



Freshwater Use and Biodiversity in Serbia

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'Synergies between biodiversity and water quality with special focus on assessments'

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Introduction

1. Benthic invertebrate community
and sediment quality
2. Aquaculture production
3. Freshwater fishery
4. Fragmentation of river habitats
5. Mini hydropower plants



Sediment quality assessment

- One of the methodological procedures for assessing metal pollution in sediment is based on the following Indicators of Contamination:
 - factor of enrichment (EF), Figure 3.
 - geo-accumulation index (IgeoE)
 - factor of contamination (CF)
 - degree of contamination (CD)
- A calculation of the relevant indicators requires the use of "background" values, i.e. the natural background of metals in sediment
- Actual effects of sediment contamination must be considered by comparing harmful effects at aquatic ecosystem level



Figure 1. The Borska Reka River. Disposal of polluted effluents from Metallurgical Industries, 2018



Figure 2. The South Morava River. Disposal of solid waste contaminants

Enrichment factor (EF) – Pilot River Basin (the Veliki Timok), Assessment of the extent of sediment pollution by metals

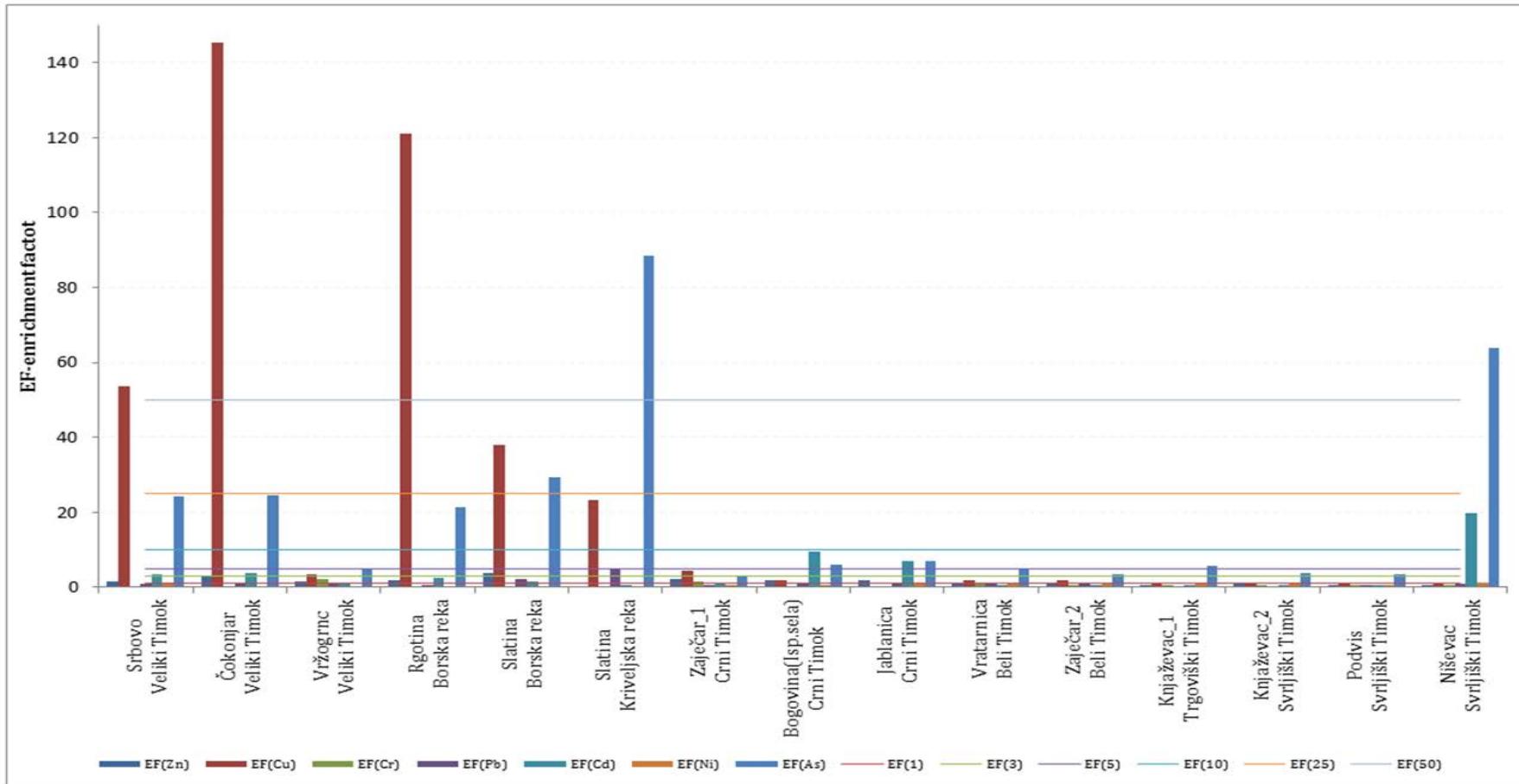
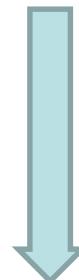
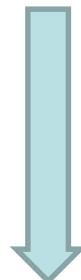


