

8. The Kurbini wetlands

Summary

The Patogu transitional complex with a total area of about 47 km² extends between the delta of the Mati River and the Rodoni cape and touches with the Rodoni bay the Adriatic Sea. The Patogu lagoon is the most relevant wetland of the region. The lagoons and all the wetlands extending north of the Ishmi mouth belong to the municipality of Fushekuqe (district Kurbini, with its main center Laçi town). The area south of the Ishmi River is situated within the municipality of Ishmi (district Durrresi).

The region of Patogu Lagoon – Fushekuqe – Negli (Fig. 8-2) was assigned as Hunting Reserve in 1962. At that time the lagoon had a large population of pheasant *Phasianus colchicus*, now it is almost extinct. Recently (2010), the natural wetland ecosystem of Patogu-Fushekuqe-Ishmi (50 km²) has been designated as Managed Natural Reserve (4th category after IUCN) (see Tab. 5-4).



Figure 8-1: Wooden bridge across the New Patogu Lagoon connecting the old and the new sandy belt (visible at the horizon) (Photo: A. Miho).

8.1. How to reach the area

Tirana or Durresi are the sites to start an excursion to the Patogu wetlands. Patogu is about 50 km far from Tirana, passing the Kamza-Laçi crossing at the main road between Tirana and Shkodra. The Ishmi delta is about 45 km from Tirana and reached through Vora, Rinasi and Ishmi village. The Rodoni cape, the Ishmi delta and the Patogu lagoon may as well be attained from Durresi or Tirana on rural roads, through Vora, Maminasi and Lalzi (*see* Chapter 9).



Figure 8-2: Satellite map of the transitional area of Patogu, situated between the Mati delta and the Ishmi delta (Laçi) with main villages, habitats and roads (red) (Google Earth, 2012, modified).

8.2. About the most important sites

The most important sites to visit in the Patogu complex are the Patogu lagoons (old and new) (Figs. 8-2, 8-4 and 8-8). Two roads on each side of the lagoon lead the visitor to the Fushekuqe reserve and the Droja mouth. The new littoral cordon west of the new lagoon and the delta of Mati is best approached by boat or by passing over a wooden bridge (Fig. 8-1). Ishmi and Droja mouths and the wetlands between the two, Negli marsh and Godulla peninsula, are toured by rural roads to the villages of Shllinza or Adriatiku. The Rodoni cape, Ishmi delta and Patogu lagoon are approached through Lalzi Bay (see Chapter 9).

Visitors of the region should take time to attend the historical site of Kruja. From Fushe Kruja, the road serpentines up to Kruja town that surrounds the Skanderbeg fortress originating from the 5-6th century. It rises on a large and steep rock at about 610 m altitude. There are remains from the Illyrian civilisation and the roman period in Zgerdheshi village near Kruja, dating from the 6th century BC. From the castle one enjoys a wonderful view on the coastal plain region and the coast line of the Patogu wetlands at the Rodoni bay.



Figure 8-3: Kruja castle
(Photo: A. Miho).

8.3. Physico-geographical characteristics

The Patogu wetlands belong to the Laçi plain which is part of the lowland that extends between the towns of Lezha, Tirana and Durrësi. It is a most significant wetland in the Western Coastal Lowland of Albania and situated at the most western side of the plain. In the east it merges with the agricultural landscape of the Fushekuqe municipality. The surrounding hills and the Rodoni cape consist mainly of neogenic molasse formations of Miocene and Pliocene; while the wetland area is formed by alluvial depositions of the quaternary, impacted today by the activities of Mati, Droja and Ishmi rivers.

Figure 8-4: Aerial view of Patogu wetland in 2005 (Photo: P. Hoda).



The morphology of the area evolved during the Holocene. By passing through four stages four lagoons have been formed, following one after the other. Each one is separated

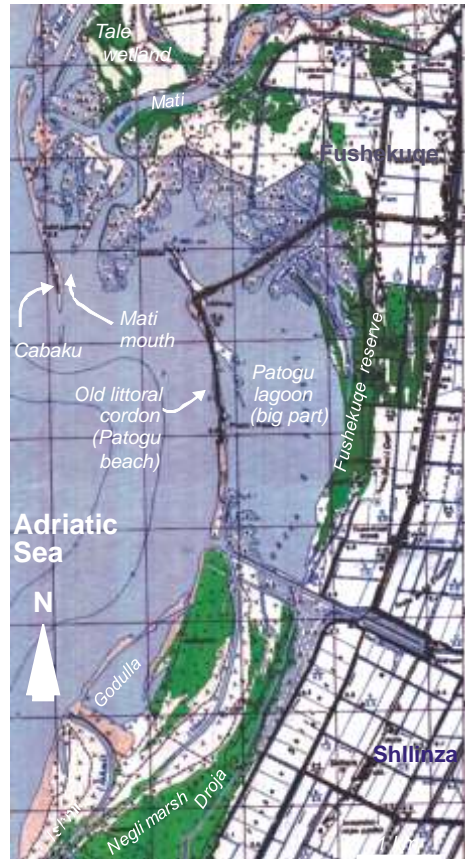
by a littoral cordon (sandy belt) (Fig. 8-4). The first lagoon arose close to Laçi town, later the other lagoons have been developed westwards. The present lagoon is the fourth one. As a result of the high sedimentation rate the Laçi plain has been built since the Pleistocene gaining a width of 10 km. This process still continues today; a new cordon becomes established and the fifth lagoon is in the process of formation. This becomes evident when a recent map (Fig. 8-2) is compared with the one from decades ago (1985; Fig. 8-5).

As the other regions along the coast, the Patogu zone is influenced by the Mediterranean plain climate characterized by high solar input (see the climate data for Kune-Vaini in chapter 7-3).

Figure 8-5: Topographic map of the Patogu wetlands 1985 (from Albanian Military Maps 1:25000; 1987)

Rarely does the temperature in Patogu drop few degrees below zero. The maximal temperatures during winter and summer may reach 19.7°C even in January and 38.8°C in July. The mean air humidity ranges between 63% in February and 72% in May. During winter the wind has a cyclone character with speeds of 5.5 to 5.8 m s⁻¹, whereas during summer slow anticyclone winds dominate.

Before 1950 the original natural cover with swamps and forests fully dominated the landscape. After that about 42 km² of wetlands have been drained and turned into arable land. The municipality of Fushekuqe spreads over a territory of 33 km² with the five villages of Adriatiku, Patogu, Gore, Gurrezi and Fushekuqe with combined about 7600 inhabitants.



