



Impact of Modified Groynes on Aquatic Macroinvertebrates

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Introduction

To assess ecological effects of modified groynes (cf. poster Hentschel & Anlauf) representative target species and objective statistical methods are necessary. Within the body of water aquatic macroinvertebrates (>1 mm) are very useful. Many of them live their whole life or at least a long period in the water. Their home range is, compared e.g. with fishes, very small. Cause many species are strongly adapted to special environmental conditions, their occurrences indicate very well long-term conditions in the body of water. Displacement of species is often caused by changing current or quality of substrata.

Conclusions

- Non-indigenous species take advantage of artificial embankment habitats
- Indigenous fresh-water organisms in navigable large rivers are supported by natural like dynamic in river banks, they mainly occurred within the groyne field
- Groynes in the river Elbe influences the composition of substrata in the groyne field
- Natural like substrata compositions, also caused by modified groynes, with high dynamic may achieve the best possible ecological status of waters and support indigenous species

Sites and Methods

- 15 groyne fields, separated by inclined or modified groynes (cf. Poster Hentschel & Anlauf) at two study sites (Elbe-km 439 - 444)
- 24 samples per groyne field, made by Van-Veen-Grab or stone brushing (fig. 1). Additional sampling at special habitats
- two sampling campaigns per year (spring & autumn) (fig. 2)
- survey of several environmental parameters to analyse the key factors governing the distribution of aquatic macroinvertebrates

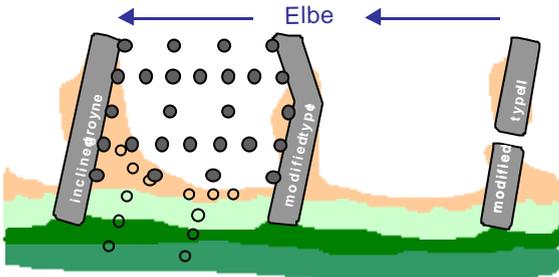


Fig.1: Different type of groynes and transect locations in groyne fields. Filled circles: macrozoobenthos raster, open circles: pitfall trap positions (cf. poster Kleinwächter et al.).

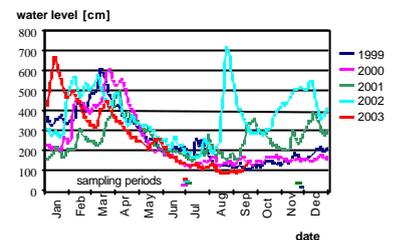


Fig.2: Water levels (water level gauge Wittenberge) and times of investigation.

Non-indigenous species

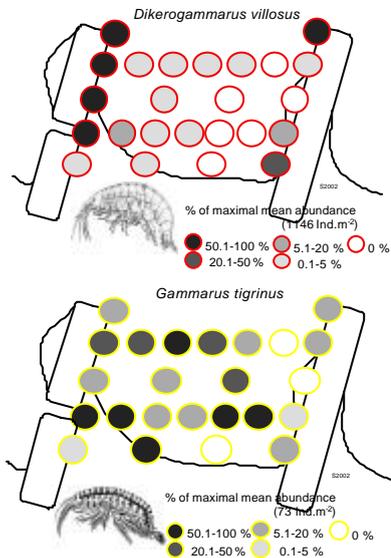


Fig. 3: Distribution pattern of two non-indigenous aquatic macroinvertebrates (*Dikerogammarus villosus* and *Gammarus tigrinus*) within a groyne field.

Mean Frequency

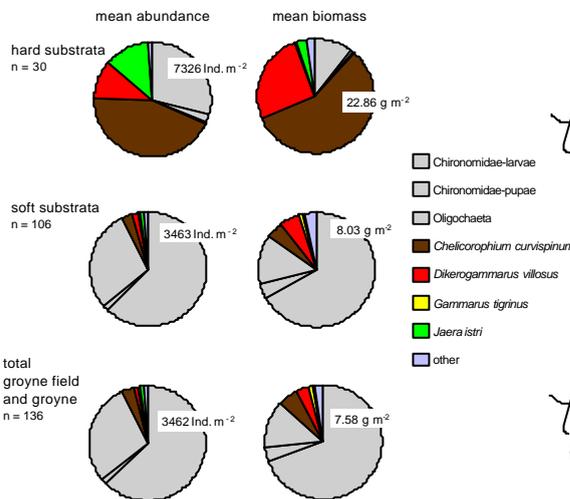


Fig. 4: Mean frequency of abundance and biomass of the most frequent limnic taxa, corresponding to different kind of substrata, resp. the whole groyne field surface (non-indigenous organisms: coloured, biomass: fixed fresh weight).

Indigenous species

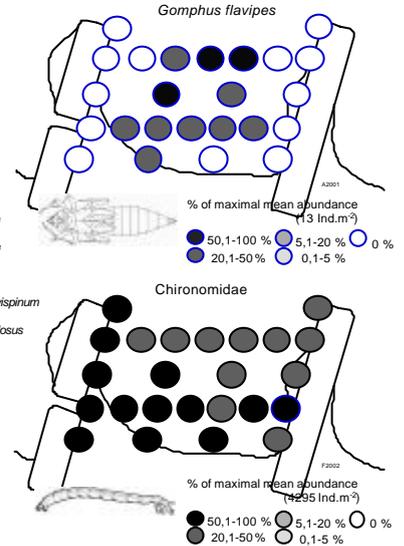


Fig. 5: Distribution pattern of two indigenous aquatic macroinvertebrate taxa (*Gomphus flavipes* and Chironomidae) within a groyne field.

Results and Discussion

At the groynes in the middle Elbe, an artificial hard substrata habitat made of rip-rap, non-indigenous species like *Dikerogammarus villosus* (Pontogammaridae, Amphipoda) (Fig. 3) or *Chelicorophium curvispinum* (Corophiidae, Amphipoda) (not shown) dominates in abundance and biomass (Fig. 4). Some non-indigenous species, like *Gammarus tigrinus* (Gammaridae, Amphipoda), probably caused by inter-specific competition, also occurred within the groyne field (Fig. 3). Some indigenous taxa like Chironomidae (Diptera) show also no specific distribution pattern (Fig. 5). River region specific species like the FFH-species *Gomphus flavipes* (Gomphidae, Odonata) lives only in sandy-silty substrate within the groyne field (Fig. 5). They are very good indicators for natural like substrate conditions.

Relating to the whole surface groynes cover only 5% of the embankment areal. Even when they show a total different species spectrum, their colonization with benthic macroinvertebrates play a subordinated role in the species composition of the whole embankment (Fig. 4). Groynes could be used as a good instrument for modelling, redynamize and rehabilitate embankment structures with the use of hydraulic power in large regulated rivers. Especially modified groynes could be used to dynamize the soil-sediments and reach the best possible ecological status of waters.

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