Figure 3. Metal enrichment factor (EF) in the sediments: No enrichment ($EF < 1$), minor ($1 \leq EF < 3$), moderate ($3 \leq EF < 5$), moderately severe ($5 \leq EF < 10$), severe ($10 \leq EF < 25$), very severe ($25 \leq EF < 50$) and extremely severe ($EF > 50$) enrichment

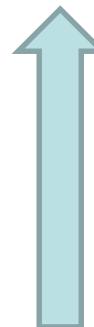
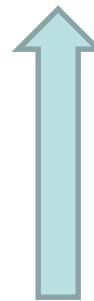
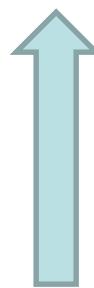


Benthic invertebrate community and sediment quality

physical and chemical variables water organic pollution (saprobity) eutrophication



benthic invertebrate community composition and structure



habitat degradation

sediment pollution

species resource competition



Taxa richness and sediment quality

- Benthic invertebrate assemblages
- Low number of taxa in benthic invertebrate community with the dominance of one or only a few taxa with high abundance - *lower sediment quality*
- High number of taxa with more complex benthic invertebrate community structure, its spatio-temporal variability as well as the presence of different functional feeding groups - *higher sediment quality*



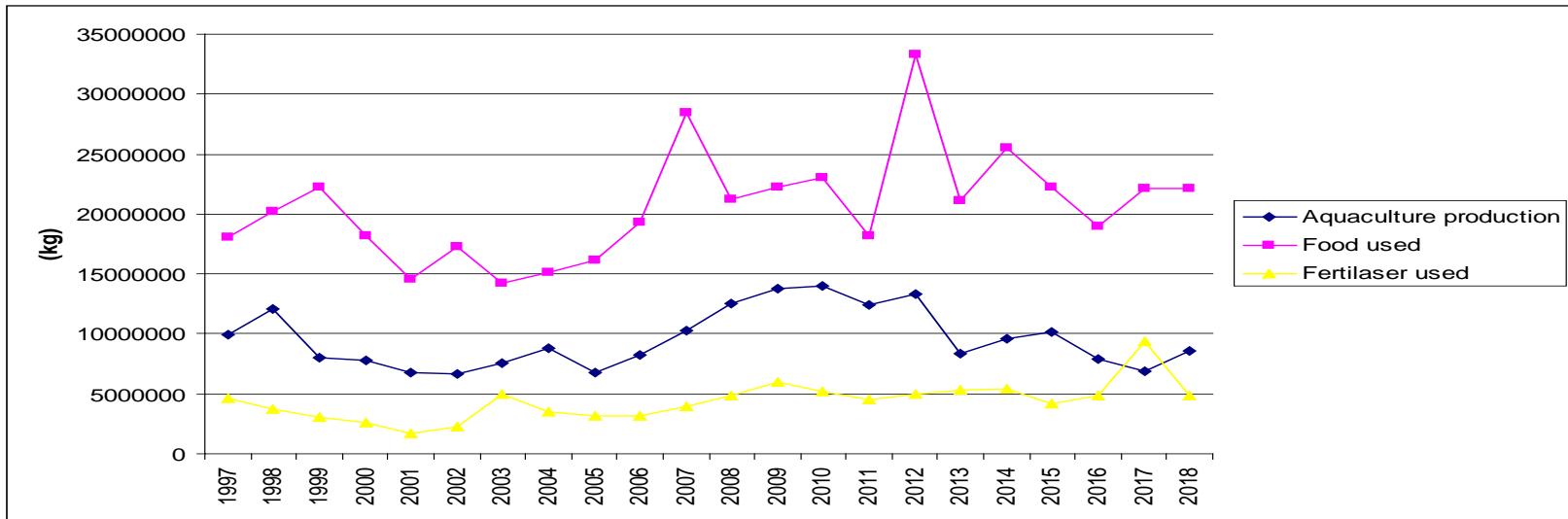
Indicators of sediment pollution

- Sediment pollution (primarily by heavy metals and pesticides)
- Natural background level of heavy metals in stream/river bed sediment
- Agricultural land use (anthropogenic impact)
- Inundation (torrents) - recent climate change effects
- transported/deposited sediment
- Bioaccumulation in larval instars of organisms and threshold values
- e. g. the caddisflies *Hydropsyche* spp. (Trichoptera) as indicators of heavy metal pollution in sediment



