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RARE AND THREATENED PLANT ASSOCIATIONS AND SPECIES OF LAKE SHKODRA – DELTA BUNA WETLANDS COMPLEX

Përmbledhje: Ekosistemi i ujërave të ëmbla të Liqenit të Shkodrës – Delta e Bunës përbën një nga komplekset ligatinore më të rëndësishme në Ballkanin Perëndimor dhe në Europën Jug-lindore për sa i përket dinamikës hidrologjike, gjeodiversitetit dhe biodiversitetit. Flora ujore e tij është e pasur. Në Liqenin e Shkodrës dhe Deltën e Bunës janë gjetur shumë bimë dhe shoqërime bimore endemike, relikte dhe të kërcënuara. Nga 360 specie bimësh dhe 104 shoqërime bimore të listuara në Listën e Kuqe të bimëve dhe shoqërimeve bimore të Shqipërisë, një numër i rëndësishëm i tyre i përket kompleksit ligatinor të Liqenit të Shkodrës dhe Deltës së Bunës. Në këtë punim jepet një listë me 31 specie bimësh endemike, të rralla dhe të kërcënuara dhe 27 shoqërime bimore të rralla e të kërcënuara së bashku me përhapjen dhe statusin e tyre në Liqenin e Shkodrës dhe Deltën e Bunës. Në zonën e studimit janë evidentuar tri specie bimësh (*Trapa natans*, *Marsilea quadrifolia* dhe *Caldesia parnassifolia*) dhe tre shoqërime bimore (*Quercetum roboris*, *Baldelio – Fraxinetum angustifoliae* dhe *Trapetum natantis*) të rralla e të kërcënuara në shkallë globale dhe Europiane. Katër shoqërime bimore janë propozuar të shtohen në Listën e Kuqe të bimëve dhe shoqërimeve bimore të Shqipërisë me status „i rrezikuar” (*Salicetum triandro-eleagni*) dhe „i prekshëm” (*Hydrochari-Nymphoidetum peltatae*, *Lemno-Spirodeletum polyrrhizae* dhe *Butomo-Sagittarietum angustifoliae*) duke dhënë edhe arsyet e marrjes në mbrojtje. Përhapja e specieve dhe shoqërimeve bimore paraqitet në harta 10 x 10 km² sipas sistemit UTM.

Fjalë kyçe: *Liqeni i Shkodrës, Delta e Bunës, kompleksi ligatinor, specie dhe shoqërime bimore të rralla dhe të rrezikuara për zhdukje*

Abstract: The freshwater ecosystem of Lake Shkodra – Delta Buna represents one of the most important wetlands complexes at the Western Balkan and SE Europe related to hydrological dynamic, geodiversity and biodiversity. Its aquatic flora is rich. A numerous endemic, relict and threatened plant species and associations in the both sites of the Lake Shkodra and Delta Buna were found. In the Red Lists of Albanian Flora and Plant Associations

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of 360 species and 104 plant associations, important number of them belongs to the wetlands complex of the Lake Shkodra – Delta Buna. A list of 31 rare, threatened and endemic plant species and 27 rare and threatened plant associations of the Lake Shkodra – Delta Buna wetlands together with their distribution in the region and their status was given. Three globally and European threatened plant species (*Trapa natans*, *Marsilea quadrifolia* and *Caldesia parnassifolia*) and three endangered plant associations (*Quercetum roboris*, *Baldelio – Fraxinetum angustifoliae* and *Trapetum natantis*) in the investigated region were evidenced. Four plant associations giving the reason of which these need to put under protection: *Salicetum triandro-eleagni* as endangered associations, and *Hydrochari-Nymphoidetum peltatae*, *Lemno-Spirodeletum polyrrhizae* and *Butomo-Sagittarietum angustifoliae* as vulnerable associations were proposed to add to the Red List of plants and associations of Albania. The distribution of all plant species and associations was mapped on 10 x 10 sq. km and shown in a UTM grid system.

Key words: *Lake Shkodra, Delta Buna, wetland complex, rare and threatened plants and associations.*

INTRODUCTION

Wetland complex of Lake Shkodra – Delta Buna is characterized by numerous favorable habitats for development of life, as lacustrine (Lake Shkodra, Lake Shasi), riverine (Lumi Buna, Morača, lower part of Drini), palustrine (marshes of Domni, Mertemza, Çasi), estuarine (Delta Buna), lagoon (Viluni Lagoon and Saline Lagoon), marine, sandy shore (Velipoje and Velika Plaža), etc.

