Fusha Xukhit near Bax-Rrjoll, Bojana-Buna Delta, Albania, 4 June 2003, (Photo: B. Stumberger)
6 Indicators for Ecological Importance

6.1 Mammals

The Rapid Assessment was not focused on mammals and only 18 terrestrial and 3 marine mammals are listed (Section 10.2) for the area. The recent observations of Bottle-nosed Dolphins in the Bojana-Buna River (see above), the tracks of bears at the beach in Albania and the high density of Jackal in the hunting ban area of Ada island indicate that the Bojana-Buna Delta is a special habitat for mammals in Europe.

The research of Krystufek, who found evidence that the Delta, with its natural sandy biotopes, is a unique “island” habitat in Europe, is very important. “The finding of a mound-building mouse population on the Adriatic coast is striking, given the overall distribution pattern of M. specilegus, especially as it appears to be the only reliable evidence of the species’ occurrence south of the mountain chains of the Balkan Peninsula. The population is > 250 km away from the nearest known Serbian localities for the species”. Krystufek & Macholan (1998) describe the mound-building mouse as a special subspecies Mus spicilegus adriaticus ssp. nova. This means that the specimens are a new Adriatic mound-building mouse subspecies, so far found only at the Velika Plaza in the Bojana-Buna Delta. This isolated population and the habitat linked to this species is in great need of protection.

In addition, Krystufek (1994) found very interesting specimens of blind moles in the Bojana-Buna Delta. Like the mice, the moles from Velika Plaza differ from those in other areas in Europe. He describes a new subspecies, smaller than the known populations, as Talpa stankovici montenegrina.

Both the blind mole and the mound-building mouse demonstrate the uniqueness of the Bojana-Buna Delta in the Mediterranean basin. The special habitats of the Delta formed by the river, and the marine effects such as the barrier island Velika Plaza, are rare. Since they are at present well preserved, they are important rescue areas for specialized and, in these two cases, genetically isolated populations. Protection and better assessment of these habitats is needed, especially on the Albanian side. The mammals of the Bojana-Buna Delta constitute an important argument for protection of the area but, at the same time, demand further research.

6.2 Rare breeds of Domestic Animals

One of the main problems and aims of nature conservation in Europe is to protect semi-open landscapes. Development during the past decades has been characterized by increasing intensity of land use on the one hand, and an increasing number of former meadows and pastures lying fallow, as a result of changing economic conditions, on the other (Redecker 2002). In Europe, there are only a few examples where pastoralism is still practised on a scale as large as in the Bojana-Buna delta. Domestic animals, especially well adapted old breeds, are of great importance for the management of waterbirds’ feeding areas (large scale flooded pastures) and many species of endangered farmland birds.

6.2.1 Pigs

An important missing link in the history of domestic breeds in Europe has been found – the Siska pig. It is the oldest European primitive pig breed and a direct descendant of the wild boar Sus scrofa. For decades it has been considered extinct (Mason 1996). In Croatian Posavina, for example, the Mangalitsa supplanted it at the end of the 19th century (Kadic 1964), while in Serbia the old Sumadija swine was reared from the Siska pig in the 19th century (e.g. Haller 2000, Stojanovic & Đorđevic-Milosevic 2003). The Siska pig becomes sexually mature quite late and requires about 3 years to develop in full (Gugic 1992). All other pig breeds in Europe developed, in contrast to the Siska pig, through crossbreeding of European and Asian pigs (e.g. Vucevac-Bajt 1988).

Siska pig

Its population numbers at least 14 individuals at two sites on the Albanian side of the delta. One group of Siskas is free roaming but occasionally attended by a shepherd, while the other group also looks for food freely, except that it is closed in a pigsty every night. The adult animal’s phenotype is original and characteristic (Figure 10). Furthermore, one of the characteristics of the Siska pig is that its young are, similar to those of the wild boar, striped (Gugic 1992). This holds good for the Siskas in the studied area. Among three swine there were two with striped young and one with

Figure 10: Siska pig (Photo: B. Stumberger)
white and striped young. For religious reasons, however, it is hardly likely that Siskas would appear elsewhere in the delta or its vicinity.

