

Alien Species and their evaluation according to the European Water Framework Directive (WFD)

Franz Schöll, Bernd König: Federal Institute of Hydrology, Am Mainzer Tor 1, 56068 Koblenz, Germany; e-mail: schoell@bafg.de, koenig@bafg.de

Introduction

There is growing evidence world-wide that alien species constitute a major threat to native biota and habitats, with many well-documented cases of alien species becoming established both in marine and freshwater systems. The impacts of alien species on native biodiversity are many and varied, including displacement of indigenous species through competition or predation, structural damage to (aquatic) habitats, and loss of genetic integrity. In addition to the threat posed by alien species to native biodiversity, there may often be severe economic impacts, although these are often difficult to quantify.

Aliens and WFD

The Water Framework Directive (WFD, European Community 2000) focuses to a large extent on environmental pressures, their impacts on biological communities and the associated hydromorphological and water quality characteristics. Neobiota are not specifically mentioned in the WFD text and only some indirect references are given. In two Common Implementation Strategy (CIS) Guidance Documents, however, aliens are mentioned inter alia as "biological pressure".

Alien species and ecological status classification

Within the EU, there are two main approaches.

- (1) *Neobiota-Index*: This approach involves a separate, specific metric for assessing alien species in their own right.
- (2) *Integrative evaluation*: Undertakes the classification process for each biological quality element as normal, and assumes that the classification tools will have detected any impacts caused by alien species.



Figure 1: The invasive Ponto-Caspian crustacean amphipod *Dikerogammarus villosus*

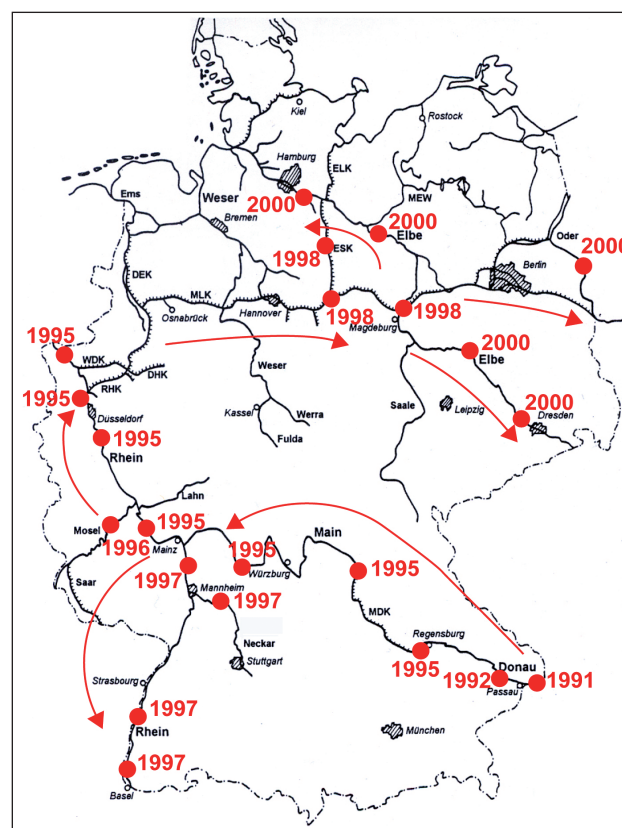
The situation in Germany

In Germany, the invasion of new animal species (neozoa) has notably modified the species spectrum of large watercourses repeatedly over the past years. An example is *Dikerogammarus villosus* (Figure 1). Its dispersion was fast – it spread out from the River Danube via the Main-Danube-Canal (finished 1992) into the German and European river systems and is now among the dominant species in most samples collected from these waterways (Figure 2). There is development and interaction between the invaders and the native fauna, and there is a continual restructuring of the species community within the River Rhine and of course other rivers as well.

The Potamon-Type-Index (PTI) – an example for the integrative evaluation of large rivers

Because of the long-lasting anthropogenic utilization of large rivers, sometimes over centuries, it is hardly possible to describe pristine reference biocoenoses. The PTI approach is model-based and pursues the principle of the open list of taxa, i.e. the reference status for Class II "good ecological status" is generally a biocoenosis characterized by lotic potamon-typical species. Species occurring in the potamal of

