

Research on the Path and Policy of “Five Water Cohabitation” in Zhejiang Province in China

Wanting Chi

Institute of Economics, Shanghai University, Shanghai, China

yxainio@vip.qq.com

Keywords: Five water cohabitation; Path; Policy

Abstract. In the context of the increasingly serious water pollution, frequent floods and low utilization of water resources, Zhejiang Province put forward the “Five water cohabitation”: “sewage treatment”, “flood prevention”, “drainage water”, “water supply treatment” and “water conservation” systems water control strategy in 2013. Zhejiang water treatment system on the surface of the water pollution controlling, in fact, is a breakthrough in water control, forced industrial restructuring and upgrading. “Five water cohabitation” policy implementation in the past two years, achieving some success, providing reference with other places, but there are still some problems and face some challenges. This paper sums up the path and policy of “Five water cohabitation” in Zhejiang Province, and in view of the problems existing in the implementation of the policy and the challenges, some suggestions are put forward for the implementation and improvement of the policy in the future.

Introduction: Connotation of “Five Water Cohabitation”

In November 29th, 2013, the four plenary session of the thirteen session of Zhejiang Province propose “five-water cohabitation”, meaning Sewage treatment, flood prevention, drainage, water conservation.

Specifically, the main task of sewage treatment is “cleaning three rivers”, “two coverage” and “two transformation”. “Cleaning three rivers” is clearing the rubbish river, rectifying the dirty rivers and the smelly rivers. “Two coverage” mains covering two lands including realizing sewage interception and sewage treatment in towns and centralized treatment of municipal solid waste. “Two transformation” mains accelerating industrial and agricultural transformation because pollution is in the water, but the root is on the shore (chemical fertilizer and industrial sewage). “Flood prevention” mains that we must promote the construction of three types of projects, such as stronger dams, make dams more solid and expansion discharging. Drainage mains pushing broaden sources and reduce expenditure, water diversion forward. The main points of water conservation is retrofitting equipment, reducing leakage, recycling, and rainwater collection and utilization demonstration, using water resources rationally [1].

Present Situation of Wastewater Discharge in Zhejiang

The Background of “Five Water Cohabitation”. As shown in Figure 1, the total discharge of wastewater in 2013 was 41.91 tons, Compared with 21.33 tons in 2002, it has nearly doubled. The direct consequence of the continuous increase in wastewater discharge is the worse situation of the water pollution [2].

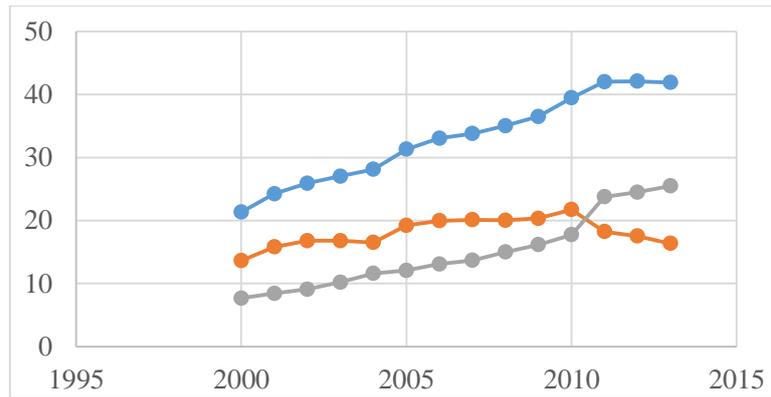


Fig. 1 total wastewater discharge in recent years in Zhejiang Province

Remark: The blue line stands for the total amount of waste water (100 million tons); the orange line stands for the industrial wastewater; the grey line stands for life wastewater.

Source: Natural resources and environment statistics yearbook 2014 in Zhejiang province

The Small Amount of Water Resources per Capita. Zhejiang is rich in water resources, but Zhejiang has a large amount of population, therefore, per capita water resource is small. As shown in Table 1, the per capita amount of water resources in Zhejiang province is lower than the national standard. According to the United Nations standards, Zhejiang is already in a moderately dry state.

Table 1 status of water resources per capita in China and Zhejiang [cubic meter/person]

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
China	1856	2152	1932	1916	2071	1816	2310	1730	2186	2060	2003
Zhejiang	1382	2046	1796	1745	1650	1776	2607	1365	2641	1696	1870

Source: National Bureau of Statistics website

Water Supply Increase, Wastewater Discharging More Serious

With the growth of economy, the density of population and the improvement of living standard, the total amount of water used in Zhejiang has continued to increase in recent years. As shown in Figure 2, the total water consumption in Zhejiang province shows a rapid growth trend [3]. In industrial field, the water-reuse rate is low. According to the case of printing and dyeing industry in Zhejiang, China printing and dyeing industry association information display that Zhejiang printing and dyeing industry waste water reuse rate less than 10% [4].