**Other rare breeds of pig**

Hammond et al. (1961) describes two other breeds of pig in Albania, the Shkodra pig and Albanian Landraces (Albanian). Both are present in the Buna Delta in two phenotypically different forms, the Albanian in black and white, and the Shkodra pig with upright – an obvious impact of the Siska pig! – and downright, landrace ears. A review of the typing of pig breeds is urgently needed, because of the crossbreeding of original races with the economically more productive modern races. Pigs of the “Mangalitsa” and “Moravka” type are also present on the Albanian side of the delta.

*Measures to be taken:* In order to save the Siska pig, certain priority conservation measures should be implemented. *In situ* conservation should start. They should include further research, phenotypic and genetic standardisation (with pedigree book) and immediate contractual protection through formation of two nuclei. If not, the Siska will certainly be lost! The same is also true for other breeds.

### 6.2.2 Cattle

Busha are autochthonous cattle of the Balkan Peninsula of *brachyceros* cattle type. It is a primitive and indigenous breed. It may be grey, yellow, red, white, black (or tiger) in colour (Stojanovic & Đorđevic-Milosevic 2003). Less than a hundred can be found today in the whole of Montenegro. In the Bojana-Buna Delta, its small number of some 20 heads is a cause for concern.

On the Albanian side of the delta, two main strains of Red Busha are present: the first is the Red Busha, with a characteristic stripe on the head (Figure 16), the second the Brown-faced Red Busha. Only free roaming animals were seen. The Black Busha strain was found only in one individual, and is probably close to extinction (Figure 12).

**Grey Busha**

On the Montenegrin side, an *in situ* programme is in place to protect the Grey Busha (1 farmer with about 10 animals and a bull at Velika plaza, Ada and the Bojana Bank. No Grey Busha cattle, however, were seen during the 2003/2004 fieldwork.

*Measures to be taken:* The Busha cattle have become endangered through crossbreeding with the Jersey breed. The situation is critical. An immediate conservation programme *in situ* is necessary (e.g. grazing in knetas for the formation of colonial aquatic birds’ feeding sites).

### 6.2.3 Sheep

The sheep inhabiting the Bojana-Buna Delta are the so-called Zackel sheep. The position as to the diversity of strains of sheep is generally unclear. Some 80% of the sheep population here is crossbred. Only local topographical names could be given to two sheep breeds/strains.

**Shkodrane**

For this primitive wool sheep, an *in situ* conservation breeding programme is ongoing in Albania. At the moment the situation is not critical (e.g. Kume & Bleta 2004).

**“Bax-Rrjolli” sheep**

This breed/strain is probably close to the Shkodrane. The coat is light silvery grey, legs and face black (Figure 13a). Completely white animals are also present (Figure 13b).

**“Reci” sheep**

15 to 20 individuals of this big sheep with characteristic colouring are known from Reci (Albania). All of them were phenotypically without variations! These sheep are extraordinary tall and are probably strain of the Barhoka sheep (Figure 14).

**Buna “Karakachan” sheep**

The south-eastern part of the Bojana-Buna delta is inhabited by about 250 crossbreeding individuals that display the characteristics of the Karakachan sheep. Only few individuals could be classified as »pure« (Figure 15a-b).

**Ljaba**

Still common in the Montenegrin part of the delta (Figure 16).

**Baljusa**

This breed is typical for Kosovo and Metohija. A male was documented in the Solana of Ulcinj in November 2004. It is important to save this breed in the region (Figure 17).

*Measures to be taken:* The focal point of sheep farming is on the Albanian side of the Bojana-Buna. *In situ* conservation should be extended to all Zackel sheep. On the Montenegrin side, a monitoring and conservation programme should be implemented.

### 6.2.4 Goats

**Balkan goat**

Genetic investigations indicate that Balkan goats are quite homogeneous. But in phenotypes they are stunningly different. The situation should be investigated. During field work a number of different “strains” or colour variations were observed: from fox red, brown, black to white forms, with striped, patches and unicolour.

