

## **Thesis Summary**

The five chapters of this thesis consist of manuscripts published in peer-reviewed journals, focused on the effects of anthropogenic acidification on freshwater ecosystems in the Czech Republic and Slovakia, and an attempt to understand the processes and time-frame of recovery using modeling. In the Tatra Mountains in Slovakia and the Bohemian Forest in the Czech Republic, high mountain lakes have been the focus of long-term studies on both the biological and chemical impacts of acidification. The effects of anthropogenic acidification on headwater streams in the mountains and highlands of the Czech Republic have been recognized more recently, and the resulting changes to the biological community and trends in chemical changes are less well-known. Dynamic modeling, combined with the incorporation of scenarios of possible climate change, is used to investigate the present status and future trends in recovery of these ecosystems after recent reductions in atmospheric acid deposition.

The first chapter is a paper on the macroinvertebrate biota in atmospherically acidified streams in the Czech Republic. This paper shows the effect of low pH on the taxonomic composition in these streams. The second chapter is focused on the current (2004) chemical composition of 91 lakes in the Tatra Mountains, 15 years after major reductions in acid deposition. The next chapter shows the results of the biogeochemical MAGIC model calibrated to a representative set of Tatra lake catchments, and an evaluation of the predicted future course of their recovery from acidification under current legislated emissions levels. The final two chapters explore the possible influence of climate change on the recovery of some of these ecosystems through the incorporation of possible climate-related scenarios into the baseline acidification modeling. The first of these uses a standard set of scenarios to evaluate the sensitivity of the MAGIC model to climate-related processes, and the results demonstrate the relative importance of these processes for acidified catchments in Europe and North America. The last chapter is an integrated study of a headwater stream in the Czech Republic consisting of two branches differing in acidification status. The MAGIC model, a regional climate model, and sampling of the macroinvertebrate community are combined to assess the current chemical and biological situation, as well as possible conflicting factors in the future recovery of the more acid branch.