8.4. Description of the most important habitats

The complex of Mati-Patogu with a total surface of about 47 km² is rich in water resources and transitory habitats, it is composed of several lagoons, ponds and wet meadows, like the Stami Bregu Detit, the Patogu lagoon, the Old Grapshi river, the Kukli meadow, the Godulla peninsula, the Big lake, the Small lake and the deltas of Mati, Ishmi and Droja (Fig. 8-2).

The wide region surrounding Fushkuqe is below sea level and has to be drained by a pumping station. The zone is rich in subterranean water, which is used to supply most of the drinking water for Durresi and Kavaja, as well as for many urban centers along the 125 km of pipelines between Fushkuqe and Durresi, with a yield of 700 to 750 l s⁻¹.

The coastal line has always been very active and dynamic. It moves towards the sea with a concurrent formation of new lagoons. The present lagoon of Patogu is the forth one in this process and a new one is about to form. The rests of the three former littoral cordons are seen along the plain between Laçi and Patogu. The dynamics of the coastal region is displayed in a continuous transformation of the marshes, dry belts, swamps and water pools and their aquatic vegetation. The villages of Gore, Fushekuqe and Patogu are now located higher than the plain and protected against river flooding and the formation of swamps in the encompassing fields.

The Patogu lagoon is a most crucial water body with a transitional character. Its total water surface including the external part amounts for 4.8 km². The surface of the surrounding watershed is 8 km² from which about 4.5 km² are cultivable land, 2 km² forests and 1.5 km² meadows. The old lagoon is split in two parts by an artificial dam, the northern part is 0.7 km², the southern one 2.7 km². An artificial channel in the northern part and a natural one in the south link the old lagoon to the outer part of the new lagoon.

There are no comprehensive limnological studies on the lagoon system. Some data are presented in tables 8-1 and 8-2 (Guelorget and Lefebvre, 1993; Xhulaj, 2009). Oxygen concentrations are close to saturation and the pH is slightly alkaline with some differences between the sampling sites in the new and the old lagoon. Based on physical-chemical and phytoplankton data it has been suggested to use the Patoku lagoons for extensive farming of detritivorous fish (e.g. mullets) or penaeid shrimps.

Table 8-1: Physic-chemical parameters of the Patogu lagoon system in April 1993; OL, old lagoon; NL, new lagoon; t, temperature; O₂, oxygen; S, salinity; TSS, total suspended solids; OM, organic matter; Chl a, chlorophyll a; Pheo a, Pheophytin a (Guelorget and Lefebvre, 1993).

Sampling site	t° (C)	O ₂ (mg l ⁻¹)	S (‰)	TSS (mg l ⁻¹)	OM (mg l ⁻¹)	Chl a (mg m ⁻³)	Pheo a (mg m ⁻³)
Old lagoon							
Littoral east 1	20.3	9.5	15.7	10.7	4.9	4.3	17.3
Littoral east 2	20.6	13.2	17.2	7.3	2.0	3.2	10.7
Centre	20.0	7.5	18.0	9.3	2.0	1.9	7.6
Littoral west		12.2	25.9	13.3	3.3	1.3	10.5
Connecting channel	-	11.3	23.7	14.0	4.0	2.1	7.6
New lagoon							
Centre	-	11.6	23.3	8.0	4.0	0.4	2.3
West	-	-	33.1	8.0	3.3	0.7	2.6

Table 8-2: Physic - Chemical parameters in the new (NL) and old lagoon (OL) of Patogu in November 2004 and April 2005. t, temperature; Cond, conductivity; TDS, total dissolved solids; S, salinity; DO, dissolved oxygen; O₂, oxygen (after Xhulaj, 2009).

Stations	t (°C)	Cond (mS cm ⁻¹)	TDS (g l ⁻¹)	S (‰)	DO (%)	O ₂ (mg l ⁻¹)	pH
Nov-04							
NL	7.6	47.75	31.2	30.9	126.5	12.3	8.0
OL	9.3	53.03	34.8	35.0	104.7	9.6	8.0
Apr-05							
NL	14.8	33.50	21.8	21.1	94.1	8.3	9.0
OL	16.0	46.70	30.2	30.2	91.7	7.6	8.8

The formation of the old lagoon started at the beginning of the 20th century, its littoral belt was formed between 1950 and 1960. The process was accelerated by high amounts of solids transported by the rivers Mati, Droja and Ishmi. At present the lagoon becomes slowly transformed to marshland, visible at many surrounding sites; the littoral belt that separates the new lagoon is narrow and highly eroded (Fig 8-6).



Figure 8-6: *Above:* The narrow littoral belt separating Old and New lagoons; *below:* the new littoral belt that separates the Adriatic Sea (left) and the New lagoon (right) (Photos: A. Miho).



The southern part of the sandy belt served earlier as swimming beach for the local people, but due to the transformation to marshland and the strong erosion in the most southern part, the beach has now been abandoned.

The new littoral cordon (the new sandy belt) is about 500 m wide (Fig. 8-6); it has been shaped after 1980 in north-south direction parallel to the former cordon. It extends from the delta of Mati to the Droja mouth. The outer lagoon seems to be nearly formed according to most recent satellite images. The lagoon is connected with the sea through large channels. The altitude of the new sandy belt varies between 0.5 to 2 m a.s.l. It becomes now invaded by pioneering vegetation and a new sea beach is established. The new sandy belt with special geomorphological and biological values is listed among the Albanian Natural Monuments.

In contrast to the dynamic accumulation of sediments in the Droja-Mati area, excessive erosion is observed in many other parts of the seacoast, especially in the southern part between the Ishmi and Droja mouths near the Godulla peninsula. The displacement of the coast towards the inland in the past decades amounts for about 200 m, giving an estimated erosion rate between 5 to 10 m per year. As a consequence the littoral cordon that separates the old lagoon became fragmented and almost disappeared in the southern part. This process was probably intensified in the watershed area in the last century by human activities, when the two large dams have been built at the Mati river in 1959 and 1963. This was combined with the complete displacement of the Mati delta (1979) and the Droja river (1990) on both sides of the Patogu lagoon.

Furthermore poor land use practices in the Tirana area, massive gravel mining in the Ishmi river bed and its tributaries Terkuza and Tirana, especially during the last decade boosted the degradation of the cordon. The erosion had strong negative effects on many tourist infrastructures in the Patogu beach zone, especially on the old littoral cordon.

In the northern part the zone borders to the plain of the Mati river and its delta (Fig. 8-2). The average flow of the river is about $100 \text{ m}^3 \text{ s}^{-1}$, but maxima of up to $3'400 \text{ m}^3 \text{ s}^{-1}$ have been recorded. The total solids transported by the river may reach $1.9 \text{ million t yr}^{-1}$.

