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THE ANTHROPOGENIC PRESSURE AND THE BIODIVERSITY IN THE NORTHWESTERN PART OF ROMANIA

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ABSTRACT. The anthropogenic pressure and the pollution with its specific forms from the North-western part of Romania and their consequences on their vegetation and fauna, the biodiversity of the area. The most significant forms of pollution from the researched area were pointed out: the clearings, the drainage of the swamp areas, the eutrophication phenomena, the entrance of some foreign invasive species, phenomena that reduced the fauna biodiversity at a half compared to the neighbouring regions. A series of measures of protection and conservation of the natural heritage and ecological rehabilitation of the area are mentioned.

Keywords: anthropogenic pressure, pollution, biodiversity

INTRODUCTION

Over the last two decades, the community of biologists from the Satu Mare branch of „Vasile Goldiş" Western University of Arad realized ample and systematic researches on the flora, the vegetation, the fauna and the environment protection in the North-western part of Romania, closed with 12 monographical studies out of which 2 were distinguished with prizes of the Romanian Academy (Emanoil Teodorescu prize – C. Karácsony, 1995; „Grigore Antipa" prize – G. Ardelean and I. Beres, 2000). At these, scores of scientific articles that appeared in prestigious magazines in the country and abroad as well as numerous quotations from great personalities of the scientific life from the biology domain add. For these reasons, the late academician Nicolae Boşcaiu stated at a Summer School of the Biology Institute of the Romanian Academy organized at Satu Mare that Maramureş and Satu Mare are probably the best researched regions from the biodiversity point of view.

As a result, we are able to approach with documents the essential aspects of the anthropogenic pressure from the area and especially its pollution effects on the natural ecosystems, on the basis of a prodigious terrain activity in which almost 40 researchers were engaged.

MATERIALS AND METHODS

In the present study, the research material consists in the analysis of the animal biodiversity from the North-western part Romania.

The research materials consisted in:
- the study in the terrain of the fauna of the area;
- the research of the scientific works that approached these theme in the researched area;
- the recording of some significant images regarding the pollution of the area;
- the selection of the most significant pieces of information for the area out of the multitude of pieces of information;
- compared study of the biodiversity from different areas of the North-western part of Romania.
- the formulation of some measures to assure the protection and the conservation of the natural heritage from the area.

RESULTS AND DICUSSIONS

The anthropogenic pressure exerts itself with intensity in the North-western part of Romania and especially in its basin areas, where the mine basin of Baia Mare registers the most dramatic effects on the lothic system of Someş River and its tributaries. But, the consequences on the biodiversity of the area has the fingerprint of the existing habitats (Ardelean, 2011).

The volcanic mountain area. The anthropogenic pressure exerts itself mainly through: silvan exploitation, over-pasturage and the extraction of non-ferrous minerals.

The silvan exploitations diminished alarmingly the surfaces covered with broadleaf forests, favoured the attacks of insects and the extension of the erosion phenomenon and the sawdust resulted from the saws endangers the fishes' and the invertebrates' life from the water, aspects noticed especially in Oaşului Mountains.

The over-pasture and the extension of the agricultural cultures diminished the surfaces occupied by natural habitats at under 10% in the Oaş and Baia Mare Basins.

The mining from Baia Mare, Turţ, Ilba, Cavnic, Baia Sprie and so on and so forth reduced the surface of the forests and deformed the landscape with the dumps, it polluted Someş, Lăpuş, Săsar, Turţ and Firiza with mine waters loaded with heavy metals and muck of floatation full with cyanides that damaged the aquatic ecosystems even to the disappearance of life in the vicinity of the source of pollution.

The barrier lakes from Firiza and Călineşti Oaş, resulted in the back of some dams over rivers strangled the circulation and other aquatic animals over the water-courses.

The basin and hill areas. Here, the anthropogenic pressure, found at maximum quotas, exerts itself through: the activity of the floatations and the

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development of the industry that produces non-ferrous, especially at Baia Mare, that pollutes through waste waters and sterile, floatation muds, inclines of unorganized wastes; the exploitation of the sand and river ballast through quarries at Seini, Ilba, Merişor, Lăpuşel and so on and so forth; the commune waters and the debris from the zootechnical farms load the natural emissaries with high quantities of organic substances, intensifying the process of water eutrophication.