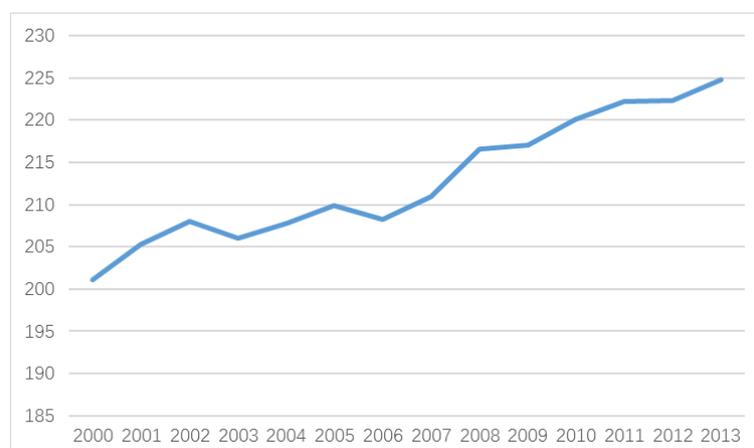


Fig. 2 the total water consumption in Zhejiang [cubic meters]

Source: Zhejiang province natural resources and environment statistics yearbook 2013

Concrete Measures

Sewage and Wastewater Co-governance. On the industrial waste water treatment, Zhejiang province has shut down a large number of enterprises which discharge industrial wastewater excessively. By 2014, Zhejiang province has eliminated 2102 non-environmental protection enterprise [5]. Shutting down at the same time, encourage mergers and acquisitions within the industry. As the scale effect and cost advantage brought about through mergers and acquisitions, the treatment cost of waste water per ton decreased obviously.

Taking Songyang County (Zhejiang Province, China) as a typical example, Songyang county has established a no breeding area and a restricted breeding area for aquaculture since 2014 while guiding farmers to change their products and actively guiding farmers to reduce the use of pesticides and fertilizers.

Aquaculture is an important source of rural sewage. Massive aquaculture wastewater has been discharged into rivers, lakes and other water body results in drinking water pollution. The eutrophication of water bodies caused by aquaculture wastewater owes to excessive amounts of nitrogen, phosphorus, veterinary drugs and other microorganism [6]. Songyang County combines the characteristics of local industries to guide the farmers to be concentrated in large-scale farms. Mean the while, carrying on the implementation of unified collection of waste collection, centralized treatment, and Promoting farming and animal husbandry and the ecological treatment model of pollution through recycling of biogas resources and recycling. In limiting pesticides and fertilizers, Songyang County is strictly forbidden to use various herbicides in each water source protection area. Since 2014, every year in May, a list of prohibited, restricted and recommended pesticides is issued regularly [7].

In the field of domestic sewage treatment: Before 2020, Zhejiang should realize the basic coverage of rural sewage treatment and centralized treatment of domestic waste [8]. On the one hand, water pollution is reduced; on the other hand, the utilization rate of water is improved.

The Implementation of Strong Dams, Consolidating Dams and Expansion Project. In Zhejiang Province, there is heavy rain every year during plum and flood seasons, which cause floods. In 2013, typhoon called “Fett” caused floods caused a direct economic loss of about 300000000000 yuan, and while fighting floods, Zhejiang realized the importance of flood prevention and control. Zhejiang province has promulgated the “five water co-governance” in flood control implementation plan of Zhejiang Province in 2015, specific objectives are shown in Table 2 [9].

Table 2 classification of flood control project of “five water co-governance” in Zhejiang Province

Project type	Total investment [100 million yuan]	Construction content
Strong reservoir engineering	198	Build 11 flood control reservoirs, such as Qianjiang River source, consolidate 600 reservoirs
Dams consolidation project	711	Reinforce embankments 3500km, Vigorously promote the swamp areas in Hangjiahu district regulation
Expanding projects	1148	The dredging drainage channel 2000km, strengthen drainage capacity of 2000 m ³ /s

Source: <http://www.docin.com/p-1081071466.html>

Broaden Sources and Reduce Expenditure, Diversion. The average rainfall in Zhejiang province is 1600 millimeters, and the total water resources are 95 billion 500 million cubic meters, therefore the water resources per capita is only 1760 cubic meters which is below the national average standard. According to the National Bureau of Statistics, there are 4334 reservoirs in Zhejiang Province, including 33 large reservoirs, 158 medium-sized reservoirs and 4143 small reservoirs. To ease the pressure of water supply in Zhejiang Province, Zhejiang plans to implement the three major projects, namely, “Broaden sources and reduce expenditure (36 billion 500 million)”, “diversion project (45 billion 900 million)” and “upgrading project (12 billion 900 million)” before 2020 [10].

