Practical Significance of Basin Water Market Construction on Agricultural Production

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Abstract On the basis of introducing the concept of water market and the water market research in cluding both domestic market and foreign market, the system design features of water market are analyzed. The features include the prior distribution of agricultural water right, the close construction of market structure, reasonable price of water obtaining right and water pollution-discharge right and scientific stipulation of total volume of water use and total volume of pollution drainage. The practical significances of basin water market construction on Chinese agricultural production are revealed, which clover safeguarding the safety of agricultural water; effectively alleviating agricultural drought; saving the agricultural production water and improving the quality of agricultural products.

Key words Water market, Agricultural production, Practical significance, China

Water resources have the characteristics of public goods and externality. Thepublic goods means that when the water resources are sufficient, they are without competitiveness and exclusiveness. The externality refers to the water use quantity and water pollution of upper stream users have accumulated effects on water use quantity and water quality of the down stream users. With the increasingly intensified scarcity of water resources, the interests-concerned people has great demand on the clear definition of property of water resources, thus the transition of management system of water resource is promoted[1]. In order to satisfy the demand of system transition; improve the efficiency of water resources allocation and improve the interests of the whole river basin and the whole society. Government from each country ad the managers of each river basin have set about to construct the water property trade market.

1 The concept of water market and its research advancement

Water market refers to the places and systems used for water property right trade[2]. Water market includes trade mechanism, trade main body, trade target, target price, supervision institution, supporting laws and regulations and water transportation system. In the paper, the trade mechanism refers to the system designed to normalize the trade behaviors of participants in water market and improve the trade efficiency of water market. For example, the buy and sell mechanism, price forming mechanism and information conduction mechanism. The main body of water market trade includes managers or governments of the river basin, distributors of water resources and consumers of water resources. The trade target refers to the property right of water resources of the river basin (water property). The water quantity and quality of river is affected by natural factors and human factors. The natural factors include ice-snow melt water, surface runoff and rainfall, which are uncontrollable. But human factors include the quantity of water used by users in the river basin and pollution emitted by users, which are the controllable factors. In order to manage the water resources, water market needs to adjust the controllable factors, so the trade target of water market-property of water resources can be regarded as water use right and pollution emission right. The price making of water use right and pollution emission right is related to its shadow price. Shadow price is also called the optimized plan price or efficiency price. It refers to the marginal contribution and marginal interests made by limited resources and products to social target under the situation of optimized allocation and reasonable use[3]. The shadow price of water use right and pollution emission right can be regarded as the social interest produced by using more than one unit of water use and pollution emission right under the optimized status. The supervision mechanism includes the management institutions which determines the primary distribution quantity of water right and the distribution order; arbitration agencies which judge the dispute of property rights of water resources; supervision institutions which maintain the normal operation of water market. Supporting laws and regulations refer to the related laws and regulations which clarify the property rights of water resources and ensure the smooth operation of water market and the compensation stipulation which eliminates the bad influences of the third party. Water conveyance system is the necessary infrastructure equipment for water market. The system is used to the distribution of water resources in river basin and dispatch of water resources in the river basin. Water conveyance system can effectively improve the distribution efficiency of water market to water resources. The foreign researches on water market dated from 30 years ago, Vaux *et al.*[4],

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first established the non-linear model to empirically analyze the economic interest bought by the transfer of agricultural water right from industrial water to urban water in California, America. The most representative foreign practice is the water bank in California. It conducted the water trade of large scale, long distance and different usage. At present, the researches of foreign water market mainly include establishing the qualitative model to explain the operation mechanism of water market; calculating the equilibrium trade volume and equilibrium trade price of water market and analyzing the welfare change of each party of water market[2].

The researches on domestic water market become fashionable from the speech, Water right and Water Market – The Economic Means for Realizing the Optimized Distribution of Water Resources, given by the former minister of water resources in the annual conference of Chinese hydraulic engineering society in 2000[5]. With the further research of water market, the Dongyang – Yiwu water right transfer pilot, Zhangye City water resource transaction pilot and the Yellow River water right transfer pilot are launched successively. But, the domestic researches on water market still lay in the primary stage and the discussion of concept definition and qualitative research. The operation situation and construction method is basically the inclusive and dispersed description and lacks the quantitative and empirical researches[2].

