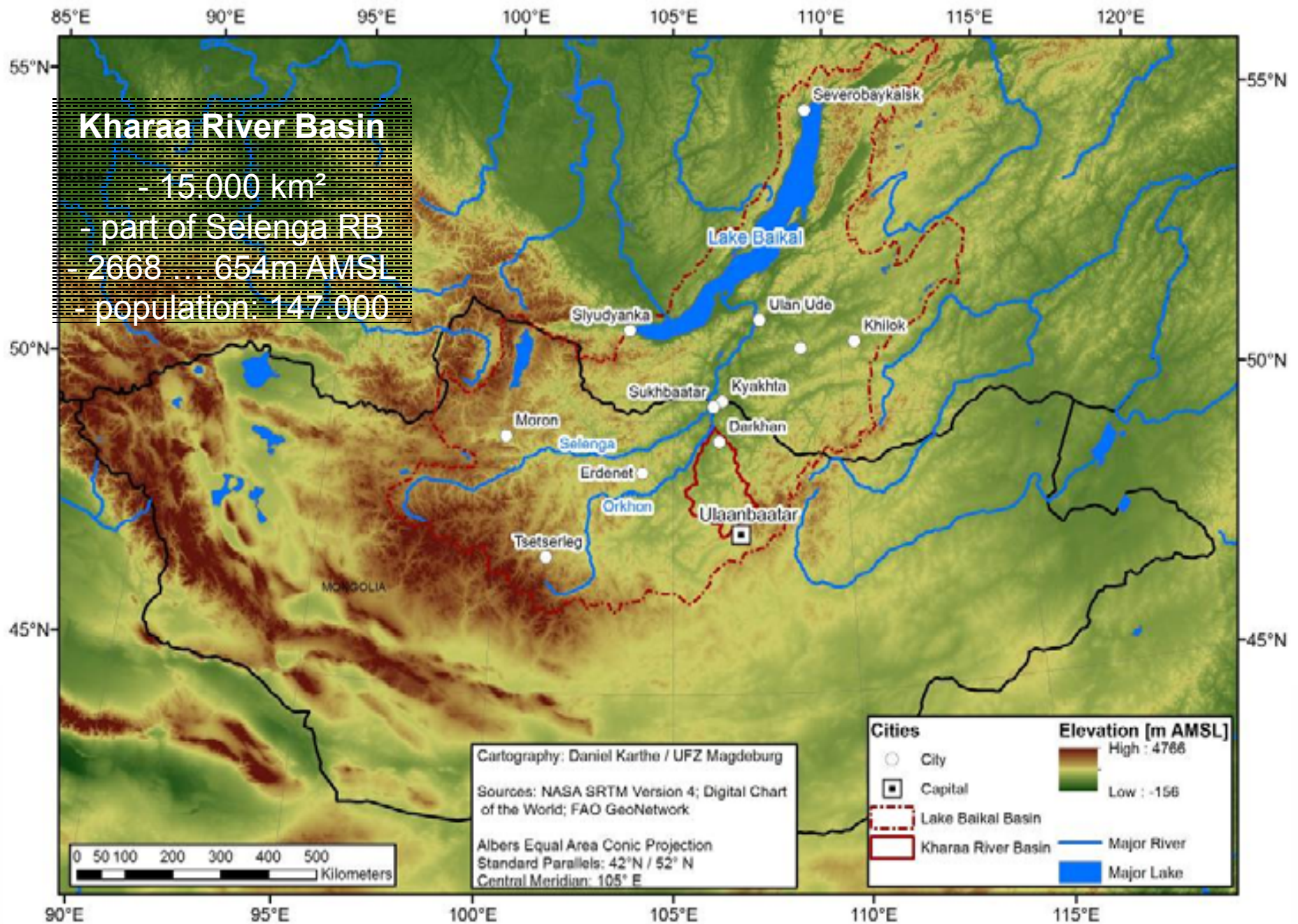


Isotope and geochemical sediment source fingerprinting to identify suspended sediment inputs in the Kharaa catchment

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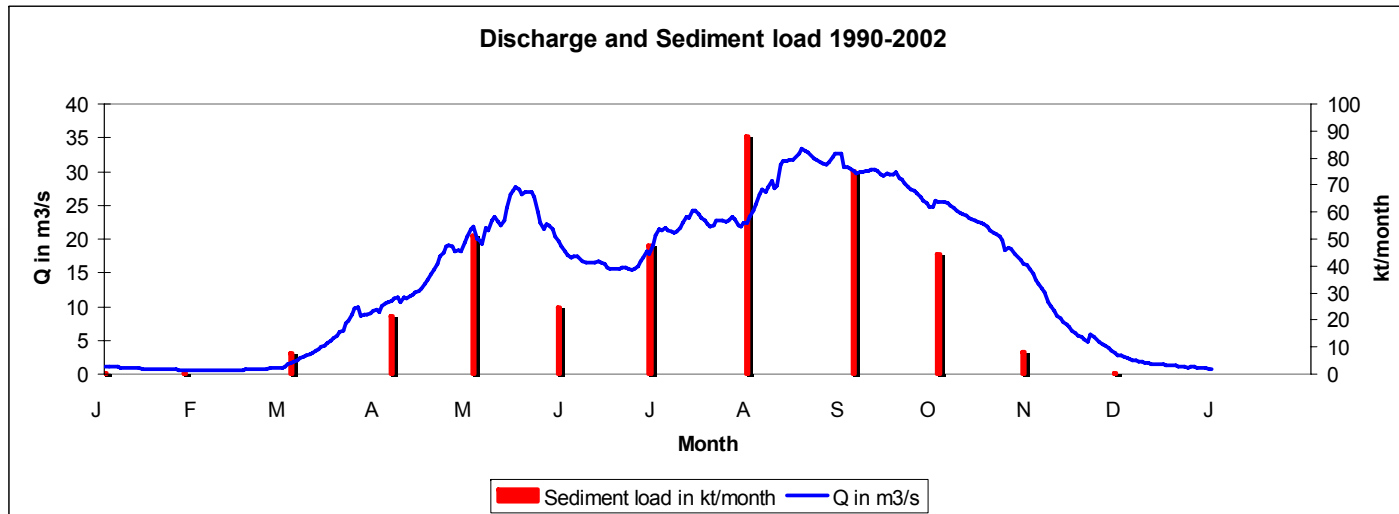
Climate

