



## **Research progress on treatment technology of black and odorous water in urban city**

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**Abstract:** Odorous-black water causes restrict urban development that influences ecological damage and threaten human health. This article mainly studies the development status of treatment technology for black and odorous water in urban city in China. Current demand for endogenous pollution control technology of black and odorous water. It will provide theoretical basis for the development of black and smelly water treatment technology.

**Keywords:** Research progress, odorous-black water, treatment technology.

### **1. Introduction**

With the continuous development of industrial and agricultural production and the continuous acceleration of the urbanization process, more and more urban inland rivers have been polluted to very serious degrees. The river becomes "black and smelly", which has a serious impact on residents' lives and the surrounding environment<sup>[1]</sup>. As an extreme phenomenon of water pollution, black and smelly water bodies not only cause ecological damage, but also severely restrict urban development. The treatment of black and odorous water bodies has become one of the most popular and difficult to solve environmental problems in my country's current water environmental protection management<sup>[2]</sup>.

The "Water Pollution Prevention and Control Action Plan" issued by the State Council in August 2015 (referred to as the "Water Ten Measures") puts forward clear

requirements for the treatment of black and odorous water bodies: by 2020, the problems of black and odorous water bodies in built-up areas of cities at prefecture-level and above in my country will be controlled within 10%; by 2030, the number of black and odorous water bodies in urban areas must be contained and eliminated. The Ministry of Ecology and Environment and the Ministry of Housing and Urban-Rural Development launched a special environmental protection campaign to remediate urban black and odorous water pollution in 2018, and carried out supervision work. Among the 295 cities at prefecture-level and above, 2720 black and smelly water bodies were checked and confirmed in 232 cities across the country, and 2294 remediation projects were completed, with a completion rate of 84.3%. There are 26 black and odorous water bodies in Shaanxi province. Among them, there are 21 cities with black and odorous water bodies in Xi'an, 19 of which have achieved initial results; Yulin City has 3 cities with black and odorous water bodies, and 2 of which have achieved initial results; Tongchuan City There is 1 city with black and odorous water bodies, which has achieved initial results. There is 1 city with black and odorous water bodies in Weinan City, which has achieved initial results.

Many black and smelly water treatment projects fall into the strange phenomenon of "treatment every year, black and smelly every year" because of the emphasis on treatment rather than maintenance, short-term rather than long-term effectiveness<sup>[3]</sup>. Therefore, in the current process of treating black and odorous water bodies, how to select suitable black and odorous water treatment technologies and optimize integration is the main problem to be solved urgently. In addition, after the treatment of black and odorous water bodies, how to effectively prevent repeated treatment effects and achieve the goal of long-term maintenance of good water quality is the key to the complete elimination of black and odorous water bodies in cities in my country.

## **2. Technology development trends**

In the field of international and domestic scientific research, black and smelly water source remediation work and technology research and development are still in its infancy. The existing research results are generally one-sided, especially for solving the key technical bottlenecks of black and smelly water source control and ecological restoration<sup>[3]</sup>. There is no report on the situation of intellectual property rights and standards at home and abroad.

Therefore, the development of this project can play a role in scientific and technological innovation in the basic research on the treatment of black and odorous water bodies in urban inland rivers, tackling major issues, and research and development of key technologies, and play a core supporting and leading role in the

"water pollution tackling battle". Provide reproducible and extendable urban inland river black and smelly water source treatment technology and integration model.

### **3. The necessity of technical research**

The primary task of remediation of urban black and odorous water bodies is to understand its causes and take effective treatment measures to eliminate the "black and odor" problem. The main causes of black and odorous water bodies in urban inland rivers are the input of external pollutants (such as industrial wastewater, domestic sewage, garbage, and non-point source pollution from both sides of the bank) and the input of internal pollution from the bottom sludge. The environmental factors that cause black odor mainly include: organic pollutants, nitrogen, phosphorus, iron, manganese, sulfide and other pollutants. Water hypoxia and poor fluidity can further accelerate the black and odor of water. For the treatment of external pollutants, many cities have done a lot of effective work, which can basically be achieved by improving the sewage pipe network, improving the efficiency of rain and sewage diversion, and centralized sewage treatment and external discharge. At the same time, it can strengthen administrative management<sup>[5]</sup>. For example, the upgrading or shutting down of the sewage of key sewage companies, and improving the efficiency of garbage removal and transportation, can further improve the processing capacity and level of external pollutants. For the treatment of endogenous pollution in sediments, which aims at endogenous treatment and ecological restoration, there are still many bottlenecks in the treatment technology.

The establishment of a technical system for comprehensive treatment of black and odorous water bodies in urban inland rivers based on the logical idea of "external source pollution interception-internal source treatment-ecological restoration" has been recognized by many. Therefore, under the premise of intercepting pollution from external sources, this project will focus on the development and integration of in-situ control technology for urban inland river black and odorous water source pollution and water ecological restoration and reconstruction technology, including: in-situ passivation technology for sediment pollution, oxygen nanobubbles Modified particle aeration technology, high-efficiency water algae removal technology, water ecological floating island restoration technology, riparian biogeochemical barrier technology, etc. At the same time, using GIS, Internet of Things, the Internet and other technical means to build a big data management platform for online monitoring and source analysis of black and smelly water intelligent Internet of Things, realizing data fusion and data sharing in multiple industries and departments, and assisting scientific decision-making. Eventually, the "black and smelly" phenomenon of water bodies in urban inland rivers will be eliminated.

#### **4. Market demand analysis**

Remediation of black and odorous water bodies in urban inland rivers is an important content and urgent task for the implementation of the National Action Plan for Water Pollution Prevention and Control. The remediation of black and smelly water bodies in urban inland rivers involves many links such as external source pollution interception, internal source treatment, ecological restoration, and living water quality preservation. It also involves many functional departments such as ecological environment, housing construction, urban planning, water conservancy, and finance, and the work of governance is difficult. At this stage, the main technical bottleneck faced by the remediation of black and odorous water bodies in urban inland rivers is the treatment of endogenous pollution of river polluted sediments and the restoration and reconstruction of healthy river ecosystems.

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