2 The features of system design of water market

2.1 The prior distribution of agricultural water right In order to satisfy the demand of people' basic life, food safety, ecological protection and emergency, the water market system stipulates that the living water right, agricultural water right, ecological water right and motivation water right should be given priority to. The rest competitive water use rights should be distributed according to time sequence and geographic sequence. The reason is that before there s no restrictions on water resources, the water users in the upper stream have the time and geographic advantages and they have the priority to use water resources, so they should definitely have the prior distribution of competitive water use right, so as to treat them equally to stimulate them to obey the regulations of water market. In China, the economic is underdeveloped in the upper stream, so the costs of using water in upper stream are higher than that in the down stream. Through distribution of water market, the competitive water use rights will gradually flow to the industrial department and service department with high added value in the down stream area.

2.2 Tight market structure Water market is made up by the water markets within the water areas and the water markets without the water areas. The water market with water areas has three grades. The first grade market is the water right transaction market among first grade water users. The realization of optimized distribution of water resources in the water areas is to materialize the water resources within the water areas. The second grade market is the commercial water trade market among the first grade water users and water factories of other waters, agricultural irrigation companies and the commercial water market among each water factory and agricultural irrigation company. It can realize optimized distribution of local areas and water resources within the waters. The third grade market is the consumption market, which can realize optimized distribution of water resources in a city or within an irrigation area[6]. The trans-waters water market is the water right trade market of the first grade water users in the water supply area to the first grade water users out of the waters, which can realize the water resources distribution worldwide.

2.3 Reasonable approach to make the water use right price and pollution emission right price The prerequisite of making the prices of water use right and pollution emission right in the water market is to determine the shadow price of water use right and pollution emission right of each river branch. Due to the differences of economic development level and social work distribution of each river branch, the shadow prices of water use right and pollution emission right vary. In other words, with each river branch, the social interests added by consuming one unit of water use right or one unit pollution emission right are different. Generally, the social economic development in Chinese upper stream is relatively backward. The productive means are backward and extensive and the environmental protection technology and the awareness in this regard is relatively low, so the upper stream will consume more water and emit more pollution with the same GDP comparing with that in the down stream. Therefore, the shadow prices of water use right and pollution emission right of each river branch increases gradually from the upper stream to the down steam. In the regulation making process of water market, the price of water use right of the whole river is stipulated between the shadow price of water use right in middle stream and that in the down stream. According to the above analysis, the price of pollution emission price should be made by this way. Thus, when the water users in the upper stream using water or emitting pollutions, they will consider the relatively large opportunity costs, which dispose them to sell water use right and pollution emission right through water market to exchange larger added value of these rights. By this way, the water market can not only solve the accumulative change of water quality of down stream water caused by upper stream water and internalized the externality of water resources, but also rationally distribute the interest compensation of water users in the upper stream water at the same time of increasing the social interests of the waters. The price making of water use right and pollution emission right of water market in the waters is the fundament for water right trade in trans-waters water market.

2.4 Scientifically stipulating the total volume of water use and pollution emission Water market demands the administrators in the rivers to scientifically stipulate the total volume of pollution emission and the time and space for emitting pollution according to the natural ecological situation of the whole rivers, social economic development level, environmental protection demand and the self-cleaning ability of major and minor bran-

ches of rivers. And then, on the basis of measuring the total volume of available water resources in the whole rivers, the total volume of the whole rivers and the time and space for getting water can be determined combining the total pollution volume and time and space of pollution emission and by taking the maximum self-cleaning ability of major branches of rivers and minimum river volume.

3 Practical significance of water market construction to Chinese agricultural production

The construction of water market can not only reflect the scarcity of water resources in market price of water and accelerate the reform of water price, but also have great practical significance on agricultural production.

