# Dissertation Literature Review

Background + Expected Trend

1. Water quality of Loch Leven: response to enrichment, restoration and climate change (Data from 1968-2007)

DOI: 10.1007/s10750-011-0923-x

Abstract

* Seasonal changes in temperature and rainfall may have positive and negative impacts on water quality
* Warmer spring temperatures appear to have a positive effect on Daphnia densities = reduced ChlA concentration in springs = improvement in water clarity in May and June
* Negative relationships between summer rainfall and ChlA concentrations
  + 3 wettest summers have low ChlA concentrations & driest summers having high concentration

Introduction (Background)

* Over the last few decades, efforts have been made to restore enriched systems, **largely through reductions in point sources of nutrients entering lakes**
* Attempts to restore the lakes are often hindered by **internal loading from nutrients that have stockpiled in the lake’s sediments**
* It is often assumed that rising temperatures will lead to a deterioration in water quality – stimulating plankton growth (particularly cyanobacteria)
  + However, changes in bacteria also affect the growth and reproduction of zooplankton grazers
* Other climate parameters, such as rainfall may have confounding influences as well

Site details

* Loch received phosphorous rich effluent from woollen mill
* Progressively reduced from a peak in the 1960s and 1970s – the mill ceased using P-based materials in 1989
* Sewage works were also a major source – tertiary treatment and effluent diversion measures were introduced at these works in the 1990s
* TP risen to 20tP/year by 1985 🡪 reduced to 8tP/y by 1995 and remained at this level in 2005
* Since 1995, diffuse nutrient loads from agricultural have also been targeted through the introduction of buffer strips – impact currently unclear
* **SITE SPECIFIC CHLA TARGETS FOR LOCH LEVEN WOULD BE 11μg/L FOR THE G/M BOUNDARY AND 22 μg/L FOR THE M/P BOUNDARY**

Results

* Highly significant trends were observed between ChlA and TP concentrations, as well as ChlA and SD
  + There is some evidence of levelling off at low TP concentrations (less than 7022 μg/L

Discussion

* This highlights how significant Daphnia grazing is to the water quality of the Loch