

IMPROVED RADIOECOLOGY FOR BIOSHPERE MODELLING - RABIO

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Introduction

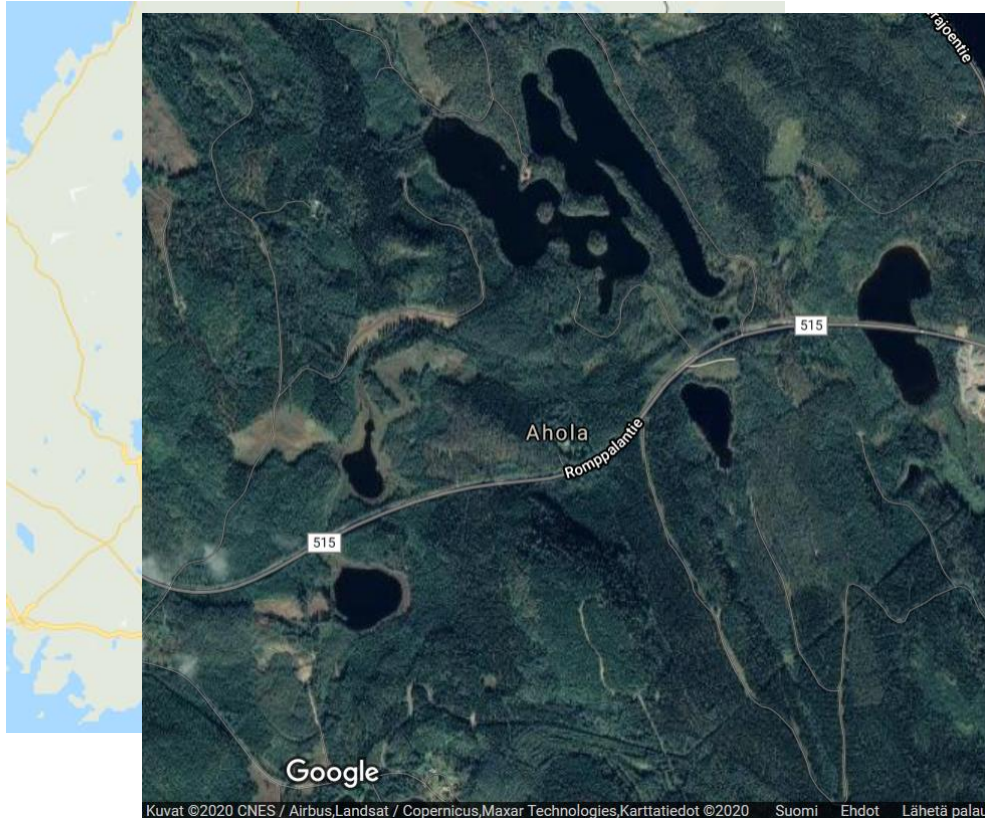
- Focus: to study the transfer of elements in boreal aquatic food chains
 - Important for safety analyses of nuclear waste management and associated radioecological modelling



RABIO: Subproject activities

- Subproject 1: Transfer of elements from sediment to aquatic food chain
 - Ongoing
- Subproject 2: Transfer of ^{14}C from sediments to aquatic food chain
 - Manuscript under preparation
- Subproject 3: Improvement of radioecological modelling
 - Ongoing

