Conservationally important macrophytes in the Bulgarian stretch of the Danube river and the near water bodies

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Introduction

In the course of several projects (Multifunctional Integrated Study Danube / Corridor and Catchment (MIDCC), Developing an electronic database of the macrophytes in Bulgaria, Red Lists of Bulgarian Vascular Plants and Fungi project, and Red Data Book of Bulgaria (new edition project), the macrophytes were studied in the Bulgarian stretch of Danube river and the near water bodies. Nine conservationally important species were found (*Euphorbia lucida* Waldst. & Kit., *Lemna gibba* L., *Marsilea quadrifolia* L., *Nymphaea alba* L., *Nymphoides peltata* (S.G. Gmel.) Kuntze, *Salvinia natans* (L.) All., *Thelypteris palustris* Schott, *Trapa natans* L., *Utricularia vulgaris* L.), which are the subject of this paper.

Methods

Field survey methods were applied in the period 2002 − 2005. For the inventarization of the plant species a boat, rake and long waders were used. The plants were photographed in the field, and samples for the herbarium SOM were collected. As a taxonomic basis the Field Guide to the Vascular Plants in Bulgaria (KOZHUHAROV 1992) was used.

The conservation status is according to the Red Lists of Bulgarian Vascular Plants and Fungi project, which followed the IUCN assessment criteria (IUCN 2001). Bern Convention (CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS 1979), EC Habitats Directive (DIRECTIVE 92/43/EEC ON THE CONSERVATION OF NATURAL HABITATS AND OF WILD FAUNA AND FLORA 1992), and the Bulgarian Biodiversity Protection Law (BIODIVERSITY PROTECTION LAW OF BULGARIA 2002) are also used.

Results

During the field surveys of Danube river and the near water bodies total number of 105 macrophytes were found, of which nine are with high conservation value (shown in Table 1). All of them are in the Red List of Bulgarian Vascular Plants having the following categories: one Critically Endangered **(**CR**)**, four Endangered **(**EN**)**, three Vulnerable **(**VU**)**, and one Near Threatened (NT) species. One species is protected by EC Habitats Directive, seven species are protected by the Bulgarian Biodiversity Protection Low (Appendix 3), and three species are in Bern Convention. Literary sources mentione other conservationally important macrophytes (see for example PETROVA & VELEV 1998), but in our studies they were not found. The order of the species in the tables follows their conservation value from high to low.

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Table 1. Macrophytes and their conservation status

Species	Family	Red List of Bulgarian Vascular Plants	Directive 92/43/EEC	Bulgarian Biodiversity Protection Law	Bern Convention
Marsilea quadrifolia L.	*Marsileaceae*	CR	+	+	+
Nymphaea alba L.	*Nymphaeaceae*	EN		+	
Nymphoides peltata (S.G.Gmel.) Kuntze	*Menyanthaceae*	EN		+	
Euphorbia lucida Waldst. & Kit.	*Euphorbiaceae*	EN		+	
Trapa natans L.	*Trapaceae*	EN		+	+
Salvinia natans (L.) All.	*Salviniaceae*	VU		+	+
Thelypteris palustris Schott	*Thelypteridaceae*	VU		+	
Utricularia vulgaris L.	*Lentibulariaceae*	VU			
Lemna gibba L.	*Lemnaceae*	NT			

Tables 2-6 (one for each water body) represent the current status of the species populations, the habitats where they were found, and the potential threats on them together with the conservation measures taken till now. Figures 1-5 show typical views of the water bodies.

Table 2. Macrophyte species in Danube river

Species	Population	Habitat	Threats	Conservation
Trapa natans	single individuals at long distance from each other in a single locality	short branch of the main river channel, stagnant water	habitats degradation, drought, floods	none
Salvinia natans	groups of individuals on several spots in two localities	short branch of the main river channel, stagnant water	habitats degradation, drought, floods	none

Fig. 1. Small river channel of Danube

Fig. 2. Srebarna lake

Fig. 3. Lake Malak Preslavets

Fig. 4. Marsh Garvan

Table 3. Macrophyte species in Srebarna lake

Species	Population	Habitat	Threats	Conservation
Nymphaea alba	groups of individuals on several spots	natural eutrophic lake	drought, changes in the regimes of use and protection	biosphere reserve
Nymphoides peltata	groups of individuals on several spots	natural eutrophic lake	drought, changes in the regimes of use and protection, overgrowth by Typha and Phragmites	biosphere reserve
Salvinia natans	groups of individuals almost everywhere in the periphery of the lake	natural eutrophic lake	drought, changes in the regimes of use and protection, overgrowth by Typha and Phragmites	biosphere reserve
Thelypteris palustris	dense groups of individuals on the floating mats in the lake	natural eutrophic lake	drought, changes in the regimes of use and protection	biosphere reserve
Utricularia vulgaris	small groups of individuals almost everywhere in the lake	natural eutrophic lake	drought, changes in the regimes of use and protection	biosphere reserve
Lemna gibba	groups of individuals on several spots	natural eutrophic lake	drought, changes in the regimes of use and protection	biosphere reserve