3.1 Guaranteeing the safety of agricultural water In recent years, due to the interest decrease of farming and the acceleration of urbanization and industrialization, farmers lose their enthusiasm on farming. The local governments dispose their policies and resources to the development of industry and the third industry. What's worse, the agricultural irrigation equipment is aging and damaging, so the farmland becomes even poorer. The water market manages the water resources within the rivers and lay stress on the prior distribution right of agricultural water right, which guarantees the safety of agricultural water and meets the national strategic demand on food safety. In the recently past national "Two Conferences" (National People's Congress and Chinese People's Political Consultative Conference), some representatives put forward the suggestion on restoring agricultural water irrigation project. In the very year, the No. 1 Document issued by the Central Government stressed the importance of agricultural water irrigation projects. The water transportation system of water market undertakes part functions of agricultural water irrigation project. After effectively distributing water resources in water market, the water transportation system is used to satisfy the use of water resources. The functions are similar to the functions of water irrigation projects in adjusting agricultural irrigation situation, improving agricultural water content and irrigation situations.

3.2 Effective alleviating agricultural draught In the past years, the draught hit Chinese farmland frequently. In the first place, the long term less precipitation in the are of Yangtze River, Huai River and Jianghan Plain. And then the serious draught happened in southwestern China. The ensuing one is the unremitting draught in Northern China and the Yellow River and Huai River areas. Once being hit by draught, the yield of local agricultural crops will drop sharply or even without any yield, which is not only detrimental to farmers' survival but also pours oil on the flame of current agricultural prices and inflation. The water market gives priority to motivation water right, which can increase governments' motivation on water use, but also is conducive to alleviating agricultural draught. Besides, water market owns tight market structure. Through the water right trade of water market within the water and water market without the water, tremendous water resources will be collected and sent to the draught hit area through advanced water transportation system. At the same time of solving the emergency of draught hit area, the water supply areas get the trade prices, which can be used to compensate the bad effects of the third party.

3.3 Saving the production water use of agriculture Generally speaking, agricultural development is located in the area with abundant water resources, but as a result of the low cost of water use, the agricultural products wastes a lot of water. Before constructing water market in the rivers, the situation of wasting water has not changed. The water market takes the scarcity of water resources in the waters and the nation into consideration. Through the rational price of water right, the real value of water resources is reflected in the market. When the use cost of water resources is paid fully attention to, the water saving behaviors in agricultural production will appear. The water saving right is traded through water market to get more income. Agricultural producers can use the income to expand agricultural production scale or increase research input on agricultural water saving technology. By this way, the farmers' subsistence needs are solved, and future agricultural production becomes more effective. So it is a good approach for solving three agricultural problems concerning agriculture, countryside and farmers.

3.4 Improving quality of agricultural products Clean and abundant water resources can promote the healthy development of agricultural products and the agricultural products will have high nutrition. On the contrary, insufficient and polluted irrigation water will shorten the growth period of Agricultural products, which leads to the mal-growth of agricultural products and the residues of harmful substances. So it is imperative for us to scientifically stipulate the total volume of water use and the water pollution emission according to the specific situation of local waters to ensure the quality of agricultural water. In the past, Chinese agricultural products are known for it poor quality, but at present, the water market construction provides favorable environment for the growth of agricultural products, which is conducive to improving quality of agricultural products and breaking through the green barriers of agricultural products.

References

[1] PENG XY, SHEN Q. Property rights of the constraints of water resources[J]. Science & Technology Progress and Policy, 2009, 26(5): 92-96. (in Chinese).

[2] TANG Q. Review of studies on water rights market[J]. Journal of Economics of Water Resources, 2008, 26(2): 22-25. (in Chinese).

[3] LIU XL, CHEN XK. Researches on sub price calculation of dynamic water sources of 9 river basins in China[J]. Management Review, 2003, 15(3): 49-54. (in Chinese).

[4] VAUX H J, HOWITT RE. Managing water scarcity: an evaluation of interregional transfers[J]. Water Resources Research, 1984, 20: 785-792. (in Chinese).

[5] WANG SC. Water right and water market - economic measures to realize optimal configuration of water resources[J]. Water Resources and Power, 2001, 19(1): 1-5. (in Chinese).

[6] ZHEN ZP, PENG XY. A general review of researches in China's water market[J]. Journal of South China University of Technology: Social Science Edition, 2005, 7(1): 24-27. (in Chinese).