Shkodra Lake – Delta Buna is the most important wetland system along the Adriatic Sea and one of the best preserved in the Mediterranean (Stumberger *et al.*, 2008).

Lake Shkodra was designated as Ramsar site and together with Delta Buna in the list of IPAs (Important Plant Areas) and IBA (Important Bird Areas) were included, while Montenegrin part of lake has the status of the National Park (1983). Delta Buna was included in the European green belt.

Vegetation around the complex of Lake Shkodra-Delta Buna is dominated mainly by xerophytes evergreen and deciduous forests and shrubs known as *maquis*, *shibljak*, *garrigue* and *steppe* (Ruci, 1983).

Aquatic and wetland flora of Lake Shkodra – Delta e Buna wetlands complex is very rich. Only in Lake Shkodra and wetland habitats around its, were found about 230 species of macrophytes (hydrophytes and helophytes) and numerous endemic, relict and threatened species (Dhora *et al.*, 2010; Rakaj *et al.*, 2010).

Lake and River plant communities are important ecological components related to their complex role that have in the structure and functioning of wetland ecosystems. They provide food and shelter (lodging) for fish, aquatic invertebrates and birds, help oxygenate the water and limit erosion etc.

Extensive development of agriculture, missing of a strategy and lows for the environmental protection for a period of 50 years accompanied by a demographic increase and bad management for the last two decades, have brought a lost, fragmentation and degradation of habitats and of biodiversity of that region. Hydrophytes

and helophytes constitute about 8% of Albanian Flora, and most of them risk to diminish their populations or to extinct of human activity.

MATERIAL AND METHODS

The compilation of the List of rare and threatened plant species and associations of the Lake Shkodra -Delta Buna area is based mainly on personal investigations and collecting plants material during 1998–2009 and on literature sources data (Desfayes, 2004; Horvat *et al.*, 1974; Janchen, 1920; Hadziablahovic *et al.*, 2001; Karpati & Karpati, 1961; Kashta, 2007; Kashta & Rakaj, 2001, 2003; Paparisto *et al.*, 1988–2000; Rakaj, 2009; Rakaj & Kashta, 2010; Ruci, 1983; Shuka *et al.*, 2008; Xhulaj & Shuka, 2007).

The threatened status of listed plants of the Lake Shkodra and Delta Buna were specified according to the Red List of Albanian Flora (Annonymous, 1997, 2007; Vangjeli *et al.*, 1995), IUCN categories (Walter & Gillet, 1998) and their actual situation verified during our field trip.

Among thousands of plants, it is necessary to make a selection of species that are considered to be of specific conservation concern, co-called „target species”. Target species are defined as species of European importance, which fulfill at least one of the criteria: The Bern Convention (Emeral Network), The Habitat Directive for the conservation of wild animal and plant species and natural habitats (Natura 2000) and listing on IUCN Red lists and endemism.

On the basis of relevant distribution data, all investigated plant species are mapped on 10 x 10 sq. km and shown in a UTM grid system.

RESULTS AND DISCUSSIONS

The Rare and Threatened Plant Species

The high ecological diversity of Lake Shkodra – Delta Buna complex explained by different wetland and habitat types have influenced not only to a rich flora, but also has conditioned growing a large number of rare and threatened plant species with a great scientific interest.

In the Lake Shkodra – Delta Buna wetland ecosystems grown 31 rare and threatened plant species or 10% of the Red List of Albania, of them 15 species belong to hydrophytes and helophytes, 6 phanerophytes, 5 geophytes, 3 hemicryptophytes and 3 psamophytes.

Three species belong to ferns and 28 belong to angiosperms, of them 22 herbaceous and 6 trees and shrubs (Table 1; Fig. 1, 2, 3, 4).

Three globally and European threatened species grown on the investigated area: *Trapa natans*, *Marsilea quadrifolia* and *Caldesia parnassifolia*.

Four species were included in the Bern Convention as regionally endangered: *Caldesia parnassifolia*, *Marsilea quadrifolia*, *Trapa natans*, and *Salvinia natans*.