Continental climate

High evapotranspiration

Snowmelt in may

Main precipitation events in summer

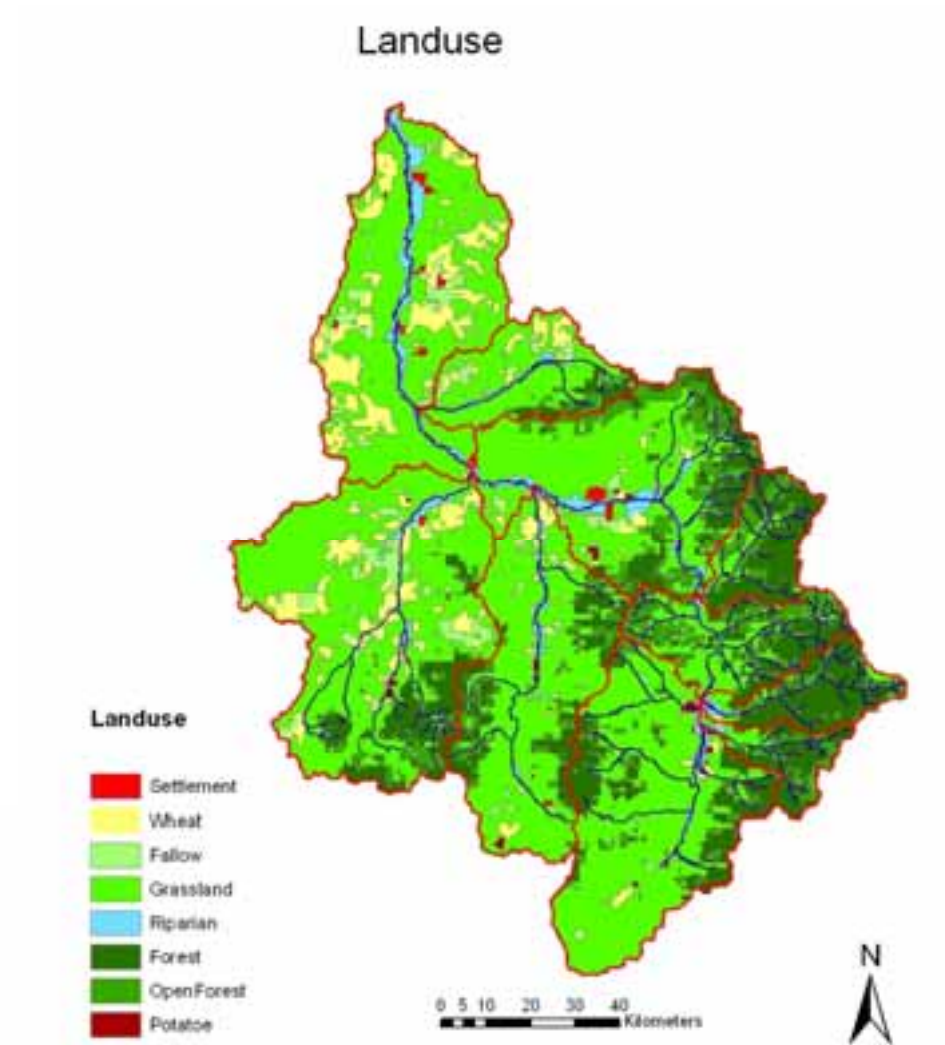


Landuse

Main landuse grassland

**Agriculture in
downstream areas**

**Upper reaches forested
and mainly pristine**



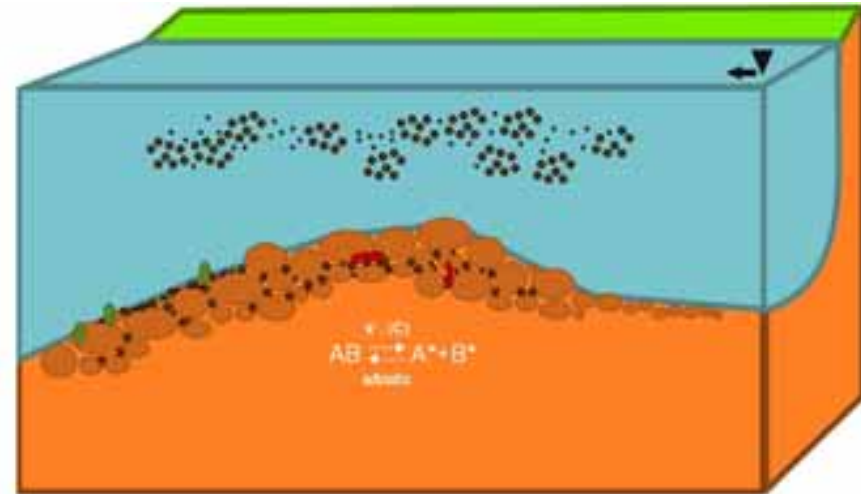
Motivation

Ecosystems of the Kharaa river are impacted by sediment inputs

Sources of the sediment are not clearly identified

Limited knowledge about transport pathways and budget

Information needed for management decisions



Response of Ecosystem functions of the hyporheic zone to fine sediments

Regulation

- Oxygenation
- Surface area

Habitat

- Suitability
- Diversity

