

4. Albanian marine coast - nature and biodiversity

Albania is a coastal country with a coastline of about 427 km, of which 273 km belongs to the flat Adriatic coast and 154 km to the rocky Ionian coast. Strong currents in the sea move the water along the coast; in summer large masses flow from the Greek Ionian Sea into the Adriatic while Adriatic water exits mainly along the Apulian coastline (Fig. 4-1).

4.1. Physico-geographical features of the Albanian coast

Based on morphology, the Albanian coast is divided into four main sectors as follows: the Buna delta Shengjini part; the coast between Shengjini and Vlora bay; the Vlora (Cold Water) Saranda; and, the Saranda Stillo Cape part adjacent to Greece.



Figure 4-1: Satellite map of Albania with the main prefectures; the predominant sea currents for June are shown (modified from <http://maps.google.com/maps>).

The Buna delta - Shengjini sector is about 15 km long and extends from the Buna delta, Velipoja beach (Fig. 4-2) and Viluni lagoon (*see* Chapter 6) southward to the rocky coast of the Rrenci mountain. The Velipoja beach which is about 10 km long and 300 m wide, is one of the largest and most attractive in Albania. Solid matter transported by the Buna river is continuously deposited in this area, therefore, sedimentation processes have dominated historically and have caused a continuous increase in the size of the delta and the beach.

The construction of the dams in the Drini river has drastically changed the sedimentation processes and enhanced massive erosion by the sea in the Albanian part of the delta and in parts of Velipoja beach during the past 20-25 years. Nevertheless, this region still harbors large and important transitional habitats and is a tourist attraction (*see* Chapter 6).



The Shengjini – Vlora part comprises about two thirds of the Albanian Adriatic coastline; it is characterized by a high morphologic diversity and an active dynamic coastline. It is exemplified by shallows along the coast, by wind and wave activities, and particularly by vast amounts of solid matter transported to the sea by the main rivers, Mati, Ishmi, Erzeni, Shkumbini, Semani and Vjosa. The most important transitional habitats of Eastern-Europe are formed along this sector, namely, the lagoons of Lezha (Fig. 4-2), Patogu, Karavasta and Narta (see Chapters 7 to 12). Here the tourist will also find nice beaches, attractive river mouths, pristine sandy dunes, capes and bays.

However, this zone is the most populated part of the country, and human impact, urbanization, water pollution and other activities have continuously degraded the natural value of the landscape.



Figure 4-3: Cold Water marine coast in Vlora (Photo: S. Miho).

The sector from Vlora (Cold Water; Figs. 4-2 and 4-3) to Saranda is part of mainly the Ionian Riviera with high and steep cliffs, rocky mountains and gravel beaches formed by the river mouths as a result of mountain torrents, like the Dukati torrent (Orikum). Beaches include Dhermi (Fig. 4-2), Spile, Qeparo and Borshi. This sector lacks transitional habitats but it is of high touristic value and its bottom water shelters a high diversity of flora and fauna.

«« **Figure 4-2:** Different parts of the Albanian marine coast: 1: Velipoja, Shkodra; 2: Shengjini, Lezha; 3: Sazani, Vlora; 4: Dhermi beach, Vlora; note the erosion processes by the sea in Velipoja and Shengjini (Photos: A. Miho and L. Kashta).

The sector from Saranda to the Stillo Cape is distinguished by geological depressions and permanent flooding of its flat parts caused by the lack of cliffs and gravel beaches (see Figs. 13-11). This is easily observed from the indent of the main landscape structures between the Saranda mountain and Ksamili (see Fig. 13-7) and by the deposition of erosion products in the Vrina plain. The Butrinti lagoon (see Chapter 13), which is located in a depression of tectonic origin, is the only transitional habitat. This region became well known from the many archeological findings discovered recently on land and underwater.

4.2. The Biodiversity of Albanian marine habitats

More than 170 aquatic macrophytes have been found along the Albanian coast (92 *Rhodophyceae*, 38 *Phucophyceae*, 40 *Chlorophyceae* and 4 Seagrasses). About 70% of species were found on rocky substrate, most of them in the Ionian Riviera, i.e. 8 species of *Cystoseira*, and the common species *Padina pavonica*, *Acetabularia acetabulum*, *Laurencia obtusa*, *Corallina elongata*, *Halimeda tuna* and *Cladophora prolifera*. Some interesting *Corrallinaceae*, such as *Lithophyllum byssoides*, *L. trochanter*, *L. dentatum*, *Tenarea tortuosa*, have been found only along the southern coast.