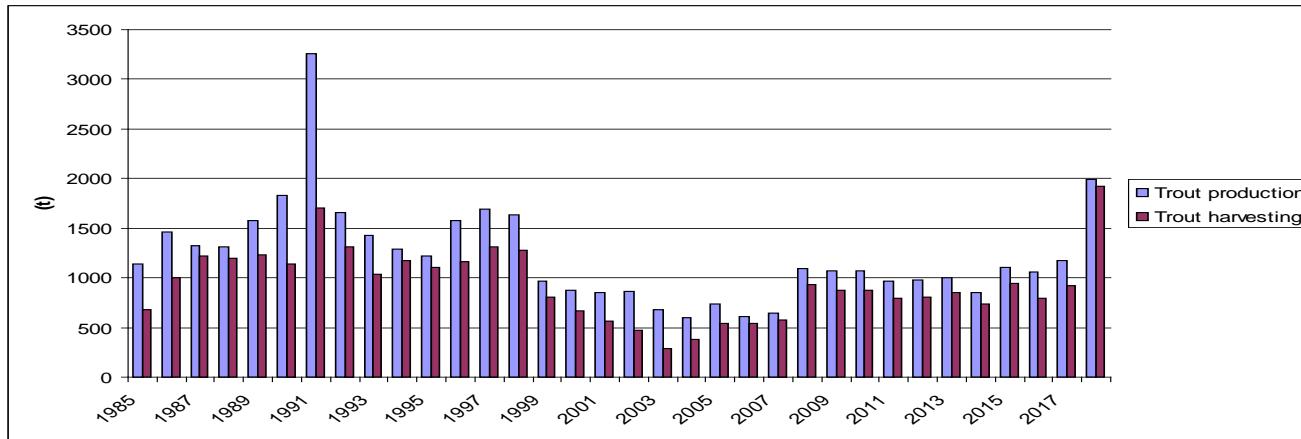
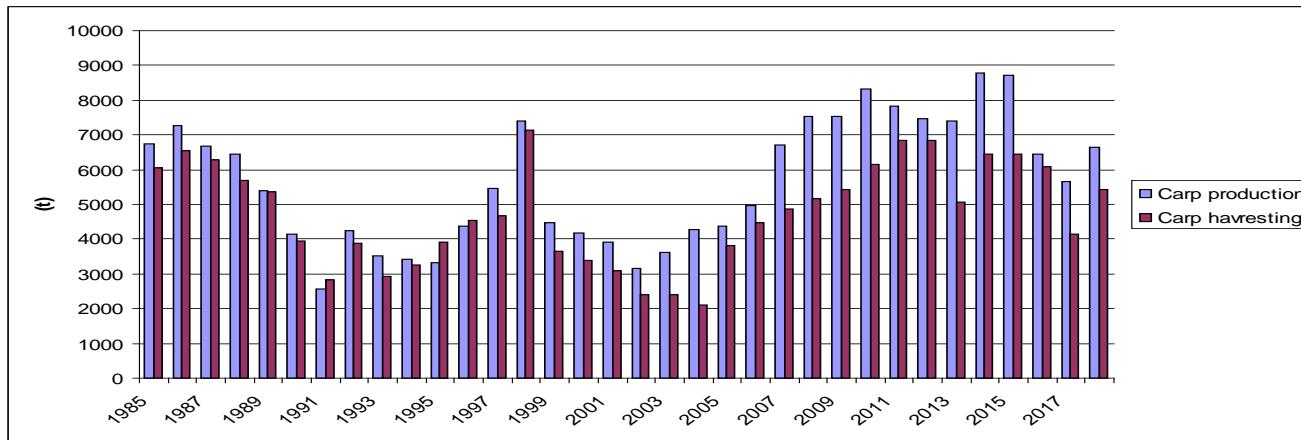


Aquaculture production



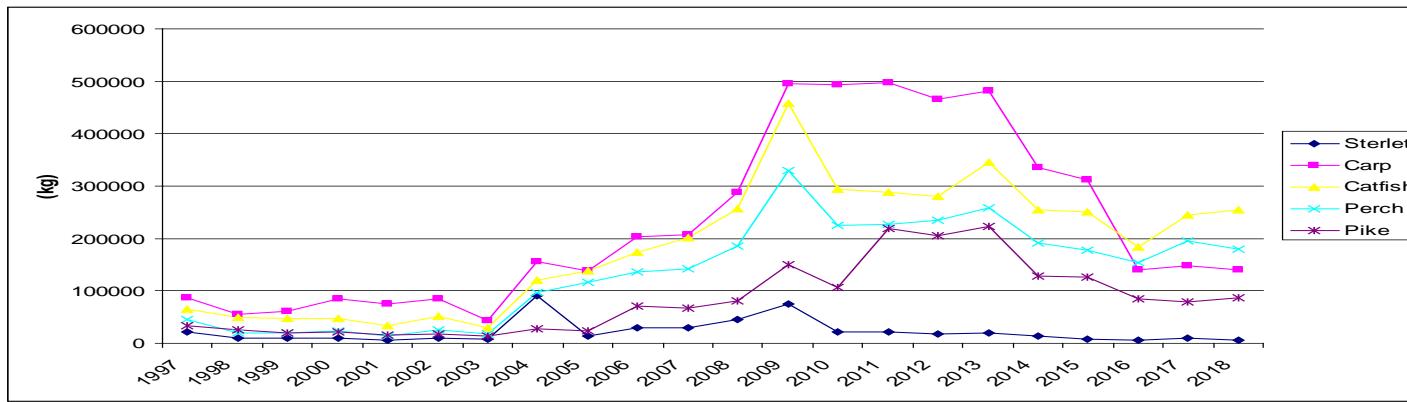
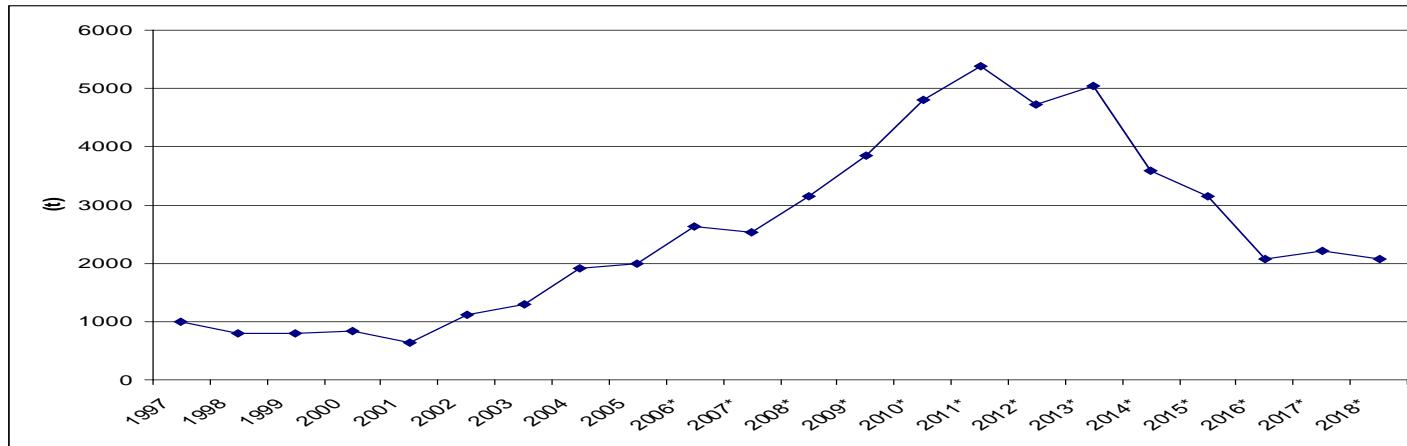