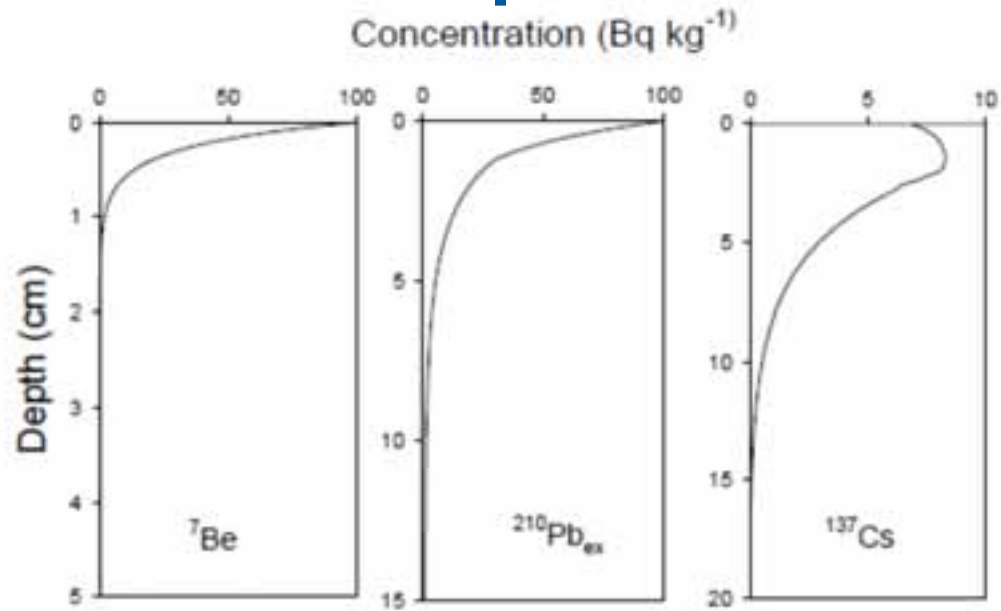
Production

- Photosynthesis
- Biomass

Objectives

- 1. Identify spatial distribution of sediment sources**
- 2. Identify the main erosion types**
- 3. Quantify sediment inputs in the river system**

Isotope sediment fingerprinting



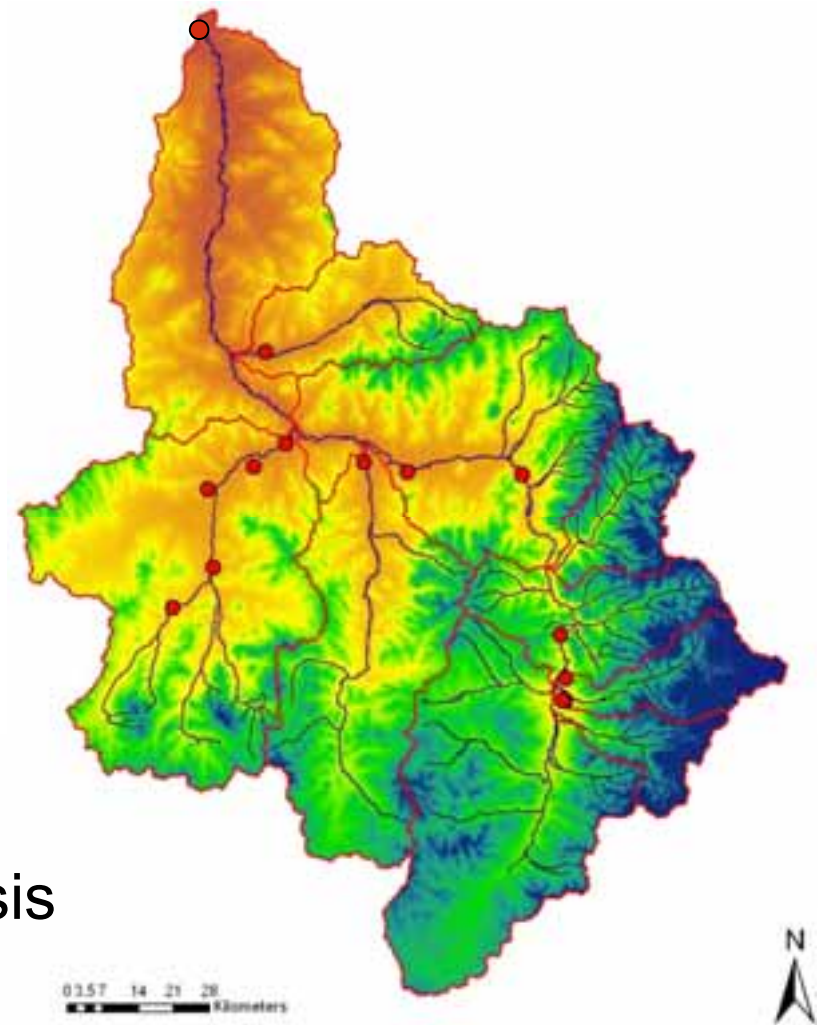
Sampling of erosion sites

12 topsoil eroding surface
reference sites 4 gully sites,
4 stream banks and 4
suspended sediment samples

Sampling after snowmelt
and rainfall season

Analysis of fraction ($<10\mu\text{m}$)
Cs-137, Pb-210 and Be-7 with
Gamma ray spectrometry

End member mixing model analysis



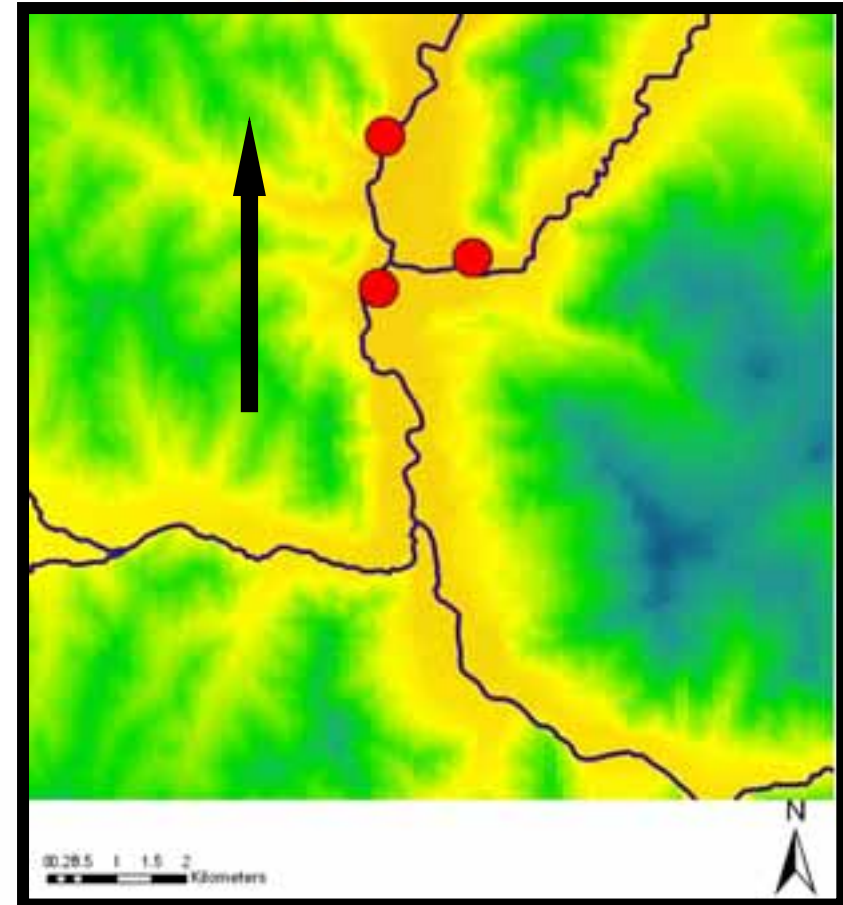
Sampling of recently deposited sediments