### 6.2.5 Horses

Most horses inhabit the Albanian part of the Bojana-Buna Delta.
Delta, their exterior features ranging from those of the horses of Tarpan to Arabian type horses (compare Figures 13-16). Horses in the Albanian part of the delta clearly belong to a group of smaller horses characteristic of the southern Balkans. We have seen two forms in the area: the Albanian Mountain Horse and a lowland form called the Mysekaja Horse (cf. Nissen 2003).

**Measures to be taken:** The horses should be phenotypically described and researched. Their small numbers dictate implementation of immediate monitoring and systematic formation of nuclei.

### 6.2.6 Donkeys

The domestic Balkan donkey as a native breed is still widespread in the Bojana-Buna Delta. These animals are phenotypically quite homogenous (Figure 17a-b). Besides typical donkeys we have seen animals with zebra stripes on the legs in Montenegro (Figure 18a-b).

**Measures to be taken:** Genetic research on these groups of donkeys would be worthwhile (impact of subspecies *Equus asinus africanus* or *somaliensis*?). It is well known that Ulcinj was inhabited by pirates who could have brought the *somaliensis/africanus* subspecies to the area. Due to the changes taking place in agriculture, the number of donkeys is going to fall drastically. This is why monitoring, coupled with a conservation programme, should be implemented immediately, and integrated with tourist opportunities.

### 6.3 Birds

The importance of the whole Bojana-Buna delta is obvious from the field study reported in previous sections. Additional reports have been prepared by Tauland Bino (Albania), Slobodan Puzovic (Serbia) and Darko Saveljic (Montenegro). The extent of the habitat network of wetlands, coastal areas, open landscape and grassland areas, forests, hills and cliffs offers excellent possibilities for nesting for a huge number of bird species as well as important stop-over sites.

The results of the study completely fulfil expectations, but some important facts are strikingly obvious:

- Two species of birds of prey of European conservation concern have not been observed during the study: Booted Eagle *Hieraaetus pennatus* and Lesser Kestrel *Falco naumanni*. Both species are listed as rare, endangered and possibly vulnerable in the list of birds prepared by Taulant Bino for the Albanian part of the Bojana-Buna Delta. The most likely reason for their current absence in the delta is hunting pressure.
- Several important flagship species of conservation concern were not seen during the study period, including Flamingo *Phoenicopterus ruber* and Little Bustard *Tetrax tetrax*. Darko Saveljic reported that both species have been shot dead. The Bojana-Buna delta is potentially a wintering and nesting site for both species. However, the suitability of the area for these and many other migrants during winter conditions or dispersal is currently greatly impaired by extensive and uncontrolled hunting and shooting.
- Human disturbance is still growing in the area and many waterbirds have difficulties in finding quiet places for feeding, resting or breeding. This is especially true for the Heron, Spoonbill and Pygmy Cormorant colony at Ada – Velipoja, which was destroyed in early summer 2003. Also ducks, like Ferruginous Duck, Garganey, Gadwall, Mallard, and Shelduck, are almost absent, with no safe breeding areas at the moment. This has to be changed urgently, in particular for Ferruginous Duck, for which the area hosts the last breeding pairs in Albania.
- Based on the reports by Reiser & Führer (1896), population numbers of most shorebirds nesting along the coastline are

