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Distribution of the World's Large Lakes

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ABSTRACT An analysis of the world distribution of large lakes has been undertaken. The data base included geographical, geological, morphometric, climatological and limnological information. Only natural lakes (fresh and salt) with a surface area greater than 500 km² were considered; 253 lakes (including coastal lagoons) were identified. Large lakes occur on all continents except Antarctica. Nearly half of them (48%) are found in North America, and most of these lie above the 40th parallel, attesting to the scouring action of continental glaciers. Tectonic belts, such as the rift valley of East Africa, the Lake Baikal region of Siberia, and the Lake Titicaca area of South America, are the second most common loci of large lakes. Morphometric data were obtained for surface and catchment area, elevation, mean and maximum depth, volume, length and breadth, shoreline length, and orientation of axis for these 253 lakes. These data show that large lakes occupy a surface area of slightly over 1,400,000 km² and have an estimated volume of 179,000 km³. Furthermore large lakes account for approximately 90% of the total surface area and volume of water held in all lakes of the world. Climatological and limnological data included precipitation, evaporation, basin runoff, water quality, and biological productivity. Information on the latter two parameters, however, is unavailable for many large lakes. About 75% of all large lakes are fresh; the remaining 25% range from brackish to hypersaline. The tropical, freshwater lakes of Africa are among the most biologically productive of the world's lakes.

1.1 Introduction

Although relatively few in total number, the 253 large lakes of the world contain nearly 90% of the world's inland surface water supply (Herdendorf, 1982). Thus, large lakes play an important role in the economy and overall prosperity of mankind, being used for many purposes—including domestic and industrial water supplies, irrigation, transportation, water-borne commerce, mineral extraction, waterfowl habitat, fishing, aquaculture, recreation, and waste assimilation. Many of the world's large lakes form international boundaries, and, moreover, most of them have special aesthetic appeal and spectacular beauty.

Given the important attributes of these bodies of water, the present study
focuses on the geographic distribution of the world's largest lakes and the interrelationships of their location, geological origin, morphometry, and limnological characteristics. The data base for this analysis is an inventory of large lakes prepared for the U.S. Geological Survey, Office of International Hydrology (Herdendorf, 1984). Key elements of the data base are listed in the appendix at the end of this chapter. This inventory defines large lakes as natural lakes (freshwater and salt water) which have a surface area of at least 500 km². Natural lakes are further defined as essentially static bodies of water, including both inland basins and those separated from the ocean by spits or barrier bars (coastal lagoons). Reservoirs were not included in the inventory, but many exist which have a surface area in excess of 500 km². In total, 253 natural lakes have been identified which satisfy these criteria. Their geographic distribution is shown in Figures 1.1a to h.

1.2 Geographic Distribution

Sixty-four nations contain or share with another country one or more of the large lakes. Table 1.1 presents a breakdown by continent and by nation for these bodies of water.

North America possesses nearly half of all the large lakes but only one-third of the world's total surface area for large lakes. Asia, with less than one-fourth of the lakes, has over 42% of the lake area. This large lake area is mainly due to the presence of the Caspian Sea, which alone accounts for over one-fourth of the area of all large lakes. Africa, the only other major locus for large lakes, accounts for less than one-seventh of the world total by area.

The Northern Hemisphere contains over 87% (220 lakes) of all the large lakes, with most of these occurring north of the 40th parallel (64%, 162 lakes). The Southern Hemisphere contains relatively few lakes and most of them are found in Africa. The African large lakes are distinguished by their large size and the fact that they lie at relatively low latitudes. Table 1.2 gives the number of large lakes that occur within 10°-latitude intervals for both hemispheres, as well as a comparison of lake areas and available land masses for each of these intervals. The dominance of large lakes in the middle latitudes is shown in Figure 1.2.

1.3 Morphometry

The published area of a specific large lake, as well as other morphometric data, can vary considerably from author to author. For example, no less than 12 different values have been published for the area of the Caspian Sea (the world's largest lake), ranging from 370,999 to 440,300 km², a difference of nearly 20%. For the inventory, the "most reliable" number was determined by considering the data source, date of publication, consensus of the literature, direct