Research Area – Pilot scale uranium mine



Paukkajanvaara, Eno, Joensuu

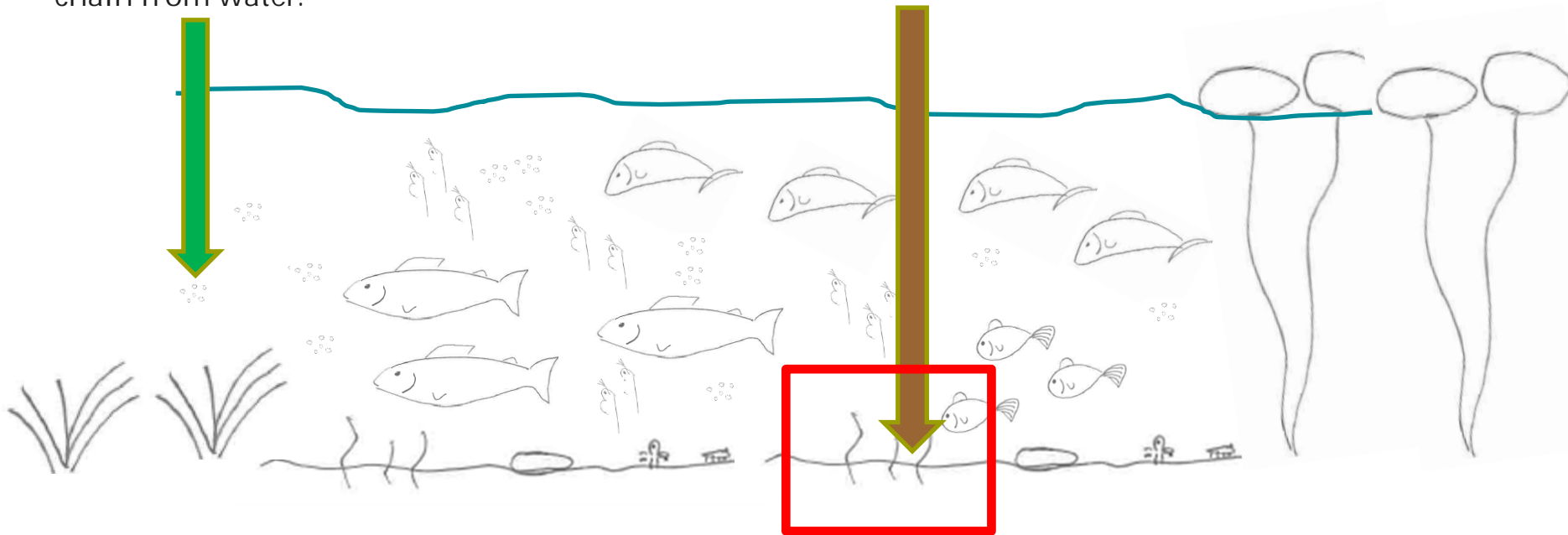
- In operation 1958-61
 - 30 tons of U ore extracted
 - Abandoned
- Mining area restored 1993-94
- Traces of the activities can be detected in the aquatic environment

e.g. Colpaert 2006

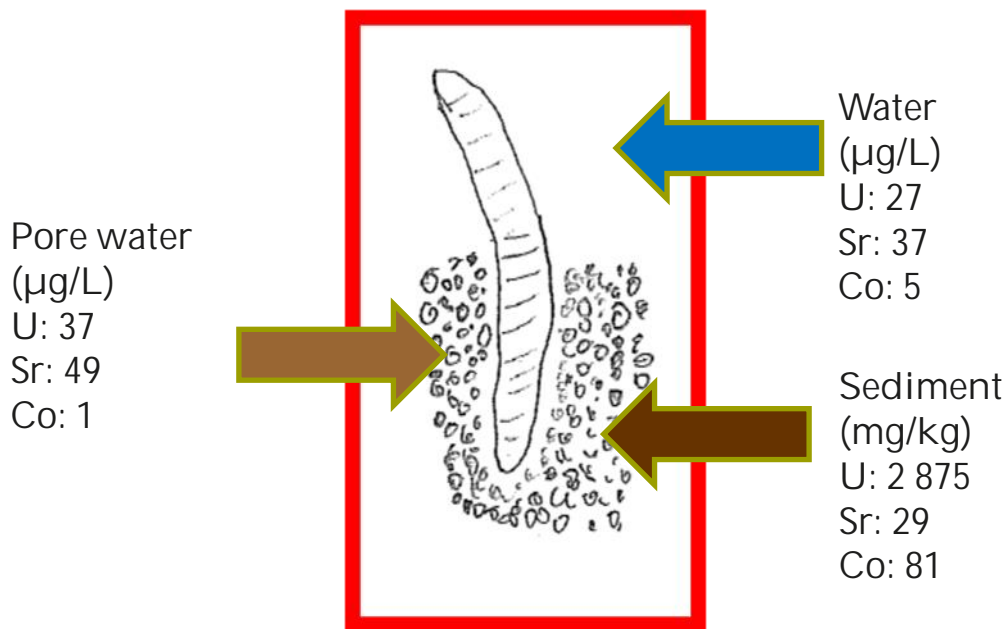
Main assumptions to be tested

Assumption 1: Radionuclides are taken up to the aquatic food chain from water.

But sediments have several orders of magnitude higher concentrations?