1000 grab samples from 22 river junctions

Sampling after snowmelt and rainfall season

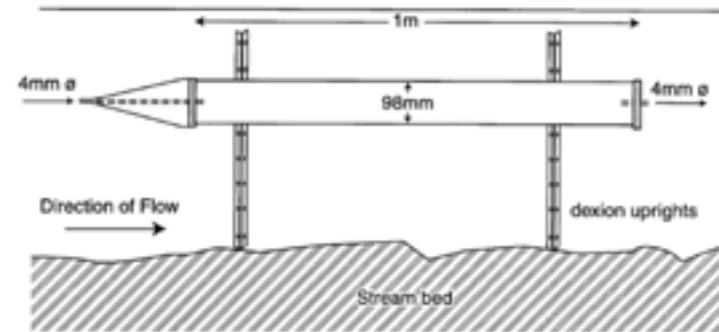
Analysis of the fine sediment fraction ($<10\mu\text{m}$) for major and trace elements with ICP-MS

End member mixing model analysis



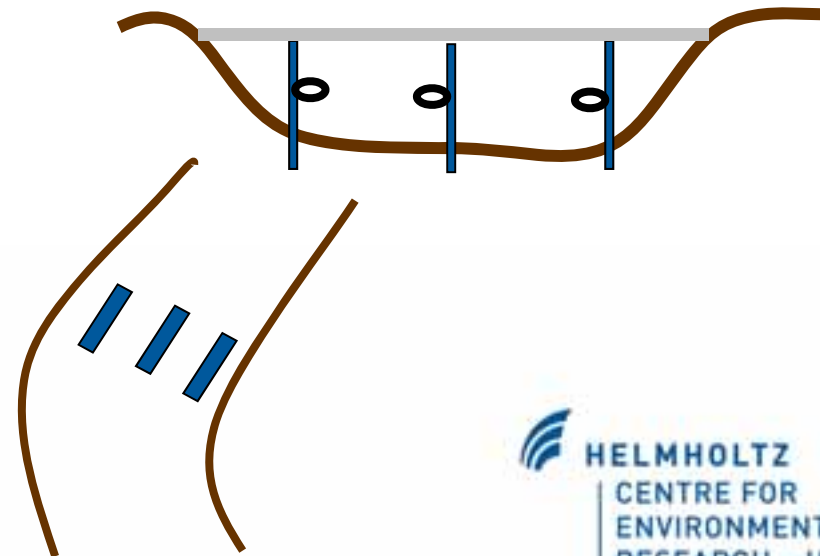
Time integrated suspended sediment sampling

3 traps with different diameter installed at the catchment outlet in 2010

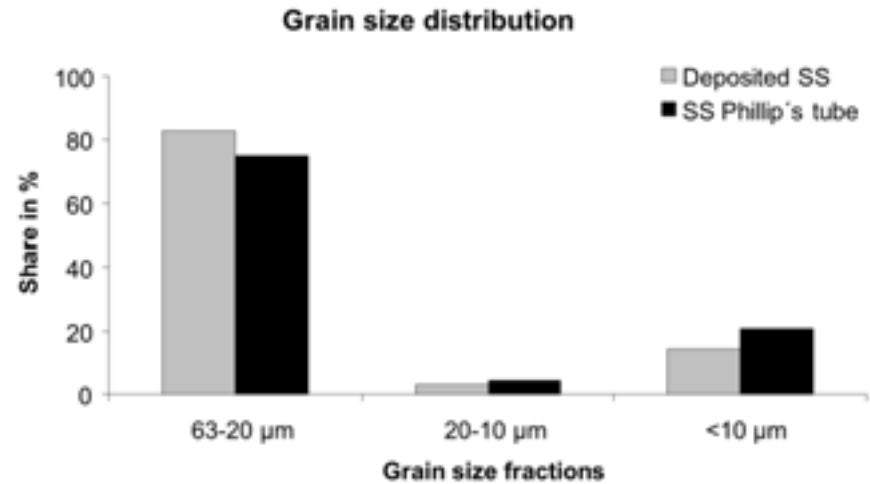
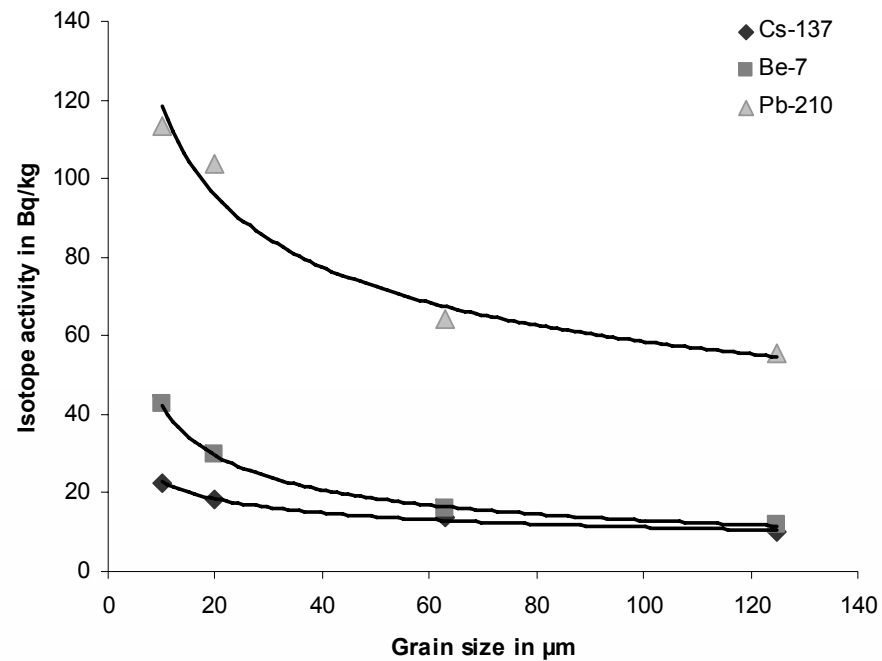


