

Study on the present situation of water pollution and ecological control methods in Hunan Province

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Abstract

As we all know, water resources are non-renewable resources, especially in the northwest area, water is difficult to find is the normal situation of every family. Water resource plays an important role in ecological civilization construction system and is an important prerequisite for human survival and development. In recent years, along with our country economy fast development, the scale of urbanization, industrialization of hunan province is more and more much, city water environmental pollution already more than city cleaning ability and capacity, which can lead to urban water environment pollution is more and more serious, so how to control in hunan city water pollution situation is imminent. This paper mainly analyzes and studies the urban water pollution and ecological control methods in Hunan Province.

Keywords

Water pollution in Hunan Province; Ecological governance; Methods strategy

1. The Introduction

Water is the source of life, is the basis of people's survival, is to ensure the premise of social and economic development. In recent years, with the continuous development of China's economic and social progress, the rapid development of urbanization and industrialization in China, the demand for fresh water resources is increasingly high. [1]However, with the increase of people's demand, urban water environment has brought a certain impact, urban sewage can not be treated for a long time, resulting in serious pollution of urban water over time. According to the investigation of the relevant government departments in hunan province, hunan urban wastewater treatment rate reached only 40%, the vast majority of the old city sewage directly discharged into the city of the surrounding water, the passage of time more than 80% of urban appeared around the river pollutants, water, odor, or even exceed the serious degradation of ecological environment problems, such as ecosystem. People living in this environment for a long time will seriously affect people's quality of life and living standards, and harm people's health.[2]

2. Sources of urban water pollution

The water system composed of lakes, urban inland rivers, reservoirs, ponds and groundwater is called urban water body. Urban water system occupies an important position in the urban ecosystem, which can not only effectively play a role in water supply, drainage, flood prevention, transportation, but also can play a role in landscape leisure. At present, urban water pollution in Hunan province is mainly divided into internal pollution and external pollution. The details are as follows:

(1) Endogenous pollution. Endogenous pollution mainly refers to the mud bottom formed by external pollutants, dead organisms and biological excreta in water after long-term accumulation and precipitation. When mud bottom accumulates in a certain amount in water, organic matter, hydroxide, carbonate and other substances will be released, thus forming endogenous pollution[3]. (2) Exogenous pollution. It mainly refers to the discharge of water generated by people's life, industry and agriculture into the lake. These wastes contain industrial raw materials, crop fertilizers, pesticides, livestock waste residues, food residues consumed by human life, urea and so on. These sewage has not been treated and discharged into the river, it will produce pathogenic bacteria, and pathogenic bacteria multiply in the river, thus inducing eutrophication of river water, causing algal blooms, inducing abnormal dissolved oxygen in water, and ultimately leading to the deterioration of river water quality. (3) Secondary pollution. In the process of sewage treatment, the local government of Hunan province lacks the concept of sewage treatment, thus neglecting the effective treatment of sewage. If the sewage treatment method is not appropriate, it will lead to the secondary pollution of urban water body. With the rapid development of urbanization, the rapid growth of urban pollution emissions, the growth rate is far beyond the treatment efficiency and working limit of sewage treatment plants, resulting in a lot of sewage discharged into urban water bodies without treatment.

3. Current situation of sewage pollution in Hunan Province

In 2021, the surface water quality of Hunan province was generally good, and 96.1 percent of the 534 provincial control and assessment sections were classified as i to iii. Among them, there are 42 sections of class i water quality, accounting for 7.9%; 420 sections of class ii water quality, accounting for 78.7%; There were 51 sections of class iii water quality, accounting for 9.6%; There were 18 sections belonging to class iv , accounting for 3.4%; 1

class v water quality section, accounting for 0.2%; There are 2 sections of inferior v water quality, accounting for 0.4%, as shown in Figure 11-2-1. Table 1 shows the classified statistical results of water quality at provincial controlled sections in 2020[4].

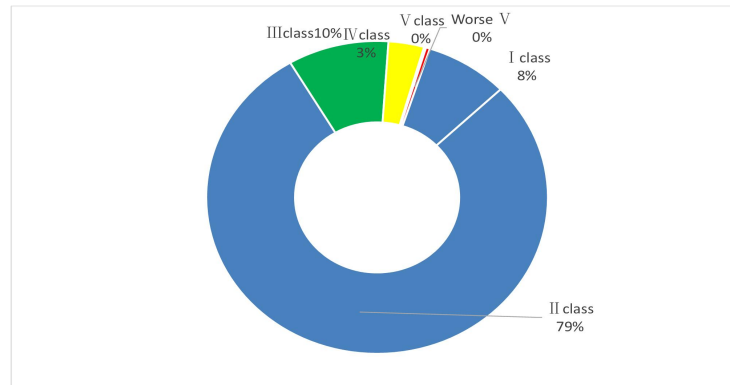


Fig. 1 Statistics of water quality categories of provincial controlled examination sections in 2021

