Monitoring of Water Macroinvertebrates Fauna Exchanges in Protected Areas

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Abstract

There are many natural (ecological) and antropogenis factors inflows on migrations of water invertebrates. There is strong necessary to monitor these processes. Protected areas seem very useful ecological laboratories for long term monitoring but international cooperation is necessary. Our department now is working in northern Poland and Central and Eastern Europe. We try describe typical for lakeland landscape fauna using new index of naturality.

Key words: aquatic insects, water mites, long term monitoring, treated species

Many areas in Poland and Eastern Europe characterize relatively not-changed landscapes with specific, like natural water and wetland fauna. In second part of XX century we observed intensively processes of water pollution and degradation of water habitats. Extensive drainage in recent years has caused great changes there in swamps and water habitats and has probably affected the distribution of insects. The effect on aquatic insects is interesting. Additionally, it is significant that peat-bog habitats are deteriorating in western and central Europe, causing fauna living in these habitats to approach extinction. Some areas protected such Polesie or Białowieża Primeval Forest are probably the last sizeable places where these species occur and where they may be successfully protected.

During last 15 years quality of waters was better and better, especially in rivers and streams. Finally we observed reintroduction and increase of density populations some rare or vulnerable species. About 10 years ago start new ecological process in northern and eastern Poland – reforestation at post rural areas. Probably the process cause next changes in water fauna. There are more ecological and antropogenous factors inflows on migrations of invertebrate water fauna. It is strong necessary to monitor these processes. Protected areas such as national parks and landscape parks seem very good ecological laboratories for theses researches.

Researches on invertebrates are very difficult because is too little specialists in one country. The international cooperation is necessary.

More then 3340 species of aquatic insects occur in Poland. In case about 80 percent species there are no data on threats [fig 1]. 30 percent better recognized

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species are vulnerable [1]. Those species can be protected by protect of theirs habitats in national and landscape parks. But for example, only 17 Polish national park (from among 23) and 4 landscape parks (from among about 120 existing) have any data about *Trichoptera*. So far, we found only 226 caddisfly species on protected areas (85 percent whole Polish trichopterofauna), and only 40 species from Red List Animals of Poland (it is about 54 percent vulnerable *Trichoptera*) [fig.2]. Other group of water invertebrates (excluding *Odonata*) are relatively worse recognized. So, we don't know what and where is protecting.
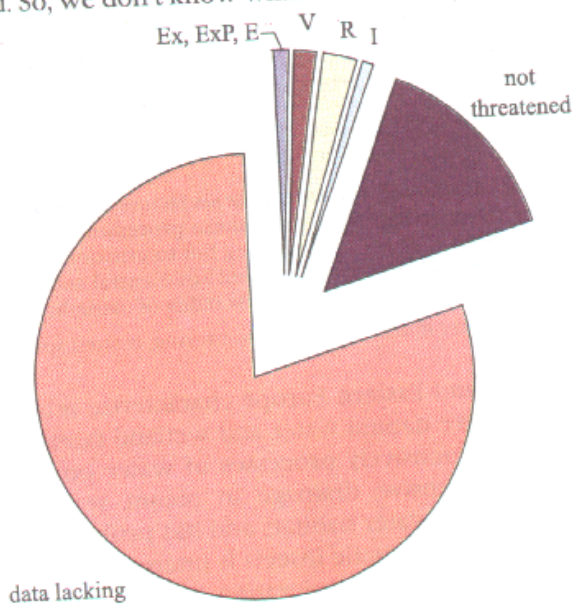

Fig. 1. State of knowledge and treat of aquatic insects in Poland

Department of Ecology and Environmental Protection have been investi gated of *Hydracarina*, *Trichoptera*, *Odonata*, aquatic *Coleoptera*, aquati *Heteroptera* and wetlands *Carabidae* [fig. 3] on protected areas in Norther and Eastern Poland [2, 3, 4, 5, 6, 7, 8, 9], Russia [10, 11, 12, 13] and Belarus [14 15] for about twenty years.

Now we are working in Mazurian Landscape Park. We will try to describ typical water fauna of a lakeland landscape, including lakes, rivers, stream springs, temporary pools, fens and bogs. The research will be basis for lon term monitoring of water and wetland fauna, including human activity impa and natural processes in migration of invertebrates fauna. We plan start wit comparative researches in other places of Central and Eastern Europe [17].

