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Environmental Policy Analysis for Water Management in Lanzhou City

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Abstract

Human activities significantly influence the integrality of ecosystems. Water plays a crucial role in ecosystems. In the last two decades, due to the over development of Lanzhou City, water environment becomes serious which is not compliance with the policy of sustainable development required by the local government. The existing policies and regulations related to water management in Lanzhou City is re-visited first in this paper. This includes the analysis of surface water and groundwater, investigation of current policies and regulations used for water management and their effects on water quality change, identification of the current problems resulting in water deterioration. Once the weaknesses of current environmental policies and regulations are figured out, they will be used to development of a comprehensive management system from the point of views engineering, legislative and social science. Finally nine corresponding implementation and management strategies based on this research are presented and will be reported to the local government.

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Keywords: Lanzhou City; water environment; policies and regulations; Water environment management

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1. Introduction

The current focus study of water environment is the urban water environment into the legal track. According to national laws and policies of some local regulations\administrative rules and regulations of the comprehensive management, it could make the management more realistic and easier to operate and implementation. To establish and improve the comprehensive management of the policy and regulation system on urban water environment is one of the most important problems to solve. China is a developing country undergoing the transition a planned economy process to market economy and the legal system is relatively weak. So in order to improve the quality of Lanzhou water environment, promote the water environment, it is necessary to research Lanzhou Water Environment governance policy.

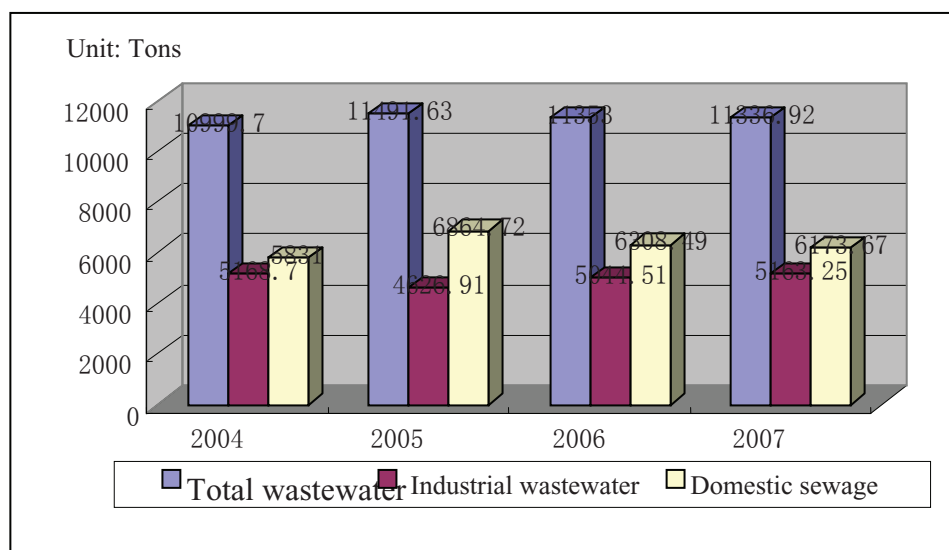
2. The current situation of water pollution in Lanzhou

Lanzhou is the only capital city which traverses by Yellow River, and it also has an important task to charge with providing clean water for the middle and lower reaches. However industrial wastewater and domestic sewage are discharged into the Yellow River is still staggering which caused serious pollution (The People's Republic and MWR, 2004).

Table 2.1 The total wastewater emissions of Lanzhou in 2004-2007 Unit: Tons

Years	Total wastewater	Industrial wastewater	Domestic sewage
2004	10999.7	5168.7	5831
2005	11491.63	4626.91	6864.72
2006	11353.00	5044.51	6308.49
2007	11336.92	5163.25	6173.67

Figure 2.1 The chart of the total wastewater emissions in Lanzhou in 2004-2007



From Table 2.1 and Figure 2.1 we can see: little change in the total wastewater discharge nearly four years and have a downward trend. And the emissions of industrial waste water has increased year by year and increased larger than the total emissions.

