Analysis on the current situation and causes of the destruction of aquatic ecosystems in China

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Abstract. In recent years, with the rapid economic development, the current situation of aquatic ecosystem in China is not optimistic, facing unprecedented challenges. Water is an irreplaceable material for all life activities. It is essential not only for human survival and development, but also for human productive activities and maintaining the ecological environment for human survival. Without a certain quantity and quality of water, all living things on the earth cannot survive. Therefore, this paper will analyze the current situation and causes of the destruction of aquatic ecosystems in China by using the data from China Environment Bulletin, which will help to promote the green and sustainable development of aquatic environment in China.

1. Introduction
The aquatic ecosystem is a general term of all types of earth surface water ecosystems, according to the level of salt water can be divided into freshwater and marine ecosystems; freshwater ecosystems in the water flow can be divided into lentic ecosystems (such as lakes, ponds and reservoirs) and lotic ecosystem (such as rivers, streams, ditches etc.) [1].

Before the reform and opening up, there were not many demands for freshwater ecosystem to provide goods and services, and fresh water was not considered to be a shortage of resources. But with the growth of population, the expansion of industrialization and irrigation agriculture, the demand for water related products and services in China has increased dramatically, forming a great pressure on the affordability of freshwater ecosystems.

The ocean is the largest water body on the earth, and it is one of the final destinations of pollutants around the earth. The pollutants in the marine environment are hard to be transferred. Therefore, with the passage of time, the destruction of the marine ecosystem will become more and more serious. While China's marine economy is developing rapidly, the damage to the marine ecosystem cannot be ignored.

On the basis of this classification, the current status and causes of the destruction of aquatic ecosystems are analyzed in China.

2. The current situation and cause of the destruction of the freshwater ecosystem
Water ecosystem includes rivers, streams, ditches and other ecosystems. It has the characteristics of continuous flow, land and water exchange, and abundant oxygen. Because it has many connections
with the surrounding land environment, it is relatively open, and there are many ways to destroy the ecosystem. Water ecosystem is a flow or rarely flowing water such as ponds, reservoirs, lakes, marshes and other ecological systems, with characteristics of clear boundary, small area and hierarchical belt. Because of the present semi closed state in the material circulation and energy flow, it is easy to be destroyed and difficult to be restored [1].

The current situation of the freshwater ecosystem in China is not optimistic. In 2015, 967 surface water control section (points) are counted (There are five sections without data that do not participate in Statistics.) which cover the seven basin, Zhejiang and Fujian provinces River, Northwest River, Southwest River and Taihu, Dianchi and Chaohu Lake River 423 rivers and Taihu, Dianchi and Chaohu and other 62 major lakes (reservoirs), the monitoring shows that Grade I of the water quality section (points) is accounted for 2.8%, which is 0.6 percentage lower than that in 2014; Grade II is accounted for 31.4%, which is 1 percentage higher than that in 2014; Grade III is accounted for 30.3%, which is 1 percentage higher than that in 2014; Grade IV is accounted for 21.1%, which is 0.2 percentage higher than that in 2014; Grade V is accounted for 5.6%, which is 1.2 percentage lower than that in 2014; worse than Grade V is accounted for 8.8%, which is 0.4 percentage lower than in 2014. From the 5118 groundwater quality monitoring points of monitoring objects, which cover mainly shallow groundwater and confined water in deep groundwater, making the groundwater system be a unit, the water quality monitoring points for excellent proportion is 9.1%, the great level proportion is 25%, the good level proportion is 4.6%, the poor level proportion is 42.5%, the very poor level proportion is 18.8%. Water quality monitoring of centralized drinking water sources has been carried out in 338 cities at the prefecture level or above. The total water intake is 355.43 billion tons, and the water intake is 345.06 million tons, accounting for 97.1%. However, as the focus of "The Action Plan for Prevention and Treatment of Water Pollution", the extreme water quality in some areas has not been improved obviously. Nearly 80% worse than Grade V waters were concentrated in Haihe River, Huaihe, Liaohe River and the Yellow River River Basin. There was a large number of black and odorous water bodies in the city, and 14 eutrophic lakes and reservoirs did not improve significantly [2], which is shown in Figure 1.

There are three main reasons for this situation as follows.

(1) Domestic sewage, industrial wastewater and agricultural sewage containing nitrogen and phosphorus inorganic or organic matter in water enriched in freshwater ecosystems lead to eutrophication, stimulating algae and other plankton reproduce rapidly, dissolved oxygen decreased, a large number of dead fish and other creatures, eventually the deterioration of water quality, freshwater ecosystems are destroyed[3]. This phenomenon is especially evident in the still water ecosystem represented by lakes. Once nitrogen and phosphorus enter the lake, it is extremely difficult to be diluted and purified, thus accumulating in lakes and greatly destroying the water bodies.