For monitoring of degradation and renaturalization of fauna we use som indexes [18], including new biocenosis naturality index [19, 20]:

$$Wns = \frac{\sum_{i=1}^{s} Wze_i}{S} \qquad Wni = \frac{\sum_{i=1}^{s} Wze_i \, n_i}{N}$$

Wni — a quantitatively and Wns — a qualitatively naturality index of the biocenosis (values: 1–16);

Wze_i — index of an ecological importance of the species "i" in the biocenosis (ecological preferences); s — number of all species; n_i — abundance of the species "i"; N — number of all specimens.

For example, in evaluation of antropogenic degradations of some swamps water-bodies in Eastern Poland, values of naturality indexes of sphagnal bogs made 2,4–16 for dragonflies, and 2,0–6,0 for caddiflies. Wns was higher as Wni for some peat-bogs, or Wni was higher as Wns (differences: 0,2–4,5). Values of naturality indexes for low-moors made for dragonflies: 2,4–4,6 (Wns), and 1.8–5,3 (Wni); for caddiflies: 1–16. [20]
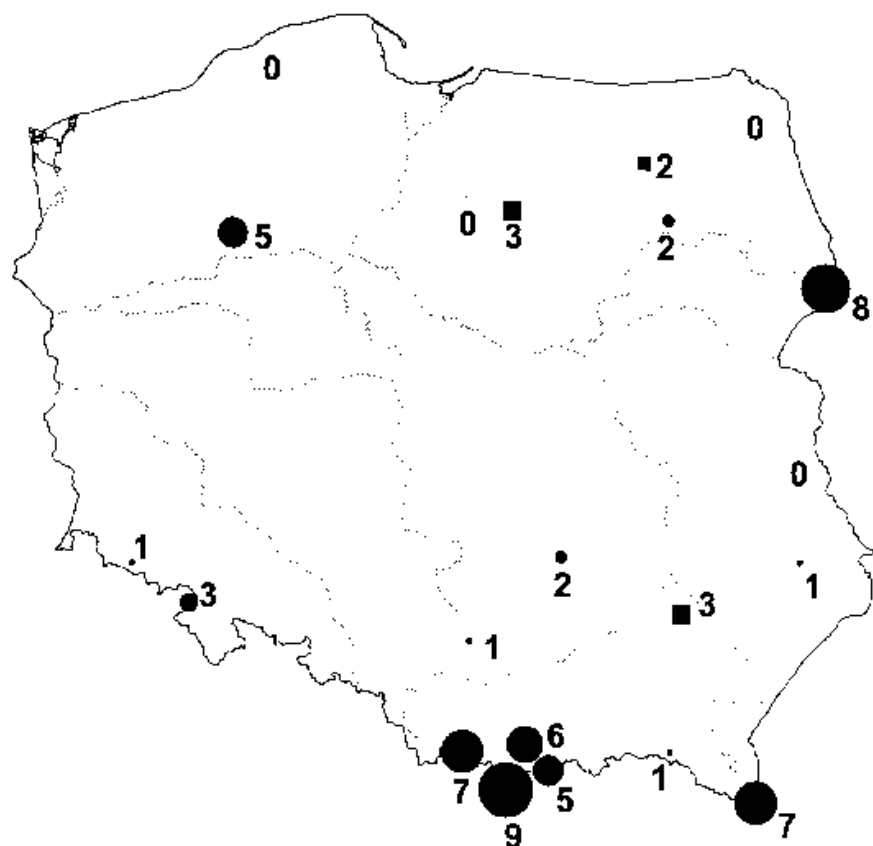

Fig. 2. Numbers of threatened species of caddisfies (*Trichoptera*) found in protected areas in Poland.