The plain areas. They are represented through the northern sector of the West Plain (Someş Plain) where the anthropogenic pressure manifests itself in multiple forms, reducing alarmingly the biodiversity of the area. 85 % of the wet habitats from the area were destroyed through the drainage of the swampy areas, especially on Crasna and Ier and Ecedului Swamp and a series of valuable fodder species disappear from the mesophile pastures through over-pasture like those from the group Trifolium. The last bodies of forests disappear because of clearances, especially those from the terraces of the rivers, and the brushes tail away, so that the surface with forests reduced itself at under 1 %. The drainage channels decrease the underground water under the horizon of the roots of the plants encouraging the instalment of the aridity and the vegetation becoming rude, a phenomenon noticed especially in Ier's Valley. The phenomenon of secondary salinization installed itself and extended in many places, the area Căuaş-Ghenci from Ier's Valley, also due to the works of drainage of the swampy areas, which led to the thinning and disappearance of vegetation from many surfaces and to the installation of some associations with arid character like *Achilleo-Festucetum pseudovinae*. Also, the anthropogenic ecosystems extend by the rendering of new terrains to agriculture, whereas big surfaces of lowland from Eced Swamp, Ier and Crasna rivers are abandoned, being almost arid.

The inferior courses of the rivers are eutrophicated excessively through the extension of the algae Chara and Spyrogira, the accumulation of nitrates and phosphates. The unilateral increase of the phytoplankton compromises the capacity of self-purification mechanisms of the rivers of the area. All in all, many barrier lakes that reduce the debits of the plain rivers at minimum, with all the consequences produced by the installation of drought, were set up as those from Domăneşti, Andrid, Sălacea, Săcuieni, Diosig

The waters of the area. Săsar. It is polluted, downstream from EM Baia Sprie, on a length of 16 kilometers due to the heavy metals found in high concentrations and the frequent fluctuations of pH between acidic and alkaline. This severe pollution determined the total disappearance of the benthonic organisms, and the number of plankton species reduced itself to a number of bacteria as *Beggiatoa, Zooglaea, Thiothrix* that indicate a high quantity of organic substance in the river.

Lăpuş. It is polluted in a similar way by the mining activity from the area, but, unlike Săsar, the blue algae like *Oscillatoria* and diatoms like *Navicula, Synedra, Hantzschia, Nitzschia* appear here in plankton association.

Someş. It becomes more polluted after the inflow of Lăpuş, loaded with mine waters, floatation, waste water from the economic agents from Baia Mare. The biocenoses are dominated only by diatoms like *Navicula, Synedra, Frustulia* and so on and so forth but some green algae are also present. The aquatic animals afferent to the moss from the boulders of the channel, the scallops and the ephemeropterous larvae are almost inexistent in the river. The content of mineral nitrogen from the water is increased and the quantity of phosphate is sometimes too high, favouring the water flowering. The most significant aspect of the water pollution is the presence of the heavy metals way over the maximum admitted quota which increases the content of algae from the water and decreases considerably the quantity of zooplankton. It results that the pollution threatens the communities of vegetals and animals from the study of the phytoplankton of Someş river but, for the moment, the damages are not irreversible, a reconstruction of its lothic system being possible. We notice the inferior course of Someş river offers a weathered landscape and a precarious ecologic equilibrium by correlating the quality of the water of Someş river with the characteristics of the flora and vegetation and the fauna that accompanies the river.

Tur. It has clean water until the affluence of Tur brook that brings mine waters loaded with heavy metals, and downstream from Turulung it also absorbs the waste waters of some big rural localities. The fishes are missing completely from Tur, as well as from Turţ downstream from the Turţ affluence, on a length of almost 1 kilometer.

Şar, Crasna, Homorod and Ier rivers. They are muddy rivers in the inferior course from the area, loaded with organic substances that came from waste waters and from the debris from the zootechnical complexes from the area, ample processes of eutrophication and an inadequate oxygen regime being visible. Here, the plankton is represented by species of blue algae, diatoms, chlorophyta, bacteria and the ciliates from the invertebrates.

Barcău river. It has a special pollution, determined by the crossing of an area of exploitation and the refinery of crude-oil (the sector Suplac-Marghita). Life is almost inexistent in the river especially downstream from the refinery from Suplac, on around 2-3 kilometers, a situation equivalent to ecological catastophe.