In order to better judge the sewage pollution situation of various cities in Hunan Province, hunan provincial government managers evaluated the water quality of lakes, rivers and other surface water in Hunan Province. Among them, a total of 534 surface water were found in the province, including 42 of class i , 420 of class ii , 51 of class iii, 18 of class iv, 1 of class v and 2 of inferior class v . The specific data contents are shown in Table 2 below[5]:

Table 2 Statistics of water quality of provincial controlled surface water examination sections in 2021

River basin	Number of sections (PCS)	I class	II class	III class	IV class	V class	Worse V
Xiangjiang	232	20	191	18	1	1	1
Zijiang	66	0	65	1	0	0	0
Yuanjiang	109	4	99	6	0	0	0
Lishui	40	8	31	1	0	0	0
The Yangtze river	5	0	5	0	0	0	0
Rivers around Dongting Lake	37	1	26	10	0	0	1
Ganjiang	1	0	1	0	0	0	0
Pearl River North wushui river	10	2	6	1	1	0	0
West of the pearl river	2	0	2	0	0	0	0
Dongting lake	11	0	0	2	9	0	0
Dongting lake	17	0	0	9	7	1	0
The province's total	4	3	1	0	0	0	0
The province's total	534	42	420	51	18	1	2

* Note: Fecal coliforms are not involved in the statistics of water quality categories, and are only evaluated as hygiene indicators; Total phosphorus and total nitrogen were evaluated separately.

Below, the author of this paper will mainly analyze and study the water quality of rivers and Dongting Lake in detail, and take corresponding solutions to the problems in time. The specific analysis and research contents are as follows:

(1) River water quality: In 2021, among the 502 provincial-controlled river sections, the main pollution indexes are ranked in ascending order according to the over-standard rate of annual mean of sections. The top three are ammonia nitrogen (0.4%), permanganate index (0.2%), chemical oxygen demand (0.2%), total phosphorus (0.2%), fluoride (0.2%) and arsenic (0.2%). Other projects did not exceed the annual average of sections. The monitoring values of some indicators of cross section samples exceeded the standard, and the top three pollution indicators were ammonia nitrogen (3.6%), total phosphorus (3.6%) and chemical oxygen demand (3.0%). The top three samples are cadmium (7.2 times), ammonia nitrogen (5.7 times) and arsenic (4.1 times) in order of the maximum monitoring value of samples. The statistics of river water quality monitoring results in 2021 are shown in Table 3.

Table 3 Statistics of water quality monitoring results of river sections under provincial control in 2021

Monitoring project	Quantity (PCS)	Annual mean of section				Cross section samples					
		Annual mean range (mg/L)	Number of cross sections exceeding standard (PCS)	Which (%)	Average composite pollution index	Maximum sample over-specification rate (%)	Number of cross sections exceeding standard (PCS)	Sample exceeding standard (PCS)	Section overshoot rate (%)	Maximum (low) value (mg/L)	The highest (low) value exceeds the multiple
pH	502	7-8	0	0.0	-	8.3	2	2	0.4	10	
Dissolved oxygen (do)	502	6.1-10.6	0	0.0	0.291	25.0	12	16	2.4	6.1	
Permanganate index	502	0.6-6.8	1	0.2	0.350	66.7	13	27	2.6	10.8	0.8
Chemical oxygen demand	502	2.0-29.8	1	0.2	0.460	91.7	15	34	3.0	51	1.6
Biochemical oxygen demand at 5 days	502	0.2-3.4	0	0.0	0.350	41.7	5	12	1.0	7.4	0.9
Ammonia nitrogen	502	0.02-1.83	2	0.4	0.180	53.8	18	36	3.6	6.68	5.7
Total phosphorus	502	0.005-0.258	1	0.2	0.240	76.9	18	33	3.6	0.52	1.6
copper	502	0.0001-0.025	0	0.0	0.002	0.0	0	0	0.0	0.11	/
zinc	502	0.0004-0.076	0	0.0	0.014	0.0	0	0	0.0	0.26	/
fluoride	502	0.030-1.640	1	0.2	0.172	83.3	1	10	0.2	2.7	1.7
selenium	502	0.0002-0.0024	0	0.0	0.030	0.0	0	0	0.0	0.0093	/
arsenic	502	0.0001-0.1050	1	0.2	0.064	58.3	4	11	0.8	0.254	4.1
mercury	502	0.000005-0.00003	0	0.0	0.200	0.0	0	0	0.0	0.0001	/
cadmium	502	0.00002-0.00383	0	0.0	0.026	8.3	2	2	0.4	0.0411	7.2
Hexavalent chromium	502	0.0005-0.012	0	0.0	0.040	0.0	0	0	0.0	0.026	/
lead	502	0.00004-0.005	0	0.0	0.020	0.0	0	0	0.0	0.027	/
cyanide	502	0.0005-0.004	0	0.0	0.005	0.0	0	0	0.0	0.011	/
Volatile phenol	502	0.0002-0.0010	0	0.0	0.060	0.0	0	0	0.0	0.0017	/