The Cabaku peninsula of about 4.5 ha in size stands within the delta of Mati. It is a small island being about 0.5 to 1.5 m above sea level and formed by the activity of marine and fluvial accumulations. It is rich in herbaceous plants and also a former nesting site of the Dalmatian pelican, the habitat has been named as a Natural Monument. The artificial displacement of the Mati delta towards the Rodoni bay, the old riverbed and its wetlands near the Tale village have been discussed before in chapter 7 with the Lezha wetlands.

In the southern part near the Rodoni bay the Ishmi delta became formed. The mean annual flow of the Ishmi river is about $21.5 \text{ m}^3 \text{ s}^{-1}$, with a recorded maximum of $1980 \text{ m}^3 \text{ s}^{-1}$. The total solids transported reach up to $2.1 \text{ million t yr}^{-1}$. After reclaiming much of the area, the Ishmi river has been formed by combining the tributaries Droja, Terkuza, Tirana and Lana. In 1990 the Droja river was again redirected straight into the sea. The Droja delta is now located in the southern part of the Patogu lagoon which accelerated the formation of a new lagoon. As a consequence the flow rate of the Ishmi and the size of its delta decreased, parallel to the enhanced erosion in the northern part.

Miho *et al.* (2005) in an integrated study on environmental state of some rivers of Albanian Adriatic Lowland reported that before 1990 the sediments of the Mati delta had a high content in the heavy metals copper, chromium, iron, nickel and manganese, values clearly higher than those found in other estuary sediments in the Adriatic or worldwide. In contrast, during their monitoring approach May 2002 - March 2004, concentrations of soluble heavy metals were unexpectedly low in the water, in sediments and in the biota from the large Albanian rivers Mati, Ishmi, Shkumbini and Semani. This is obviously a consequence of the present low impact from the abandoned mining industry either in the Mati and Ishmi watersheds .

On the other side, Tirana and Lana rivers collect the entire wastewater from Tirana capital and its suburbs (Fig. 8-7). Therefore, Miho *et al.* (2005) reported that the water quality within Ishmi watershed was worse of all rivers assessed (See also Tab. 5-10; Fig. 5-4; § 5.5 in Chapter 5).



Figure 8-7: Panorama view of Tirana Capital from Dajti Mountain (about 1000 m a.s.l) with the schematized tributaries of Ishmi river (Photo: A. Miho).

As a consequence the water is highly polluted with organic material leading to high saprobic values for the Ishmi and its tributaries (- mesosaprobic to polysaprobic). Nitrite is an indicator of high oxygen demand in polluted aquatic systems. High pollution causes both oxygen loss and denitrification, in parallel increased values for ammonia and phosphate are found. A high value for total suspended solids (TSS) is more related to the erosion activity of the rivers in the catchment area than to pollution (Fig. 8-8; see also Tab. 5-10; Fig. 5-4). In addition, besides the heavy urban and industrial impact on water quality, poor land use practices are widespread with illegal deforestation or gravel mining in the Ishmi tributaries. This affected the geomorphology of the coastal zone and disturbed its biodiversity. We believe that the situation is not really improved in Ishmi watershed, but in certain aspects it might be even worsened (Miho *et al.*, 2010; ABCNews, 2013).

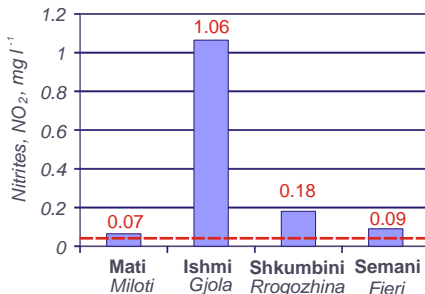


Figure 8-8: Average concentrations of nitrite (NO₂⁻, mg/l⁻¹) transported in the Adriatic Sea (see also Tab. 5-10), at the coastal stations of some Albanian rivers between May 2002 and March 2004 (Miho *et al.*, 2005). The red dashed line indicates the value of 0.03 mg l⁻¹, which is the Fish Directive 44 (2006) of the third class limit concerning the quality of fresh water needing protection or improvement in order to support fish life.

The Negli marsh with the Godulla peninsula is a wetland system of about 8 km² embedded between the deltas of the rivers Ishmi and Droja. It is a swampy area with sparse brackish water pools surrounded by reed beds; tamarisks are the most dominant shrubs. Cultivated pine trees grow along the littoral dunes. The sandy beach area suffers from the strong activity of erosion by the sea.

8.5 Biodiversity of the Patogu wetlands

Flora: About 166 higher plant species have been recorded within the whole Patogu-Fushekuqe area, most of them belong to the grasses (*Poaceae*). About 15 species are endangered, examples are the English oak (*Quercus robur*) and the Aleppo pine (*Pinus halepensis*). In the coastal part of Fushekuqe 20 individuals of the Aleppo pine of an age of about 120 years still exist.

More than 40% of the marshy ground of the Patogu lagoon is covered by submersed phanerogams, mainly by the seagrass *Zostera noltii* and the Spiral ditchgrass *Ruppia cirrhosa* in the calmer and sheltered habitats, as observed in other Albanian lagoon areas. Macro algae grow also associated with sea grasses, such as the green algae *Cladophora* spp., *Ulva intestinalis* and *U. laetevirens*.



Common reed (*Phragmites australis*) prospers in large areas in peripheral parts of the lagoons and associations with Narrowleaf cattail (*Typha angustifolia*) cover limited surfaces often in fresh water channels in the southern part. Bulrush (*Scirpus* spp.) grows in many places in all lagoons. In the northern and southern littorals several halophyte associations thrive, mainly succulent species dominated largely by *Arthrocnemum* plants (*A. fruticosum*, *A. perenne*, *A. glaucum*). A small number of other species accompany them, like *Salicornia europaea*, *Limonium vulgare*, *Inula crithmoides*, *Halimione portulacoides*, or *Artemisia coerulescens*. Other communities include the Sea rush (genus *Juncus*, mainly *J. acutus* and *J. maritimus*) (Figs. 8-9 and 8-10).

Sandy dune vegetation develops in the sandy belts in the western part, it is scarce near to the water, but becomes gradually denser with distance from it. Typical representatives are listed in table 8-3. About half of the former forests have been damaged in the past decade, notably in the zones of gravel digging of Lameti, Patogu and Mati. The most important forest area is in Fushekuqe, where a Mediterranean alluvial mixed forest spreads. The dominant trees are alder (*Alnus glutinosa*), Narrow-leaved ash (*Fraxinus angustifolia*), less frequent is elm (*Ulmus campestris*), oak (*Quercus robur*), White poplar (*Populus alba*), Stone pine (*Pinus pinea*) and Aleppo pine (*P. Halepensis*).

