Effect of acid deposition on Inland Aquatic

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1

Catchments

- Chemical properties of surface waters in lakes, springs, and river are results (outputs) of elemental cycles in their catchments.

- Continuous monitoring of deposition, soil, vegetation, and surface water in catchments, can give us information on the ecosystem mechanism.

- For evaluating acid deposition impacts on surface water, catchment analysis would be informative.

2

Natural acidic lakes

- Dystrophic lakes

  By effect of humic acids (organic acids) derived from litters, such as fallen leaves and branches, water of the lakes is acidified.

- Volcanic acidic lakes

  By effect of valcano (and hot spring), water of the lakes is acidified.

  Fishes cannot live in most of these lakes.

3

Lakes acidified by acid deposition

- In 1960s, pH of lake water decreased, declining aquatic animal/plant population in Northern Europe and Northern America.

- Bedrock of these areas are mainly granite, acidic rock, whose acid neutralizing capacity is very low.

- Surface soil were eroded by glacier.

- Catchment of acidified lakes could not neutralize acid deposition.

4

Buffering mechanism of lakes

- **Alkalinity**

  Buffering capacity by HCO_3^- and CO_3^{2-} ions

  Bedrocks may be important: lake acidification was not observed in the lakes on limestone (calcareous) area.

- **(Micro-) Biological activities**

  Sulfate reduction

  Denitrification

5

Impact on inland aquatic environment

- Fishes such as trout and salmon disappeared from lakes when pH of lake water decreased below about 5.5.
- Flora in lakes changed.

  Sensitive alga disappeared by acidification of lake waters, and tolerant alga could survive.

  Diatoms change their species composition with lake water pH, and their silicate cell walls will be left in the sediment. By investigating the silicate cell walls in sediments, history of acidification of the lake could be estimated.

6