![Figure 1. Situation of the freshwater ecosystem in China](image-url)
(2) The poor supervision of the environmental protection department causes a large number of pollutants to be discharged into the surface runoff with sewage. Taking rivers as an example, its sources of pollution are wide, many ways and complex species. Once a river is polluted, the whole river's ecological environment will soon be affected because of its fluidity[4].

(3) The pollutant in the atmosphere enters the surface water with precipitation, such as acid rain, which reduces the pH value of the water body and affects the survival of the aquatic animal population. Besides, rainwater will bring a lot of surface pollutants into the water through the sewer. The heavy metals, organic chloride and suspended solids will have potentially fatal effects on many kinds of fish and invertebrate aquatic animals[5].

3. The current situation and causes of marine ecosystem damage

The situation of the marine ecosystem in China is still severe, and the phenomenon of land source pollutants being discharged into the ocean is serious. In 2015, the monitoring results of inorganic nitrogen, active phosphate, petroleum and chemical oxygen demand, which are in the sea area under the jurisdiction of China, showed that the seawater pollution in the offshore area is still serious, and the quality of seawater near the coast is good. In winter, spring, summer and autumn, the sea area of the worse than Grade IV sea water accounted for 2.2%, 1.7%, 1.3% and 2.1% of the area under the jurisdiction of China respectively. Pollution of coastal waters are mainly distributed in the waters of Liaodong Bay, Bohai Bay, Laizhou Bay, Jiangsu coastal, Yangtze River Estuary, Hangzhou Bay, Zhejiang coast and the Pearl River estuary. Compared with the same period in the summer of 2014, the sea area of the worse than Grade IV sea water in Bohai and the East China Sea decreased, about 1690 and 1660 square kilometers respectively. The sea area of the worse than Grade IV sea water in the Yellow Sea and the South China Sea increased by 1710 and 520 square kilometres respectively [6], they are shown in Figure 2 and Figure3. Mariculture area environment is not optimistic, that from the monitoring results of the implementation of the 50 mariculture area, 56% of the mariculture water quality is good, some mariculture areas affected by phosphate and inorganic nitrogen are being eutrophication, 48% of the mariculture sediment quality is in good condition, high content of culture sediment in fecal coliform, organic carbon and arsenic. The overall quality of the cultured organisms is general. There are DDT, polychlorinated biphenyls, fecal coliform groups, cadmium, arsenic and lead in the cultured organisms in some aquaculture areas. The frequent occurrence of red tide in the coastal and offshore waters of China has caused huge economic losses to the aquaculture industry and caused great damage to the marine ecology. China's coastal erosion is very serious. At present, about 70% of the sand banks and most open mud banks have been eroded. The erosion coastline of sandy coast has been more than 2500 kilometers. In general, the coastal marine ecosystem in China is in a fragile state, and the trend of ecological environment deterioration has not been alleviated [7], it is shown in Figure 4.
There are several main reasons for the present situation of the marine ecological environment as follows.

(1) In recent years, land-based pollutants discharge and reclamation of man-made destruction of the coastal waters of China lead to habitat deterioration, unbalanced ecological structure and damage of typical ecosystems, biodiversity and endangered species decrease. Due to containing high concentrations of nutrients of sewage discharged into the sea, ecological disasters such as red tide marine are being more and more[8].

(2) The rapid economic development of the coastal areas has produced great environmental pressure. The coastal areas of China are growing rapidly, and the economy is developing rapidly. A large number of industrial wastewater and domestic sewage are discharged into the sea. Agricultural non-point source pollution and runoff also transmit various pollutants and nutrients to the ocean. At the same time, all kinds of marine development activities, such as reclamation, offshore oil and gas development, ship transportation, have increased the pressure of the marine environment. The overutilization of resources, especially over fishing, further aggravates the destruction of marine ecology.
(3) The marine environmental protection lacks macro planning and regulations, and the supervision and management mechanism is not perfect. Lack of macroscopical guidance, coordination and planning for environmental protection in key sea areas has resulted in environmental protection and remediation of key sea areas cannot be effectively carried out, and many marine environmental protection measures cannot be effectively implemented. At the same time, due to the lack of specific and operable marine environmental protection regulations and technical standards, there is insufficient management basis in marine environmental protection, and monitoring and evaluation standardization is not strong enough to establish effective marine environment monitoring, monitoring and evaluation system[7].

4. Conclusions
With the development of economy and society in China, the environmental pressure of aquatic ecosystem is increasing. And the increasingly serious water pollution makes the number of water resources available in China decrease. Therefore, we must protect the water and increase the strength of sewage treatment at the same time of economic development. Based on this, water safety investigation must comprehensively be carried out, the large amount of sewage discharged must be
prevented into the water. The river pollution will be controlled, the healthy development of the marine ecological system will be ensured. The China aquatic ecosystem monitoring network will be established, as well as the supervision and management of pollution emergency mechanism. The public consciousness will be improved on the aquatic ecosystem pollution prevention and control[9].

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