From the situation of regional emissions: in 2007, emissions from industrial wastewater in the West are the largest solid area, BOD, cadmium, lead, hexavalent chromium, arsenic, phenol, cyanide, solid areas are concentrated in the West, wastewater suspended solids, chemical oxygen demand, BOD, cadmium, lead, hexavalent chromium,

arsenic, ammonia and other pollutants are the largest oil-processing industry. So Xigu has more serious water pollution. Other counties in the industrial wastewater emissions shown in Table 2.2.

Table 2.2 The situation of Industrial wastewater's polluted area in Lanzhou in 2007 Unit: Tons

Pollutions	Regional						Total
	ChengGuan Area	QiLiHe Area	XiGu Area	AnNing Area	HongGu Area	YongDeng Country	
Wastewater Emissions	107.80	66.00	3145.60	20.40	303.70	365.40	4009.10
Suspended matter	33.00	35.10	1370.20	4.30	121.00	95.70	1659.30
COD	63.90	41.40	2604.30	19.50	94.40	104.30	2927.80
BOD			206.40				206.40
C_d			0.16				0.16
P_d			0.70				0.70
C_r^{6+}			0.21				0.21
A_s			0.35				0.35
Volatile Phenols			1.99				1.99
Cyanide			0.85				0.85
Petroleum	1.48	3.01	146.93	0.03	8.60	4.39	164.44
Sulfide	0.41	0.12	10.26	0.05	1.07	0.37	12.28
Ammonia			438.21				438.21

In Lanzhou City, nearly 100 million tons of pollution water directly discharged into the Yellow River per year without any treatment sewage.

From the situation of Monitoring, the structure of water pollution in Lanzhou City has changed, the proportion of domestic sewage is increasing. Lanzhou is highest in dealing with the urban sewage in Gansu Province, but the treatment rate is only 37%. 60% of the sewage is direct discharged into the Yellow River. A large number of domestic sewage becomes the new killer of the Yellow River in Lanzhou water environment.

3. The policy system and regulation situation of water environment in Lanzhou

Reference to national laws and regulations related to water environment, combined with the local water environment situation. In the last century of 80s and 90s, the Gansu provincial government and Lanzhou city presented a series of local environmental protection laws and regulations of water management regulations, standards and norms including Water Management in Lanzhou City Charter (1986), Measures for the Administration of Lanzhou City to save water (1987), Lanzhou urban groundwater resource management practices (1993) documents have been abolished. At present, it practices the local administrative regulations, horse of Lanzhou City Beach, cuijiaji Tai Tan, Ying-door to beach water pollution prevention Interim Provisions (1993), the provisions of surface water environmental functional category in Gansu Province (1994), water Permit System Regulations in Gansu Province

(1995),Lanzhou city drinking water source protection and pollution control measures(1997),Management Regulations on Municipal Water Supply;(2000),Lanzhou city water conservation management practices(2000), The Peoples Republic of China Water Act in Gansu Province (Lanzhou Yearbook,2004).