Figure 4-4: Macrophyte algae from marine habitats: the community of the brown algae *Cystoseira amentacea* in the tidal zone (infralittoral fringe), Himara (Photo: L. Kashta).



Figure 4-5: Macrophyte algae from marine habitats: 1: the red algae *Lithophyllum byssoides*, Sazani Island, Vlora; 2: the red algae, *Nematolium helminthoides*, Spille, Kavaja (Photos: L. Kashta).

Table 4-1: Algal species referred in the Red List of the Albanian Flora (Decision of the Ministry of Environment Waters and Forestry, date 8.05.2007)

Rhodophyceae

- Bornetia secundiflora*
- Catenella caespitosa*
- Digenea simplex*
- Lithophyllum dentatum*
- Lithophyllum byssoides* (=L. *lichenoides*)
- Lithophyllum trochanter*
- Tenarea tortuosa*

Phucophyceae

- Cladostephus spongiosus* fo. *hedwigoides*
- Cystoseira amentacea* var. *spicata*
- Cystoseira spinosa* var. *compressa* (=C. *adriatica*)
- Fucus virsoides*

Chlorophyceae

- Codium decorticatum*
- Polyphysa parvula*

Seagrasses

- Posidonia oceanica*
- Zostera noltii*

Endangered species recorded on the Red List of the Albanian Flora or in the Barcelona Protocol are listed in tables 4-1 and 4-2, respectively. Some macrophyte algae are illustrated in figures 4-4 to 4-6.

Table 4-2: Marine species included in the Annex II of the SPA Protocol (Barcelona Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, 1995)

- Lithophyllum byssoides*
- Cystoseira amentacea* var. *spicata*
- Cystoseira spinosa* var. *compressa*
- Posidonia oceanica*
- Zostera noltii*



Figure 4-6: Macrophyte algae from marine habitats: **1:** the brown algae *Padina pavonica* at Lukova, Saranda; **2:** the red algae *Peyssonelia squamaria* at Ksamili, Saranda; **3:** the brown algae *Cystoseira amentacea* at Kakome, Saranda; **4:** the green algae, *Acetabularia acetabulum*; **5:** a green algae *Codium* spp., Fteli, Saranda; **6:** the brown algae, *Cystoseira spinosa*, Karaburuni, Vlora (Photos: L. Kashta).

The sandy substrate of the infra-littoral zone, mainly along the Adriatic coastline, is inhabited by marine seagrasses, *Posidonia oceanica* and *Cymodocea nodosa* (Fig. 4-7). Recently the habitats of the sensitive seagrass *P. oceanica*, endemic in the Mediterranean Sea, seem to be significantly disturbed along the Albanian part of the Adriatic. Along the Adriatic coast isolated *P. oceanica* beds are found only in Rodoni, Porto Romano (Durrresi) and Vlora bay. The species is almost absent in the region from Velipoja to Rodoni Promontory (Durrresi) and the region from Durrresi to Vlora, probably as a consequence of the impact of the Buna, Drini, Mati and Ishmi rivers in the northern part, and of the Semani and Vjosa, in the south.

In a recent study (Pititto *et al.*, 2009; Fig: 4-8), about 28.4 km² of the *Posidonia* meadows have been mapped along the Albanian coast; in total 11 meadows have been found, located in the area between Rodoni Cape (Northern limit; Durrresi) and Stillo Cape (Southern limit; Saranda). The upper limit of growth was observed at about 5 m deep. The lower depth extremity increased gradually from north to south: it was at 16-18 m deep in the northern meadows and about 30 m in the southern ones. The mean shoot density in Dhermi (Ionian coast), at about 602 shoots m⁻², was significantly higher than in Rodoni Cape and Porto Romano (Durrresi), where the mean shoot density was about 323 and 247 shoots m⁻², respectively. The meadows of Porto Romano seem to be more adversely impacted and endangered. The three areas along the Ionian coast seem healthy and in a better natural state.



Figure 4-7: 1: Meadow of the marine grass, *Posidonia oceanica*, at Dhermi, Vlora; 2: meadow with the smaller Neptune grass, *Cymodocea nodosa*, at Rodoni, Durrresi (Photos: L. Kashta).



Figure 4-8: Courtesy of an underwater study of the *Posidonia* meadows along the Albanian coast (Photos: L. Kashta and <http://cemsaproject.net/home>).

