

Identification of sediment inputs via ditches in an agriculturally dominated catchment

Pilot project to develop concrete measures for improving water quality in the Upper Kraichbach

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Motivation

- Negative impact of suspended solids in the Kraichbach caused by agriculture, wastewater treatment plants, urban discharges
- Quantification of erosion and sediment input with models (e.g. USLE¹)
- Lack of heterogeneity and small structures are not well represented (e.g. ditches)

Objective

- Localization of sources, role of small structures and their connectivity to waters or sewer systems
- Determination of specific sites for implementing measures

Methods

- Analysis of flow accumulation with 1x1m DEM
- Field visits to assess hydrological connectivity during rain
- Delineation of subcatchments of ditches and areas connected to the sewer system (n = 95)
- Applying soil loss raster¹ (1x1m) on new subcatchments
- all areas with soil loss higher than the median are categorized as priority areas for measures

Results

- Median area-specific soil loss is 4 t/ha/a
- Max. soil loss is 7,09 t/ha/a in a catchment of a ditch
- Soil loss ranges from 0 to 888 t/a
- The prioritized areas contribute 70% of soil loss
- 17 subcatchments are hydrologically connected but not in the sediment input modelling¹



Fig. 1: Outlets from concrete channels and a large retention area drain into the Kohlbach via a ditch (A).

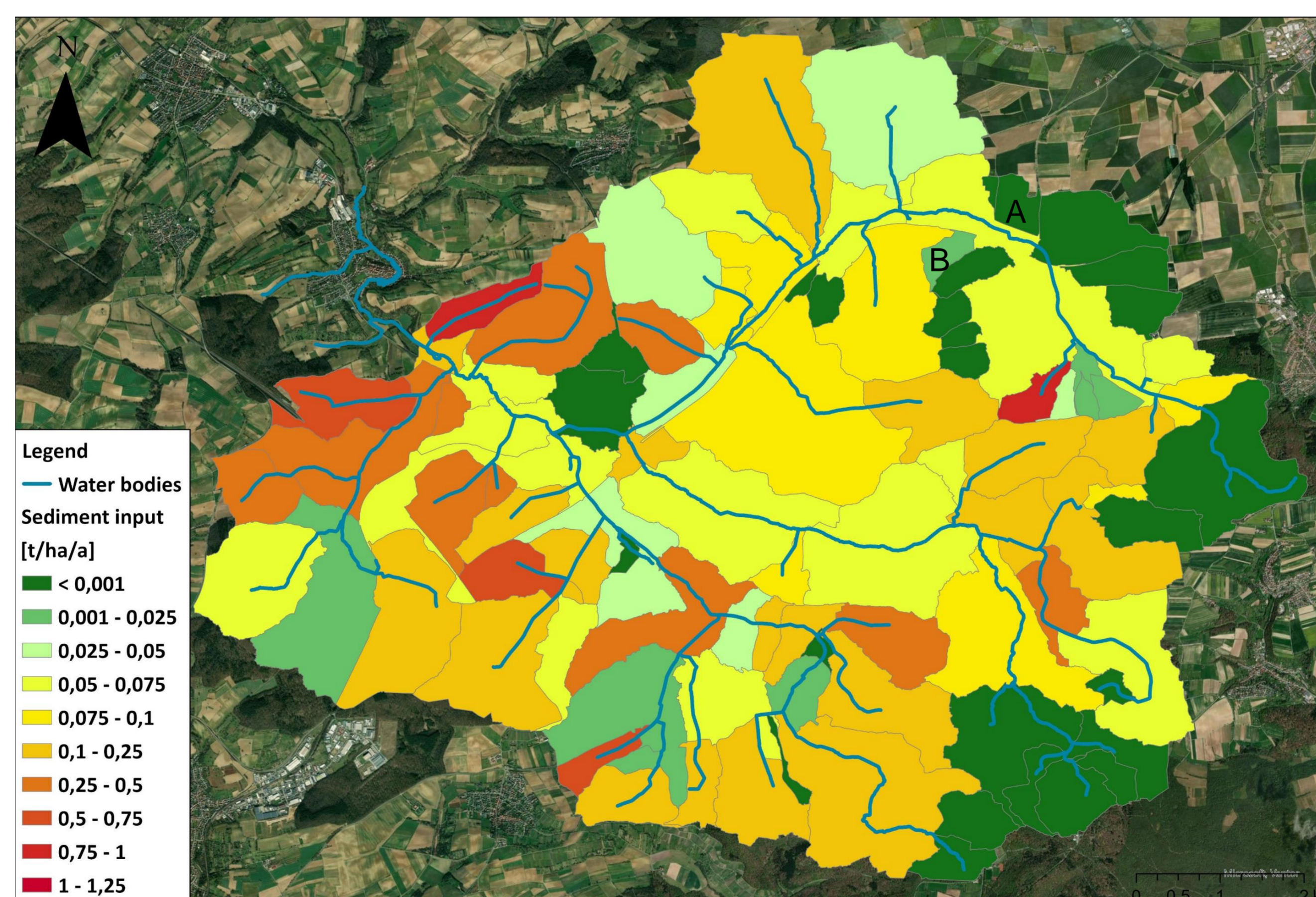


Fig. 2: Map of average area-specific sediment input for subcatchments of ditches or areas connected to the sewer system.



Fig. 3: Field ditch with turbid water and road with sediments (B).

Discussion

- Remote sensing data do not capture all small structures and their connectivity to waters → site visits are necessary
- Approach enables the prioritization of agricultural land for soil loss prevention and sediment retention measures
- Even if the total soil loss is comparable small, the area specific soil loss can be large, thus the ecological effect can be relevant
- Ditches and streets contribute sediment to waters and should be included in sediment modelling and mitigation planning due to their ecological relevance for small waters bodies

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¹ Allion, Katharina; Gebel, Michael; Uhlig, Mario; Halbfass, Stefan; Bürger, Stephan; Kiemle, Lisa; Fuchs, Stephan (2021): Use of Monitoring Approaches to Verify the Predictive Accuracy of the Modeling of Particle-Bound Solid Inputs to Surface Waters. In: *Water* 13 (24), S. 3649. DOI: 10.3390/w13243649.