Figure 2: Dispersion of *Dikerogammarus villosus* in German waterways



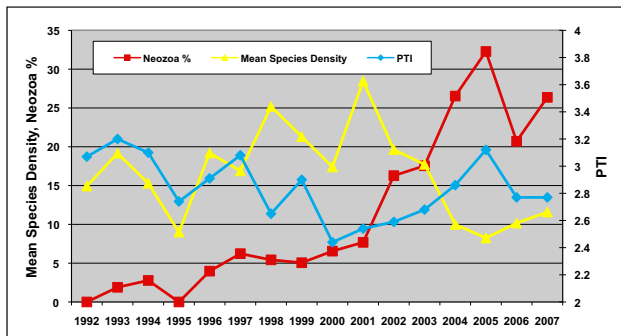


Figure 3: River Elbe, 1992-2007: Relative abundance (%) of neozoa in the whole biocenosis, mean species density and PTI values. Class boundaries of ecological status: PTI "high": 1 – 1.9, "good": 1.91 – 2.6; "moderate": 2.61 – 3.4; "poor": 3.41 – 4.1; "bad": 4.11 – 5

Central European rivers are rated for their potamal-linkage in five classes, ranging from (1) = weak linkage on the potamal (euryocious species) to (5) = strong linkage on the potamal (stenocious species). Neozoa are included and are mostly rated as euryocious species. (Full particulars of computing the PTI are given in Schöll et al. 2005).

Long-term investigation of the ecological status

The results of the ecological evaluation of long-term investigation of the River Elbe are given in Figure 3. Due to the rising oxygen content in the River Elbe induced by wastewater treatment plants constructed in the catchment after 1990, the ecological status improved from "moderate" (1992) to "good" (1999). The mean species numbers increased, too. Single species were considered extinct in the River Elbe for decades; however, some species re-established themselves such as

the mayflies *Oligoneuriella rhenana* and *Potamanthus luteus*. Since 2001, the increasing immigration of neozoa (*D. villosus*, *Jaera sarsi*, *Chaetogammarus trichiatus*, *Corbicula fluminea*) has diminished the average number of species, and the ecological status has impaired from "good" to "moderate". In the Rivers Rhine and Danube we can notice similar effects (not shown here). It is a fact that the assessment tool for large rivers, the PTI, was successful to detect the impacts caused by alien species.

Conclusions

In certain types of waters and for certain biological quality elements neobiota have a major impact on the ecological assessment according to the WFD. Neobiota can lead to the assignment of a lower ecological status, regardless of anthropogenic interference. To visualize the influence of neobiota in the ecological assessment, neobiota-dominated waters should therefore be particularly marked. We propose to assign such a mark for the macrozoobenthos in large rivers of more than 30 % neozoa-dominance in the whole biocenosis (calculated after abundance-classes).

References

- European Community (2000): Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal of the European Communities L327: 1-72
- Schöll F, Haybach A, König B (2005): Das erweiterte Potamontypieverfahren zur ökologischen Bewertung von Bundeswasserstraßen (Fließgewässertypen 10 und 20: Kies- und sandgeprägte Ströme, Qualitätskomponente Makrozoobenthos) nach Maßgabe der EU-Wasserrahmenrichtlinie. Hydrologie und Wasserwirtschaft 49 (5), 234 – 247

In brief information

37th IAD Conference Oct 29 - Nov 1, 2008, in Chisinau, Moldova

Jürg Bloesch: Stauffacherstrasse 159, CH-8004 Zürich, Switzerland,
e-mail: bloesch@eawag.ch

The 37th IAD Conference was entitled "The Danube River Basin in a Changing World". This is true in many respects. Global climate change and global political change provide the scientific and real background of our work and problems. However, IAD as the oldest Danubian NGO is also affected on a smaller scale. For the first time in the 52 years long history of IAD we met in Moldova. And for the first time, the conference was not organized by local IAD or associated organisations, but as a joint effort of IAD General Secretariat, National Committee of IAD Serbia, IAD/ENVIRES Romania and Free International University of Moldova, co-ordinated by co-chairpersons of the Organizing Committee – Ivana Teodorovic, President of IAD and Dumitru Drumea, Country Representative of Moldova in IAD. The following persons in-

volved in the organization are greatly acknowledged: Cristina Sandu, Ivana Planojevic, Emilia Radu, Ioan Paceșila and Djore Kasimir.

The Conference was financially supported by IAD, National Committee of IAD Serbia and Provincial Secretariat for Environmental Protection and Sustainable Development of Autonomous Province of Vojvodina (Serbia).

The actual focus of IAD research was presented in several keynote lectures. They encompassed, together with oral and poster presentations, the major research topics of IAD such as hydromorphology and floodplains, sturgeons (and other fishes), potamoplankton and macrophytes, biomonitoring (ecotoxicology), and last but not least the applied side with sustainable development and implementation of measures to achieve and fulfill „good ecological status of surface waters“ in the context of the EU Water Framework Directive (WFD).