Almost extinct in that area would be considered *Marsilea quadrifolia*, *Salvinia natans* and *Lycium europaeum*, since have not been found in the reported areas for many years (Schütt, 1945; Karpati & Karpati, 1961).

Quercus robur was considered critically risked due to damage and destruction of its habitat as a result of human activity. It does not create forest groups, but grow only as solitary tree in that region.

Hydrocotyle vulgaris was considered rare species due to the critical reduction of its habitat.

Three species (*Anacamptis palustris*, *Leucojum aestivum* and *Hyacinthella dalmatica*) were proposed to include in the Red List of Albanian plants, for their very limited distribution area in Albania (Rakaj & Kashta, 2010).

The Rare and Threatened plant Associations

Of 40 Corine habitats evidenced in Albania (Vangjeli *et al.*, 2007), 23 rare and threatened plant associations were identified in wetlands complex of Lake Shkodra – Buna Delta. About 8 associations belong to scrub-shrub and trees, 15 to herbaceous plants or rooted vascular, persistent emergent and floating-leaved, of them 9 asso-

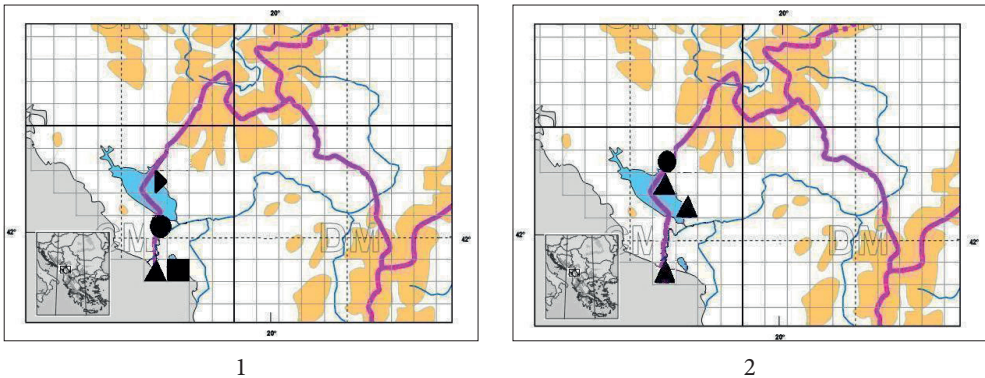


Figure 1. – Distribution of species *Caldesia parnassifolia*, *Hippuris vulgaris*, *Nymphoides peltata*, *Hyacinthella dalmatica* (overturned triangle), *Prunus webbii*, *Petteria ramentacea* (circle), *Baldellia ranunculoides*, *Lycium europaeum*, *Pancratium maritimum*, *Desmazeria marina*, *Ammophila arenaria* (triangle) and *Zostera noltii* (quadrangle) in Lake Shkodra – Delta Buna.

– Distribution of associations *Cypero-Paspaleetum distichi*, *Quercetum roboris*, *Querco-Fraxinetum angustifoliae*, *Baldelio-Fraxinetum angustifoliae* (triangle), *Schoeno-Plantaginetum maritimae*, *Ammophiletum arundinaceae*, *Alno-Fraxinetum angustifoliae* (triangle, quadrangle) and *Rupprietum cirrhosae* (quadrangle) in Lake Shkodra – Delta Buna.

Figure 2. – Distribution of species *Adiantum capillus-veneris* (circle), *Hydrocotyle vulgaris*, *Oenanthe tenuifolia*, *Gladiolus palustris*, *Anacamptis palustris*, *Quercus robur*, *Laurus nobilis* (triangle) and *Marsilea quadrifolia* (triangle 2) in Lake Shkodra – Delta Buna.

– Distribution of associations *Nymphoidetum peltatae*, *Potameto-Najadetum*, *Potameto-Vallisnerietu*, *Leucojo-Fraxinetum angustifoliae* (triangle 1,2) and *Hydrocotile-Caricetum elatae* (triangle 2,3) in Lake Shkodra – Delta Buna.

