

## Ecological collapse of Lake Baikal and Lake Hovsgol ecosystems during the Last Glacial and consequences for aquatic species diversity

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### Abstract

Sedimentary sections from Lake Baikal in Siberia and Lake Hovsgol in Mongolia show that during the Last Glacial Maximum (LGM), planktonic/benthic diatoms, chrysophyte cysts, sponge spicules and zooplankton remains did not accumulate in the lake sediments. The combined data suggest a drastic lowering of photosynthetic production and perhaps the collapse of the ecosystems of both lakes due to significant environmental changes during the LGM. Both lakes were almost uninhabited during the LGM. Starting from ~ 12,000 to 13,000 <sup>14</sup>C years ago, the planktonic communities redeveloped and primary production increased in both lakes. As a result, Holocene sediments contain abundant and well-preserved planktonic/benthic diatoms, stomatocysts, sponge spicules and zooplankton remains.

The ecosystem stress in Lake Baikal during glacial time appears to be due to a decrease in nutrient loading from the watershed, lowering of surface water temperature, and very low transparency of water and ice. We believe that endemic species in Baikal survived during glacial ecological catastrophes in refugia that could have been a source of species that invaded and repopulated Baikal after intense and long glacial winters. The ecosystem stress in Lake Hovsgol during glacial time appears to be due primarily to drastic lake level falls, and changes in water chemistry. At the beginning of the Holocene, Lake Hovsgol was reoccupied again by cosmopolitan species probably from surrounding small lakes and rivers.

In addition to the LGM results, we also show that Lake Baikal planktonic diatom species diversity during the last 350 ka is closely related to solar insolation fluctuations caused by the 23 and 41 ka cycles of the Earth's precession and

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