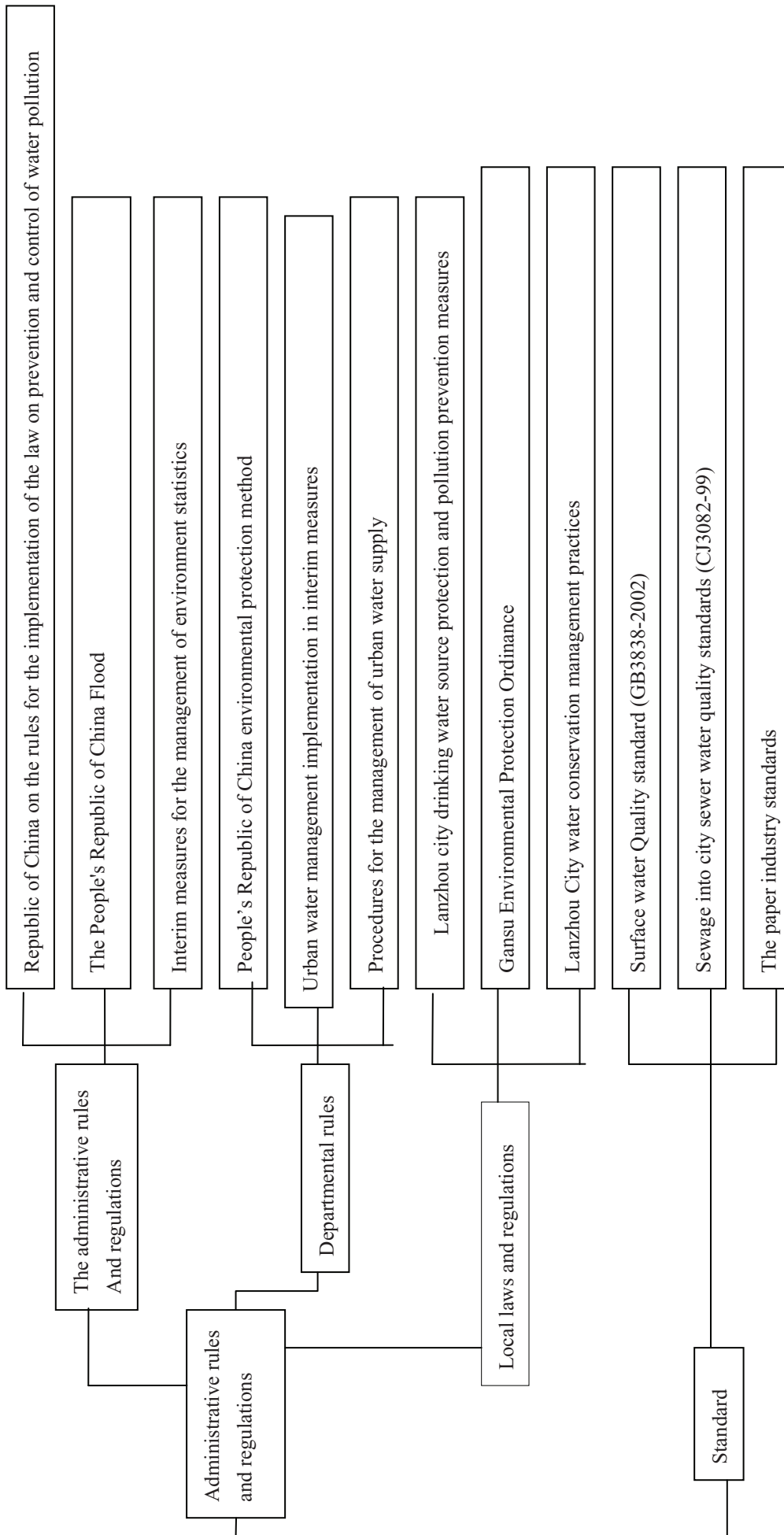
On March 2001, appealed by the peoples congress,the leadership of Central Information Commission with provincial and municipal Environmental Protection Bureau and his party were in the area of water pollution control survey.Xigu District government issued a quote on the clean up and rectify a circular water source protection areas, on May, Anning zone on the Government introduced the quote; Towards the door to comprehensive improvement of beach water decision;in 2005, authorities prepared a quote;comprehensive management of water pollution in the Yellow River in Lanzhou program,the program of water pollution in the Yellow River in Lanzhou proposed the comprehensive regulation of specific measures.To further improve on sudden environmental pollution accident emergency response capabilities,it developed a sudden environmental Emergency Plan in Lanzhou City.Provincial executive meeting\special study section of the Yellow River in Gansu water pollution control,discussed and adopted the quote;water pollution remediation plan on Yellow River (Gansu above),which is first introduced in the Yellow River water pollution remediation plan.Provincial government introduced the quote;strengthening the Yellow River in Gansu on the prevention of water pollution in view,set the year 2004 to 2005 projects and 20specific measures for prevention and treatment.In 2006 ,according to the quote;do the province on drinking water source protection area clean-up and rectification of environmental violations in the notice,require city drinking water source for the investigation on a centralized drinking water sources,two protected areas within the industry,living sewage and other illegal acts proposed regulation scheme. In the quote:on the promotion of urban sewage treatment projects across the province and industry views of operations,the provincial government points out:in order to ensure that at the end of 2010,all of cities and sewage treatment rate is no less than 70% (not less than Lanzhou Shi 80%).For the system of drainage,the new revised quote;Water Pollution Control Act,will re-merged division of water pollution control, building a comprehensive set of legal mechanisms to control water pollution.