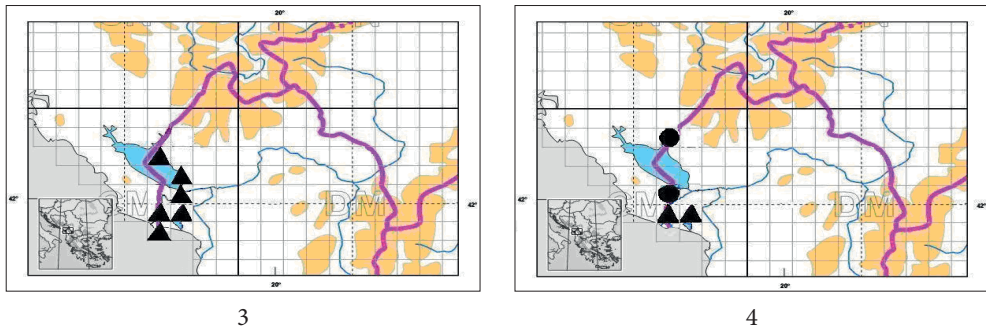


Figure 3. – Distribution of species *Nuphar lutea*, *Nymphaea alba*, *Ranunculus lingua*, *Trapa natans*, *Butomus umbellatus*, *Sagittaria sagittifolia*, *Hydrocharis morsus-ranae* (triangle) in Lake Shkodra – Delta Buna.

– Distribution of associations *Nymphaeetum albo-luteae*, *Myriophyllo-Nupharetum*, *Myriophyllo-Nymphaeetum*, *Potamogetum perfoliati*, *Typhetum latifolia*, *Populetum albae*, *Salicetum triandro-eleagni*, *Tamarici-Salicetum purpureae*, *Trapetum natantis* (triangle) in Lake Shkodra – Delta Buna.

Figure 4. – Distribution of species *Salvinia natans*, *Cladium mariscus* (triangle 1) in Lake Shkodra – Delta Buna.

– Distribution of associations *Lemnetum minoris*, *Lemno – Spirodeletum polyrrhizae*, *Butomo-Sagittarietum angustifoliae* (triangle), *Hydrochari-Nymphoidetum peltatae* (triangle 1) and *Carpinetum orientalis* subsp. *punicetosum* (circle) in Lake Shkodra – Delta Buna.

ciations grow in the open water, 2 associations in the marshes and shallow waters, 1 associations in canals, 1 association in the brackish and salted water and 2 associations grow in sandy substratum and sandy dunes (Table 2, Fig. 1, 2, 3, 4).

Plant associations of aquatic and wetland of Lake Shkodra – Delta Buna can be grouped as bellow:

I. Associations of submersed plants: *Potameto-Najadetum*, *Potameto-Vallisnerietum*, *Potamogetum perfoliati*, *Ruppium cirrhosae*.

II. Associations of floating leaved plants: *Nymphaeetum albo-luteae*, *Trapetum natantis*, *Nymphoidetum peltatae*, *Hydrochari-Nymphoidetum peltatae*.

III. Associations of submersed and floating leaved plants: *Myriophyllo-Nupharetum* *Myriophyllo-Nymphaeetum*, etc.

IV. Associations of helophytes, that have roots and a part of stalk underwater: *Typhetum latifolia* *Cypero -Paspaleum distichi*, etc (Persistent emergents).

V. Associations of scrub-shrubs and trees of wetland habitats (riparian) on the lakeside of Lake Shkodra and riverside of Buna that flooded sesonaly (Temporarily emergents): *Alno-Fraxinetum angustifoliae*, *Populetum albae*, *Salicetum triandro-eleagni*, *Quercu-Fraxinetum angustifoliae*, *Quercetum roboris*, *Tamarici-Salicetum purpureae*, etc.

Four other associations were proposed to include in the list of rare and threatened associations of Albania:

1. *Salicetum triandro-eleagni* Rivas-Martínez 1964, with very limited distribution on lakeside of Lake Shkodra and riverside of Delta Buna, which is threaten as result of intensive exploitation and possibilities to transform its habitat by human activity.

2. *Hydrochari-Nymphoidetum peltatae* Slavnić 1956, with very limited distribution on canals of Delta Buna and Mertemza, risking the drain.

3. *Lemno-Spirodeletum polyrrhizae* W. Koch 54, with very limited distribution on canals of Domni, Mertemza and Velipoja, that also risks to drain.

4. *Butomo-Sagittarietum angustifoliae* Peinado & Esteve 1982, with very limited distribution in a small surface of Domen marsh, that risk to extinct from grazing and human activity.

Hydrophytes are more threaten since their survival depends on the conservation of species ecosystem often sensitive of climate change and impact of human.

