

LAKE RESPONSES TO DROUGHT AND PROLONGED ANOXIA

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During the 1970s drought period in north-west Europe, lakes experienced reduced hydraulic loads, increased hydraulic residence times and increased surface water temperatures. Data show two responses to these extreme conditions in eutrophic lakes in Northern Ireland. Firstly, the effects of stratification, prolonged anoxia and reduction in the hypolimnion of White Lough caused the massive release of sedimentary manganese (Mn) and phosphorus (P), which was transferred to the epilimnion during overturn, causing hypertrophication, and eventually lost to the outflow. The record in dated sediments shows a 70% loss of sedimentary P and a 300% increase in diatom-inferred total P at this time, which corresponds with increases in measured epilimnion total P concentrations. Secondly, and contrary to this process, dated sediments in Friary Lough, 5km from White Lough, have no indication of a similar internal loading episode but show a decline in diatom-inferred total P during the mid-1970s. This is most probably due to reduced external P loads. The sedimentary P record confirms this with no declines away from the accumulation rising trend during the same period. Other lakes in the area exhibit a similar response to Friary Lough. Reasons for the two responses are still speculative, although data show that thermocline stability and a critical concentration of P in the sediments prior to extreme anoxia may be contributory. This has serious implications for lake ecology and management if sediments with high P accumulations experience similar drought conditions.