Aquaculture production



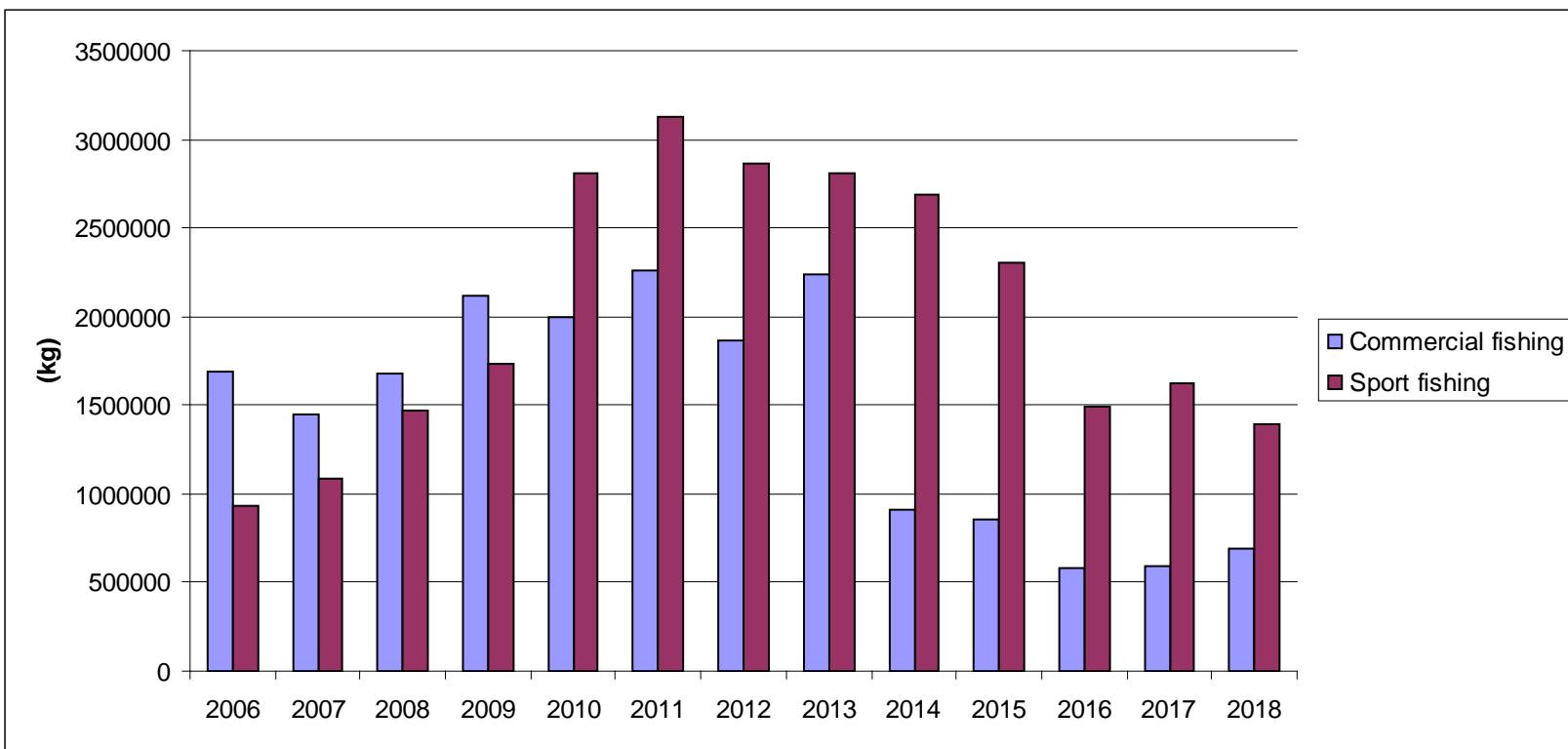


Freshwater fishery



