costs. The amount left over (10,000 to 30,000 CNY) belongs to the member villages. It is made public once a month, and stays on their respective savings accounts for major repairs and enlargements and improvements made after implementation. 20% of the WA budget is earmarked for a so-called Guarantee Fund, intended to support those villages which have not yet accumulated enough water fees to meet unexpected larger repairs or poor villages with a small number of users, and to cover damages caused by natural disasters, the costs of training personnel, rewards for model workers and units, or top-ups for extra work by township operators. The incentive part of operator salaries (40%) is distributed according to the working points acquired. Depending on working age and performance, the WA invests into their old-age pension fund.

The special features of the Linqu WA have been ascribed as its being neither a government institution nor a business enterprise, but instead a local non-profit mass organization (*fei yinglixing shetuan zuzhi*) pursuing the aim of safe operation and long-term benefit by giving technical advice to its members, providing professional training, repair facilities and other services. The problem was the legal status of WAs – one of the questions with which financial institutions were confronted. The WAs had widely varying reserves (between 90,000 and 350,000 CNY), the reasons being high operation costs for small facilities, but also the quality of the management. According to a project survey in April 1998, covering

9 counties, 22 townships and 29 administrative villages, at least one (17% of cases), two (20%) or three (62%) of the following financial institutions were present in the villages: The Agricultural Bank of China, The Agricultural Credit Cooperative (*Nongcun xinyong hezuoshe*) and the Mutual Help Foundation (*Huzhu jijinhui*). Rural Credit Cooperatives at the county level were interested in cooperation with the WA/project in financing credits, given the capacity of repayment of the WAs. In principle, they are only allowed to give credits to private persons or profit-oriented business enterprises. Although WAs have a statute which is based on a cooperative conception, they are only a type of association which is established with the consent of the township government. From a formal-legal perspective, a credit contract between a WA and a financial institution is therefore only possible with some difficulties. A recommendation (Wehnert 1998:Annex I) followed was therefore to establish an "investment fund" with three "columns": a minimum 50% own-contribution by the villages, credit from local institutions of at least 15%, and the rest from the project.

In 2000 Linqu was granted 900,000 CNY by the government for drinking water projects, on the condition that these were built and operated according to FSP standards. One of the factors for Linqu's success was the support of the provincial Bureau of Water Conservancy, an official document of which, in August 2001, recommended the Linqu approach to all its provincial line agencies and disseminated it as a convincing management design (Shandong sheng shuiliting 2001). The paper was published in a collection of documents and regulations (Linqu 2001:11ff.) which makes possible a thorough survey of the history and contents of the Linqu WA. By the end of 2003 more than 800,000 CNY had been accumulated in Linqu from water charges, with a considerable part of this having been reinvested in the construction of new projects, "leading to the target of a self-reliable, self-developed, self-managed, self-serviced, self-completed and common development" (Shandong sheng shuiliting 2001:9). The success rate of water fee collection within the county WA had risen to more than 95%. The same was the case in Pingyi county, whose rate increased from 63% to 99,4%. Pingyi as well established a unified county-wide administrative system in 2006 (Pingyi 2007).

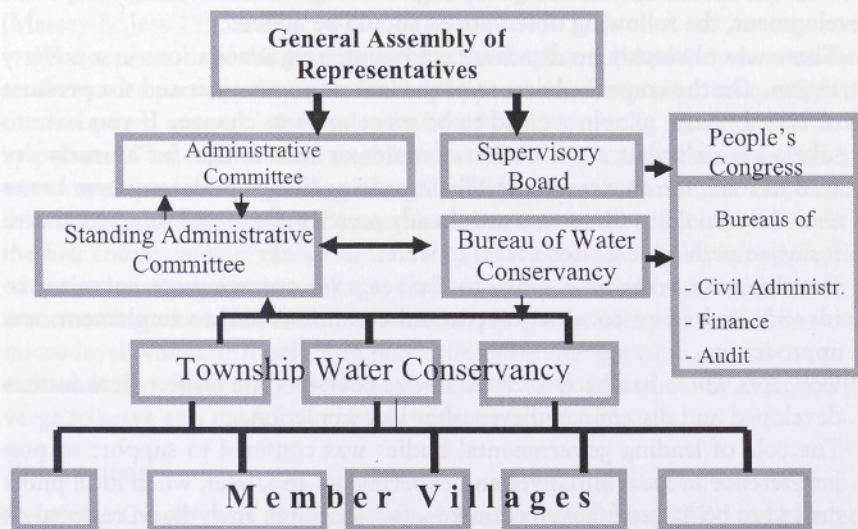
According to the Bureau of Water Conservancy, the new management type of the county WA reflects:

