

Research on the benign utilization and management system of water environment in our country

FANG Junhua, LONG Tengrui, HE qiang

Faculty of Urban Construction & Environmental Engineering, Chongqing University, 400045, P.R. China

Abstract: With the rapid development of economic, the condition of water crisis and water pollution becomes more and more urgent in our country. Only through building up the benign utilization and management of water environment, can we relax the problem of water crisis and water pollution. But in our country, for some reasons, it hasn't received much attention. So the government must strengthen the management policy and build prompt mechanism, and thus quicken the process on the benign utilization of water resource.

Keyword: benign utilization management system water resource

1. The present condition of water resource

Our country is one of the thirteen countries shortest in water resource in the world. The amount of water shortage adds up to 60 billion m^3 every year. In the 666 organic cities, there are 400 cities short of water, and the amount of water shortage adds up to 10 million m^3

every day.

From the table, we can see that the GDP of our country is less than 20 percent that of the Japan and 7 percent that of the America, but the increasing rate of amount of water taken is 20 percent more than that of America.

Table 1 water resource usage and economic development of china, America and Japan

Country	Population $P/10^9$	GDP $/10^9 \$$	Ratio of R_p	The amount of usable water $Q/(10^9 m^3)$	The amount of water used $Q_1/(10^9 m^3)$	Ratio of used water quantity R_w	Q_1/GDP $/(m^3/\$)$	Ratio of Q_1/Q R	%	The increasing rate of water of amount taken from 1980 to 1985/%
China	10.575	2825	1	11000	5000	1	1.77	1	45.5	10.5
America	2.424	39440	14.1	10160	4600	0.92	0.117	0.066	45.3	-10.7
Japan	1.21	15799	5.6	2000	892	0.18	0.0565	0.032	44.6	1.1

At the same time, the water pollution condition becomes worse and worse. According to the report of "china environmental communiqué", 78 percent of City Rivers cannot be used as resource of dinking water and half of the ground water has been polluted. The pollution condition is shocking by the sight and must be treated as soon as possible.

So, it is really urgent for our country to build up a benign utilization of water resource and relax the problem of water crisis and water pollution.

2. The benign utilization of water resource

To sustain the benign utilization of water resource, the government must build up reasonable price system of all kinds of water and urge the people to save water, and increase the investment on the treatment of

wastewater, and come to use reclaimed water as the second water resource widely in industry and municipal system.

2.1 Save water

In the frame of market economy, price is the most important means to induce the water users. At present, the price of tap water and wastewater treatment in our country is relatively low, in some places, the water resource even allowed to use freely. This condition has led to the waste of valuable water resource and caused the water crises to a large extend. The government has realized it and taken measure to improve the price system. The following table is a list of the changing water price in Beijing during "the tenth five year plan", from which we can see clearly that the water price will

increase yearly and at last reach the standard of the reasonable price.

Table 2 change of water price in Beijing during "the tenth five year plan"

Time	Price of tap water and water resource/¥/¥	The Price of wastewater /¥	Integrate water price /¥	The Increase rate of Water price /%
2000	1.14	0.30	1.44	20
2001	1.39	0.38	1.77	24.6
2002	1.82	0.44	2.26	26.5
2003	2.30	0.60	2.90	28.3
2004	2.98	0.79	3.77	30.1
2005	3.92	1.03	4.95	31.3

2.2 Wastewater disposal

At present, the main problems of urban sewage treatment in China is that the investment and construction of it. The investment proportion of urban drainage in GNP in China is far less than that of the overseas, project construction cost becomes higher and higher, the status of investment is not reasonable, capital raised is very difficult. To solve the problems, the corresponding department should pay more attention to the appraisal work for the construction project, establish the scientific tariff system as soon as possible and broaden the investment channels. The drainage system should be built ahead of the Wastewater treatment plant.