Scientific name	Common name	Albanian name
<i>Cakile maritima</i>	European searocket	Brokra bregdetare
<i>Cyperus capitatus</i>	Capitate galingale	Truska
<i>Echinophora spinosa</i>	Prickly parsnip	Ekinofora gjembake
<i>Ephedra distachya</i>	Ephedra distachya	Gjinjeza dykallinjeshë
<i>Eryngium maritimum</i>	Sea holly	Gjembardhi bregdetar
<i>Medicago marina</i>	Sea medick	Jonxha detare
<i>Salsola kali</i>	Prickly glasswort	Kembekuqja
<i>Xanthium strumarium</i>	Rough cocklebur	Rodhja, Ksanti italian

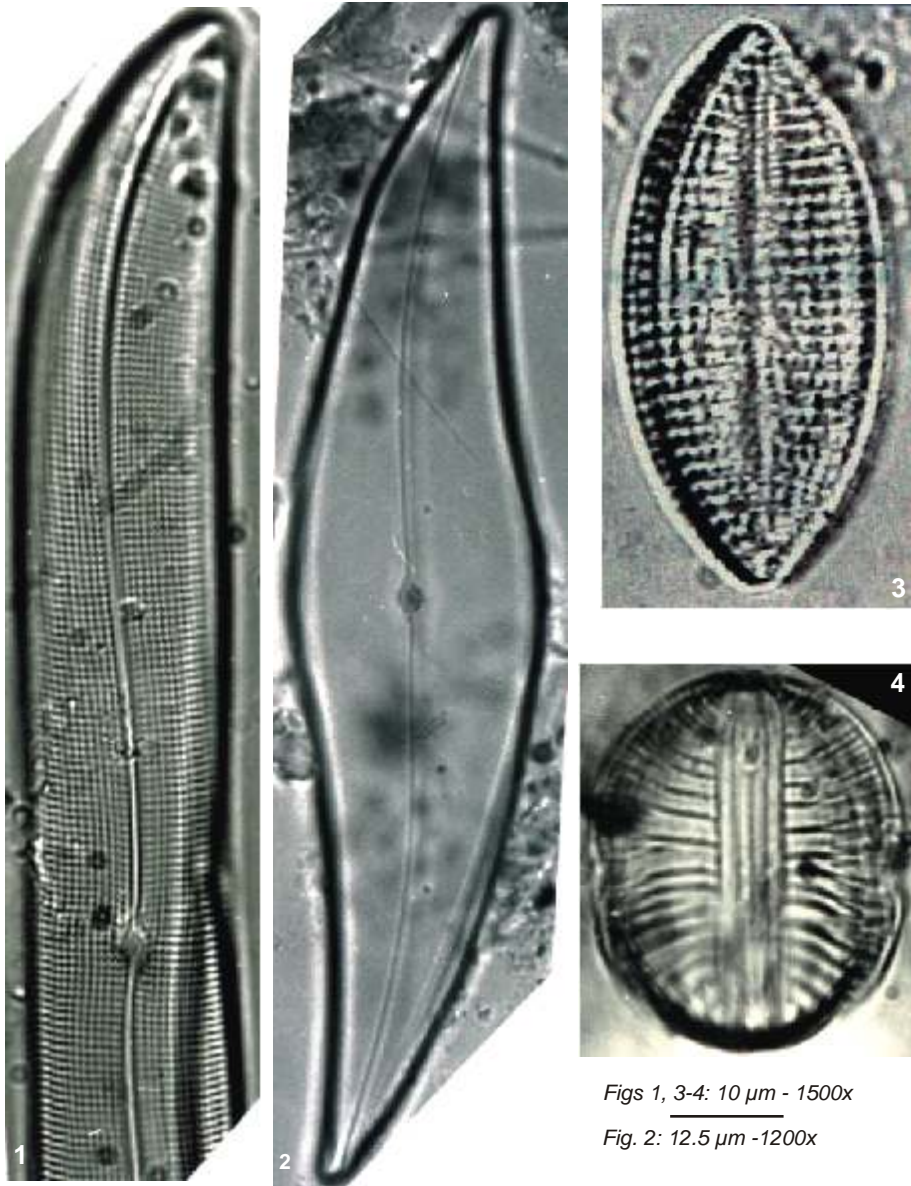
« « « **Figure 8-9:** Patogu lagoon and Fushekuqe forest at its border (Photo: S. Beqiraj).



Figure 8-10: Typical habitats in the Patogu lagoon (Photo: S. Beqiraj).

About 120 diatom taxa have been identified in the Patogu habitats, the most frequent species are listed in table 8-4 and illustrated in figures 8-11 and 8-12. Compared to other lagoons, the phytoplankton density in the Patogu lagoon was moderate with 190 to 632 cells ml⁻¹ and it consisted mainly of pennatae diatoms.

<i>Achnanthes brevipes</i>	<i>Cocconeis scutellum</i>	<i>Navicula gregaria</i>
<i>Achnantheidium minutissimum</i>	<i>Cyclotella comensis</i>	<i>Nitzschia amphibia</i>
<i>Amphora pediculus</i>	<i>Cyclotella meneghiniana</i>	<i>Nitzschia frustulum</i>
<i>Aulacoseira ambigua</i>	<i>Fragilaria capucina</i> var. <i>capucina</i>	<i>Rhoicosphenia abbreviata</i>
<i>Aulacoseira granulata</i>	<i>Melosira varians</i>	<i>Thalassiosira oestrupii</i>
<i>Cocconeis placentula</i> var. <i>placentula</i>	<i>Navicula duerrenbergiana</i>	



Figs 1, 3-4: 10 μm - 1500x

Fig. 2: 12.5 μm -1200x

Figure 8-11: Some common microscopic siliceous algae (diatoms) from the Patogu lagoon: 1: *Gyrosigma balticum*; 2: *Pleurosigma angulatum*; 3: *Nitzschia compressa*; 4: *Rhopalodia gibba* var. *minuta* (Photos, A. Miho).