petroleum	502	0.005-0.02	0	0.0	0.200	8.3	2	2	0.4	0.07	0.4
Anionic surfactant	502	0.02-0.12	0	0.0	0.100	0.0	0	0	0.0	0.19	/
sulfide	502	0.002-0.046	0	0.0	0.030	0.0	0	0	0.0	0.1	/
Fecal coliforms	361	52-163000	48	13.3	0.662	100.0	101	554	28.0	240000	23.0

In 2021, among the examination sections of provincial controlled rivers, the annual mean of pollution indexes exceeded the standard, including fluoride, arsenic, ammonia nitrogen, total phosphorus, chemical oxygen demand and permanganate index. Except for ammonia nitrogen, the annual mean of 2 sections exceeded the standard, and the number of other 5 indexes exceeded the standard was 1 section. Compared with last year, the annual mean value of cadmium in 1 section decreased, the annual mean value of ammonia nitrogen in 2 new sections exceeded, and the annual mean value of total phosphorus in 1 section exceeded. In general, the annual mean value index and the number of sections exceeded both increased compared with last year.

(2) Water quality of Dongting Lake: In 2021, the overall water quality of Dongting Lake is class iv, with 2 sections belonging to Class iii and 9 sections belonging to Class iv. When the total nitrogen was evaluated separately, the overall water quality of Dongting Lake was class v, among 11 provincial control sections, 2 sections belonged to class iv, 8 sections belonged to class v, and 1 section belonged to inferior class v.

The 11 sections of Dongting Lake are medium nutrition. The water body of Dongting Lake is at medium nutrient level.

In 2021, among 11 sections of Dongting Lake body, the annual average of total phosphorus exceeded the standard, and 9 sections exceeded the standard, with an over standard rate of 81.8%. Among the 21 monitoring indexes of 11 sections, one index of total phosphorus was not up to standard, and the maximum sample overstandard rate was 90.9%. The maximum exceeding multiple of the sample monitoring value is 1.7 times of total phosphorus, which is the main pollution index of Dongting Lake. According to the separate evaluation results of total nitrogen, the annual mean value of total nitrogen in 11 sections of Dongting Lake body exceeded the standard, and the rate of annual mean and sample exceeded the standard were 100.0%. The maximum exceeding multiple of sample monitoring value was 2.0 times. Total nitrogen was also the main pollution index of Dongting Lake body. The statistics of water quality monitoring results of Dongting Lake in 2021 are shown in Table 4.

Table 4 Statistics of water quality monitoring results of provincial control section of Dongting Lake in 2021

Monitoring project	Number of sections (PCS)	Annual mean of section			Cross section samples					
		Annual mean range (mg/L)	Number of cross sections exceeding standard (PCS)	Which (%)	Maximum sample over-specification rate (%)	Number of cross sections exceeding standard (PCS)	Which (%)	Maximum (low) value (mg/L)	Maximum (low) value (mg/L)	Maximum superscaler
pH	11	7-8	0	0.0	0.0	0	0.0	0	9	

Permanganate index	11	7.3-8.7	0	0.0	0.0	0	0.0	0	7.3	
Chemical oxygen demand	11	1.2-2.2	0	0.0	0.0	0	0.0	0	3.3	
Biochemical oxygen demand at 5 days	11	5.5-9.6	0	0.0	0.0	0	0.0	0	15	
Ammonia nitrogen	11	0.9-1.9	0	0.0	0.0	0	0.0	0	2.3	
Total phosphorus	11	0.02-0.39	0	0.0	0.0	0	0.0	0	0.74	
copper	11	0.036-0.088	9	81.8	100.0	10	90.9	83	0.136	1.7
zinc	11	0.001-0.003	0	0.0	0.0	0	0.0	0	0.004	
fluoride	11	0.008-0.025	0	0.0	0.0	0	0.0	0	0.025	
selenium	11	0.094-0.210	0	0.0	0.0	0	0.0	0	0.277	
arsenic	11	0.0002-0.0002	0	0.0	0.0	0	0.0	0	0.0004	
mercury	11	0.0018-0.0038	0	0.0	0.0	0	0.0	0	0.006	
cadmium	11	0.00002-0.00002	0	0.0	0.0	0	0.0	0	0.00002	
Hexavalent chromium	11	0.00003-0.00012	0	0.0	0.0	0	0.0	0	0.00018	
lead	11	0.002-0.002	0	0.0	0.0	0	0.0	0	0.002	
cyanide	11	0.0003-0.001	0	0.0	0.0	0	0.0	0	0.002	
Volatile phenol	11	0.0005-0.001	0	0.0	0.0	0	0.0	0	0.002	
petroleum	11	0.0002-0.0006	0	0.0	0.0	0	0.0	0	0.0008	
Anionic surface	11	0.005-0.005	0	0.0	0.0	0	0.0	0	0.005	
surfactant	11	0.02-0.04	0	0.0	0.0	0	0.0	0	0.08	
sulfide	11	0.002-0.018	0	0.0	0.0	0	0.0	0	0.051	
Total nitrogen	11	1.29-2.38	11	100.0	100.0	11	100.0	124	3.01	2.0