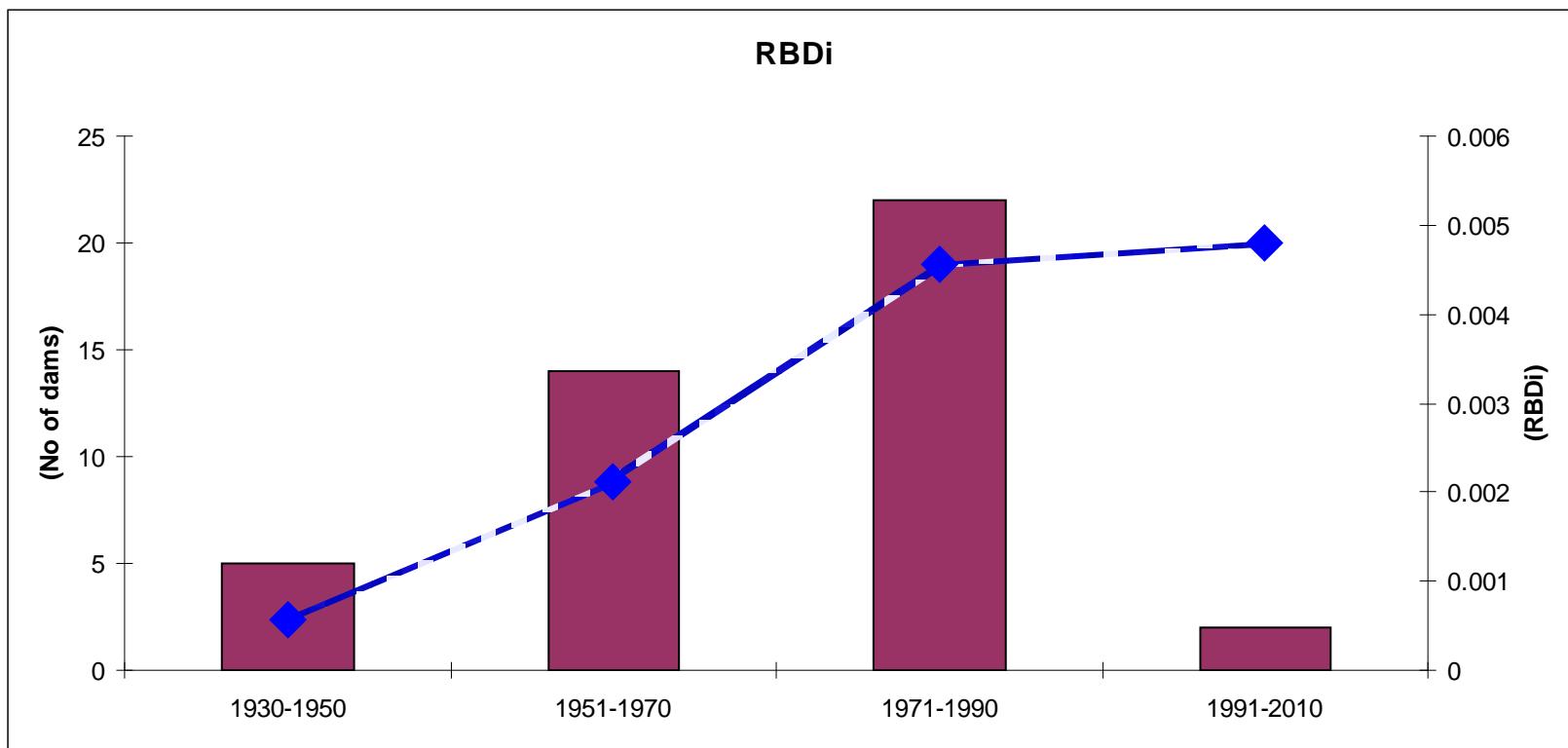


Freshwater fishery



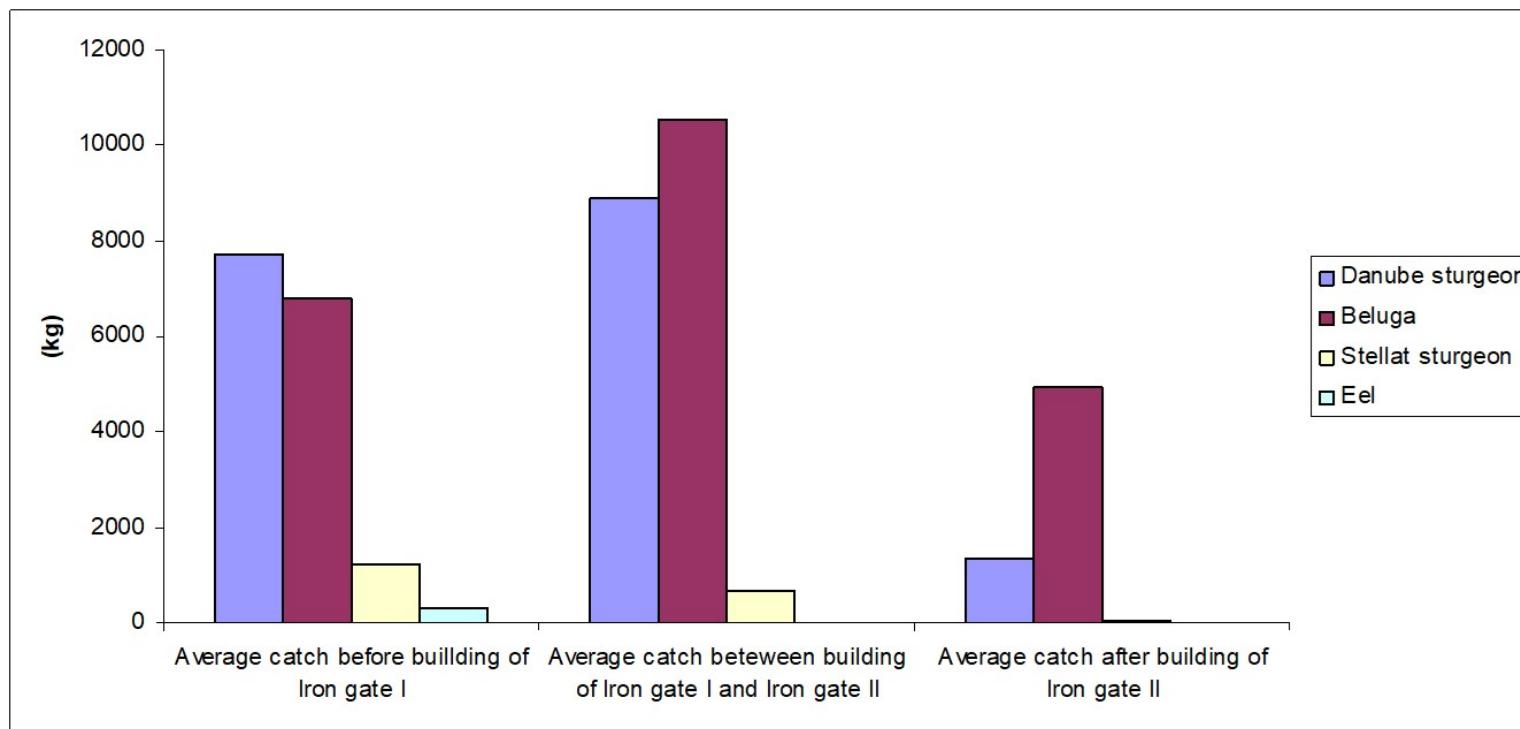


