

big 968

*"It is not hard to formulate the alarm
calls,
but to make the public recognise them. ..."*

Juhász-Nagy – Zsolnai 1992

Zoological monitoring in the Szigetköz (1994)

Ferenc Mészáros (1) & Ottó Bertalan (2)

(1) Zoological Department of the Hungarian Natural History Museum
H-1088 Budapest, Baross u. 13.

(2) Limited Company of Agricultural and Food-industrial Managers, Győr Bureau
H-9024 Győr, Zrínyi u. 23.——

Introduction

(Ideas on Natural Values)

In a certain sense the key words of the biosphere crisis, the conflict between mankind and nature are: value, damage, gain, efficiency and the conflict of interests. We believe that the effects exerted on the fauna of the Szigetköz by the diversion of the Danube can be categorised as damage. According to the Hungarian Concise Dictionary damage is a loss of values. To judge the loss of the values as a consequence of a certain measure, in this case as a consequence of the diversion of the Danube on the fauna of the Szigetköz, it might be worthwhile to investigate some details of this loss more thoroughly. What we are dealing with here, are the natural (zoological) values, and their loss. When we talk about natural values, we can not skip the discussion of two questions:

- 1.) Why the biota (flora, fauna) is considered as a value?
- 2.) If it is value, why is it so difficult to recognise it?

The greatest problem of mankind is probably the biosphere crisis, and the most apparent symptoms of this phenomenon are the fast decay of the

biota of our planet, the decrease of biodiversity, and the drastic degradation of our ecological environment. These threatening signs make it inevitable to recognise that nature is in general valuable. What is usually not recognised that it is a value category of paramount importance. Despite all this, in a given case, under given circumstances the recognition of the value of nature is not so obvious. Especially not so, when - here we might recall the ideas of Juhász-Nagy (1993) - the value of nature should stand against the momentary economical interest, when it must run against "the ideas of militant kind". As biodiversity is a characteristic parameter of nature, the survival of life is dependent on the sustainment of biodiversity. Any decrease in diversity means that the chance to recover after perturbations also declines. Consequently, each and every specimen, species, population, association etc. of the biota of our planet is valuable. If the above is true, it is very difficult to understand, why it is so hopeless sometimes to make the political and economical decision-making bodies to accept the values of the biota. In a monetary value-system it is impossible to give a certain value to nature, or to its components.

The value of the fauna of the Szigetköz

According to the faunistic research carried out in past years the most characteristic values of the fauna of the Szigetköz are (Mészáros & Báldi 1992):

1. high species richness,
2. special associations of species,
3. high degree of special mosaicity.

The exerted effects on the biota by the diversion of the Danube can be detected only by a long-term ecological research (Kovácsné Láng & Fekete 1995). For this reason the evaluation of the change in the fauna - under the short period of time - is fairly uncertain. This uncertainty is further increased by the following:

- the zoological evaluation of the Szigetköz was completed only in 1992. Hence we already know which species occur in the region from among those presumed to be important on the basis of certain considerations,
- quantitative studies have not been carried out, and also quantitative estimations are missing,
- the animal population - with the exception of disastrous events - usually react to even drastic environmental effects not with extinction, but with the gradual change of population parameters (e.g. abundance, reproduction rate, migration).

Under the present controversial circumstances it must be accepted that

- any kind of natural diversity is valuable,

- every kind of human action threatening or decreasing the diversity is harmful, and hence the issuing degradation must be taken as a damage.

The changes of the fauna after the diversion of the Danube

The effects exerted on the fauna since the diversion of the Danube, at the end of October 1992, can be divided into two time periods.

1. The prompt and drastic effect directly after the diversion (from the end of October 1992 till the beginning of the reproductive season of 1993).

It was the aquatic fauna, which suffered most. The details, at least in the case of the fish fauna, are well known. As a consequence of the diversion the habitat of fishes was reduced by approximately 50 percent. The direct loss of fish is estimated to be 200 tons. This figure does not contain the loss in reproductive output, its value, and other biological damages. Some additional data: according to our estimation 50 % of the bigger mussels completely vanished (*Unio spp.*, *Anodonta spp.*). Probably 70-80 % of the so-called small mussels (*Pisidium spp.*, *Dreissena spp.*) perished. The effect on the terrestrial fauna could not be appreciated owing to the timing of the diversion (the end of October). Otherwise this effect is indirect, and hence can be detected over a longer period of time.