Emptied every 2-4 weeks

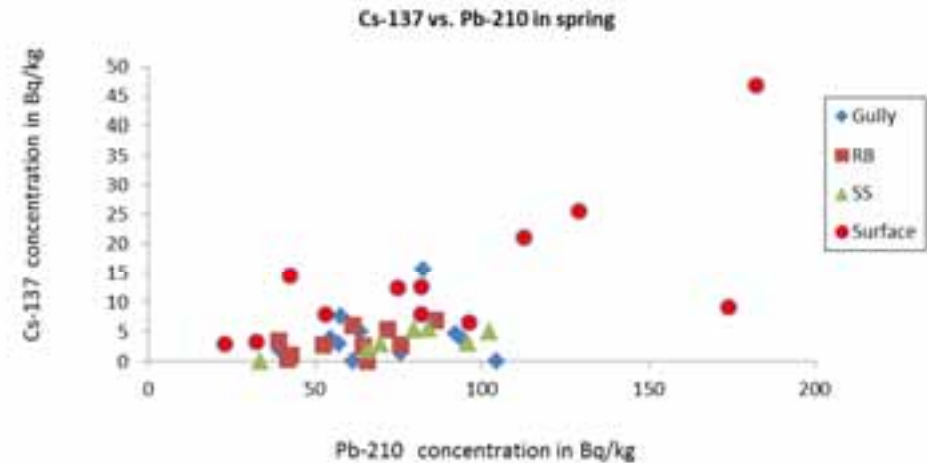
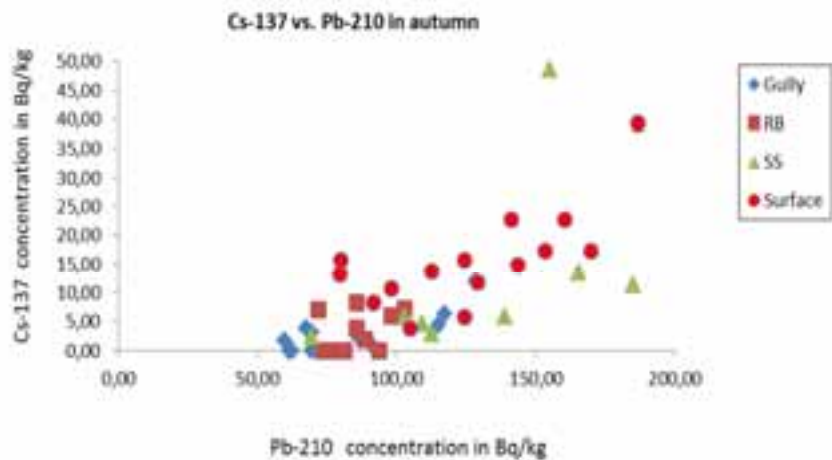
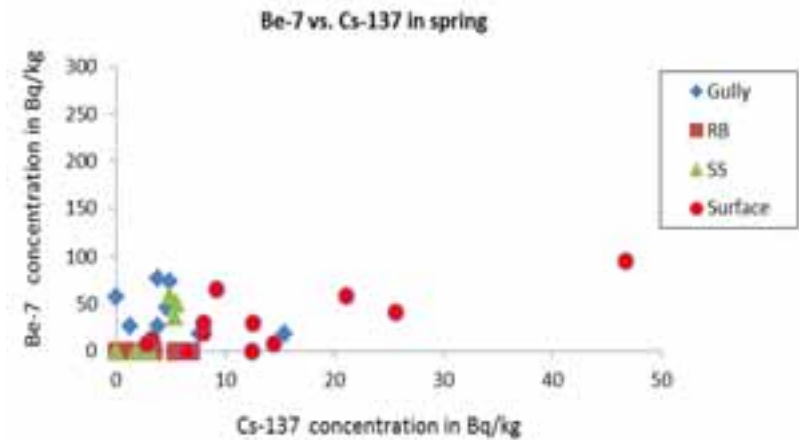
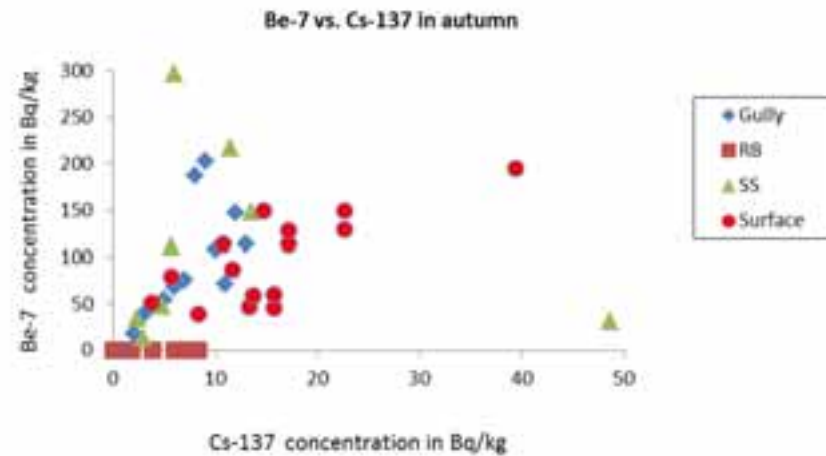
Allows for event specific sampling or integrated sampling