---

Figure 17: Baljusa sheep (Photo: M. Schneider Jacoby)
Figure 18: Mysekaja Horse (Photo: B. Stumberger)
Figure 19: Horses near Gjo-Lulit (Photo: B. Stumberger)
Figure 20: Wild horse (Photo: B. Stumberger)
Figure 21: Free roaming horses (Photo: B. Stumberger)
Figure 22a-b: Donkeys in the Bojana-Buna delta (Photo: B. Stumberger)
Figure 23a-b: Donkeys with zebra stripes (Photo: M. Schneider Jacoby)
declining and the birds are suffering from increasing tourist activities and, mostly illegal, hunting practices. We found two shot adults from the small local breeding population of Oystercatcher in the sand dunes near Velipoja (Albania) in June 2003. Fishponds near Rec and the salina of Ulcinj are important secondary habitats, but in the salina the number of breeding waders is also decreasing (Saveljic 2002). The reasons are vegetation succession, unsuitable water levels with periods of flooding, and human disturbance. Nevertheless the Ulcinj salina is still the key-site habitat for most waterbirds in the Bojana-Buna Delta and has to be specially protected and managed. The abandoned fish ponds of Reci, where we found a small breeding colony of Collard Pratincole, is currently the only known nesting locality for the species in Albania (Taulant Bino, pers. com.).

6.4 Fish

The Bojana-Buna Delta is still an outstanding habitat for fish. 143 fish species and sub-species have been listed by experts from Albania and Montenegro. This high species diversity reflects the diverse habitat mosaic of the Bojana-Buna Delta. Furthermore, the river connects the Adriatic Sea with the inland Skadar Lake, as well as the coastal lagoons of the delta with the adjoining wetlands of Sasko Jezero. The basin of Skadar Lake is free of any hydropower dams. Its tributaries are connected, without obstructions, with the mountainous hinterland and, via the Bojana/Buna River, with the Adriatic Sea.

For the present survey, fish species of the main wetland habitats have been separated into six wetland units: freshwater lake (Skadar lake), small freshwater lake (Sasko Lake), river (Bojana-Buna), pro-delta (littoral zone of the Adriatic along the delta front), lagoon (Viluni Lagoon) and artificial saline wetlands (Solana Ulcinj) (Figure 24, Section 10.4 List of Fish species).

![Figure 24: Species diversity of fishes (species and sub-species) of main wetland units in the Bojana-Buna river delta, Lake Skadar and the Adriatic Sea.](image)

Besides the importance of overall species diversity, numbers of endangered fish species are an important indicator of the ecological value of the Bojana-Buna wetland complex. According to the red list criteria of IUCN (2001), the basin of Skadar Lake, the river Bojana-Buna and Sasko Lake, due to their large numbers of endemic taxa, are of international importance for conservation. Apart from conserving the original biodiversity of the area, it is particularly important to preserve autochthonous elements of the ichthyofauna.

A detailed survey, therefore, of endemic and sub-endemic species and subspecies in the area, together with an assessment of their national conservation status, is urgently needed. For some species (like *Salmo montenegrinus*) or subspecies (like *Gobio gobio lepidolaemus*) their taxonomic validity is unclear, while some other species have decreased dramatically (*Chondrostoma nasus ohridanum*), and some, in Lake Skadar and the tributaries, are on the verge of extinction (*Acipenser naccarii, Salmo marmoratus, Salmo dentex*) or may already be extinct (*Chondrostoma scordensis*) (compare section 7.4 and Table 17).