2. The changes detected after a longer period of time

The fauna of the Szigetköz will mainly be affected by the longterm effects, which process must be monitored on a long-term basis. The already completed research is suitable only for a momentary description of the present status being a transitional phase of a protracted - maybe several decade long - biological process. If we exclude the theoretically possible antropogenic effects, the main limiting factor of the aquatic organisms is the surface water with its physical parameters, while the same of the terrestrial organisms is the ground water. These limiting factors closely interwire (e.g. floods).

We forecasted two basic changes in the fauna of the Szigetköz (Mészáros, Ronkay & Vojnits, 1994):

- an increase in species diversity as a consequence of the invasion of mezophil fauna, followed by a decrease issued from emigration and the extinction of special fauna elements.

- unpredictable fauna migration will begin among the Upper -, and

Lower - Szigetköz and the neighbouring areas.

From the results of the 1994 zoological monitoring the above mentioned trends are more than apparent (Mészáros, 1994).

1. Extinction and disappearance of species

From the animal taxa, involved in our research, probably very few species became extinct in the Szigetköz, but some new species appeared, which were not recorded before.

It is a very difficult question to judge whether the disappearance of a species by its habitat is a reversible or an irreversible process, and also whether the detection of new species could be attributed to the unsuitability of earlier research projects. It is very probable that the number of species have not yet changed considerably since the diversion, maybe the number of registered species has increased. It must be borned in mind that if we cannot observe or find a given animal species or taxa at a given time, it can be attributed to different reasons (so it is not sure that the given taxon has become extinct), of course, if we find it, that is a fact. There is no doubt that the molluscan species of the temporary ponds, channels and ditches became extinct, where the water disappeared completely since the diversion. All the aquatic molluscan species have become extinct, which were formerly living in the Kálnoki-channel, in the side- branches of the Zsejke-channel, in the smaller channels between Dunaremete and Lipót, in the ditches of the islands of the flood plain above Dunaremete. Between Ásványráró and Duanremete the meadow and willow bog mosaics dried out, and also the shallow lake near the gravel-pit lake between Lipót and Duanremete. On the stretch between the 1850-1848 river km of the main Danube not a single living molluscan specimen was found. From the Öreg-Duna, no living or lately perished specimen of *Theodoxus (Th.) danubialis*, *Fagotia acicularis*, and *Unio crassus* was recovered. The former two species were inhabiting the bank barrier basalt fillings and on the not rolled, stable bottom stones. Between the points where the Danube crosses the border of Hungary and Ásványráró their habitat completely disappeared. The abundance of *Unio crassus* was very low even before the diversion, and the mitigation of its habitat might have decrease its number under the critical minimum viable population size.

With the disappearance of *Stratiotes aloides* from the Lipóti-dead arm, two Odonata species: *Aeshna viridis* and *Leucorrhinia pectoralis*, listed in the Bern Convention, also became extinct. Another Odonata species *Coenagrion ornatum* disappeared from the region of Lipót and from the Zsejkei-channel. At the same time in the channels presently filled with water: for example in Zsejkei- channel, Gazfői-Duna, Nováki-channel almost all the species were recorded, which were formerly living in the area covered with water.

2. Fauna changes in the flood plain and at certain points outside the dikes (reedbeds)

a.) Species number and abundance decrease and/or increase. Between the 1840 and 1801 river km 21 molluscan species were found. This is approximately half of the riverine fauna. The average species number per kilometre value decrease upstream:

1801-1810	7.9	127.9	items per collection
1811-1820	6.4	79.0	items per collection
1821-1830	4.0	80.1	items per collection
1831-1840	3.1	49.1	items per collection