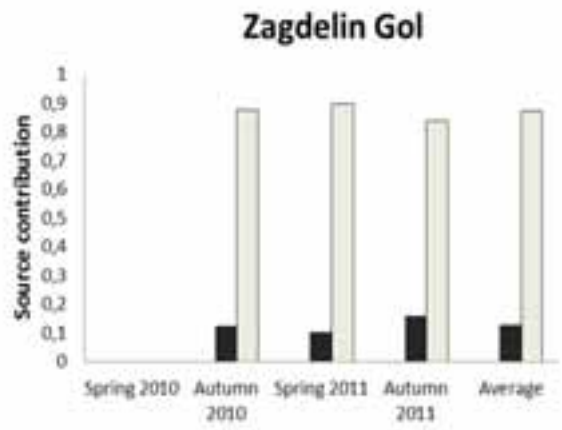
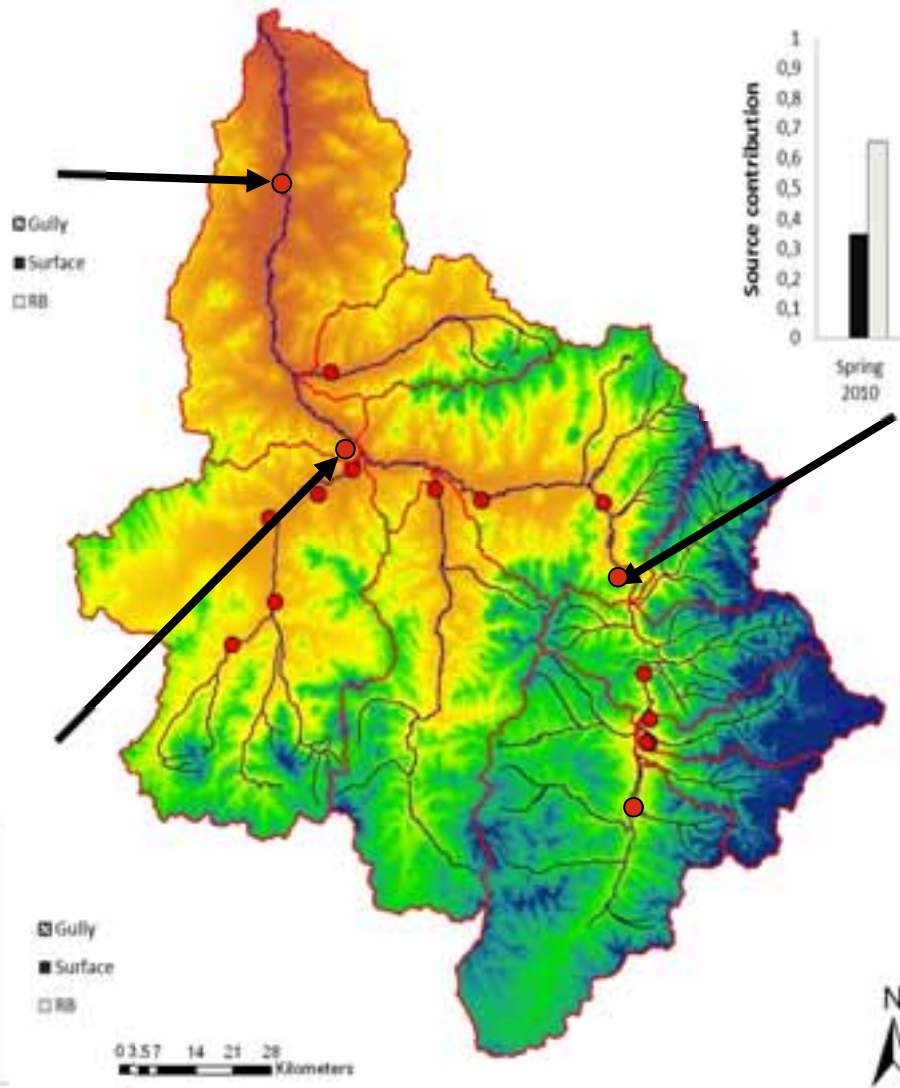
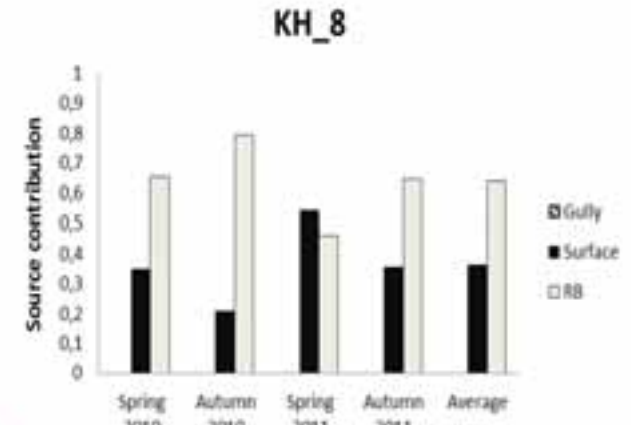
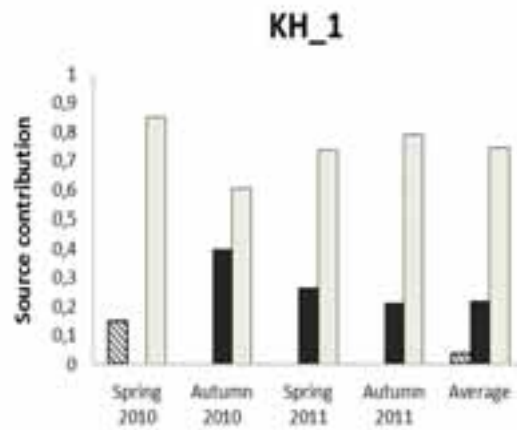
Sensitivity of isotope concentration to grain size



