



A STUDY OF FRESHWATER POND TAXA *MARSILEA QUADRIFOLIA* & *SALVINIA NATANS* IN KOLKHETI LOWLAND BLACK SEA COASTLINE

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ABSTRACT

In recent years, degradation of freshwater ponds, an important habitat of biodiversity, caused by the anthropogenic factors, has prompted scientists from the Mediterranean countries to evaluate freshwater ponds by the IUCN Red List as threatened ecosystem [1,2]. In 2015 IUCN Red List officially gave the freshwater ponds of the Mediterranean Sea coastal area global status [1,2]. The aim of the paper is to study freshwater species: *Marsilea quadrifolia* and *Salvinia natans*. The subject of the present study was freshwater ponds of Nature 2000 and Emerald Network coastal zone with predominance of *Salvinia natans* and protected by the EUNIS system and Bern Convention from Sarfi to Anaklia.

Methodology: During the study a transect method was used; special attention was paid to the habitat type, its ecological state, plant covering density (in %), composition of species and their quantity.

Results: Freshwater ponds of the Kolkheti costal area are valuable for being an important habitat for IUCN Red List species: *Salvinia natans* (LC) and *Marsilea quadrifolia* (LC). But these habitats and, respectively, plant species are affected by the greatest anthropogenic factors such as implementation infrastructural projects (seaports, terminals) causing their degradation and disappearance.

Discussion and Conclusion: In the article spreading of the habitats of *Salvinia natans* and *Marsilea quadrifolia* and threats are determined; recommendations for *in-situ* & *ex-situ* conservation of habitats and plant species are given.

Key Words: Kolkheti, Freshwater ponds, *Marsilea quadrifolia*, *Salvinia natans*, Conservation

INTRODUCTION

Natural freshwater ponds cover only 1% of the planet; they are distinguished with biodiversity and present one of the important ecosystems being under threat. In recent years, degradation of freshwater ponds, an important habitat of biodiversity, caused by the anthropogenic factors, has prompted scientists from the Mediterranean countries to evaluate freshwater ponds by the IUCN Red List as threatened ecosystems. In 2015 IUCN Red List officially gave the freshwater ponds of the Mediterranean Sea coastal area global status [1,2].

After the natural freshwater ponds were officially recognized by IUCN, donors and private companies took upon themselves an obligation and responsibility to help preservation of the habitats and protect it from any negative influences.

This will provide a possibility to create protected territories of a new type. It would be reasonable to create a database and spreading maps [1,2,3]. Freshwater ponds of the Kolkheti coastal area are valuable for being an important habitat for IUCN Red List species: *Salvinia natans*, *Marsilea quadrifolia*. Both species are evaluated as of Least Concern (LC) category. This category includes widespread and large taxa and notes that they are not qualified as threatened groups.

Subject of the Study

Materials and Methods

The subject of the study was protected by Nature 2000, Emerald Network and Bern Convention freshwater ponds and living there indicator species *Salvinia natans*, *Marsilea*

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quadrifolia. By the definition, a freshwater pond is a depression in the ground with greenish and brownish clear water, where pH=5-6.

Habitats and density of plant cover were studied by the method DAFOR, where D means dominant species, A - Abundant, F - Frequent, O - Occasional, R - Rare. (www.Halcrow, www.TACIS, www.ICWS). For plant description a transect method was used. Transect is a straight line running across the given habitat for the purpose of studying its plant communities. During phytocenosis study of the given habitat a square method was used on every 50 m space along the transect line. The squares were 4x4 m² in parameters. For obtaining more detailed data the Domin-Krajina method was also used [1-4]. During the study special attention was paid to the habitat type, its ecological state, plant covering density (in %), composition of species and their quantity, and vitality of single species. The main guideline for field investigations was ecology of dry land plants [1-9].

RESULTS

Marsilea quadrifolia is a subject protected by Bern Convention and EUNIS agreement of European Union. The pond with *Marsilea quadrifolia* was destroyed during the construction of a new boulevard and infrastructure systems.

At present, the only habitat of *Marsilea quadrifolia* in Kolkheti, is a pond near the Tskaltsminda river and village Kvavilnari, close to a coastal dune.