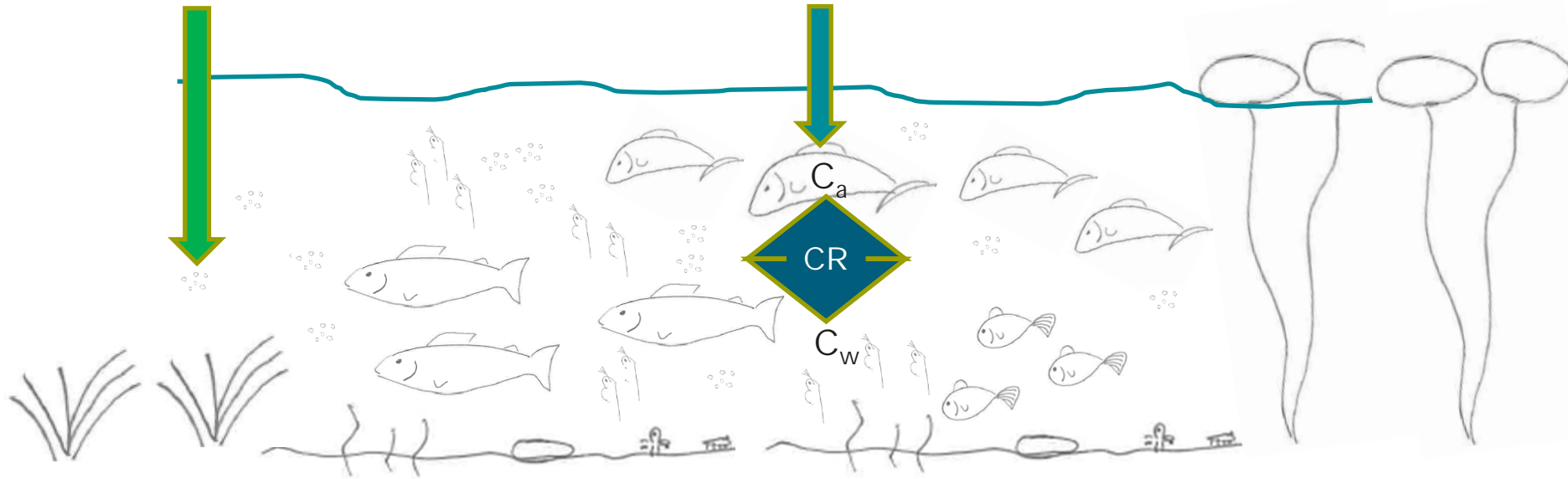
Assumption 1: Distribution of elements



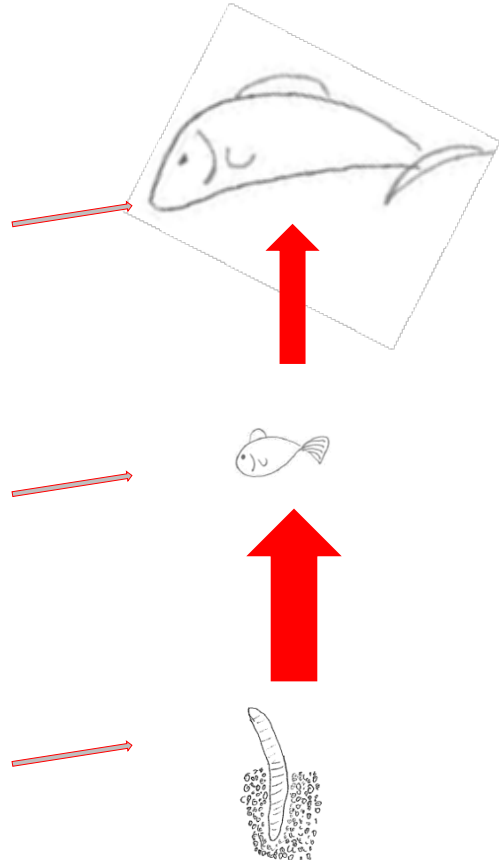
Main assumptions to be tested

Assumption 1: Radionuclides are taken up to the aquatic food chain from water.

Assumption 2: Ratio of the concentration (CR) between organism and its environment is independent of the environmental concentration.



Assumpt. 1 & 2: Main observations from the field and lab



- Unrealistically high concentration ratios if calculated with water concentrations
 - Food chain transfer?
- Benthic organisms have higher concentrations than fish (exception: Strontium)
- CR depends on the environmental concentration?
 - Tendency: higher conc. = lower CR
 - More data required!

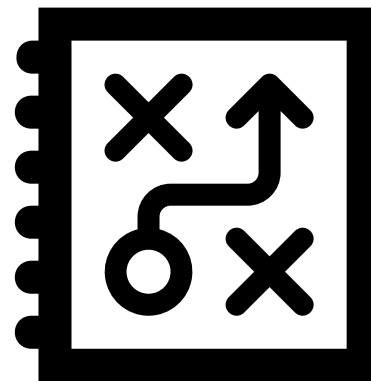
Field experiment

- Research questions:
 - How much aquatic and sediment concentrations contribute to the concentration in organisms?
 - Comparison to laboratory experiment.
 - Has wider concentration range.
 - Data just arrived, not analyzed yet



Radioecological modelling

- Data is still quite scarce
- Indications with some elements that concentration ratio is not constant
- Sediment as a source should be considered
- What kind of modelled result is good enough?





Thanks!

Marko Ylönen (PhD-student)

Heidi Nurmi (MSc-student)

Research group: Soroush Majlesi, Jukka Juutilainen, Christina Biasi, Jonne Naarala.



UEF  **WATER**