Fragmentation of river habitats



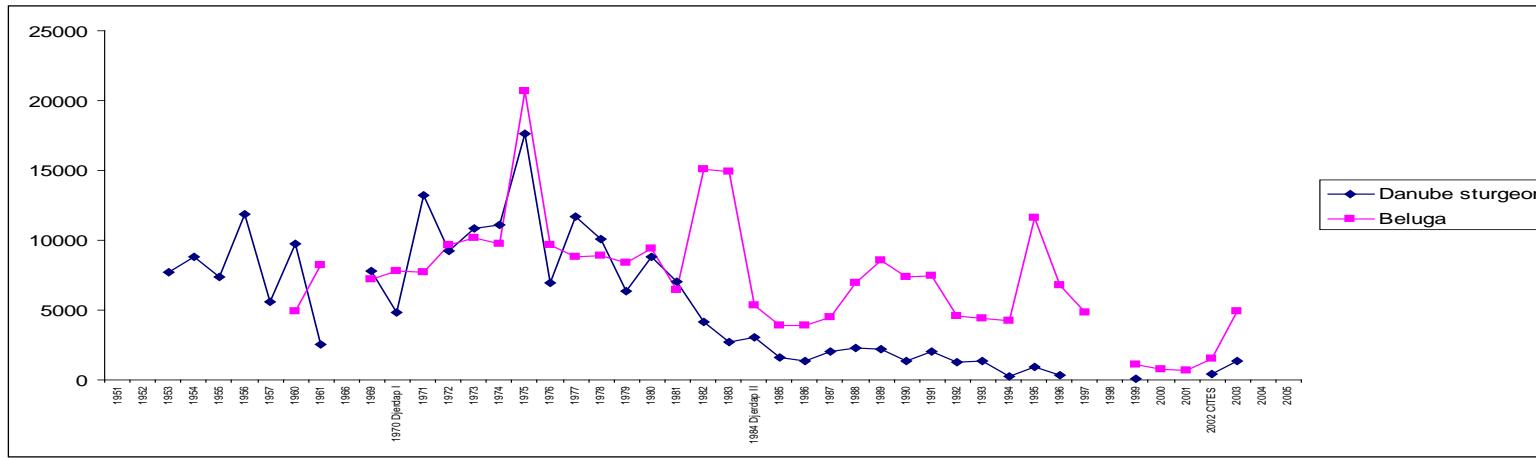
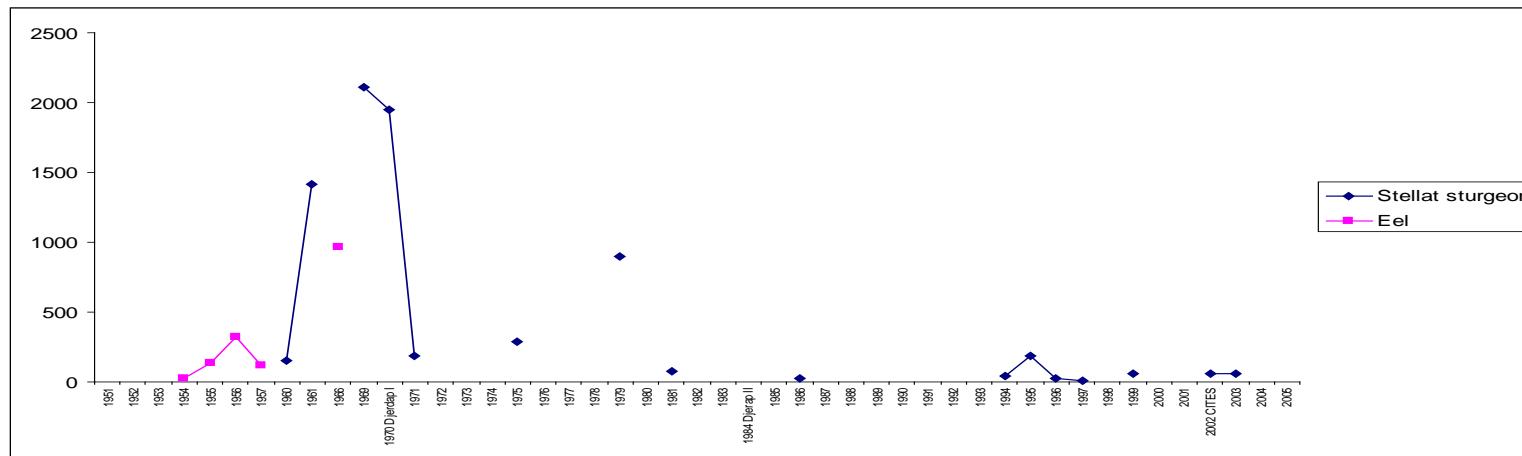