It is very interesting, that the indexes of mountain peat-bogs are clearly higher. It can be a result of raw climate conditions, in which an ecological tolerance range is narrower. There are differences between indexes for dragonflies and for caddiflies; indexes calculated for both taxa together are intermediate; it results probably from different sensibility on habitat disturbance. On some bogs the indexes calculated using Wze for fens were higher as indexes using after Wze for sphagnal peat-bogs; for caddisflies on some low-moors occurred more specifically sphagnophilous fauna. It can be interpreted on two ways: 1. these objects are already buckled, but it is yet not visible in the "landscape" level; 2. low-moor fauna is very dispersal and it abundant populates sphagnal peat-bogs too, which are suboptimal biotops for it [20].
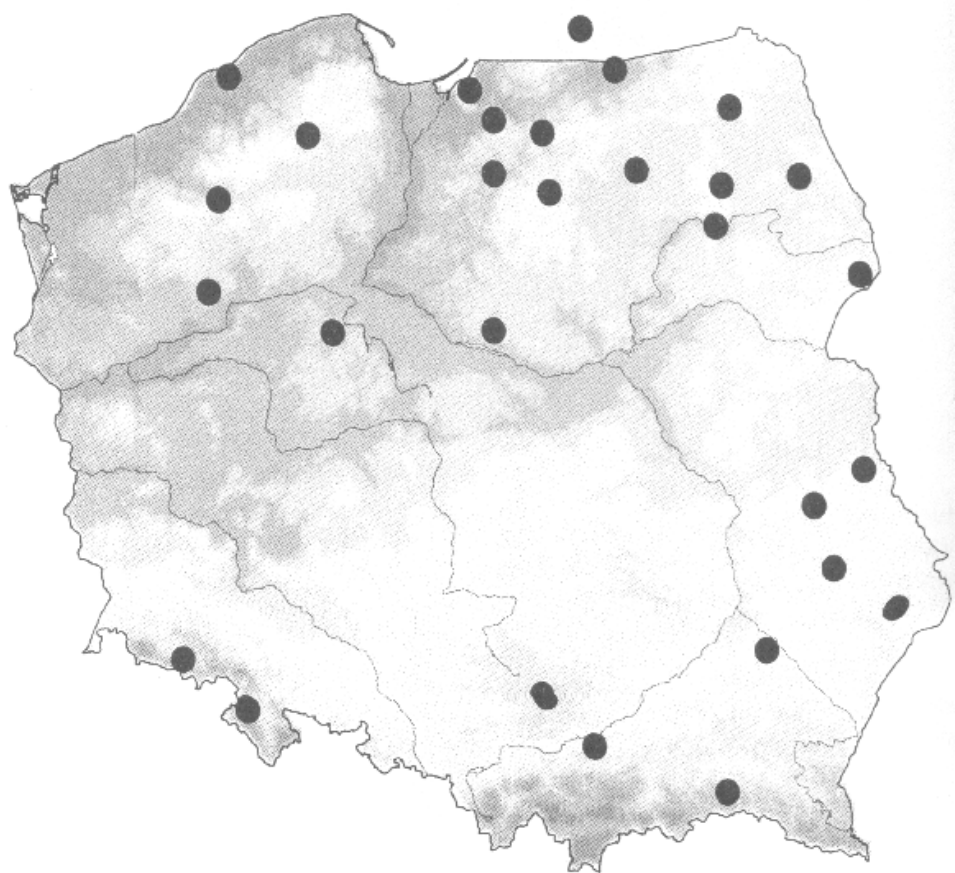
Fig. 3. Areas of the investigations of Department of Ecology and Environmental Protection UWM on insects and water mites.

The biocenosis naturality index seems be a good tool for planning an animal protection: to choose different objects for protection other species in a national or a landscape park or a various park on the country. It is necessary because each species should be protected in region and habitat optimal for its. Additionally active protection of one species can be disadvantageous for other.

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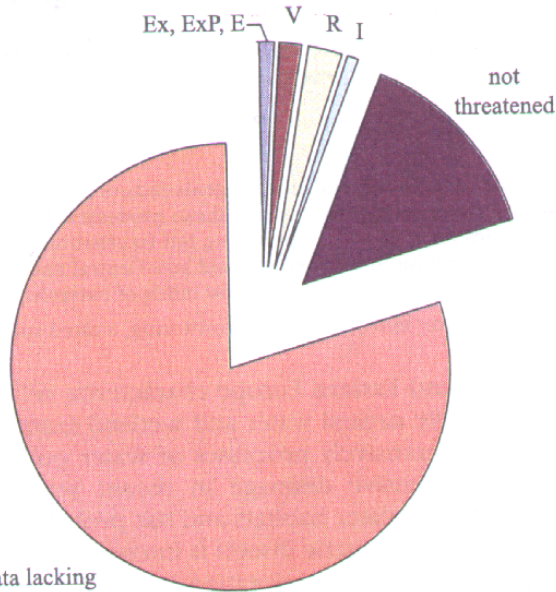
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