Remark: The evaluation standard is the surface water quality standard iii; PH dimensionless, fecal coliforms: per L.

In 2021, the comprehensive pollution index of xiangjiang tributaries was between 0.094 and 0.246, which was still in the clean level. Among them, Hengyang xinglong reservoir section, Yongzhou Zhuge Temple and purple river into the Mouth of the Xiangjiang river section water quality is better; Yongzhou bai River into the Mouth of the Xiangjiang River, Hengyang steamed water into the mouth of the Xiangjiang River and Yi water into the mouth of the Xiangjiang river water quality is poor. Compared with last year, the average comprehensive pollution index of zishui River in xiangjiang estuary and Haocaotang village in Zhushan Town decreased significantly, the average comprehensive pollution index of Yishui river in Xiangjiang estuary increased significantly, and the comprehensive pollution index of other tributaries was basically flat.

The change trend of the comprehensive pollution index of chemical oxygen demand, permanganate index, ammonia nitrogen and total phosphorus in xiangjiang River trunk Stream is shown in Figure 6. The calculated results of chemical oxygen demand, permanganate index, ammonia nitrogen and total phosphorus pollution index of the main stream of xiangjiang River show that the variation trend of the comprehensive pollution index of the above pollutants is mainly related to the distribution of urban population and industrial pollution sources. The pollution of permanganate index, ammonia nitrogen and total phosphorus along the xiangjiang main stream increased. The chemical oxygen demand fluctuates greatly along the xiangjiang river, and the section of zhuzhou section and Zhuzhou section of Zhuting ferry is more prominent.

4. Control measures of urban water pollution

4.1. Cut off pollution sources and strengthen protection of water sources

In order to effectively prevent and control the pollution of urban water environment, hunan provincial government agencies monitor the source of pollution, so as to effectively cut off the source of transmission. Since the Chinese government has issued a "industrial" three wastes "" emissions standards, hunan province government departments in strict accordance with national standards, the polluting enterprises to take off, stop and consolidation treatment, limit the use of polluting raw material process, actively encourage enterprise technology innovation, so as to effectively achieve the purpose of reducing pollutant emissions. Even, the agricultural implementation of the "three reduction" action, actively promote green prevention and control technology, the reuse of modern technology to collect and treat livestock excreta. When treating domestic sewage, it is necessary to treat urban drainage equipment, upgrade sewage pipes comprehensively, realize sewage diversion, and ensure that sewage treatment meets national standards.

4.2. Strengthen the publicity of the concept of environmental protection

Due to the national environment protection consciousness weak, so the government needs to actively promote the environmental protection concept of hunan province, enhancing environmental protection publicity and education work, improve the residents' awareness of water protection, conscientiously do a good job in environmental protection work, reduce the emissions of waste water, starts from me, start from around things, afforestation, actively encourage residents to improve the coverage of urban green environment, Improve the ability of the ecological environment to repair itself.

5. Conclusion

In recent years, with the acceleration of urban construction in Hunan Province, domestic water, industrial water and agricultural water will affect people's quality of life and health.

Therefore, the government sector by adopting innovative technologies, explore reasonable ways and means of the pollution treatment, improve the quality of wastewater discharge, in order to promote the sustainable development of social economy of our country, need training and publicity of the seriousness of water pollution, strengthen the residents' awareness of their own, sewer system of industrial enterprise to conduct a comprehensive inspection, thus effectively control quality of industrial wastewater discharge. In the process of sewage treatment, the Government of Hunan Province can also adopt ecological governance law, build artificial wetlands, ecological rivers, ecological ditches and other ways to effectively improve the local urban water pollution on the premise of reducing operating costs.

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