Effects of the Danube River Fragmentation



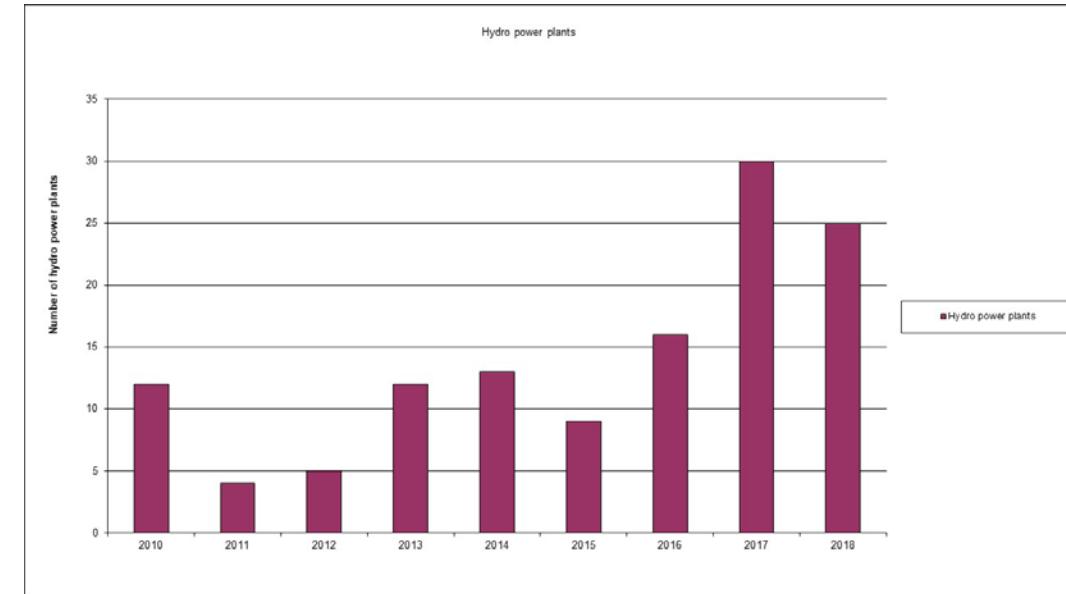
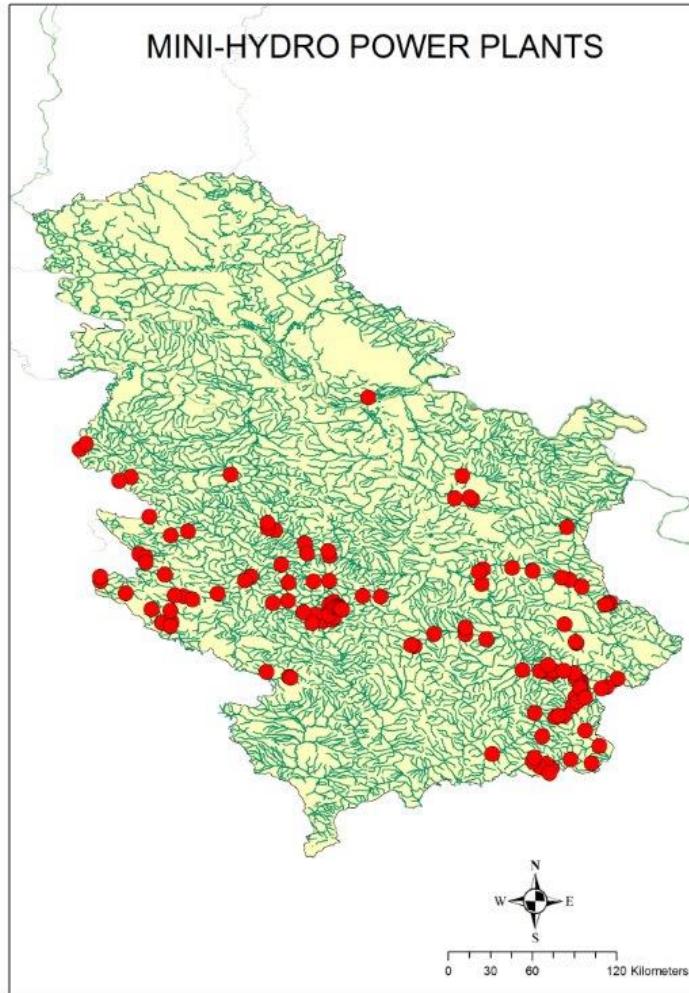