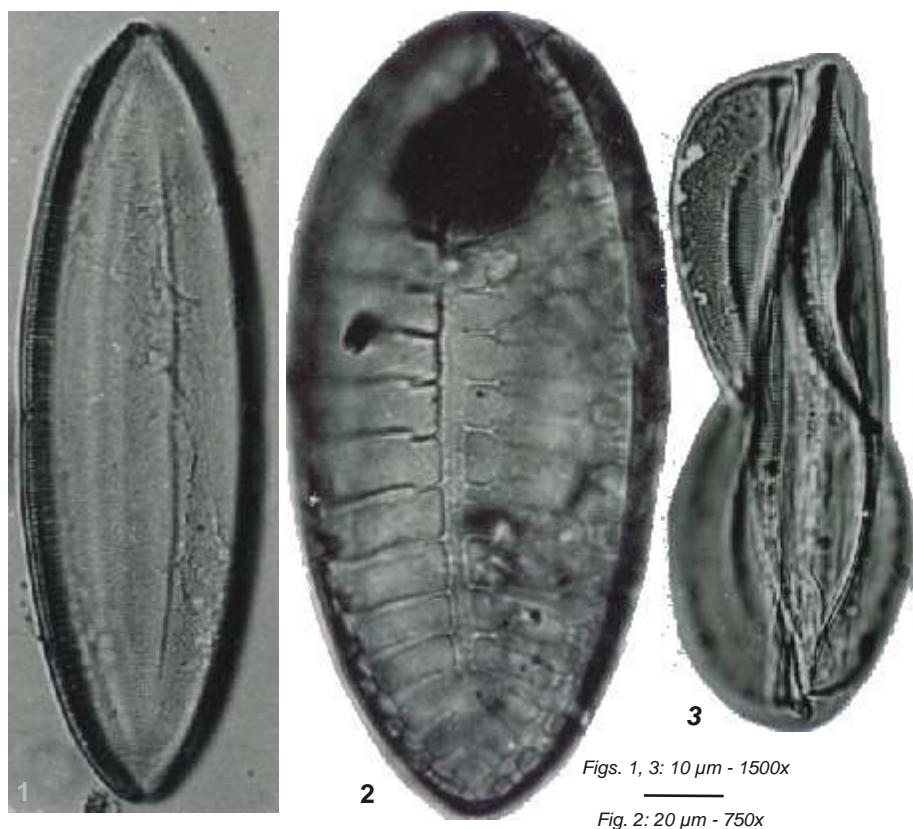


Figure 8-12: Some common microscopic siliceous algae (diatoms) from Patogu lagoon:
1: *Nitzschia circumscuta*; 2: *Surirella fluminensis*; 3: *Entomoneis paludosa* (Photos: A. Miho).

Shrubs disseminate extensively (Tab. 8-5) mixed with liana species. Poplar and Locust (*Robinia pseudoacacia*) are cultivated. There still exist areas with White poplar in Ishmi and with alder in the Mati gravel. Shrubs like tamarisks, Chaste tree and Elmleaf blackberry are dominant on the Godulla peninsula. Despite of the strong environmental impact the tamarisks recovered and are abundant also on the Lameti and Droja riverbanks (Fig. 8-13).

Table 8-5: Shrub vegetation in the Patou wetlands.		
Scientific name	Common name	Albanian name
Shrubs		
<i>Crataegus monogyna</i>	Common hawthorn	Murriz njeberthamor
<i>Juniperus oxycedrus</i>	Prickly juniper	Dellinja e kuqe
<i>Pyracantha coccinea</i>	Firethorn	Ushinthe
<i>Rosa sempervirens</i>	Evergreen rose	Trendafil i breshkes
<i>Rubus ulmifolius</i>	Elm leaf blackberry	Manaferra, Ferremane
<i>Tamarix</i> spp.	Tamarisks	Marina
<i>Vitex agnus-castus</i>	Chaste tree	Konopica
Liana species		
<i>Clematis viticella</i>	Virgin's bower	Kulpra e zeze
<i>Hedera helix</i>	Common ivy	Urthe
<i>Periploca graeca</i>	Silk vine	Shtalpra
<i>Smilax aspera</i>	Rough bindweed	Morenxa

Figure 8-13: Habitats at the Patogu lagoons
(Photo: L. Kashta)



Fauna: The benthic fauna in Patogu lagoon is rather poor, especially in the northern part which is often flooded by the Mati river. Only 12 mollusks species, 5 gastropods and 7 bivalves have been reported. The most

common and abundant are *Cyclope neritea*, *Cerastoderma glaucum*, *Scrobicularia cottardi* and *Scrobicularia plana*. In freshwater habitats, the snails *Lymnaea stagnalis* and *Planorbis planorbis* are quite frequent. In addition a large population of terrestrial mollusks has been observed, these are also common in forests, meadows, fields and riverbanks scattered between the families of the *Helicidae*, *Hygromiidae* and *Clausiliidae*. Endangered species are listed in table 8-6.

Table 8-6: Endangered mollusks species from Patogu wetlands (URDHER 146, 2007) .		
Scientific name	Common name	Albanian name
<i>Chamelea gallina</i>	Striped venus	Venusi me shirita
<i>Mytilus galloprovincialis</i>	Mediterranean mussel	Midhja e zeze
<i>Solen marginatus</i>	Grooved razor shell	Midhja myll
<i>Venerupis decussata</i>	Chequered carpet shell, Cross-cut carpet shell	Midhja tapet

Cephalopods are also frequent in the marine water, like cuttlefish, squid and octopus. These are also crucial for sea fishing. In the lagoons they are less numerous. More common in the brackish water of the lagoons are the snails *Cerithium*, *Hydrobia* and *Cyclope*, the mussels *Scrobicularia* and *Cerastoderma*.

Many different marine crustaceans are found in lagoons; the most prevalent genera are listed in table 8-7. Especially the Prawn (*Penaeus kerathurus*) is an important catch in marine fishing. Many crustaceans found in the Rodoni and Patogu regions are endangered (Tab. 8-8).

The Blue crab *Callinectes sapidus* (Fig. 8-14), an invasive species, recorded also in other lagoons (i.e. Viluni, Butrinti or Narta), has been recently recorded as quite abundant and established in the Patogu lagoon.



Figure 8-14: The Blue crab, *Callinectes sapidus*, a highly invasive species found recently in Patogu lagoon (Photo: L. Kashta).