The plain lakes. They are rich in organic substances and nitrates and they have a very advanced process of flowering that diminishes the development of the populations specific to the zooplancton from the area. The fish fauna is represented by stagnophile species but, everywhere, it is dominated by species of intrusive and expansive fish, first of all by the gold fish

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(Carassius auratus) that eliminated from the competition very valuable autochtonous species like the small fry caruda.

An ample interdisciplinary study was made by D.I. Ardelean (2013) regarding the relation between the water, mud, fish fauna and fish as food quality on the rivers Tur (affected by heavy metals) and Barcău (affected by petroleum products) that offers us a series of examples regarding the effects of the anthropogenic pressure on the aquatic biodiversity (the simplification of the qualitative structure of the fish fauna and the diminishing of the fish fund). Also a recent study by D.I. Ardelean (2013) about the environment economy and accountancy mentions a series of ways through which the natural heritage can be protected and conserved through the introduction of some more severe regulations in the handling of the environment products, like the „payment" of the services that the environment offers us. We can not omit, also, the same author's work (D.I. Ardelean 2011) regarding the ecological reconstruction of Ier's Valley that shows us ways through which we can assure the conservation of the biodiversity and durable development.

Two works are very important in the evaluation of the animal biodiversity (Ardelean, 2012; Ardelean and Beres, 2011) consacrated to the establisment of the index of the species of animals from the area, the first for Satu Mare County and the second for Maramureş County. The effects of the anthropogenic pressure, of the pollution on the animal biodiversity can be expressed by the number of species identified in the area: Satu Mare has 5206 species of animals compared to Maramureş Basin that has 8530 species of animals although it has only half the surface. The weak animal biodiversity from the Northwestern region of Romania is the consequence of an anthropogenic pressure, a more severe pollution and especially of the destruction of habitats offered by the ample mud areas from once.

CONCLUSIONS

The anthropogenic pressure is great in the entire Northwestern region of Romania and the pollution is almost generalized, having, though, particularities from one area to another.

The most affected zones by the pollution are the plains where ample surfaces of swamps were drained as those from Ier and Ecedului Plain.

The industrial pollution is severe in the Baia Mare Basin where the mining affects the scenery, the forests and especially the water-courses in which the mine and floatation waters filled with heavy metals and cyanides discharge.

The clearances reduced alarmingly the broadleaf forests in the mountain areas, and especially in Oaşului Mountains, a phenomenon that encouraged the accelerated extension of the erosion phenomenon.

The extended saltings from Ier Valley and Crasna Valley, as a result of the drainage of the swampy areas, modified and reduced drastically the flora and vegetation of the area.

Invasive autochthonous species of fish like the gold fish (*Carassius auratus*) that eliminated from the competition the small fry (*Carassius carassius*) were introduced in most of the dead-waters of the area.

The animal biodiversity is highly diminished by the anthropogenic pressure and the pollution in the Northwestern part of the country compared to the neighboring areas (Maramureş and Sălaj), representing approximately 50% compared to the surrounding.

Ample projects of environment investments for the ecological reconstruction are necessary to conserve the natural heritage of the area.

REFERENCES

Ardelean D.I. (2011) – Financial implications of the ecological reconstruction of Ier's Valley, "Vasile Goldiş" University Press, Arad

Ardelean D.I. (2013) – Effects of the anthropogenic impact on the quality of water, ichtiofauna and fish (as food) on the rivers Tur and Barcău (the northwestern region of Romania), PhD Thesis

Ardelean D.I. (2013) – The environment economy and accountancy, "Vasile Goldiş" University Press, Arad

Ardelean G. (2011) – The vertebrata fauna of the northwestern region of Romania, "Vasile Goldiş" University Press, Arad

Ardelean G. (2012) – The catalogue of the species of animals from Satu Mare County (Oaş, Codru, Someş), "Vasile Goldiş" University Press, Arad

Ardelean G., Beres I. (2000) – The vertebrata fauna of Maramureş, Dacia Publishing House, Cluj Napoca

Ardelean G., Beres I. (2011) – The index of the species of vertebrata and invertebrate from Baia Mare Basin and the bordering areas, "Vasile Goldiş" University Press, Arad

Karacsony C. (1995) - The flora and the vegetation of Satu Mare county, The Publishing House of the Satu Mare Museum, Satu Mare

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Fig. 1. Mining polluted area North of Baia Mare

Fig. 2 Secondary salt mine at Căuaş on Ier's Plain

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Fig. 3 Ier channeled and euthrophicated at Vezendiu

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