### Table 17: Fish species according to IUCN Red List (2000) and Bern Convention

<table>
<thead>
<tr>
<th>Species</th>
<th>Red List IUCN</th>
<th>Bern</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acipenser sturio</em></td>
<td>CR (A1d, D1)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Acipenser naccarii</em></td>
<td>EN (A1a-d, D1)</td>
<td>A II</td>
</tr>
<tr>
<td><em>Acipenser stellatus</em></td>
<td>CR (A1d, D1)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Alburnus alburnus alborella</em></td>
<td>VU (A2c)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Alburnoides bipunctatus ohridanus</em></td>
<td>DD</td>
<td>A III</td>
</tr>
<tr>
<td><em>Alosa fallax nilotica</em></td>
<td>LR (nt)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Aristichthys nobili</em></td>
<td>LR (nt)</td>
<td>?</td>
</tr>
<tr>
<td><em>Barbus meridianalis peteni</em></td>
<td>A III</td>
<td></td>
</tr>
<tr>
<td><em>Blennius flaviatilis</em></td>
<td>A III</td>
<td></td>
</tr>
<tr>
<td><em>Chondrostoma nasus ohridanus</em></td>
<td>LR (nt)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Ctenopharyngodon idellus</em></td>
<td>LR (nt)</td>
<td>?</td>
</tr>
<tr>
<td><em>Cyprinus carpio</em></td>
<td>CR (A2c)</td>
<td></td>
</tr>
<tr>
<td><em>Gobitis taoenia ohridana</em> (DD)*</td>
<td>LR (nt)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Hypophthalmichthys molitrix</em></td>
<td>LR (nt)</td>
<td>?</td>
</tr>
<tr>
<td><em>Lampropterus fluviatilis</em></td>
<td>LR (nt)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Lampropterus planeri</em></td>
<td>LR (nt)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Pachychilodon pictum</em></td>
<td>LR (nt)</td>
<td>A III</td>
</tr>
<tr>
<td><em>Petromyzon marinus</em></td>
<td>A III</td>
<td></td>
</tr>
<tr>
<td><em>Rhodeus sericeus amarus</em></td>
<td>A III</td>
<td></td>
</tr>
<tr>
<td><em>Rutilus basak ohridanus</em></td>
<td>A III(?)</td>
<td></td>
</tr>
<tr>
<td><em>Rutilus prespensis vukovi</em></td>
<td>A III(?)</td>
<td></td>
</tr>
<tr>
<td><em>Salmo trutta lacustris</em></td>
<td>DD</td>
<td></td>
</tr>
<tr>
<td><em>Salmo marmoratus</em></td>
<td>DD</td>
<td></td>
</tr>
</tbody>
</table>

6.5 Amphibians and Reptiles

The current list of amphibians and reptiles recorded for the area is impressive, but more research is needed. The large number of species reflects the great diversity of habitat types, from wet to dry terrestrial habitats, as well the diverse relief of the Bojana-Buna Delta. From the viewpoint of conservation it is important to note that areas under heavy human pressure, like Velika Plaza, Ada and the coastal areas in Albania, are also key sites where protection of many amphibians and reptiles is needed. The first studies, presented in the DEG Regional Master Plan for Tourism, clearly demonstrate the importance of the barrier island of Velika Plaza, with its dynamic relief and differing habitats, from open sand dunes to alluvial forests, for some highly endangered species like Balkan Green Lizard *Locerta trilineata* and European Glass Lizard *Ophisaurus apodus* (DEG 2003). The presence of Loggerhead Turtle *Caretta caretta* on Ada island is most important (1 adult female at the beach, 24.5.2002, observed by D. Saveljic, see Section 8.2.1.2)
6.6 Vegetation

Research on evaluating the diversity of vegetation in the Bojana-Buna Delta has just started. In this study we have included two reports, one from each country. They give evidence of the great biodiversity, which is demonstrated in the habitat map (Map 3).

6.6.1 Information concerning the Vegetation in Albania (Marash Rakaj)

The wetland ecosystem of Buna River, Velipoja Reserve and Viluni Lagoon, together with other wetlands (Domni, Mertemza, Luarzi, Çași) and water channels that are connected to them, constitutes a habitat complex favourable for the development of high floristic diversity. The high biodiversity of this wetland ecosystem is the result of a variety of geographical, geological, ecological and limnological factors.

6.6.1.1 Main Biotopes

- **Running waters** of the Buna River and Delta, together with artificial channels in the Velipoja area, in which plant species from microalgae and algae to macrophytes are growing.

- **Stagnant fresh waters** of Mertemza, Domni, Çași, Luarzi and the marshlands of Velipoja Reserve are inhabited by a rich flora and vegetation composed of floating meadows. This vegetation type is dominated by Nymphaea alba, Nuphar luteum, Hydrocharis morsus-ranae, Trapa natans, etc. Submerged species living in these biotopes are Myriophyllum spicatum, Ceratophyllum demersum, Potamogeton pectinatus and other wetland species like Phragmites communis, Typha latifolia, Schoenoplectus lacustris, Cyperus longus and green algae.

- **In springs**, different species of green algae (Chara sp., Nitella sp.) and microalgae live, mainly diatom species.

