Water Withdrawals

Indicator #7056

Assessment: Mixed, Unchanging

Purpose

- To use the rate of water withdrawal to help evaluate the sustainability of human activity in the Great Lakes basin.

Ecosystem Objective

The first objective is to protect the basin's water resources from long-term depletion. Although the volume of the Great Lakes is vast, less than one percent of their waters are renewed annually through precipitation, run-off and infiltration. Most water withdrawn is returned to the watershed, but water can be lost due to evapotranspiration, incorporation into manufactured goods, or diversion to other drainage basins. In this sense, the waters of the Great Lakes can be considered a non-renewable resource.

The second objective is to minimize the ecological impacts stemming from water withdrawals. The act of withdrawing water can shift the flow regime, which in turn can affect the health of aquatic ecosystems. Water that is returned to the basin after human use can also introduce contaminants, thermal pollution or invasive species into the watershed. The process of withdrawing, treating and transporting water also requires energy.

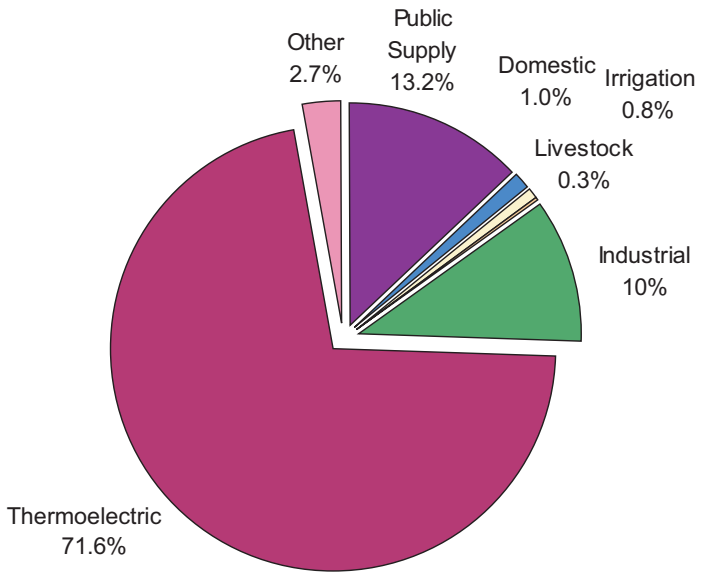

Figure 1. Water Withdrawals in the Great Lakes basin, by category as percentage of total, 2000.
Source: Great Lakes Commission, 2004

State of the Ecosystem

Water was withdrawn from the Great Lakes basin at a rate of 46,046 million gallons per day (MGD) in 2000 (or 174 billion litres per day), with almost two-thirds withdrawn in the U.S. side (30,977 MGD) and the remaining one-third in Canada (15,070 MGD). Self-supplying thermoelectric and industrial users withdrew over 80% of the total. Public water systems, which are the municipal systems that supply households, commercial users and other facilities, comprised 13% of withdrawals. The rural sector, which includes both domestic and agricultural users, withdrew 2%, with the remaining 3% used for environmental, recreation, navigation and quality control purposes. Hydroelectric use, which is considered "in-stream use" because water is not actually removed from its source, accounted for additional withdrawals at a rate of 799,987 MGD (Figure 1) (GLC 2004).

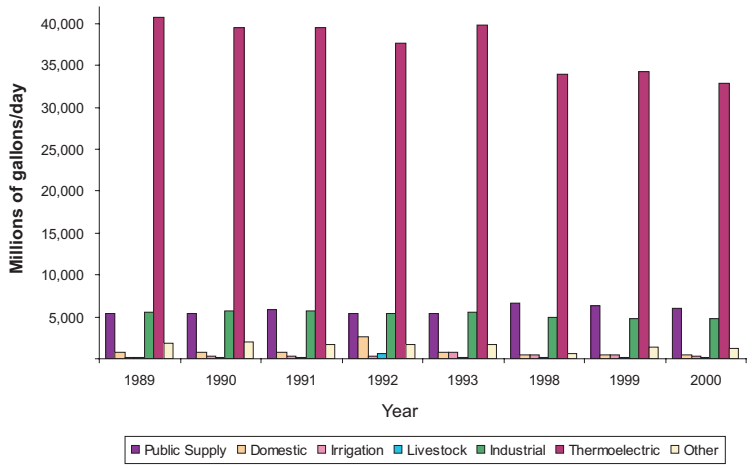

Figure 2. Great Lakes basin water withdrawals by category, 1989-1993 and 1998-2000.
Source: Great Lakes Commission, 1991-2004

Withdrawal rates in the late 1990s were below their historical peaks and do not appear to be increasing at present. On the U.S. side, withdrawals have dropped by more than 20% since 1980, following rapid increases from the 1950s onwards (USGS 1950-2000)[1]. Canadian withdrawals continued rising until the mid-1990s, but have decreased by roughly 30% since then (Harris and Tate 1999)[2]. In both countries, the recent declines have been caused by the shutdown of nuclear power facilities, advances in water efficiency in the industrial sector, and growing public awareness on resource conservation. Part of the decrease, however, may be attributed to improvements in data collection methods over time (USGS 1985). Refer to Figures 2,3 and 4.

The majority of waters withdrawn are returned to the basin through run-off and discharge. Approximately 5% is made unavailable, however, through evapotranspiration or