Table 4. Macrophyte species in lake Malak Preslavets

Species	Population	Habitat	Threats	Conservation
Nymphaea alba	dense groups of individuals covering large areas of the lake surface	artificial eutrophic lake	drought, changes in the regimes of use and protection, water tourism	protected area

Table 5. Macrophyte species in marsh Garvan

Species	Population	Habitat	Threats	Conservation
Nymphaea alba	small group of individuals	marsh	drought, changes in the regimes of use and protection	protected area
Nymphoides peltata	single individuals at long distance from each other	marsh	drought, changes in the regimes of use and protection	protected area
Salvinia natans	small groups of individuals on several spots	marsh	drought, changes in the regimes of use and protection	protected area

Fig. 5. Brashlen-Kalimok reservoirs

Fig. 6. *Marsilea quadrifolia*

Figures 6-10 show images of the studied macrophyte species in their natural habitats.

Fig. 7. *Trapa natans* in Danube near Belene

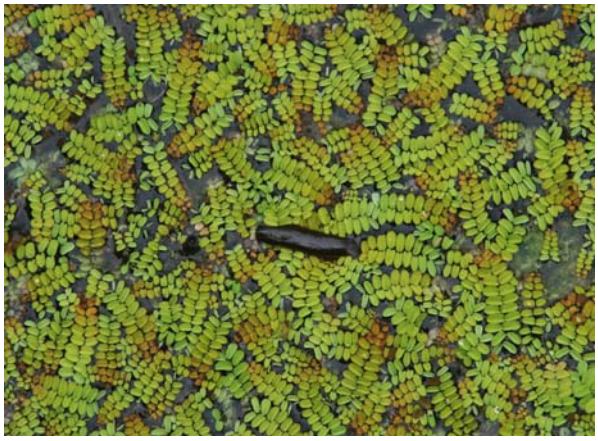

Fig. 8. *Salvinia natans* in Brashlen-Kalimok

Fig. 9. *Thelipteris palustris* in Srebarna lake

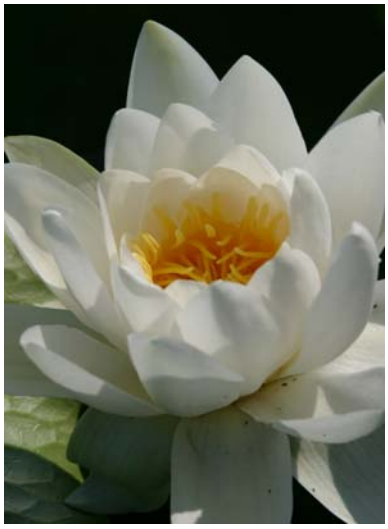

Fig. 10. *Nymphaea alba* in Srebarna lake

Table 6. Macrophyte species in Brashlen-Kalimok reservoirs

Species	Population	Habitat	Threats	Conservation
Marsilea quadrifolia	small group of individuals	group of artificial reservoirs	drought, overgrowth by herbal species, changes in the regimes of use and protection	protected area
Nymphoides peltata	small groups of individuals	group of artificial reservoirs	drought, changes in the regimes of use and protection	protected area
Euphorbia lucida	single individuals at long distance from each other	alluvial meadows of river valleys	drought, changes in the regimes of use and protection	protected area
Salvinia natans	dense groups of individuals covering large areas on several spots of the reservoirs	group of artificial reservoirs	drought, changes in the regimes of use and protection	protected area
Lemna gibba	dense groups of individuals covering large areas on several spots of the reservoirs	group of artificial reservoirs	drought, changes in the regimes of use and protection	protected area

Discussion

This study could be regarded as a snapshot of the current population status of the conservationally important aquatic macrophytes. It cannot give trends of their population development because is conducted in relatively short period (four years) and the results could not be compared because of lack of early population studies.

The situated very near the Danube river inland water bodies Srebarna, Malak Preslavets, Garvan, and Brashlen-Kalimok are one of the most interesting areas from biodiversity protection point of view. Srebarna is recognized by UNESCO as a biosphere reserve. Malak Preslavets, Garvan and Brashlen-Kalimok have status of natural protected areas. They are important bird and plant areas and are the last survived natural wetlands after the desiccation campaign in the mid-fifties of the twentieth century in Bulgaria. The contemporary level of protection of the nine conservationally important macrophytes is relatively good. Their habitats are included in protected areas, but attention should be paid to the strict adhering to the rules of use and protection.

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