- **Brackish waters** of Viluni Lagoon have a surface area of approximately 3.39 km². Zostera noltii and Ruppia cirrhosa are dominant species that characterize the lagoon's vegetation and cover large areas of submerged meadows with high biological productivity. Other species of plants in salty marshlands (halophytes) include Limonium vulgare, Salicornia europaea and Artemisia fruticosa.

- **Broad-leaf forests** in Velipoja Reserve, on Franz Joseph Island, Pentare and Viluni consist of woods and brushes like White poplar *Populus alba*, Tamarisk *Tamarix parviflora*, Willows *Salix fragilis* and *S. alba*, Alder *Alnus glutinosa* and Narrow-leaved ash *Fraxinus angustifolia*

- On the **sandy shores** between the mouth of the Bojana-Buna River and Viluni Lagoon, sand dwelling plants or psammophytes like Amophila arenaria, Eryngium maritimum and Carex arenaria are growing.

- **Coastal pine forests** between the river mouth and Viluni Lagoon consist mainly of Stone *Pinus pinea* and Aleppo Pine *P. halepensis*.

- **The rocky shores** of Ana e Malit and Renci have a poor vegetation of trees and shrubs. Besides a rich vegetation of meso- and kserophyte herbs, *Phillyrea latifolia*, *Olea europaea var. europaea*, Macedonian Oak *Quercus trojana*, Christ's thorn *Paliurus spinosa-christi* and Wild Pomegranate *Punica granatum* are the most abundant species.

6.6.1.2 General floristic data

The wetland ecosystem of Bojana-Buna River, Velipoja and Viluni Lagoon belongs to the Mediterranean evergreen shrub zone, the Ilicis Oak Adriatic subzone (*Orno-Quercetum ilicis*), which is composed mainly of *maquis* (macchie). In addition, deciduous *garrigue* and *soft shaparral* vegetation types are growing.

The flora is composed of the following general types:

- **Woody and broad-leaved shrubs** with evergreen leaves, like *Phillyrea latifolia*, *Olea europaea var. europaea*, Wild Olive *O. europaea var. sylvestris* and *O. oleaster*, and deciduous trees, like Willows *Salix sp.*, White Poplar *Populus alba*, Black Poplar *Populus nigra*, Alder *Alnus glutinosa*, Narrow Ash *Fraxinus angustifolia* and Common Oak *Quercus robur* spp. *Scutariensis*. The latter often grow in small groups.

- **Hydrophytes** with submerged living plants include *Potamogeton sp.*, *Ceratophyllum submersum*, *Myriophyllum verticillatum*, *Chara* sp.*div.*, etc., and floating plants like *Nymphaea alba*, *Nuphar lutea*, *Trapa natans*, *Hydrocharis morsus-ranae*.

- **Helophytes or hygrophytes** that grow in marshlands, but not normally submerged, are distributed in the littoral zone: *Phragmites communis*, *Typha latifolia*, *Schoenoplectus lacustris*, *Cyperus longus* and *Butomus umbellatus*, *Alisma plantago-aquatica*, *Veronica beca-bunga*, *Zoostera inoltii*, *Orchis sp.*, etc.,

- The majority of **halophytes** that grow in coastal marshes and on beaches show some degree of succulence, with swollen leaves or stems: *Salicornia europaea*, *Arthrocnemum fruticosum*, *Halimione portulacoides*, *Salsoli kali*, *Spergularia marina*, *Inula crithmoides*, etc.

- **Psammophytes** grow on the sand dunes along the coast: *Amophila arenaria*, *Lagurus ovata*, *Medicago marina*, *Pancratium maritimum*, *Atriplex hastata*, *Agropyrum junceum*, *Eryngium maritimum*, etc.

6.6.1.3 Threatened species

The recent Red Lists of Albanian Flora (1995, 1997) include around 320 threatened and rare species – 10% of the autochthonous flora of the country. Around 128 occur in the Shkodra region, and of these, 24 species are growing in the wetland ecosystem of the Bojana-Buna River, Velipoja Reserve and Viluni Lagoon.