In the Red List of Lake Shkodra-Delta Buna wetlands complex were included rare, endemic and threatened plant species with scientific, ecologic and economic values, that risk to extinct as result of their direct damages by deforestation, grazing, intensive exploitation and introduction of invasive species or as result of their habitats lost and degradation by changing of water regime, erosion, drainage, irrigation and pollution by urban and solid residues, etc.

The results of this study completely support statements of different experts for natural values of Lake Shkodra – Delta Buna wetlands complex: this complex represent one of the most diverse, important and interesting areas of the West Balkan Peninsula and South Europe (Radović *et al.*, 2008; Rakaj *et al.*, 2010).

The improvement and rigorous application of legislations, together with establishment of management and monitoring permanent structures in that protected area are some significant points to be focused on in future.

New insights aiming to realize a full evaluation on the ecological situation of plant species and associations of that region will be necessary.

CONCLUSIONS

Flora of wetland ecosystems of Lake Shkodra – Delta Buna is very rich. Round 31 rare and threaten plant species and 27 rare and threaten associations were identified and mapped.

Three species belong to ferns and 28 to angiosperms, of them 15 species are hydrophytes and hygrophytes, 6 phanerophytes, 5 geophytes, 3 hemicriptophytes and 3 psamophytes.

Three globally and European threatened plant species (*Trapa natans*, *Marsilea quadrifolia* and *Caldesia parnassifolia*) grow in that region.

Two plant species (*Anacamptis palustris*, *Hyacinthella dalmatica*), and four plant associations (*Salicetum triandro-eleagni*, *Hydrochari-Nymphoidetum peltatae*, *Lemno-Spirodeletum polyrrhizae* and *Butomo-Sagittarietum angustifoliae*) with very limited distribution in the investigation area are proposed to include in the Red List of Albanian Flora.

Human intensive activities and periodically floods during last decades have damaged and degraded some of the wetland habitats of that region threatening seriously biodiversity values, and therefore treatment and management of protected regions according to their status is indispensable.

Table 1. The Red List of plant species of Lake Shkodra – Delta Buna wetlands complex

| Division | Nr. | Scientific name | Family | Wetland indicator status | Iucn status | Localities |
|-----------------------|-----|---|---------------|--------------------------|-------------|--|
| PTERIDOSP. | 1. | <i>Adiantum capillus-veneris</i> LINNAEUS 1753 | Adiantaceae | UPL, FACU | VU A1b | Mokset (Lake Shkodra) |
| | 2. | <i>Marsilea quadrifolia</i> LINNAEUS 1753 | Marsileaceae | OBL | EN A1c | Lake Shkodra |
| | 3. | <i>Salvinia natans</i> (L.) ALLIONI 1785 | Salviniaceae | OBL | EN A1c | Mertemza marsh |
| ANGIOSP. A. NYMPH. | 4. | <i>Nuphar lutea</i> (L.) SMITH 1809 | Nymphaeaceae | OBL; FACW | VU A1b | Lake Shkodra, Domen, Mertemza |
| | 5. | <i>Nymphaea alba</i> LINNAEUS 1753 | Nymphaeaceae | OBL | VU A1b | Lake Shkodra, Velipoja Rezervat, Domen, Mertemza |
| B 1. MESANG. | 6. | <i>Ranunculus lingua</i> LINNAEUS 1822 | Ranunculaceae | FACW | VU A1b | Lake Shkodra, Domen, Mertemza |
| B 2. EUDICOTS | 7. | <i>Nymphoides peltata</i> (S. GMELIN) O. KUNTZE 1891 | Menyanthaceae | OBL | VU A1b | Lake Shkodra, Mertemza |
| | 8. | <i>Hydrocotyle vulgaris</i> LINNAEUS 1753 | Apiaceae | FACW | VU A2b | Lake Shkodra, Velipoja Rezervat |
| | 9. | <i>Oenanthe tenuifolia</i> BOISSIER ET ORPHANIDES 1859 | Apiaceae | FACW | VU A1b | Lake Shkodra, Velipoja Rezervat |
| | 10. | <i>Hippuris vulgaris</i> LINNAEUS 1753 | Hippuridaceae | FACW | VU A1b | Lake Shkodra |
| | 11. | <i>Trapa natans</i> LINNAEUS 1753 | Lythraceae | OBL | EN A1b | Lake Shkodra, Delta Buna |
| | 12. | <i>Tanacetum cinerarifolia</i> (TREV.) SCHULTZ BIP 1820 | Asteraceae | UPL | VU A1b | Shiroke |
| | 13. | <i>Quercus robur</i> LINNAEUS 1753 | Fagaceae | FACU | VU A1b | Lake Shkodra Velipoja Rezervat |
| | 14. | <i>Laurus nobilis</i> LINNAEUS 1753 | Lauraceae | UPL | EN A1b | Lake Shkodra, Delta Buna |