Along the Adriatic coast, *Posidonia oceanica* seems to be substituted by another marine grass, *Cymodocea nodosa*, considered to be more tolerant to varying ecological conditions. *C. nodosa*, unlike *P. oceanica*, is not found in dense meadows (Fig. 4-7). The density of *Posidonia* meadows is more elevated along the Ionian coast, with increased production of leaves and rhizomes, although, in some areas there is evidence of disturbance from human activity (e.g., sand excavation, illegal fishing with explosives) which contributes to growth retardation and the formation of *matte morte*

Halophila stipulacea, a Lessepsian seagrass species (Fig. 4-9) found in tropical, subtropical and temperate waters, was also recorded in Albanian marine waters adjacent to Ksamili, Saranda, Himara and Vlora Bay, growing in waters from 2 to 15 m deep; it creates small meadows near *Posidonia* beds, or associated with *Cymodocea nodosa*, *Zostera noltii* or *Caulerpa prolifera*. This species seems to prefer enclosed and more protected habitats. Another invasive species of Australian origin, the green seaweed *Caulerpa racemosa* var. *cylindracea* (Fig. 4-9) was first discovered along the Albanian coastline in 2002 and became now common along the coast, growing on a wide range of substrata (sandy, muddy and especially on dead *matte* of *Posidonia*) at depths 2 to 25 m.

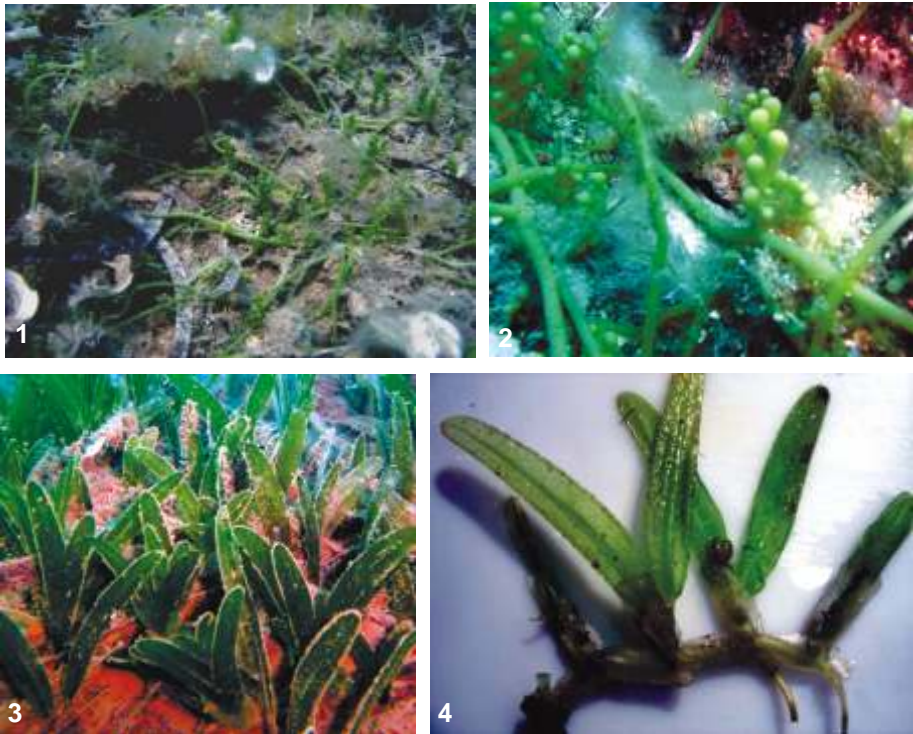
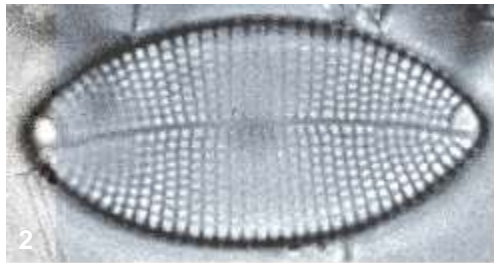
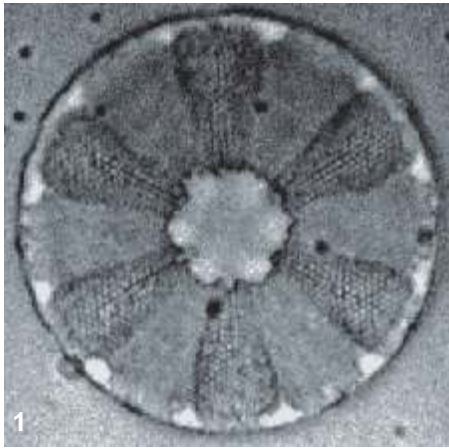


Figure 4-9: 1 and 2: Invasive marine seaweed *Caulerpa racemosa* at Lukova, Saranda; 3 and 4: *Halophila stipulacea* at Fteli Bay, Saranda (Photos: L. Kashta).