Table 1: Plant communities of *Marsilea quadrifolia*

	Species	DDomin
1	<i>Phragmites australis</i>	3
2	<i>Paspalum paspaloides</i>	2
3	<i>Veronica baccabunga</i>	2
4	<i>Sagittaria sagitiifolia</i>	2
5	<i>Potamogeton crispus</i>	4
6	<i>Ceratophyllum demersum</i>	4
7	<i>Butomus umbellatus</i>	1
8	<i>Marsilea quadrifolia</i>	7
9	<i>Rhamphicarpa medwedewii</i>	4



Figure 1: *Marsilea quadrifolia*.



Figure 2: *Rhamphicarpa medwedewii*.

In the habitat of *Marsilea quadrifolia* a transect was made from the South to the North at a space of every 50 m. along its route. Every square contains the following plant communities:

1. *Paspalum paspaloides*, *Rhamphicarpa medwedewii*, *Cyperus badius* ;
2. *Typha angustifolia*, *Phragmites australis* ;
3. *Typha angustifolia*, *Paspalum paspaloides*, *Sagittaria sagitiifolia*, *Marsilea quadrifolia*;
4. *Marsilea quadrifolia*, *Paspalum paspaloides*, *Veronica baccabunga*, *Scirpus triqueter*;
5. *Rhamphicarpa medwedewii*;
7. *Typha angustifolia*;
8. *Marsilea quadrifolia*;
9. *Paspalum paspaloides*.

The ponds with predominance of *Salvinia natans* are protected by Bern Convention and EUNIS (European Union Nature Information System) agreement together with Emerald Network and Nature 2000. The development of the Anaklia free zone has destroyed freshwater ponds with predominance of *Salvinia* and caltrop. The area of *Salvinia* spreading gradually diminishes.

Today the habitats of *Salvinia* in the Kolkheti lowland are the following:

Anaklia – small freshwater ponds. Their number was significantly higher but it has been decreased and only two ponds of 5x5 m size remained;

The river Tsivi - there is small number of population in channels, but only individual species can be found;

Churia – along the road to the south of Kulevi terminal.



Figure 3: *Salvinia natans*

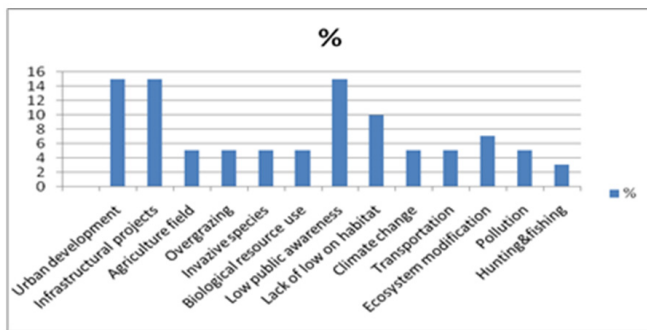


Figure 4: Drivers of threats affecting threatened *Marsilea quadrifolia* and *Salvinia natans* habitats.

DISCUSSION

Historically, in the coastal area of Kolkheti, habitats have been continuously degraded and disappeared as a result of human activity. This process has significantly increased from the beginning of the 20th century, namely: irrigation ac-

tivities, dams over rivers that accompanied urban projects. In many places freshwater ponds were turned into dumpsites. A dump site at the right side of the Chorokhi River is a good example of it. Understanding of the importance of habitats, their role in the ecosystems is very low among the population. Significant anthropogenic factors are water pollution, uncontrolled tourism, the sea coastal line contaminated by household trash during the warm season. Excessive pasturage is one of the worst dangers as well as uncontrolled hunting and fishing. As a result, favorable conditions are created for proliferation propagation of invasive species. Another problem is that the territories of special value beyond the protected area are not given protected status that allows uncontrolled hunting and fishing.

CONCLUSION

In order to save the biodiversity of per-humid ecosystems of the Kolkheti coastal area, to implement protection and management of threatened species, it is necessary to activate and toughen the measures for environmental protection as well as create local protected areas. The role in protecting ecosystems cannot be overestimated. They form homeostasis that allows communities of species to function normally. Disappearance of even one species leads to misbalance between species interaction. Therefore all these habitats must be fully protected [10-12]. It is necessary to conduct *ex-situ* conservation of the species in the Batumi Botanical Garden as well as in the Kolkheti protected areas (the Kolkheti National park and Kobuleti protected areas). For this purpose, it is of utmost importance to create artificial freshwater ponds.

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