| Division | Nr. | Scientific name | Family | Wetland indicator status | Iucn status | Localities |
|-----------------|-----|--|------------------|--------------------------|-------------|--|
| | 15. | <i>Salix triandra</i> LINNAEUS 1753 | Salicaceae | FACW, FAC | VU A1b | Lake Shkodra Delta Buna |
| | 16. | <i>Prunus webbii</i> (SPACH) VIERH. 1915 | Rosaceae | UPL | VU A1b | Zogaj |
| | 17. | <i>Petteria ramentacea</i> (SIEBER) C. PRESLE 1845 | Fabaceae | UPL | Lr nt | Zogaj |
| | 18. | <i>Lycium europaeum</i> LINNAEUS 1753 | Solanaceae | FACU, FAC* | CR A1b | Velipoja Rezervat |
| B3. MONOCOTS | 19. | <i>Butomus umbelatus</i> LINNAEUS 1753 | Butomaceae | FACW | VU A1b | Lake Shkodra Delta Buna |
| | 20. | <i>Baldellia ranunculoides</i> (L.) PARLATORE 1860 | Alismataceae | FACW | CR A1c | Velipoja Rezervat |
| | 21. | <i>Caldesia parnassifolia</i> (BASSI) PARLATORE 1860 | Alismataceae | OBL, FACW | VU A1b | Lake Shkodra |
| | 22. | <i>Sagittaria sagittifolia</i> L. 1753 | Alismataceae | FACW, | VU A1b | Domen, Mertemza and Lake Shkodra |
| | 23. | <i>Hydrocharis morsus- ranae</i> LINNAEUS 1753 | Hydrocharitaceae | OBL, FACW | VU A1b | Lake Shkodra, Domen and Delta Buna |
| | 24. | <i>Zostera noltii</i> HORNEM 1832 | Zosteraceae | OBL | VU A2b | Viluni Lagoon |
| | 25. | <i>Gladiolus palustris</i> GAUDIN 1828 | Iridaceae | FACW | LR nt | Lake Shkodra, V. Rezervat |
| | 26. | <i>Anacamptis palustris</i> (JACQUIN) R. M. BATEMAN 1997 | Orchidaceae | FACW | EN A1b* | Lake Shkodra, Velipoja Rezervat |
| | 27. | <i>Cladium mariscus</i> (L.) POHL 1809 | Cyperaceae | FACW, FACW | VU A1b | Mertemza marsh |
| | 28. | <i>Hyacinthella dalmatica</i> CHOUARD 1931 | Hyacinthaceae | UPL | EN A1b* | Pjeteroshan |
| | 29. | <i>Pancratium maritimum</i> LINNAEUS 1753 | Amaryllidaceae | UPL | EN A1b | Velipoja Rezervat |
| | 30. | <i>Desmazeria marina</i> (L.) DRUDE 1912 | Poaceae | UPL | VU A1b | Velipoja Rezervat |
| | 31. | <i>Ammophila arenaria</i> (L.) LINK 1827 | Poaceae | UPL | EN A1b | Velipoja sandy dunes |

* Plant species proposed to include in the Red List of Albanian Flora.