The 24 threatened and rare species are classified, according to IUCN categories, as follows:

- Critically endangered (CR) 1
- Endangered (EN) 9
- Rare (R) 1
- Vulnerable (V) 13
- Lower risk (LR) 0
Two threatened species belong to ferns (Marsilea and Adiantum), and 22 to Angiosperms. One species, Quercus robur ssp. Scutariensis, listed as Critically Endangered is sub-endemic for the area. Another species, Hydrocotyle vulgaris, is considered as Rare, while 9 species are Endangered due to the critical, human induced reduction of their habitats, which could lead to extinction. The species listed as Vulnerable include many hydrophytes, whose survival depends on the preservation of the highly sensitive aquatic ecosystems like coastal lagoons and water basins. Two of the more important species in this group are Trapa natans and Marsilea quadrifolia, which are considered to be threatened on a global scale.

6.6.2 Information concerning the Vegetation in Montenegro (Danka Petrovic, Snezana Vuksanovic)

6.6.2.1 Psammo-halophyte vegetation

Velika Plaza - “the Great Beach”, close to Ulcinj - is the area with the most developed and well preserved psammo-halophyte vegetation on the Montenegrin coastline. Because of movable ground and salinity the plant communities that make up this type of vegetation are poor in floristic components and in plant cover. These plant communities are naturally highly unstable and therefore very sensitive to anthropogenic influences. In other areas along the Montenegrin coastline, this vegetation type currently exists only in fragments in the wake of the building of hotels, camps and housing estates.

The psammo-halophyte vegetation of Velika Plaza consists of two plant communities, Xanthio-Cakiletum maritimae (Beg.1941) Pign.1953 and Agropyretum mediterraneum (Kühn) Br.-Bl. 1933.

The youngest cover of plants, which forms the zone of vegetation closest to the shoreline, is represented by Xanthio-Cakiletum maritimae. It consists of a small number of plant species that are adapted to the high instability of the ground and influence of the sea on its habitat. Representatives of this vegetation type are: Xanthium italicum and Cakile maritima. In addition the presence of the following species was noted: Echinophora spinosa, Salsola kali, Euphorbia peplis, Euphorbia paralias, Polygonum maritimum, Atriplex hastata, Eryngium amygdaloides, Aristolochia rotunda, Helichrysum italicum. This type of vegetation is widespread in the Bojana-Buna delta but locally there are some differences in floristic structure.

The plant cover of the second vegetation zone from the shoreline, which is interconnected to the first one, consists of Agropyretum mediterraneum community. The substrate in this zone is more adapted to the first vegetation zone. Agrypyrum junceum, which protects the surface layers of sand dunes with its bush-like habitus, contributes to the stability of this substratum. Besides these representative species, this association includes: Echinophora spinosa, Eryngium maritimum, Euphorbia paralias, Medicago marina, Ammophila arenaria, Calystegia soldanella, Pseudorlaya pumila, Lagurus ovatus, Xanthium italicum, Cakile maritima, Euphorbia peplis, Polygonum maritimum, Atriplex hastata, Aegilops ovata, Vulpia ciliata, Schoenus nigricans, Juncus maritimus and Reichardia picroides. Pancratium maritimum, which is included in the national Red List (Act on Protection of Rare, Endangered and Threatened Animal and Plant Species – Sluzbeni list RCG, 36/82), is part of this plant community. The psammo-halophyte vegetation of Ada consists of similar species to those in Velika Plaza.

6.6.2.2 Vegetation of the Flooded Areas

The area along the Bojana-Buna River and around Sasko Lake is rich in floodplain vegetation. Here we can distinguish between two zones.

In the first zone the youngest plant cover consists of herbaceous (greenish) plants and is found along the riverside. It is poor in floristic components, their representatives being Phragmites communis and Typha angustifolia. Besides these species there are also Scirpus lacustris, Scirpus maritimus, Butomus umbellatus, and Eleocharis palustris. At Sasko Lake, Marsh Pennyworth Hydrocotile vulgaris was found. So far the species is known only at a few locations in Montenegro.