Due to encountered sampling difficulties the collected number of specimens (items per collection) is not easy to analyse, since the data were very scattered. Nevertheless its trend correlates with that of the species number decline (see above). In the Upper and Middle-Szigetköz we did not find Dobsonfly species (Megaloptera). At least 4- 5 Ephemeroptera species disappeared from most of the side-branches having connection with the main-channel. From the riverine forest preferring, but not aquatic Neuropterans three have disappeared from the majority of flood plain willow stands since 1993. The decrease in water level in the side-branches causes an increase in the number of Sisyridae. The Trichoptera assemblages, rich in species, of the Mosoni-Duna are still present, but *Hydropsyche angustipennis*, a characteristic eurytopic species of moderately polluted waters, appeared at several sampling sites, where it was not recorded formerly. The abundance and species number of the reed-associated lepidopterans was considerably low, compared to former inventories. In the Lower-Szigetköz several characteristic species of the sand-steppe associations were found in high numbers. Usually the abundance and species number of the reed-associated lepidopterans does not decline even in severe drought, provided the water supply of the area is appropriate. In the desiccated former river-bed the proportion of xerophilous, or drought tolerating beetle species was 38 %, while none of these species occurs in the samples collected at the sample sites located in the wet willow stands, where proportion of the hygrophilous species was 68 % (Figs 1-2).

b.) Changes in the species composition; appearance of drought tolerating or xerophilous species in higher number and abundance, decrease of abundance and number of aquatic and semiaquatic species. Warmth preferring and xerophilous Neuropterans appeared in the flood plain habitats (*Hypochrysa elegans*, *Myrmeleon inconspicuus*). Characteristic hard-wood riparian forest Neuropterans (*Xanthostigma xanthostigma*, *Hemerobius micans*) were also collected in the flood plain. Several faunistically important and valuable species were recorded in the Scirpo-Phragmitetum austro-orientale and Calamagrostis-Salicetum cinereae complex outside the dikes (e.g. *Eulithis testata*, *Graphipora augur*, *Xestia sexistrigata*, *Diachrysia zosimi*). Several of these are

Palearctic species of wide distribution, closely associated with plant communities of the intermediate zone of continental broad-leaved forest and steppes, rich in herbaceous layer. In Hungary these species occur in very few localities, while in North, North-western Europe and in the Eastern part of the Palearctic they are found in higher numbers. Their appearance and discovery within a year cannot be accidental. The profound change in the water-regime could be detected through the population structure change of waterfrogs. In 1994 and 1993 the ratio of *Rana lessonae* and *R. esculenta* was approximately equal. If we compare it to the state recorded in 1989-1991, we can see that the ratio of *R. esculenta* significantly increased. The spring water-regime is a very influential factor in sustaining the E-L population structure. The lack of spring (April-May) floods and the continuous low water-level during this period will cause on the long run the decrease of water frogs, and the increase of the ratio of *R. esculenta* (Figure 3).

3. Internal migration increase

The specimens of some Lepidoptera species - mainly the members of the least mobile characteristic wetland-meadow species, which are usually restricted to their habitats - were detected far from their characteristic habitats in the middle of summer. This local migration might signal the change of the habitats of the Szigetköz. Usually these extraordinary migration patterns are the signs of environmental disturbances, and these are aimed at discovering new, potentially suitable habitats.

4. Changes of the fish fauna

Nearly 50 % of the so-called Szigetköz fish nursery that played an important role in the reproduction of the fish fauna, have partly been damaged or disappeared (Bertalan, 1994). Fishery experts found 53 such nurseries in the whole of the Szigetköz by. In 1993-94 we found 16 inappropriate spawning sites. The former spawning sites, situated in the big branches near the main-branch in the Upper- and Middle-Szigetköz, are at the present either absolutely dry, or their water-regime is uncertain, and hence their fish production is weak. Neither is the spawning of fish undisturbed in the Lower- Szigetköz. The water fed into the main-channel causes unpredictable water-level changes over a considerably large area. As the fish turn back and forth several times, they reach their spawning sites too late. In the Mosoni-Danube more successful spawnings were observed than in former times. The artificial water recharge brought about new spawningsites. Any amount of extra water recharge fed into the main-channel, and hence also into the Szigetköz, gives the fish fauna of the region a better chance of survival. The quantitative analyses of the 1994 fish harvest is not yet available. But it is a well-known fact that 20 percent less fish were caught in 1993 from the remaining waterbodies of the Szigetköz than in 1992. According to the preliminary results the loss of the fishharvest was less than it was expected on the bases of the loss of fish caused by the diversion.

5. Places where no detectable faunal change was recorded

Partly as a consequence of the artificial water recharge there was no detectable aquatic or semiaquatic faunal change at the following places: the Mosoni-Danube, the channels outside the dikes, and the waterbodies affected by them. At some places the population even became stronger.