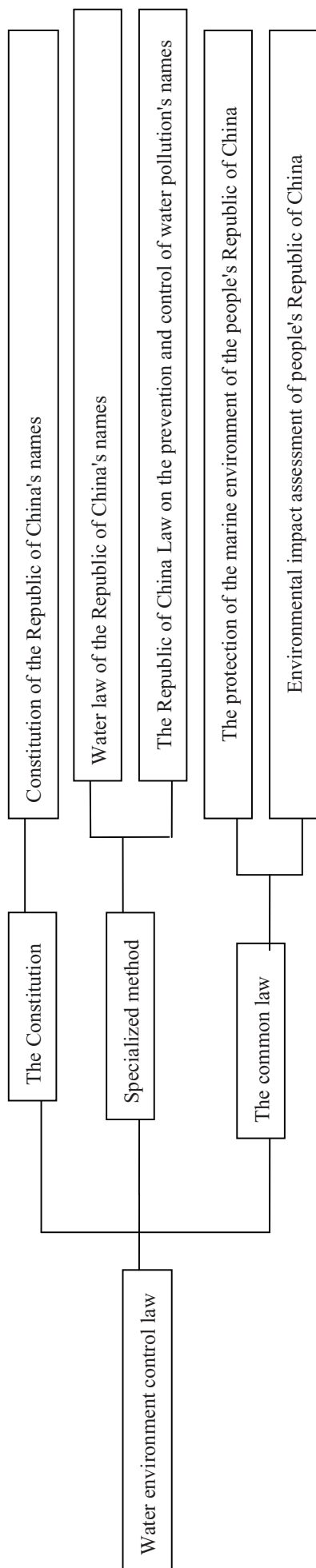
4. To analyze the existing problems of water policy and law system in Lanzhou

4.1 The policy and regulation system on environmental management of urban water

Water management policies and regulations have their own adjustment range, object, it is to adjust the water environment,people development,utilization,protection of the formation process of the legal relationship between the various legal norms in general.It may be grouped by several separate laws,regulations,ordinances,rules and relevant standards, such as rivers and water conservation areas and lakes,reservoirs, underground water source protection areas and drainage water quality and other separate regulations,ordinances,regulations,standards.In recent years,the Chinese Government attaches particular importance to environmental protection,especially water environmental protection, developed a series of water environment of the development,utilization and protection of the laws,rules and regulations to protect the water environment which played an important role(Liu.G.T,2003;Liu.Q.S,2004).

The current water environment management in Lanzhou City policies and regulations related to Figure 4.1
Figure 4.1 Lanzhou city water environmental governance of the legal system.





4.2 The main problems on policies and regulations of water environment management system in Lanzhou

Currently, despite the enactment of the water resources protection and environmental laws and numerous regulations and standards in Lanzhou, but it also exist a certain lack of coordination and authority, where there are contradictions and conflicts, and most of laws about the water environment, rules, regulations, has developed a number of specific sectors. To some extent, it has conflicts when sector interests and local interests reflected in the rules, regulations (Gansu Province, 2007).

In recently, legislation lag is a significant problem. The so-called lag is the implementation of the policies and regulations are always behind in time of water resources, environmental issues and practice development requirements. Judging from the solution, after lag only can perfect, not radically to avoid. Currently, major legislation on water environmental resources in Lanzhou are escaping violence when the issue before legislation is introduced. In future, the direction of legislation based on the full account of the development trend of water environment Practical so certain in advance legislation, which is feasible and desirable in practice.

