

Effects of climate change on mountain streams

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The frequency and possibly the extent of flooding will change as the climate changes. An increase in the amount of gravel and sand that is transported by rivers is also to be expected. Existing measures against floods need to be adapted. What effects do flooding and sediment transport have on fish environments?

Background

Climate change will considerably affect flooding and sediment transport in mountain streams over the coming 40 to 100 years. It is to be expected that the number and intensity of rainfall events will change. This could lead to more frequent and larger floods. Also, the melting of glaciers and permafrost uncovers sediment that can be washed away. For this reason, many mountain streams carry more gravel and sand. Due to larger sediment volumes, existing protection measures will only partially fulfil their functions. The modified distribution of material in rivers will also affect the living conditions of fish. Floods in winter and spring can interfere with the success of natural reproduction. However, the exact repercussions are hardly known yet.

Aims and methods

In this project, the consequences of climate change on sediment transport and the quality of fish habitat will be examined. We will analyse how severe precipitation, snowmelt, glacial retreat and changes in vegetation cover influence sediment delivery into mountain streams. Using a model, sediment balances of selected river catchments will be calculated, and it will be determined how the changing sediment transport in rivers influences the survival of brown trout populations. We will compare the model predictions with data from past flood events in the Alps and from field campaigns investigating fish habitat conditions.

Significance

With this project, we aim to improve the understanding of the various effects of climate change in mountain catchments. The results will represent an important basis for the evaluation of future flood hazards with bed load displacement in mountain streams on the one hand, and the assessment of living conditions for fish on the other hand. In this way, recommendations for an ecological and integral management of catchments, taking into account climate changes, can be formulated.