“Five Water Co-governance” Mechanism, Institutional Innovation

Established the “Five Water Co-governance” Leading Group. Because different departments govern water together, the situation of shirking responsibility between different departments is very serious, and the interdepartmental coordination is costly and inefficient. The establishment of the “five water co-governance” leading groups can lead and coordinate the work between different departments, reduce the cost of inter departmental administrative work, while improving the efficiency of policy implementation.

Establishing “River Responsibility System”. As the name suggests, the main content of the system is that the principal person in charge of the partly or whole river and take environmental responsibility for it. All levels of management responsibilities including river water quality and pollution sources of River Survey Organization, at the same time, the development of water environmental governance implementation plan and promote the implementation of key projects, the final coordination to resolve key and difficult problems as well as supervision and inspection, to complete the main task of water environment governance fundamentally. After the outbreak of blue-green algae in Taihu, Wuxi City, Jiangsu Province, China first implemented the “River Responsibility system”. Zhejiang learned from the successful experience of Wuxi Province, and Zhejiang province introduced “Suggestions on the full implementation of the River Responsibility system, strengthen the water environment control work” in 2013. Up to now, “River Responsibility system” has achieved provincial, city, county, town (township) full coverage, and extended to the village.

“Five Water Co-governance” Existing Problems

Lack of Funds. Zhejiang Province, the total investment of five water co-governance is up to 468 billion, and in 2014 the finance income of Zhejiang province is 412 billion 202 million yuan. The total investment of five water co-governance project is over annual revenue the Zhejiang province in 2014. It has become a problem which can't be ignored. “Zhejiang provincial government debt audit results” showed that by the end of 2015, the debt ratio of Zhejiang was 63.48%. In such a high debt situation, the government could not support the “five water co-governance” through a large number of bonds. At the same time, Zhejiang support “five water co-governance” by cutting spending. Even so, the “five water co-governance” still has a large funding gap.

Based on this, governments at all levels introduce PPP mode, adopt BOT, BT, and other new business models to support “Five water co-governance”, and It helps ease the pressure on funds in the short term. However, because the PPP project has been implemented at present, most of them are namely stocks, but real debt, and few private funds are involved in the “five water co-governance”. Therefore, further implementation is needed in this sector.

Evaluation Mechanism is Imperfect. “Five water co-governance”, from measures to effect assessment, are implemented by the government departments, which is lack of effective public supervision system. In the current assessment system, assessment of the county government and the township government, according to the results of examination report from the higher authorities, the government have motivation to deliberately increase the rating assessment results, sometimes there will be some unreal, we found that the current higher level to the lower level government assessment score is generally higher, but the actual results does not necessarily make people satisfied.

At present, there is no unified quantitative standard for water treatment efficiency. The quantitative standards established between provinces are not consistent. And the standards of quantification in some areas are very vague, and the subjective factors are very strong in the evaluation.

Public Participation Channels Narrow. In accordance with the current laws of China, environmental protection organizations must register in the Civil Affairs Department, and “Regulations on the administration of social organizations” is formulated that a civil organization which have more than 50 individual members or more than 30 units shall register in the civil affairs

department upon examination and approval by its competent business unit. Limited to the above conditions, the majority fund of the existing environmental protection organizations is from the memberships, and the environmental protection activities are difficult to obtain government funding support.

The new provisions of China's environmental law demonstrates: "The destruction of the ecological environmental pollution, and damaging the interests of the public, should be legally registered in the Civil Affairs Department of the State Council, and the national social organizations specializing in environmental protection and welfare activities for five consecutive years and have a good reputation may apply to the people's court proceedings. Where otherwise provided by other laws, such provisions shall prevail". In my opinion, under the circumstance that people's sense of ownership is relatively weak, and protecting their rights through environmental litigation is an ideal way to participate in environmental protection activities. At present, the relevant laws of environmental protection in China are too demanding to the legal subjects of civil litigants, and many people can't participate in environmental protection activities through this approach.

Conclusions and Policy Recommendations

Improve Financing Mechanism. Water governance needs a large amount of financial support. At this stage, our government debt burden is higher, and it is not realistic to complete the flood control solely with the government's power totally. The government should broaden the financing channels, such as through the exploration of the use of PPP model. Zhejiang province has a unique advantage in economic development, private capital strength, so the government needs to develop this kind of advantage.