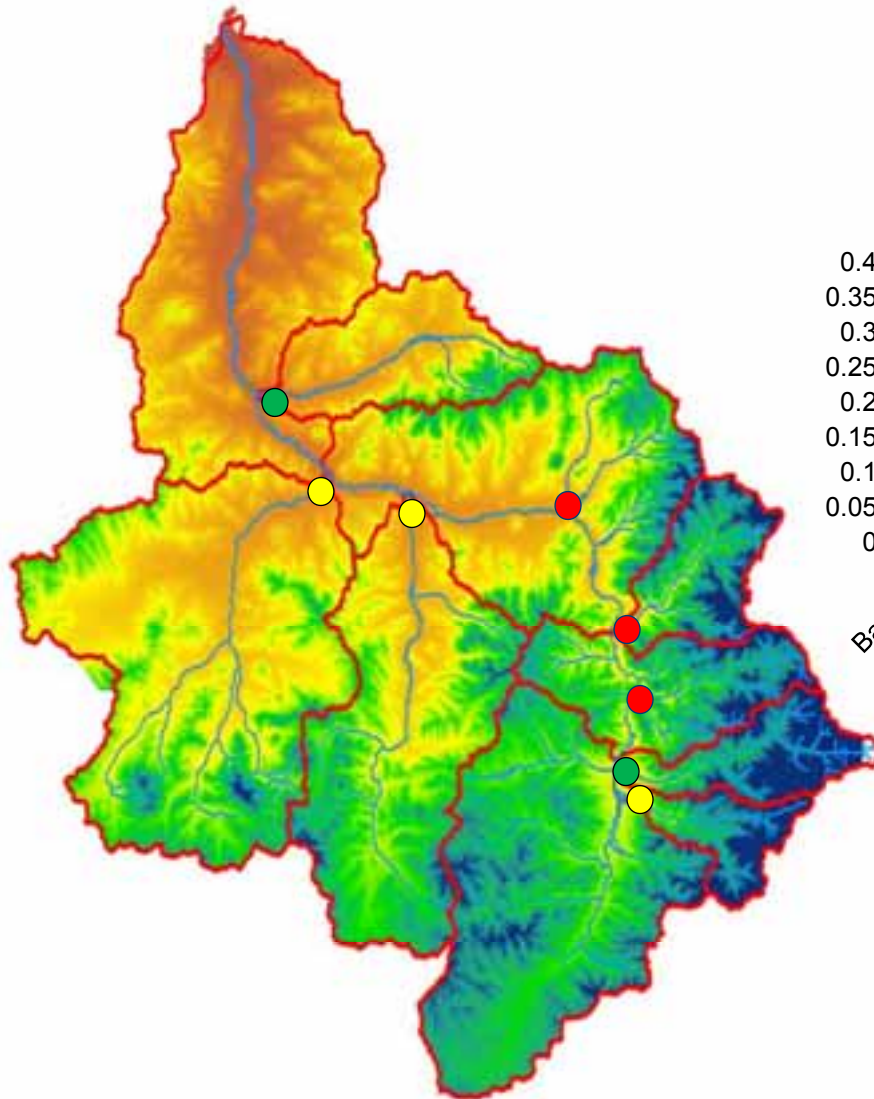
Results from isotope analysis



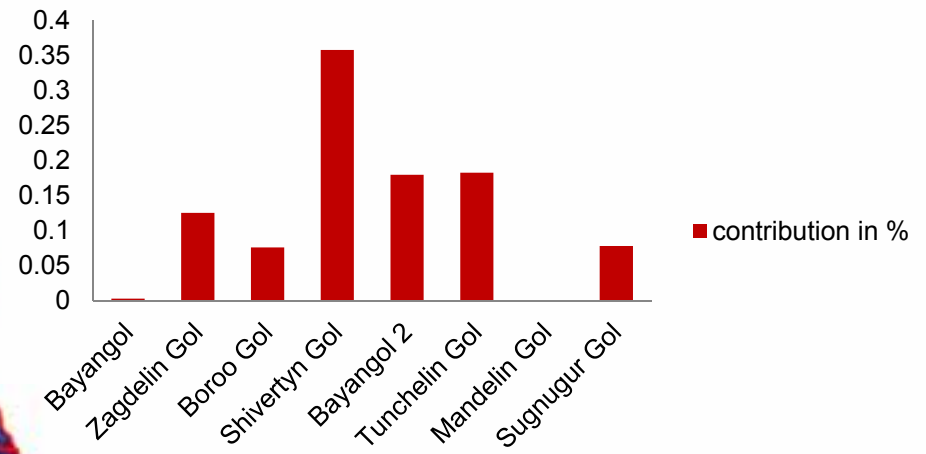
Erosion type contribution



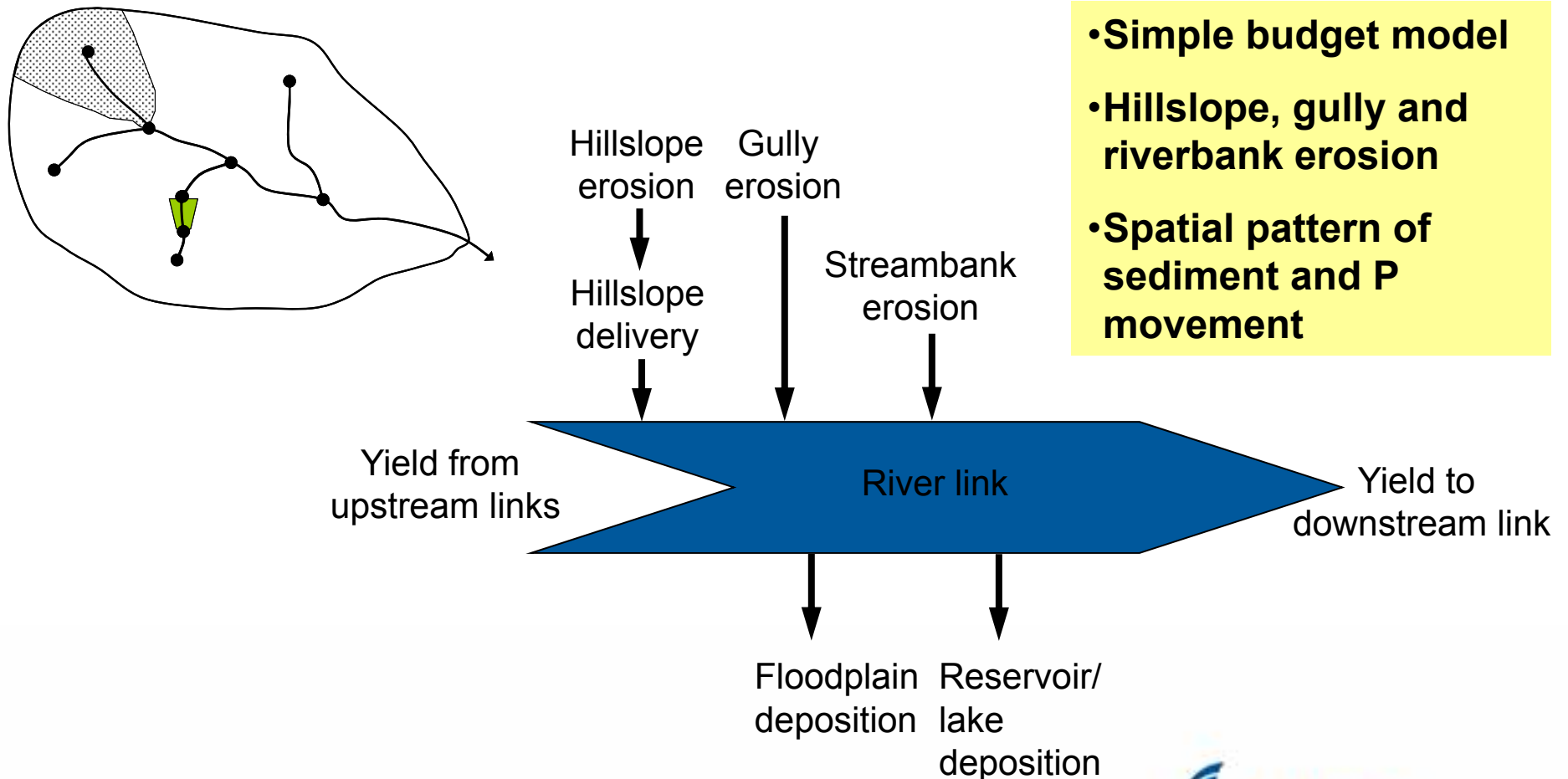
Contribution of subcatchments



Subcatchment contributions

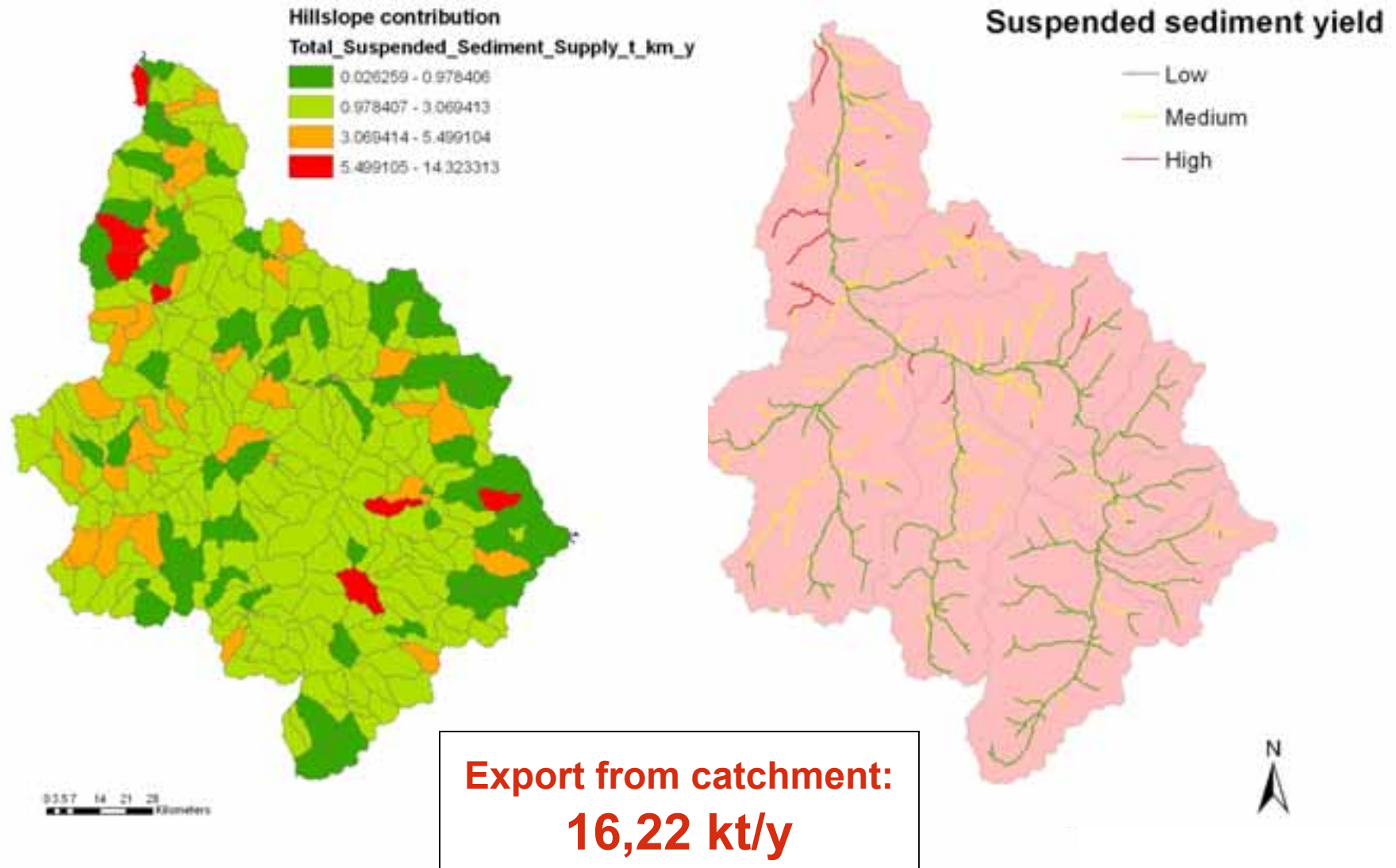


Sediment budget calculation with Sednet



Wilkinson, S., Henderson, A., Chen, Y., Sherman, B., 2004. SedNet User Guide, Version 2. Client Report, CSIRO Land and Water, Canberra. www.toolkit.net.au/sednet.

Sediment Budget with Sednet for 2010



Conclusion

Good possibility for using sediment fingerprinting at this catchment scale and identify main sediment sources

Riverbank erosion is the dominant source of SS in the catchment, especially in the downstream regions

Most of the sediment originates from the midstream subcatchments

System mainly disturbed by riverbank erosion

→ Riparian protection zones can decrease the sediment load



**Thank you very
much!**