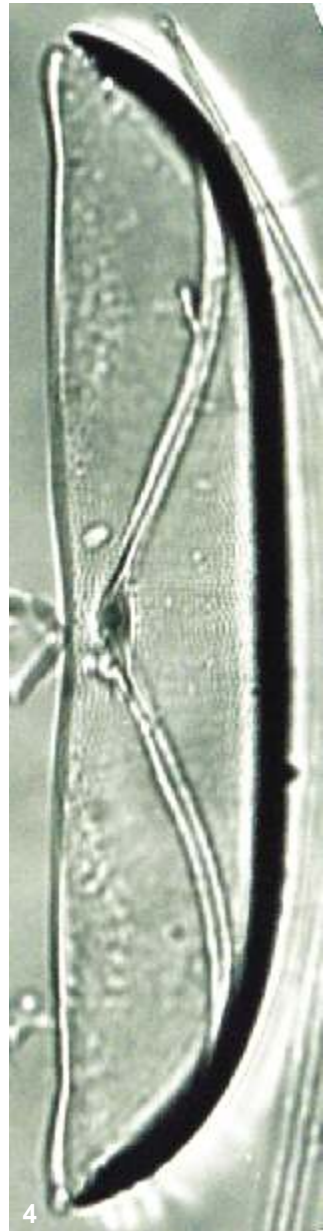
Research studies focused on microscopic algae (phytoplankton or periphyton) in the Albanian coastal wetlands and marine habitats started only during the last three decades, mostly in the lagoons of Butrinti, Narta, Karavasta and Patogu. More than 930 taxa of microscopic algae are already known; most of them belong to pennate diatoms (ca. 720 taxa) (Figs. 4-10 and 4-11), and less to centric diatoms (ca. 120 taxa), followed then by dinoflagellates (ca. 77 taxa). Only about 245 taxa of diatoms were found in marine waters, ca. 130 in various habitats of Vlora bay (in the Adriatic from Zverneci to Orikumi), and ca. 180 taxa in Ksamili (Ionian littoral) (Miho *et al.*, 2012). About 20 known taxa belong to other groups only, such as cyanobacteria (10 taxa), *Coccolithophyceae* (4 taxa), *Dictyochophyceae*, *Euglenophyceae* and *Prasinophyceae* (2 taxa each one). Among these taxa potentially toxic species were observed, belonging to the genera *Pseudonitzschia*, *Karenia*, *Alexandrium*, *Dinophysis* and *Gonyaulax* (see also Fig. 13-24).

The first insight to the oceanography of the southeastern Adriatic Sea in Drini bay was carried on in May 2009 (see Fig. 6-38). It aimed to know about the coastal water influence of Albanian rivers when it comes into contact with the inflowing oligotrophic Eastern Adriatic Current (Ionian Surface Water and Levantine Intermediate Water). The results were discussed by Vilicic *et al.* (2010). Low nutrient concentrations were observed in the whole transect of the Drini bay, where phosphorous seems to be the limiting factor. It provokes low productivity not only above the Albanian shelf but also in the north along the Montenegrin and Croatian coast of the Adriatic Sea. A distinct plankton distribution was observed on each side of the shelf break hydrographic boundary, during gradual warming of the surface waters. The prochlorophytes accumulated along the nutricline above the shelf and continental slope. The phosphorus limited inshore waters were dominated by a small diatom *Chaetoceros circinalis*, dinoflagellates, cryptophytes, autotrophic picoplankton, and heterotrophic nanoplankton. The offshore surface layer was characterized by bigger nanoplankton (coccolithophorids, green flagellates).



10 μ m

Figure 4-10:
Diatoms from marine habitats in Saranda:
1: *Actinoptychus* cf. *senarius*, Armura;
2: *Achnathes separata*, Harbour;
3: *Coconeis pseudomarginata*, Armura;
4: *Amphora arenaria*, Harbour
(Photos: A. Miho).