Without a fairly comprehensive policy on effluent standards. Government to improve the rapid development of local economic development and local economic conditions. In Lanzhou, the untreated sewage discharged into the Yellow River directly, the sewage treatment rate is not high. Today's drainage facilities is increasingly market-oriented, urban drainage industry diversified interests appeared, therefore, the Government must develop a new water law, passed legislation to strengthen water management and drainage standard behavior. Currently, there exists 30% of restaurants in Lanzhou no access to urban sewage drainage systems, direct dumping or received well on the road side; other restaurants though have access to the drainage system, but only simple drainage, no provision of separate pools, resulting in high Oil sewage without any treatment directly into sewer. In this way, without any oily wastewater into the restaurant treated sewer system, pipeline system will form a plug, after a lot of oil through the pipeline network into the sewage treatment plants, makes a lot of biological bacteria deterioration death which is very sensitive to oil, it also decreased water quality caused by water pollution and emissions.

Supervision policies are not implemented and the punishment is not enough. Condition Monitoring is the responsibility of environmental protection authorities, but also the responsibility of the sewage business. Currently, the development of water environment in Lanzhou monitoring slowly capacity to monitor the level is generally low. Monitoring of large, covers a wide range of environmental protection departments rely solely on their environmental monitoring agencies work hard to achieve satisfactory results. This requires the establishment of pollution sources that are not in accordance with the provisions of line monitoring device, do not seriously carry out the sewage situation in self-test, to block interference monitoring environmental monitoring of the enterprise, it should be according to relevant regulations seriously. But the analysis of the existing urban water policies and regulations related to environmental protection has found that current policies and regulations on the general destruction of illegal urban water environment, given only to a less extent the administrative or civil penalties for some serious damage to the behavior of urban water environment should be given severe punishment accordingly. Lanzhou City, on the destruction of the water environment and violations of laws and regulations related to the punishment light can also be said of the illegal destruction of the water environment, low cost, thus it take risks in making many people in the acquisitiveness dare to challenge the law under the doctrine of the drive.

5. The proposed policy and regulation system in improving the water environment in Lanzhou

5.1 Strengthening government intervention in Water Environmental Governance

Water pollution control in particular integrated water pollution control is a large-scale public welfare undertakings. In such event, the role of government is extremely prominent, very important and also very effective. Government's strong determination, hard-line attitude, strong intervention implementation and enforcement measures is not only essential but must be strengthened. This is the theory that more is required for the practice and confirmed.

The water pollution control is a difficult work and it is still need to uphold and strengthen the government's responsibility to continue and deepen the government responsible for environmental quality guidelines and basic principles. Meanwhile, with in water environment protection the China government is playing an increasingly important role, while failure and excessive government intervention, interference issues are also increasingly prominent. Stressing the "Rule of Law", "according to law" Today, strengthen government responsibility, powers to be exercised, it is extremely necessary and important.

The development of urban water environment and usage of the implementation of government-led strategy, which for the implementation and strengthening of the Government in the development and protection of water

environment in the intervention possible. Strengthen the role of intervention in urban development and protection of water environment in and control are threefold: First, using urban water environment and create economic benefits as soon as possible; second is to prevent water damage to the environment, even though unreasonable or development of real development tools and technologies is not enough water environment has led to negative externalities, government regulation can also economic policies (such as sewage charges) and social control (such as the sound development of laws and regulations, etc.) damaged the interests of certain groups of compensation, especially the urban water environment the communities; Third, to avoid duplication of investment and construction. This is to solve the contradiction between protection and development and can achieve economic development and resources, ecological protection of the "win-win."

