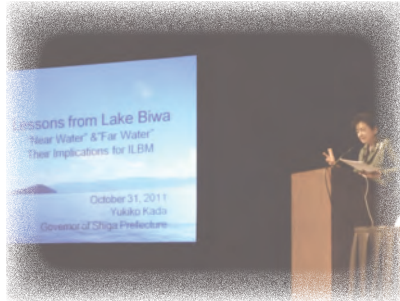


From Lake Biwa to the World



Chapter 5 Introduction

Lakes in the World: Values, Issues and Challenges

Keywords: Aral Sea, Climate change, Retention time

On our planet, there are approximately 27 million natural lakes and half a million artificial lakes (reservoirs), each of which is greater than one hectare in size. Sometimes described as “pearls on a river string,” they form one of the fundamental hydrologic systems on the earth and present a unique feature on the global landscape.

1. Values of Lakes

Containing over 90% of the readily-available liquid freshwater on the surface of our planet, lakes are a key component of the global water resource systems. Whether natural or artificial, lakes support human lives in a variety of ways: drinking and industrial water supply, irrigation, fisheries, hydropower, recreation, transportation, aesthetics, cultural and religious significance. In developing countries, lakes are often closely connected to the livelihoods of poor local communities. In many developed countries, lakes provide water to cities and towns to support domestic, industrial, and recreational needs of the people living there. Lakes also serve as essential habitats for a variety of animals and plants, including endemic species unique to the area and having significant scientific values.

2. Issues of Lakes in the World

Data from around the world shows that the overall environment of the lakes in the world continues to degrade. In extreme cases, lakes can diminish. The Aral Sea in Central Asia, once the world's fourth largest lake, has almost vanished because of the ill-planned water extraction projects from the two rivers flowing into the lake. Now the Aral Sea is no longer what it used to be and much of it has turned

into a desert (Fig. 5-1).



Fig. 5-1 Abandoned ships on the “Aral Sea”

Some 48% of the problems confronting most lakes in the world originate in their respective lake basins. The most frequently mentioned problem is sedimentation - deposition of sand/mud caused by deforestation and inappropriate land uses in the upstream region of a lake. Eutrophication, typically illustrated by thick growth of water hyacinth, is another problem widely observed in lakes located in both developing and developed countries.

There are also problems arising outside lake basins, such as the introduction of invasive species, long-range transportation of airborne pollutants causing acid rain, *etc.* Recently, globalization is also affecting lake environments. An emerging issue is climate change. Its effect is expected to be more serious in lakes than in other surface water bodies where water stays long and temperature continues to rise.

3. Why Have These Problems Occurred?

Lakes naturally undergo aging over time. However, their recent problems are largely the results of unsustainable uses of lakes by human societies. It is for this

reason that lakes are often referred to as the mirrors of human activities. Lakes are often terminal points of wastes generated from socioeconomic activities in human societies. In many developing countries, human excreta are discharged directly into rivers and/or lakes.

4. Challenges Confronting Lake Management

Lake management is associated with the characteristics of lakes where water stays long and takes time to be replenished (Lake Titicaca, Peru/Bolivia, for example, requires more than 1,300 years for all the water in the lake to be replaced). This characteristic of long retention time of lakes (Table 5-1) allows complicated physical and chemical changes, often unexplainable, to take place within lakes and makes their management even more difficult. Once polluted, it will take a lot of time, money and efforts to effect the recovery of lakes, and it will not necessarily be possible to restore them to their original conditions. Global experience tells us that lake management is a long-term

challenge.

Another difficulty in lake management is the resolution of conflicts among different sectors with differing interests in using lake resources. Upstream and downstream conflict is also difficult to resolve. If it is a transboundary lake, which is shared by two or more countries, the situation could become even more complicated.

5. Toward the Future

In spite of all these problems and difficulties, we need to manage lakes sustainably not only for the current generation, but also for the future generations. Lakes have a huge potential in supporting human beings and other living creatures in nature. Lake conservation should be considered as a global challenge. Despite of the difficulties, if managed sustainably, lakes can provide a great many opportunities for the sustainable management of other water bodies also important for the well-being of human societies.

(International Lake Environment
Committee Foundation)

Table 5-1 Retention time of lakes

Natural lakes	(years)	Reservoirs	(years)
Titicaca (Peru/Bolivia)	1,343	Volta (Ghana)	4
Tahoe (USA)	700	Kariba (Zambia/Zimbabwe)	3
Baikal (Russia)	380	Tucuruí (Brazil)	0.14
Lake Toba (Indonesia)	109–279		
Vättern (Sweden)	55.9		
Victoria (Uganda/Kenya/Tanzania)	23		
Biwa (Japan)	5.5		
Balaton (Hungary)	2		
Tai-hu (China)	0.65		