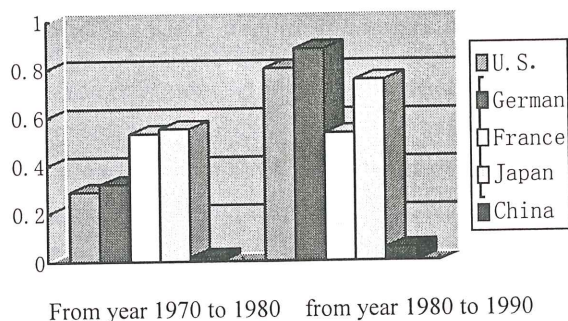


Fig. 1 the ratio of investment on wastewater drainage to the GDP in different countries

2.3 Reclaimed municipal water

Reclaimed municipal water has proved to be the best way to solve problem of water crisis and to advance the development of wastewater treatment. In America and Israel, reclaimed municipal water has been widely used

as reasonable second water resource. Through water reusing, the amount of pollutant discharged to the water and the amount of fresh water taken form the environment both decreased. At present, our country has built about 400 wastewater treatment plants and the disposal rate has reached 30 percent. According to "the tenth five year plan", the disposal rate of wastewater will reach 45 percent, and if the reusing rate can reach 20 percent, the amount of reclaimed municipal water will be 40 billion m³ per year. It can greatly relax the water crisis in a lot of cities. In the following table we list the present built reclaimed municipal water plants in our country.

Table 3 some built reclaimed municipal water plants in our country

City	Address of the Treatment plant	Amount reused (m ³ /d)	Purpose
Beijing	Gao bei dian treatment plant	300 000	Industry , municipal
Dalian	Chunliu river treatment plant	80 000	Industry
Taiyuan	Yangjiabao treatment plant	2000	Municipal
Tianjin	Jizhuangzi treatment plant	53 000	Industry , municipal
Qingdao	Haibo river treatment plant	40 000	Industry , municipal
Xi'an	Beishi bridge treatment plant	10 000	Industry , municipal

But because of the realization limitation, many cities have neglected reclaimed municipal water. Compared with developed countries, the reuse rate is relatively low. So the Urban treated wastewater reuse plan must be set in the context of urban overall plan and river basin plan, the standards and technical policy must be developed for treated wastewater reuse and more attention must be paid to the security for reusing the treated wastewater and need the public to participate in the wastewater reuse action. And only by benefiting developed countries' experiences, consummating policy system and developing suitable technologies, can we make the field of municipal sewage reuse develop rapidly and healthily in China.

3. The management system of water

At present, water supply and wastewater treatment belongs to different administer department, especially in some cities the drainage pipeline and wastewater plant also belongs to different administer department, and when add the utilization of reclaimed municipal

water, it will involve the water resource management, health and construction department. The information of and plan water resource, the policy and the statute are not consistent; the department of water management departments cannot cooperate and harmonize with each other. The complex management condition has brought great difficulties to wastewater treatment and reclaimed municipal water, and lead to the water crisis. So the government must take measure to coalition some department and founded the uniform water management department to plan the water supply and wastewater treatment and reclaimed municipal water.

Most European countries and other developed countries such as America have carried the uniform water management into execution for long time. It promotes the utilization of reclaimed municipal water greatly. In America, the government incorporate the water resource, water supply, wastewater treatment, reclaimed municipal water and user to be a optimization management scope through compartmentalizing "watersheds". The "watersheds" does not been compartmentalized according to administration domination scope, but defined to sustain the benign water circulation and optimization management. The scope of "watersheds" can be small or large. One city can include some "watersheds" and one "watersheds" can contain some cities too.

Our government has realized the worse condition of this management system and since October 1,2002 it has issued the new "water law". In the law it regulate clearly that the government must take measure to strengthen the unification management system and

separate it from the exploring and utilization of water resource. Condition that, to build up integrate management system of water resource within the scope of cities is reasonable. But the government must change from the manager of the enterprise to be the manager of water market. That is to say, the government must change from a microcosmic manager to be a macroscopical manager and meet with the present water law and regulations. Only by this way, can we carry the management of water resource to a new and higher level and sustain the benign recycle of water environment.

4. Conclusions

Benign utilization and management of water environment is the best way to relax the problem of water crisis and water pollution. So the government must pay more attention to strengthen the management policy and build prompt mechanism, and thus quicken the process on the benign utilization of water environment.

References

- 1 Joe.M.E.et.al. water reuse Ann. Arbor science publishers.Inc.1982 water reuse is gaining popularity throughout the United States,Water Environment & Technology.
- 2 JiangWenlai, WangHuadong, Yulianshen, etal. Research on Regional Environment and Development. Beijing: China Environmental Sciences Press, 1993. 177. D.K.
- 3 D.K.Ameerman, Once the province of communities the Southland West, water reuse is gaining popularity throughout the United States, Water Environment &Technology, 67-71(1998)
- 4 Water management department of china, the condition of water environment in year 2000