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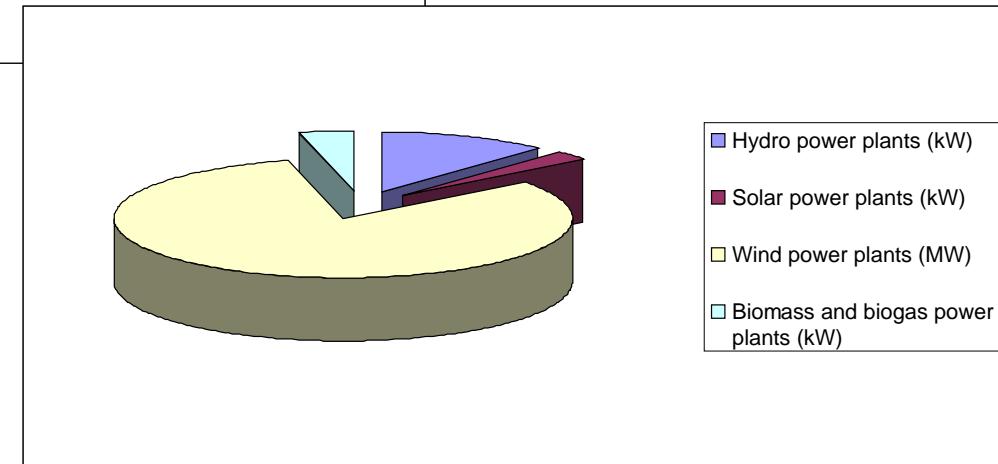
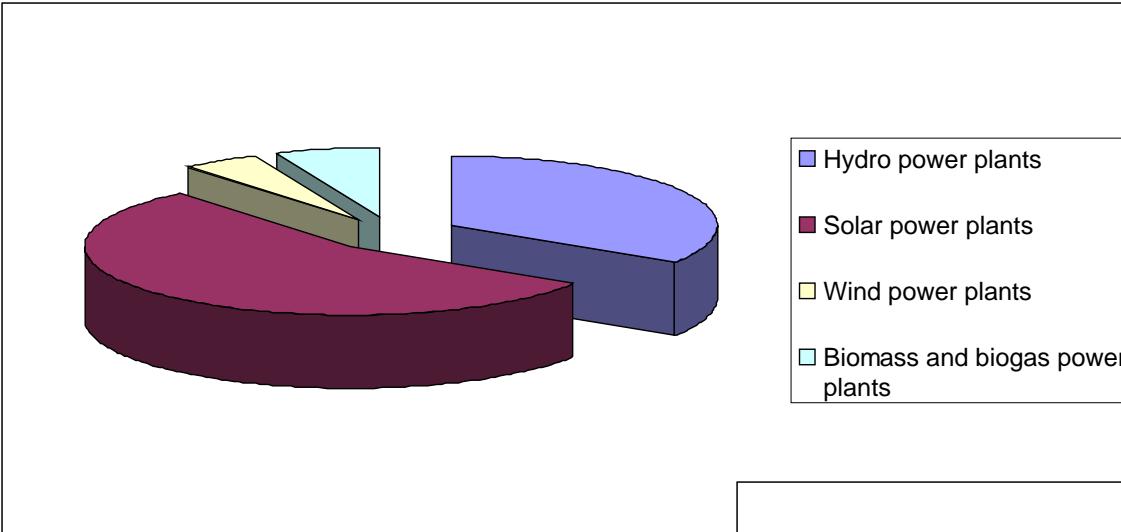


Mini hydropower plants





Renewable energy



An aerial photograph of a river flowing through a rural area. The river curves back and forth, creating several loops. The surrounding land is a mix of green vegetation and agricultural fields, some of which are planted in crops and others are fallow. Small roads and paths follow the contours of the land and the river. In the distance, more fields and possibly some buildings are visible under a clear sky.

Thanks for your
attention!