Scientific name	Common name	Albanian name
<i>Carcinus</i>	Common littoral crab	Gerthia
<i>Crangon</i>	Common shrimp	Karkalec
<i>Dardanus</i>	Hermit crabs	Gaforre barkbute
<i>Dorippe</i>	Swimming crab	Gaforre
<i>Goneplax</i>	Angular crab	
<i>Inachus</i>	Spider crab	
<i>Liocarcinus</i>	Swimming crab	Gerthia kembelopate
<i>Maja</i>	European spider crab	Merimange deti
<i>Nephrops</i>	Lobsters	Karkalec i eger
<i>Paguristes</i>	Hermit crabs	Gaforre barkbute
<i>Pagurus</i>		
<i>Palaemon</i>	Common prawn	Karkalec
<i>Penaeus</i>	Tiger prawn	Karkaleci i detit
<i>Scyllarus</i>	Slipper lobsters	Gaforre

<i>Alpheus dentipes</i>	<i>Hipolite longirostris</i>	<i>Palinurus elephas</i>
<i>Brachynotus sexdentatus</i>	<i>Hommarus gammarus</i>	<i>Parthenope angulifrons</i>
<i>Callianassa tyrrhena</i>	<i>Maja squinado</i>	<i>Pinnotheres pisum</i>
<i>Crangon crangon</i>	<i>Paguristes oculatus</i>	<i>Pisa armata</i>
<i>Eriphia verrucosa</i>	<i>Palaemon serratus</i>	<i>Thoralus cranchii</i>

The insects represent the largest group among animals with about 130 species recorded in the region, most of them found in the swamps, channels and forests. They belong to dragonflies (*Odonata*), grasshoppers (*Orthoptera*), bugs (*Hemiptera*), beetles (*Coleoptera*), butterflies (*Lepidoptera*), flies and mosquitoes (*Diptera*). The following insects are referred to be endangered: *Mantis religiosa*, *Empusa egea*, *Libelloides ottomanus*, *Myrmeleon formicarius*, *Zerynthia polyxena* and *Gonepteryx deopatra*.

Both the lagoons and the marine habitats are relevant for fishing (Fig. 8-15), as well as the Ishmi River. About 56 fish species have been noted. Most common in the lagoons are three species of gray mullets, eel, red mullet, common sole, sea bream and sea bass.

The total annual yield in fish is about 40 t, but with a decreasing trend. Most of the catch concerns mullets with about 36.5 t y⁻¹. The rest is eel and other species. Main fish species basic for the fish diversity in the lagoons and in the marine habitats are listed in table 8-9.

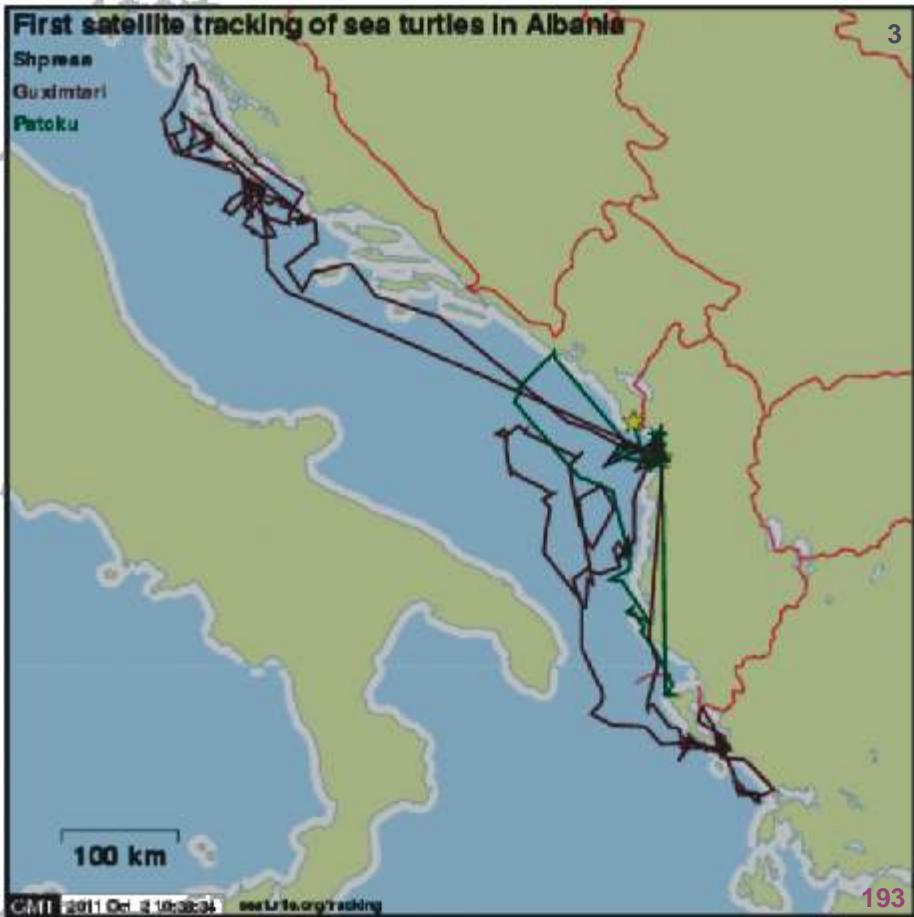
Table 8-9: Fish in the Patogu region.		
Scientific name	Common name	Albanian name
Common in Patogu wetlands		
<i>Anguilla anguilla</i>	Eel	Ngjala
<i>Aphanius</i> spp.	South european toothcarp	Çeliku
<i>Atherina hepsetus</i>	Mediterranean sand smelt	Aterina
<i>Dicentrarchus labrax</i>	Sea bass	Levreku
<i>Diplodus</i> spp.	Seabream	Sargu
<i>Engraulis encrasicolus</i>	European anchovy	Açuga
<i>Gobius bucchichi</i>	Bucchich's goby	Burdullaku
<i>Lithognathus mormyrus</i>	Sand steenbras	Murra
<i>Liza aurata</i>	Gray mullet	Veshflorini
<i>Liza ramada</i>	Gray mullet	Qefulli i vjeshtes
<i>Mugil cephalus</i>	Gray mullet	Qefulli i verës
<i>Mullus barbatus</i>	Red mullet	Barbuni
<i>Oblada melanura</i>	Saddled seabream	Melanura, Spalca shalezese
<i>Solea vulgaris</i>	Common sole	Gjuheza e zakonshme
<i>Sparus aurata</i>	Sea bream	Kocja
<i>Sprattus sprattus</i>	European sprat	Papalina
<i>Symphodus cinereus</i>	Grey wrasse	Buzoçi i hirtë
<i>Syngnathus</i> spp.	Seaweed pipefishes	Peshku gjelpere
<i>Trachurus mediterraneus</i>	Mediterranean horse mackerel	Stavrida mesdhetare
Other species in marine habitats		
<i>Alosa fallax</i>	Twaite shad	Kubla
<i>Boops boops</i>	Bogue	Vopa
<i>Conger conger</i>	European conger	Ngjala e eger, Ngjala e detit
<i>Dasyatis pastinaca</i>	Common stingray	Shkoterra, Trigoni, Bishtmii
<i>Sardina pilchardus</i>	European pilchard	Sardelja, Bokfa
<i>Scophthalmus maximus</i> (<i>Rhombus maximus</i>)	Trubot, European flounder	Shkotra
<i>Squatina squatina</i>	Angel shark	Peshku engjell, Engjelli i detit, Skadhina
<i>Torpedo marmorata</i>	Marbled electric ray	Peshk elektrik i mermerte
<i>Trachurus trachurus</i>	Atlantic horse mackerel	Stavrida atlantike, Stavridhi
<i>Trigla</i> spp.	Piper gurnard	Peshku gjel, Peshkagjeli



Figure 8-15: Amateur fishermen and tourists at the main channel connecting two lagoons (Photo: A. Miho).