5.2 To establish the compensation mechanism of a sound water environment

First of all, in Gansu Province, especially in plain river valley and urban river pollution prominent, and some even declining river water quality, especially in the Yellow River in Lanzhou Yellow River oil spill occurred in 125. October 22nd, 2006, appeared on the Yellow River in Lanzhou Yantan a one-kilometer-long slick of red incidents, but also ecological alarm sounded. Secondly, the management of urban waste water treatment plant conspicuous contradictions, remains to be strengthened to protect drinking water sources, agriculture and rural nonpoint pollution and very difficult task. Finally, severe water shortages, regional water disputes will increase, affecting the economic and social coordination, health and sustainable development. So introduce the compensation mechanisms for the protection of water environment, ecological protection of water environment compensation subject, object, content, scope, standards and methods as well as fund raising and other aspects of specific norms for the actual operation. Compensation mechanism should be developed in the form of the draft law.

The form of draft laws enacted provisions of the draft to the city government should be above the county level through transfer payments, regional cooperation, etc. To establish and improve drinking water source protection areas located in the region and the rivers, lakes, reservoirs upstream areas and the conservation area water quality of the ecological compensation mechanism.

5.3 To establish and improve the pricing policies

Price is the key to start the market mechanism. Sewage treatment and water reuse industry, the market is driven into the market to support a certain price mechanism to change the traditional business model and management model. If there is no definite return mechanism, it is impossible to attract the participation of multiple investors. At the same time, there is a price policy to promote social allocate efficiency, stimulate production efficiency and maintain enterprise development potential of the three goals (Yai. G. Q., 2006). Government should focus on these tasks and goals, establishing and improving the pricing policy.

Break the traditional pricing model, reference national average cost of sewage treatment industry, Lanzhou should follow the principle of preserving the small profit, a rational and scientific treatment price. If the current price is low, it can increase the price of sewage treatment, or the Central Water Resources Management Company to pay certain fees to the sewage treatment company, to improve the profitability of sewage treatment capacity, attract more capital and enterprises to enter the wastewater treatment market the wastewater treatment market in a bigger cake. Meanwhile, the establishment of the normal treatment price adjustment mechanism to increase the sewage treatment business expectations for the future. Price adjustment model, as follows:

$$P_{t+1} = C_t (1 + PRI - X) + P_t + 1 \times r \quad (1)$$

The first type an equal sign on the right side of the unit cost of items, second item for the unit profit, by order and to consider the quality factor (Q), available:

$$P_{t+1} = Q \times C_t (1 + PRI - X) / (1 - r) \quad (2)$$

Type in: P_{t+1} - the next price control;

C_t - the unit cost of the current period;

PRI - the retail price index;

X - as stipulated by the Government productivity growth (decline in costs);

Q - for product and service quality factor;

r - the profit margin.

In the above model, the implementation of the quality factor Q and the price-linked approach, can help businesses control costs under the ceiling, meets the government's product quality standards, to the public (consumers) to provide a better quality of service.

6. Conclusions and recommendations

In summary, there are still insufficient in the policy system of Lanzhou Water Environmental Governance, government must make use of ideological education, policy initiatives, the legal system, price leverage and other means of measures on water resources and water environment management and governance, to ensure Lanzhou proper use of water resources.

Lanzhou is one of the most polluted cities in the domestic one, in recent years with economic development and acceleration of western development, industrial development and rapid population growth, rapid development of urban construction, to Lanzhou City, state water quality brought great pressure. This not only seriously affect the health of the people of Lanzhou City, and the overall image of the city of Lanzhou, but also affect the social, economic and environmental sustainability. Improve the quality of urban water environment to improve people's living life play an important role on relevant government proposal to give support.

1. Combined with the development of Lanzhou City master plan, development of environmental management policy system and water-related long-term planning.

2. Suggested that the relevant administrative departments to strengthen law enforcement on the water environment Lanzhou strict monitoring, to ensure improved quality of urban water environment.

3. In the next step in-depth study, suggested that full use of modern computer technology, more investments in technology, improve management, to improve social and economic benefits.

4. Well-developed add "building water-saving society in Lanzhou City Planning", "Lanzhou City, the source of centralized drinking water system for unexpected water pollution incident emergency plan" and so on water environmental policies and regulations.

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