Explores Ways to Change the Existing "Governance-Review" Mechanism. In summary, the introduction of third parties will enable better supervision, the current evaluation of water management and water treatment effect are undertaken by the government, and should explore the change of existing governance evaluation mechanism, such as "government-the third party evaluation", "third governance of government performance evaluation".

In the water treatment effect evaluation, we should establish a unified evaluation criteria, and timely deliver the relevant data. At present, PM2.5 data are published daily in China, and this mechanism can also be applied to water treatment. In addition, electronic monitoring sites should be set up at the administrative juncture of each river to deliver water quality in real time so as to avoid data fraud and facilitate supervision by the masses.

Reform the Existing Water Administration System. The phenomenon of many departments jointly control the water is serious in China, failed to achieve effective separation of duties. The establishment of the "five water co-governance" leading groups can lead and coordinate the work between different departments, reduce the cost of inter departmental administrative work, while improving the efficiency of policy implementation. Many rivers flow through many administrative district, due to administrative division to flood brings many challenges, our country can learn from experience in French, in accordance with the division of water basin, establishing water resources management bureau to manage for water. Zhejiang can set up the water intake and drainage permit system, and the River Basin Management Bureau is responsible for the formulation of limit after water intake and drainage area of the river downstream from the local government allocation of water, emissions and carry out wastewater drainage, trading system.

Strengthening Water Saving Management. According to the Japanese residents in the housing, stadiums, schools, shopping malls and other places to build rainwater recycling device, through legislation in the form of mandatory provisions to achieve a certain scale residential areas, such as schools, stadiums, shopping malls which can be recycled rainwater for urban greening, city living water use, fire his actual water field. In the field of agricultural irrigation, water saving equipment such as drip irrigation, sprinkling irrigation and micro irrigation should be promoted, and waste of water resources should be reduced by reforming canals.

Strengthening Agricultural Management. Chemical fertilizer and pesticide planting industry is a major source of agricultural source pollution, there has been a considerable part of the directory

of chemical fertilizer and pesticide authorities which issues restrictions and prohibit some kinds of chemical fertilizers and pesticides to guide farmers to reduce the use of chemical fertilizers and pesticides. In China, the overall knowledge of farmers is not wide, many farmers do not know that crops can't absorb excessive use of chemical fertilizers and pesticides. Excessive use of chemical fertilizers, pesticides is not only a waste of resources, but also lead to soil compaction, and enhance the resistance of pests, resulting in soil production capacity worse than the previous year to form a vicious circle. The government should train farmers in an appropriate way to educate them about the dangers of excessive use of fertilizers and pesticides. If farmers can know the excessive use of fertilizer, the harm of pesticides will be reduced consciously, and the pollution will be reduced.

Establishes a Water Source Protection Zone and Isolation Belt. It is an important mean of reducing water pollution to set up "isolation belt" on rivers and coasts, and crops are not allowed to be planted within a certain distance from the river bank. Instead, crops with a strong absorption of nitrogen, phosphorus, potassium and other residual chemical fertilizers which can effectively reduce the pollution of chemical fertilizers and pesticides to water bodies within a certain range of the two sides of the river. After the isolation belt is set, even if some chemical fertilizer and pesticide enter the environment, they can be isolated and further absorbed by the landscape crops planted on the belt which can reduce the pollution of the chemical fertilizer and pesticide to the water body.

Reference

- [1] Y.H. Wang: *Anti flood* (Zhejiang Gongshang University press, Hangzhou 2014)
- [2] Information on <http://zjnews.zjol.com.cn/system/2014/03/27/019935146.shtml>
- [3] J. Feng: *Water Resources Management*, Vol.25 (2010) No.1, p.41.
- [4] M.H. Shen: *Journal of Jiaying University*, Vol.27 (2015) No.1, p54.
- [5] Information on <http://www.chinairn.com/news/20150107/174520930.shtml>
- [6] C. Chen: *The functions of local government in environmental governance transition-Taking Pujiang County as an example of crystal industry pollution in Shanghai* (Master, East China University of politics and law, China 2015), p56.
- [7] Information on <http://www.hbzhan.com/news/Detail/106513.html>
- [8] Information on <http://info.water.hc360.com/2015/05/180904500089.shtml>
- [9] G. Shen: *Zhejiang daily*, Vol.66 (2014) No.2
- [10] B.L. Xia: *The people's daily*, Vol.108 (2014) No.15.