the organic combination of administrative management and democratic consultation, market regulation and economic instruments, and has the



distinguishing features of equality, democracy, service-orientation and mutual support. It reflects the threefold unity of authority, responsibility and duty. The WA is the bridge and the nexus between people and government. It represents the state's management of its financial investment, as well as the collective management of the people's own investment. Practice provides evidence that this management approach is a [...] scientific and effective management system for small scale rural water supply facilities. (Li 2004:7)

Figure 2 Organizational Chart of a County Water Supply Organization



Source: Y. Monschein.

### Conclusion: Development as a Time-Consuming Bottom-Up Process

Years after the end of external (foreign) support, the institution-building described here was still in full swing. In March and June 2004 three more county WA were established, increasing the total number of county WAs to nine, namely the counties of Linqi (September 1999), Pingyi (May 2001), Shanting (July 2001), Mengyin (June 2002), Zoucheng (December 2002), Cangshan (December 2003),

Yishui (March 2004), Yinan (June 2004), and Sishui (June 2004). At the same time, the Shandong Bureau of Water Conservancy promoted the dissemination of the WA management system as a model throughout the whole province and on a national level. (See e.g. the identical editions on different websites: Li 2004, Shandong sheng shuiliting 2007a, 2007b.) By 2006 40 counties and county-level cities in Shandong had adopted a district wide administrative rural water supply system (Wang 2006). Overcoming the rural-urban divide in this respect at least, Dezhou city established a uniform water supply system for the city and the countryside.

To summarize some of the main findings with regard to this synergetic spin-off development, the following observations should be added:

- There was obviously no disadvantage in initiating innovations in a poverty region. On the contrary, because of the lack of alternatives and the pressure of actual needs, people seemed to be more open to change. If you have to take an hour's walk for a bucket of water or wait in line for a nearly dry well to refill, the chances of actually improving living conditions seem better than they would to those who are already pretty well-off and threatened with losing something, e.g. free access to water.
- Development takes time – five to six years on average were necessary to identify and adapt to actual needs and conditions and to implement new approaches.
- Concepts which had been initiated in due course of the project were further developed and disseminated even after its completion.
- The role of leading governmental bodies was confined to support or non-interference in local initiatives and experiments and, later, when local pilots proved to be successful, concentrated, after thorough analysis, on regional or provincial dissemination.
- Innovations may start from a micro level and have an impact on macro level institution building.

It may seem somewhat paradoxical that the user-nearest approach (i.e. the original principle of “one village – one well”) did not turn out to be the user-friendliest one. However, as I. M. Young has already observed:

If institutional change is possible at all, it must begin from intervening in the contradictions and tensions of existing society. [...] Such a model of the good society as composed of decentralized, economically self-sufficient, face-to-face communities functioning as autonomous political entities is



both wildly utopian and undesirable. (Young cited in: Massey & Jess 1995:81)

In other words: a grass-roots approach is not necessarily confined to a grass-roots level; instead, supporting a much wider range of beneficiaries it may be developed bottom-up in a locally-adapted way towards a multi-layered, economically effective, environmentally sound and sustainable institution. When seeking the most effective and economic strategy, local solutions can be the starting point for regional, perhaps even global ones. Or to concur with Massey and Jess: "The global is simply all those uniquenesses and interdependencies through which the various local elements are constituted [...], causality is not all 'top-down'" (Massey & Jess 1995:227).

The experience of this foreign assisted development aid project demonstrates an alternative participatory, user-friendly approach at the grass-roots towards the often required appropriate regulatory framework, normally provided top-down by policies. The experimental establishment of the first rural water association in one township was the beginning of a spin-off development to similar associations in other townships of several counties and culminated in the establishment of the first county-wide organisations. The innovation was achieved in cooperation with the local population, villages and township administration. It serves as a convincing example for the impacts of pilot measures in rural China on a micro level which, through long processes of implementation contribute to an economically efficient and ecologically sound water management and is on the verge to serve as a model on a much wider regional scale.

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