

Promoting the Conservation of China's Lakes and Wetlands in a Comprehensive Way

Large numbers of lakes and wetlands are widely distributed across China, covering 6.5% of the national territory. Together the lakes and wetlands conserve 96% of the country's available freshwater resources and serve as home to a wide range of plants and animals, including 4,220 species of higher plants and 2,312 species of vertebrates. In addition to their immense capacity for flood control, environmental purification and climate regulation, the lakes and wetlands are also the major sources of China's freshwater aquatic products and are important tourism destinations. They have played an irreplaceable role in various aspects of socioeconomic development, ranging from water supply, flood control and economic growth to biodiversity protection and regional ecological balance.

In spite of their high service value per unit area among various ecosystems, however, the lakes and wetlands in China are suffering from rapid shrinkage in their area and severe environmental pollution. As a result, the advancing degradation of their service functions has become a bottleneck problem for the socioeconomic growth and livelihoods of residents in the neighboring regions and reaches. In response, a task force headed by Prof. LIU Changming, Member of the Chinese Academy of Sciences (CAS), and supported by the Academic Divisions of the Chinese Academy of Sciences (CASAD) examined the environmental deterioration and ecologic degradation facing the lakes and wetlands in China. Their work was part of the studies on strategies for safeguarding China's water resources. Based on an analysis of the causes of the problems, the researchers made suggestions to secure the safety of the country's water and promote its ecological development.

I. Great Urgency for Lake and Wetland Conservation in China

1. Rapid Shrinkage or Dried-up

Since the 1950s, the number of lakes in China has dropped by 243, totaling an area of 9,606 square kilometers, accounting for 12% of the total acreage of China's lakes. Most of the dried-up lakes were located in the middle or lower reaches of the Yangtze River and the arid areas in northwest China.

As to wetlands, more than 50% of their total area has become dry. The gravest situation has occurred in northeast China, the middle and lower reaches of the Yangtze River and the Qinghai-Tibet Plateau. Over the past decade, about 34,000 square kilometers (about 8.8%) of the wetlands in China have vanished, constituting a natural ecological system with the fastest rate of area decrease in the country.

2. Deteriorating Water Environment

In east China the water quality of lakes and wetlands has become degraded and their eutrophication level elevated. In China's east, northeast and on the Yunnan-Guizhou Plateau about 85.4% of the lakes with an area of more than 10 square kilometers have exceeded the standards of eutrophication. Of these, 40.1% reached a level of severe eutrophication. The water quality of more than 45% of the water bodies and marshes is below the level of the national class III, and water quality is poor in the marshes in regions such as Beijing-Tianjin-Hebei, the Sanjiang Plain, the middle and lower reaches of the Yangtze River and the northwest Yunnan Plateau.

3. Obvious Ecological Degradation

The increasing ecological degradation of lakes and wetlands has led to a reduced number of biological species and a dramatic decline in the quantity of fish populations, a narrowed distribution range of higher aquatic vascular plants and microbenthic organisms and decreased biodiversity. At the same time, there has occurred a massive proliferation and concentration of phytoplanktons such as algae. In addition, the diversity of water birds has dropped by 24%, and about 52% of them have experienced a significant reduction of their population numbers. With the increased levels of eutrophication of the lakes, the extensive occurrence of cyanobacterial blooms is likely to trigger frequent ecological disasters.

II. Major Causes: Inappropriate Human Activity and Unsatisfactory Management

Both natural and anthropogenic factors contribute to the current grave eco-environment problems confronting lakes and wetlands in China. The major natural factors include changes in the water balance of lakes and wetlands as a result of climate change, which leads to the drying up and ecological degradation of some lakes and wetlands. The major anthropogenic factors include environmentally harmful practices in everyday life and the wider economy and backward management measures.

1. Most Direct Cause: Improper Production and Consumption Activities against the Background of Climate Change

The hydrological patterns and rhythms of lakes and wetlands have been altered by large-scale and long-standing reclamation programs, drainage projects and excessive aquaculture and fishing activities. These practices have resulted in a dramatic dysfunction of normal environmental purification and ecological regulation of lakes and wetlands, weakening their capacity for recovery and intensifying the environmental pollution and flooding in neighboring regions.

Over the past 30 years, in spite of repeated bans placed by the government, even larger numbers of reclamation programs along lakes and wetlands have been launched across the country. This has led to concentrations of industrial and urban development

pushing further into areas of lakes and wetlands, adding to the complications and pressures of protecting lakes and wetlands.

2. Significant Impact of Water Conservancy Projects

Over the past several decades, various kinds of water conservancy projects have played an important role in controlling floods and safeguarding the water supply to sustain water-based resources and people's livelihoods. At the same time, various projects (especially those for river and lake improvement, flood control and river basin development) have had increasingly large impacts on lakes and wetlands. The normal interconnectedness of rivers, lakes and wetlands has been broken, leading to the dramatic reduction of their functions, weakening their capacity for environmental recovery, reducing their biodiversity and lowering their capacity for flood control.