The second zone consists of alluvial forests with heavy underbrush. These forests have a heterogeneous vegetation structure, although they consist of only a few plant species which change, like a mosaic, throughout this area.

The most abundant species at the mouth of the Bojana-Buna River are Tamarix africana and Juncus acutus. Smaller fragments of both species also exist more inland, along the river, and at Sasko Lake. Tamarix africana is the dominant species of Mala Kneta and along the edge of alluvial meadows.

Trees of the most heterogeneous floristic forests include Populus alba, Populus nigra, Quercus robur ssp. scutariensis, Alnus glutinosa, Fraxinus angustifolia, and F. oxycarpa. In the shrub layer, Salix alba, S. purpurea, Cornus sanguinea, Ligustrum vulgare, Crataegus monogyna, Amorpha fruticosa, and Punica granatum are to be found, as well as herbaceous plants like Teucrium polium, Hypericum perforatum, Euphorbia amygdaloides, Aristolochia rotunda, and Helichrysum italicum. This type of vegetation is widespread in the Bojana-Buna delta but locally there are some differences in floristic structure.

On Ada Island the dominant tree species is Populus alba, whilst the dominant tree along the lower course of the Bojana-Buna River upstream of Ada is Fraxinus angustifolia.

Hydrophilous shrubs are most prominent in the inundation zone of Lake Saso. The dominant species is Vitex agnus castus L. Salix alba L., Salix purpurea L., Amorpha fruticosa and Juncus acutus are also growing. Similar vegetation is present in Velika Kneta and Kneta Fraskanjel.

Behind Velika plaza, some 200 to 300 m from the shoreline, there is a belt of alluvial forest with the endemic Montenegrin oak species, Quercus robur ssp. scutariensis. This alluvial forest
develops in warm Mediterranean climates with periodic flooding, and represents a combination of evergreen and deciduous species. In addition to Qu. r. scutariensis, the following species are growing in this forest: Populus alba, Fraxinus angustifolia, Alnus glutinosa, Ulmus minor, Carpinus orientalis, Cornus sanguinea, and Rubus ulmifolius. Although the community Robureto-Carpinetum orientalis has been described for the area (Jankovic, M. and Bogojevic, R., 1965), we have found only fragments of this vegetation type. We assume this to be the effect of intensive anthropogenic influence.

In the karst depression (polje) around Lake Sasko, (Kneta Fraskanjel and Donja Klezna) and the area along the Bojana-Buna River are used as heterogeneous grasslands. There are “partitions” between these meadows comprising elements of alluvial forests and shrubs, which include mainly the following species: Vitex agnus-castus, Tamarix africana, Salix alba, S. fragilis, and Fraxinus oxycarpa. The dominant species in regularly flooded meadows are: Lythrum salicaria, Oenanthe silifolia, Scirpus maritimus, S. lacustris, Potentilla reptans, and Iris pseudacorus.

6.6.2.3 Halophyte Vegetation

In the basins of Ulcinj salina, in the location of the former Zoganje lagoon (Zoganjsko Jezero), a narrow belt of halophyte vegetation is found. The plants that are part of this vegetation are regularly flooded by seawater. When the water level in the basins falls, they remain on the drying out, highly saline mudflats. Because of the extreme conditions only a few dominant species exist in this habitat. The most characteristic are: Salicornia herbacea, Suaeda maritima, Limonium angustifolium, Juncus acutus, and J. maritimus.

Halophyte vegetation is also present in Velika Kneta, where the lower concentration of salt allows for higher species diversity, and the plant communities there are more diverse than those in Ulcinj salina.

6.6.2.4 Vegetation of Xeric Meadows

In the literature referring to the xeric meadows of the Ulcinj fields there is reference to vegetation that belongs to the Thero-Brachyppodietalia Br.-Bl. 47 group (Blecic and Lakusic 1976). As our research was conducted at the end of June, the grass on the meadows was already cut and we could not research this zone in greater detail.