Table 2. List of rare and threaten Plant Associations of Lake Shkodra
– Delta Buna wetlands complex

| NR. | NAME OF ASSOCIACION | CLASS/ALLEANCA | LOCALITY |
|-----|---|--|--|
| 1. | Lemnetum minoris SOÓ 1947 | LEMNETEA Lemnion | Domen, Mertemza, Velipoja |
| 2. | <i>Lemno – Spirodeletum polyrrhizae</i> W. KOCH 54 | | Domen, Mertemza, Velipoja |
| 3. | <i>Nymphoidetum peltatae</i> (ALL. 1922) OBERD. ET TH. MULL. 1960 | POTAMETEA Nymphaeion | Kaldrun, Jubica, Lake Shkodra |
| 4. | <i>Hydrochari-Nymphoidetum peltatae</i> Slavnić 1956 | | Mertemza |
| 5. | <i>Nympheatum albo-luteae</i> NOWINSKI. 1928 | | Lake Shkodra, Mertemz, Domen, Velipoja Rezervat |
| 6. | <i>Myriophyllo-Nupharetum</i> W. KOCH 1926 | | Lake Shkodra, Domen, Velipoja Rezervat |
| 7. | <i>Myriophyllo-Nympheatum</i> W. KOCH 1926 | | Lake Shkodra, Domen, Velipoja Rezervat, Mertemza |
| 8. | <i>Trapetum natantis</i> MÜLL. ET GÖRS. 1969 | | Lake Shkodra, Domen, Velipoja. |
| 9. | <i>Potameto-Najadetum</i> HORVATIĆ ET MICEVSKI 1960 | Potamion | Lake Shkodra |
| 10. | <i>Potameto-Vallisnerietum</i> BR.- BL. 1931 | | Lake Shkodra |
| 11. | <i>Potamogetum perfoliati</i> KAKUSIĆ ET PAVLOVIĆ 1976 | | Lake Shkodra, Mertemza, Delta Buna |
| 12. | <i>Butomo-Sagittarietum angustifoliae</i> PEINADO & ESTEVE 1982 | | Domen, Mertemza |
| 13. | <i>Ruppium cirrhosae</i> IVERSEN 1934 | Ruppion maritima | Viluni Lagoon |
| 14. | <i>Typhetum latifolia</i> SOÓ L 927 | PHRAGMITI – MAGNOCARICETEA Phragmition australis | Lake Shkodra, Mertemza, Delta Buna |
| 15. | <i>Cypero-Paspaletum distichi</i> HORVATIĆ (54) 56 | | Delta Buna |
| 16. | <i>Hydrocotile-Caricetum elatae</i> HORVATIĆ 54 | | Gril, Island of F. Jozef, Velipoja Rezervat |
| 17. | <i>Schoeno – Plantaginetum maritimae</i> RIVAS MART. 1984 | Plantaginion | Seaside of Velipoja |
| 18. | <i>Ammophiletum arundinaceae</i> Br.-Bl. (1931) 1933 | AMOPHILETEA Ammophilion | Sandy Dune of Velipoja |

| NR. | NAME OF ASSOCIACION | CLASS/ALLEANCA | LOCALITY |
|-----|--|---|--|
| 19. | <i>Quercetum roboris</i> JOV. ET TOMIC 1979 | ALNO-POPULETEA Alno-Quercion roboris | Velipoja Rezervat |
| 20. | <i>Quercu-Fraxinetum angustifoliae</i> BR.-BL. 1933 | Fraxinion angustifoliae | Velipoja Rezervat |
| 21. | <i>Baldelio (Echinodoro)-Fraxinetum angustifoliae</i> KARPATI 1962 | | Velipoja Rezervat |
| 22. | <i>Alno-Fraxinetum angustifoliae</i> TCHOU 1947 | | Velipoja Rezervat, Viluni Lagoon |
| 23. | <i>Leucojo-Fraxinetum angustifoliae</i> GLAVAC. 1959 | | Lake Shkodra |
| 24. | <i>Populetum albae</i> (BR.-BL.) TCHOU 1947 | Populion albae | Dobraç, Kosan, Velipoja Rezervat |
| 25. | <i>Salicetum triandro-eleagni</i> RIVAS-MARTÍNEZ 1964 | | Lake Shkodra, Zus, Delta Buna |
| 26. | <i>Tamarici-Salicetum purpureae</i> DE FOUCAULT 1992 | | Velipoja Rezervat, Lake Shkodra |
| 27. | <i>Carpinetum orientalis</i> HORVATIC 49 Subass. <i>punicetosum</i> GREBENSC. 49 (<i>Punicetum granatae</i>) | QUERCO-FAGETEA Ostryo-carpinion | Shiroke – Zogaj, Vukpalaj- Kushe Hot, Mali Kolaj |

* Plant associations proposed to include in the list of rare and threaten associations for Albania.

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