Figure 8-16: Visit in the Patogu lagoon during the sea turtle satellite tracking in September 2009 (Photo: A. Miho).



Several species are mentioned as endangered, *Aphanius* spp. have not been seen to visit the lagoon recently, *Lichia amia* and *Argyrosomus regius* are two quite demanded species, but heavily endangered. Two species of sharks (*Carcharodon carcharias* and *Galeus malastomus*) that are occasionally observed in the marine water of the Rodoni bay are considered globally threatened. In addition *Petromyzon marinus* and *Uranoscopus scaber*, which are present in the Patogu lagoon, also belong to the red list.

Figure 8-17: Running after a sea turtle
(Photo: I. Haxhiu)

About 9 species of amphibians have been listed for the region which amounts for about half of the species known for Albania, 3 frogs (*Rana* spp.), 2 toads (*Bufo* spp.), 2 newts (*Triturus* spp.) and one tree frog (*Hyla arborea*). About 26 species of reptiles are known for the region. The Sea turtle (*Caretta caretta*) frequently visits the shallow marine waters, it has been first observed in 1993. The Green turtle (*Chelonia mydas*) was first observed in the Rodoni bay in 2002; most of the individuals were of juvenile stage (Fig. 8-17).



Figure 8-18: 1: Individuals of the sea turtle *Caretta caretta*, one adult female and two sub-adults males from Patogu lagoon in a tagging experiment (white arrows) by Prof. M. White (left) and Prof. I. Haxhiu (right) in the project 'Monitoring and Conservation of Important Sea Turtle Feeding Grounds in the Patogu Area of Albania, 2008-2010'. 2: Return of the turtles to the sea on September 12th 2009 (Photos: A. Miho). 3: Satellite tracking results until 02 October 2011 (http://www.seaturtle.org/tracking/index.shtml?project_id=445). » » »

Since 2008 more than 200 sea turtles have been tagged in Patogu and in September 2009 the first satellite tracking has been carried out with three individuals (Fig. 8-16 and 8-18).

Two terrapin species live in the Patogu area, *Emys orbicularis* and *Mauremys caspica*; they inhabit the freshwater channels and marshes. At dryer sites, especially in forests, the Herman's tortoise (*Testudo hermani*) is frequently found. Other reptiles present are the legless lizards (*Ophisaurus apodus*, *Anguis fragilis*), and snakes (*Coluber* spp., *Elaphe* spp., *Malpolon monspessulanus*, *Natrix* spp., *Telescopus fallax* and *Vipera ammodytes*).

The Fushekuqe region offers a high diversity of undisturbed habitats that are fundamental for birds: the sea coast, lagoons and marshes, river estuaries, channels, the Fushekuqe forest and other forested spots and finally the agricultural fields. The zone is well connected with Lezha and Velipoja habitats in the north and Lalzi and Karavasta ones in the southern part, as well as with many other wetlands within the country. As most of those, the zone is part of an important migration road for birds. The most represented and abundant bird species belong to the *Charadriiformes*. Of high importance are the forest and shrub zones, providing habitats in the region for about 50% of the species listed, followed by reed beds and the open zones. Some present bird species are globally endangered, like the Slender-billed curlew (*Numenius tenuirostris*), the Dalmatian pelican, the Lesser kestrel (*Falco naumanni*), the Pygmy cormorant, or the Pallid harrier (*Circus macrourus*).

About 70 wintering bird species have been reported for the zone, more than half of them in the Fushekuqe forest (43 species). Most belong to the sparrows (*Passeriformes*) and 27 are waterfowl species. In 2001 about 2100 individuals of various waterfowl species have been counted, which amounts for about half of the number evaluated in 1996. Most abundant were species of the *Charadriiformes*, ducks (*Anseriformes*) and seagulls (*Lariformes*). Among the endangered wintering birds the most frequent were the Pied avocet (*Recurvirostra avosetta*), the Eurasian curlew (*Numenius arquata*) and the Kentish plover (*Charadrius alexandrinus*).

About 179 species of birds were inventoried in 2001 in the spring period, with about 72 waterfowl species. Most were found in the forested zones. Passerines with 71 species formed the majority, followed by snipes, gulls and other seabirds (*Charadriiformes*) with 39 species, ducks with 15, predatory birds with 15 and herons and egrets with 11 species. Waterfowls were the most abundant in individuals. The most common are listed in table 8-10.

Table 8-10: Documented as nesting birds in Patogu wetlands.

Scientific name	Common name	Albanian name	Notes
<i>Acrocephalus scirpaceus</i>	Reed warbler	Rogozhari cicerues, Bilbilthi i kallamave, Çika	most abundant sparrows
<i>Apus apus</i>	Common swift	Dejka	
<i>Ardea cinerea</i>	Grey heron	Çafka e perhime	years ago
<i>Burhinus oedichnemus</i>	Stone curlew	Gjelaci symadh	years ago
<i>Buteo buteo</i>	Common buzzard	Huta, Orli, Petriti minjngrenes	
<i>Cettia cetti</i>	Cetti's warbler	Bilbili i kenetave	most abundant sparrows
<i>Charadrius alexandrinus</i>	Snowy plover	Vrapuesi gushebardhe	10 to 30 couples currently
<i>Cisticola juncidis</i>	Zitting cisticola, Streaked fantail warbler	Sqepholli i xunktheve	most abundant sparrows
<i>Dendrocopos syriacus</i>	Syrian woodpecker	Qukapiku i zakonshem larosh	
<i>Gallinula chloropus</i>	Common moorhen	Pula e ujit, bariu	few couples today
<i>Hippolais pallida</i>	Olivaceous warbler	Perqeshesi i vogel i ullinjve	most abundant sparrows
<i>Ixobrychus minutus</i>	Little bittern	Gakthi i vogel	few couples today
<i>Miliaria calandra</i>	Corn bunting	Cerla e zakonshme, cerla, Fuga gretha	most abundant sparrows
<i>Motacilla flava</i>	Yellow wagtail	Bisht lekundes i verdhe	most abundant sparrows
<i>Sterna albifrons</i>	Little tern	Dallendyshja e detit ballbardhe	few couples today
<i>Streptopelia turtur</i>	European turtle dove	Turtulli, Turtullesha	
<i>Tachybaptus ruficollis</i>	Little grebe	Kredharaku i vogel	years ago 195

Among endangered visitors are again the Dalmatian pelican (*Pelecanus crispus*), the Pygmy cormorant (*Phalacrocorax pygmaeus*), the White stork (*Ciconia ciconia*), the Spoon bill (*Platalea leucorodia*) and especially the Slender billed curlew (*Numenius tenuirostris*) which has been observed so far only in 1992.

