

HelmholtzZentrum münchen

German Research Center for Environmental Health

Environmental sensitivity

Alpine Ecosystem

Jochen Tschiersch

Helmholtz Zentrum München
Institute of Radiation Protection
Exp. Radioecology

Vienna, 25-29/01/2010

Alpine Ecosystem

Alpine ecosystems show a very distinct behaviour:

- nutrient cycling
- specific prevailing climatic and environmental conditions

In general Alpine ecosystems are characterized by:

high altitudes leading to extreme climatic conditions:

- with high amounts of precipitation,
- a long-lasting snow cover and frozen soils in winter.
- When melting, big amounts of water rush down the slope immediately (too much for infiltration, leading to erosion, wash off)
- a short vegetation period

Alpine Ecosystem

Consequences:

- slow soil building processes
- slow decomposition of soil organic matter
- low pH-values in soil
- litter accumulation
- nutrient deficiency (no fertilisation, input of organic matter only via browsing animals, slow litter decay)
- nutrient storage in the root or litter layer
- nutrient recycling from decaying plant parts
- plant species/communities adapted to such conditions with deep or widely extended rooting systems

Alpine Ecosystem

Consequences (cont.):

- shallow soil profiles on slopes
- variable soil texture composition dependent on the position at the slope (fine material accumulated at foot-hills)
- driven by soil properties, alpine soils have a very specific soil microbiology with high amount of fungal biomass (in acid soils).

Consequences for alpine radioecology:

- high capacity to store Cs in superficial soil layers
- retarded migration of radionuclides into deeper soil layers
- a higher plant uptake of radionuclides
- longer ecological half-lives in the food-chain compared to lowland ecosystems.

Alpine Ecosystem

Meeting: Vienna, 8.10.09

Participants: P. Bossew (A), H. Lettner (A), F. Strebl (A), J. Tschiersch (D)

Discussion on the term sensitivity

Sensitivity in the context of radioecology:

- environmental sensitivity
- model sensitivity
- parameter sensitivity

Alpine Ecosystem

Meeting: Vienna, 8.10.09

Participants: P. Bossew (A), H. Lettner (A), F. Strebl (A), J. Tschiersch (D)

Discussion on the definition of the end point:

Classical concept of radiation protection:

- End point is **human**, considering relevant pathways of exposure
- Main dose contribution by **milk**

Alpine Ecosystem

Considered models:

Ecosys/Rodos

(Müller, H., Pröhl, G.: Ecosys- 87: A dynamic model for assessing radiological consequences of nuclear accidents. Health Phys. 64, 232–252 (1993))

Resrad

(<http://web.ead.anl.gov/resrad/home2/resrad.cfm>)

Considered scenario:

Chernobyl

Literature compilation:

In regard to environmental sensitivity, alpine ecosystem, model

Alpine Ecosystem

Next steps:

Establishing a list of used model parameters

- Which can be changed, adapted to alpine ecosystem
- Which are sensitive (in regard to dose to humans)

Exercise the Chernobyl scenario