3. Subjective Factors: Unsatisfactory Management

An awareness of the need for lake and wetland conservation has long been inadequate among officials of local governments across the country. Typically the production function of lakes and wetlands has been regarded as all-important while ecological and conservation considerations have been neglected. The wetlands are classified as underutilized land resources without regard for their appropriate place in the national classification system of land resources. This classification fails to recognize the wetlands as an independent land resource, leading to uncertainty and overlapping within its legislative definition.

At present no national administrative organ is responsible for the unified management of lakes and wetlands. Instead, lakes and wetlands are administered by several organizations with complicated relationships, overlapping functions and low efficiency. The managerial and utilization powers that apply to land within a natural conservation area are separated, leading to considerable management difficulties

In addition, there is a lack of concern for systematic and comprehensive conservation and management of "a life community" of mountains, rivers, forests, farmlands and lakes, much less the coordination and regulation of overall river areas. There is no legislative guarantee that lakes will be protected. The protection rate of wetlands in the national key ecological zone is only 51.5% and the

protection rate of national key wetlands merely 66.5%.

III. Countermeasures and Recommendations

1. Strengthening the Protection Redline System and Gradually Enforcing Integrated Watershed Management

It is important to reinforce the functional role of lakes and wetlands and adopt different protection measures suited to the different kinds of lakes and wetlands. There is a need to formulate an overall strategy and goals for the protection of China's lakes and wetlands that take into consideration different natural environmental features, socioeconomic conditions and ecological service functions. Various priorities and roadmap plans for conserving lakes and wetlands in different categories and regions should be clarified so as to standardize and guide the sustainable utilization of natural resources and maintain and upgrade the key functions of various lakes and wetlands. A redline protection system should be introduced for the strictest protection of key ecosystem function regions, including major water source and ecological conservation areas, drinking water sources, and habitats for rare and precious species. It is important to promote integrated river basin management, and to coordinate the different elements of the life community of mountains, rivers, forests, farmlands and lakes.

It is advisable to implement classification protection and integrated river basin management by regarding the different parts of the system (water bodies, lakeshores and transitional zones of wetlands, adjacent areas of lakes and wetlands and the entire river basin) as an inseparable whole.

There is a need to establish trans-departmental and cross-regional administration and to clarify the management boundaries of lakes and wetlands, the ownership of land near water and management responsibilities. It is important to improve the tertiary management system that interlinks special administration at the national, provincial and local levels with professional protection organizations, and set up a comprehensive management system featuring coordination by concerned authorities and labor-division between different departments.

2. Strengthening Legislation and Promoting the

Legal Management of Lakes and Wetlands

It is important to advance the legislative process of lake and wetland protection, and speed up the steps for introducing new regulations for the protection of lakes and wetlands. There is a need to clarify the ecological attributes of unutilized lands such as intertidal zones and swamps within the national category of land utilization according to law. In lake and wetland protection it is necessary to make clear the responsibility, managerial procedure, codes of conduct and management boundaries so as to make the protection management based in law and sustainable.

3. Earmarking Special Funds to Launch a National Lakes and Wetland Ecological Conservation Program

(1) Natural Protection of Lakes and Wetlands

There is a need to protect natural lakes and wetlands with important ecological functions by designating them as ecological redline protection zones and introducing an ecological compensation system. It is important to constantly upgrade the capacity building of various existing lake and wetland reserves at different levels by increasing investments and strengthening the assessment of their protection requirements. It is advisable to pursue programs for returning fishponds to lakes and wetlands and for returning farmlands to lakes and wetlands in key areas and in regions with the key role of ecological conservation, so as to restore and upgrade their ecological service.

(2) Developing Ecological Buffer Zones of Lakes and Wetlands

It is advisable to pursue programs that aim for comprehensive improvement of the environmental conditions around lakesides and wetland buffer belts. At the same time it is advisable to forgo ill-considered developments and efforts that do not meet the ecological needs of lakes and wetlands, to designate sufficient land for ecological protection and to carry out wetland and forest belt improvements at lakesides, river mouths, canals and ponds.

(3) Realignment and Interconnectedness of Water Systems

It is necessary to maintain the basic water resources to support a viable ecological system, to support the water linkages and functional roles of lakes and rivers

at different levels, and to establish a long-term water-supply mechanism. It is important to distinguish clean water corridors and effluent passages, maintain and improve the water linkages and ecological connections between rivers and lakes and between rivers and wetlands, and to strengthen the capacities of water self-purification and the water environment by improving the water linkages of rivers and wetlands.

(4) Pollution Control and Resource Utilization Engineering

It is necessary to optimize the industrial structure of water basins and make a vigorous effort to pursue clean production and pollution reduction around lakes and wetlands, and to control the total pollutant discharge into lakes and wetlands. It is urgent to facilitate the recycling of eutrophic river sediment

compost and the management and maintenance of aquatic plants and their resource utilization so as to form a benign circle and mechanism for the resource utilization of pollutants.

(5) Upgrading the Conservation Capacity of Lakes and Wetlands by Means of Science and Technology

It is advisable to develop a registry, an accounting and monitoring system for ecological assets comprising the major lakes, rivers and wetlands across the country. Such a registry might establish an early-warning system and ecological risk governance mechanism for key rivers, lakes and wetlands, one that would improve the capacity of scientific research on rivers, lakes and wetlands in a comprehensive way, providing support for scientific innovation and management for the protection, conservation and recovery projects.