The effects of artificial water recharge on the fauna of the flood plains. The zoological evaluation of the effects of the water recharge system in 1994 is hopeless, especially owing to its late installation. It is highly probable that the previous ecological parameters of the flood plain cannot be restored with water recharge alone. Its function can be only the reduction of the caused damages in the case of some taxa. Its effectiveness is only of local importance, and is also highly dependent on the given taxa (its life style, ecological requirements and development form). We would like to draw attention to the fact that the hygrophilous oribatid species were either not found (*Hydrozetes parisiensis*, *Heterozetes palustris*), or their abundance was lower in the soil samples collected along the shoreline in the vicinity of the water recharge system, operated at Kisbodak. Possibly the water movement in the soil from the open water of the channels towards their surroundings is very limited.

Summary

The main findings of the 1994 zoological monitoring can be summarized in the following points:

1. some kind of change was detected in all the studied zootaxa;
2. the nature of these changes is different from any former ones; 3. the trends of biodiversity changes can be categorised negative compared to the state prior the diversion of the Danube.

It is justified to ask, how threatened the fauna of the Szigetköz is at its present state, should we expect an ecological disaster? The word disaster reminds us the well-known natural disasters. As we did not - except for a short period of time, right after the diversion - experience anything of that kind, the disaster is apparently a baseless threat. The disaster is when a new fauna is formed with different characteristic fauna elements, where the formerly present flora and fauna elements and associations are missing, of which the Szigetköz owed its biological uniqueness.

The data presented in this study are the results of the zoological monitoring of the Szigetköz. The participants of the research were:

Dr. Ambrus, András, Dr. Bankovics, Attila, Dr. Báldi, András, Bánkuti, Károly, Dr. Forró, László, Fuisz, Tibor, Gubányi, András, Horváth, Gyula János, Kisbenedek, Tibor, Kovács, Tibor, Dr. Mahunka, Sándor, Dr. Majoros, Gábor, Dr. Merkl, Ottó, Dr. Mészáros, Ferenc, Dr. Moskát, Csaba, Peregovits, László, Dr. Ronkay, László, Dr. Szél, Győző, Dr. Sziráki, György, Dr. Uherkovich, Akos, Vida, Antal, Zágon, András.

Literature

Bertalan, O. (1995) Halfauna monitorozás. Győr. 7 old. Kézirat. (Monitoring of the fish fauna. Manuscript)

Juhász-Nagy, P. (1993) Az eltűnő sokféleség. Scientia Kiadó, Budapest, 147 old. (Disappearing diversity)

Juhász-Nagy, P. & Zsolnai, L. (1991) Humánökológia. ELTE, Budapest, 108 old. (Humanecology)

Kovácsné Láng, E. & Fekete, G. (1995) Miért kellenek hosszú távú ökológiai kutatások? Magyar Tudomány XL/4, 377-392. (Why are long-term ecological monitorings necessary?)

Mészáros, F. (ed.) (1994) Jelentés a Szigetköz 1994-es zoológiai monitoringjáról. Budapest. 179 old. Kézirat. (Report on the 1994 zoological monitoring of the Szigetköz. Manuscript)

Mészáros, F. & Báldi, A. (ed.) (1992) A tervezett Fertő-tavi - Hansági - és Szigetközi Nemzeti Park botanikai és zoológiai állapotfelmérése és javasolt övezeti rendszere. I. Szigetköz. Budapest, 325 old. Kézirat. The botanical and zoological assessment of the planned Fertő - Hanság - Szigetköz National Park and its recommended zonation.

Mészáros, F. - Ronkay, L. & Vojnits, A.. (1994) The Nature Protection Aspects of the Gabčíkovo - Nagymaros Project. In: Environmental Risks and Impact Associated with the Gabčíkovo - Nagymaros Project. Budapest, 141-167. Kézirat.

Legends to the figures:

1. Figure 1. Proportion of Carabid beetles in the dry bed of the main-channel according to their drought-tolerance. (Dunakiliti) (drought tolerating and xerophilous species; neutral species; sylvicolous and hygrophilous species, littoral and hygrophilous species).

2. Figure 2. Proportion of Carabid beetles in the willow forests according to their drought-tolerance. (Ásványráró, Kisbodak) (drought tolerating and xerophilous species; neutral species; sylvicolous and hygrophilous species; littoral and hygrophilous species).

3. Figure 3. The change of the population structure of *Rana* sp. through the years with different watersupply.