About 34 species of birds are nesting there, most of them are Passerines. No large bird colonies seem now to be present in the Patogu zone. About 6 nesting species belong to waterfowls. In 2001, few pairs of the Little bittern (*Ixobrychus minutus*) and the common moorhen (*Gallinula chloropus*), some more pairs of the Little tern (*Sterna albifrons*), and 10 to 30 pairs of the Snowy plover (*Charadrius alexandrinus*) were recorded. Earlier, the Little grebe (*Tachybaptus ruficollis*), the Grey heron (*Ardea cinerea*) and the Stone curlew (*Burhinus oediacnemus*) had been observed. From the passerines the most abundant species were the Yellow wagtail (*Motacilla flava*), the Streaked fantail warbler (*Cisticola juncidis*), the Reed warbler (*Acrocephalus scirpaesus*), Cetti's warbler (*Cettia cetti*), the Olivaceous warbler (*Hippolais pallida*) and the Corn bunting (*Miliaria calandra*). Other birds mentioned to nest are the Common buzzard (*Buteo buteo*), the European turtle dove (*Streptopelia turtur*), the Syrian woodpecker (*Dendrocopus syriacus*) or the Common swift (*Apus apus*). The nesting of the Dalmatian pelican in Mati delta (Cabaku) seems now to be only a record of former times. The Ishmi was also famous for pheasant, a species now reduced to a few individuals.

Among the waterfowl species encountered in autumn, the most common were *Charadriiformes* (about 54% with whimbrels (*Numenius* spp.), greenshanks and sandpipers (*Tringa* spp. and *Calidiris* spp.) and Lariformes (40% with various gulls (*Larus ridibundus* and *L. cachinnans*). Moreover, although in smaller numbers, ducks are common visitors, i.e. *Anas penelope*, *A. clypeata*, *A. platyrhynchos*. Herons and egrets are also common during summer, mainly *Egretta garzetta*, *E. alba* and *Ardea cinerea*.

Among predatory species the harriers (*Circus aeruginosus*, *C. cyaneus*, *C. macrourus*), the Common buzzard (*Buteo buteo*), the kestrels (*Falco tinnunculus* and *F. naumanni*) have been recorded.

Table 8 -11: Waterfowls in the Patogu region.		
Latin name	Common name	Albanian name
Spring observations		
<i>Acrocephalus arundinaceus</i>	Great reed-warbler	Bilbilthi fushor i kallamave
<i>Anas clypeata</i>	Northern shoveler	Sqepluga, Rosa sqepluge
<i>Calidris ferrugin ea</i>	Curlew sandpiper	Gjelaci
<i>Egretta garzetta</i>	Little egret	Çafka e bardhe e vogel,
<i>Falco vespertinus</i>	Red-footed falcon	Skifteri kembekuq
<i>Larus cachinnans</i>	Caspian gull	Pulebardha kembeverdhe
Fall observations		
<i>Anas clypeata</i> <i>Anas penelope</i> <i>Anas platyrh ynchos</i>	Ducks	Sqepluga, Rosa sqepluge Kryekuqja e madhe Rosa jeshile
<i>Anthus pratensis</i> <i>Anthus spinoletta</i>	Meadow and water pipit	Drenja e luadhit Drenja e malit
<i>Ardea cinerea</i>	Grey heron	Çafka e perhime
<i>Buteo buteo</i>	Common buzzard	Huta, Petriti minjngrenes
<i>Calidris spp.</i>	Sandpipers	Gjelaci
<i>Carduelis carduelis</i>	Goldfinch	Gardalina
<i>Circus aeruginosus</i> <i>Circus cyaneus</i> <i>Circus macrourus</i>	Harriers	Shqipja e kenetave Shqipja e fushes Shqipja e zbehte
<i>Egretta alba</i> <i>Egretta garzetta</i>	Egrets	Çafka e bardhe e madhe Çafka e bardhe e vogel
<i>Falco naumanni</i> <i>Falco tinnunculus</i>	Kestrels	Skifteri kthetraverdhe Skifteri, Petriti, Sokoli
<i>Galerida cristata</i>	Hood lark	Dervishi, Larusha me kesule
<i>Larus cachinnans</i> <i>Larus ridibundus</i>	Gulls	Pulebardha kembeverdhe Pulebardha e rendomte
<i>Numenius spp.</i>	Whimbrels	Kojliku
<i>Passer domesticus</i>	House sparrow	Harabeli, Trumcaku, Murrashi
<i>Sturnus vulgaris</i>	Starling	Cerloi i zi pikalosh, Gargulli
<i>Tringa spp.</i>	Greenshanks	Qyrylyku

Species that inhabit shrubs and fields are mainly the sparrows, like Hood lark (*Galerida cristata*), Meadow and Water pipit (*Anthus pratensis*, *A. spinoletta*), Starling (*Sturnus vulgaris*), House sparrow (*Passer domesticus*) or Goldfinch (*Carduelis carduelis*) (Tab. 8-11).

About 38 species of mammals are recorded for the whole zone, 11 of them are globally endangered. We find 8 bat species, 5 rodents and 6 carnivores. The most common carnivores are the jackal (*Canis aureus*), the fox (*Vulpes vulpes*), the otter (*Lutra lutra*), the weasel (*Mustela nivalis*), the polecat (*M. putorius*) and the badger (*Meles meles*). The hedgehog (*Erinaceus concolor*), the mole (*Talpa stankovici*), the hare (*Lepus europaeus*) and the squirrel (*Sciurus vulgaris*) are also present in the area. In the Mediterranean forests and shrubs of Rodoni one may run across wild boar (*Sus scrofa*).

Figure 8-19: New Patogu lagoon from the bridge on the main channel connecting the old and the new lagoon; the new littoral cordon is seen at the horizon (Photo: A. Miho).