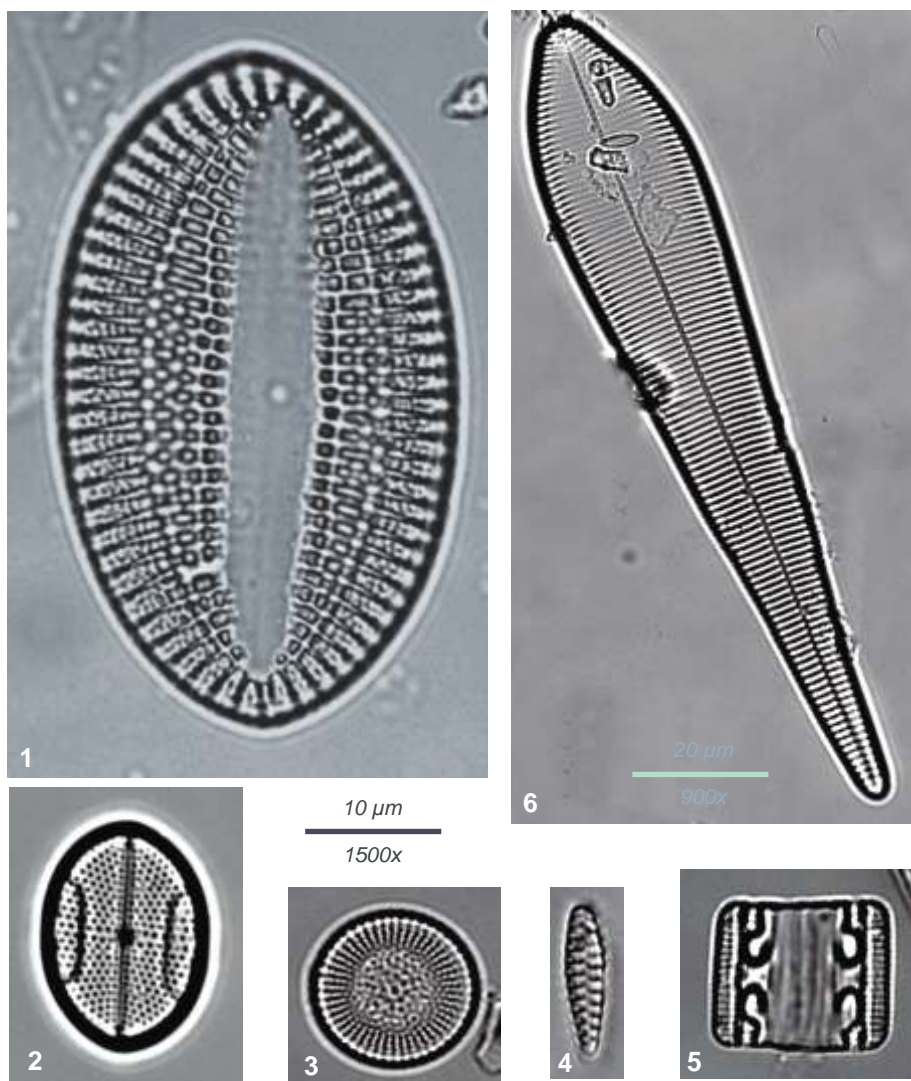


Figure 4-11: Diatoms from marine habitats in Vlora: 1: *Cocconeis maxima*; 2: *Mastogloia binotata*; 3: *Stephanodiscus medius*; 4: *Opephora mutabilis*; 5: *Grammatophora angulosa*; 6: *Licmophora cf. abbreviata* (Photos: M. Mitro).

Studies about the fauna of marine habitats cover only a limited number of groups. Along the Albanian coastline about 50 species of echinoderms (Figs. 4-12 and 4-13), 115 decapods and 230 marine mollusks have been reported. The Mediterranean blue mussel (*Mytilus galloprovincialis*) grows in dense patches in lagoons and in other coastal habitats. The littoral crab is also common in Albanian lagoons. About 78 macrofauna species were common in *Posidonia* meadows, among them sponges, anthozoans, bryozoans, gastropods, bivalves, polychaetes, crustaceans, echinoderms, ascidians and fish.

As regards to the benthic macroinvertebrates, 210 mollusk species have been reported from Vlora bay; more than 120 macroinvertebrates have been recorded along the shallow rocky coast of Vlora between Cold Water and Orikumi, about 110 species in Saranda bay area, about 90 species from the shallow rocky coast of Kallmi (Duresi) and more than 40 species along the rocky coast of Shengjini. Macroinvertebrates from marine habitats are depicted in figures 4-13 to 4-18.



Figure 4-12: Prof. Lekë Gjijnuri (1938 – 2001) was a zoologist and a pioneer in marine biology in Albania, especially related to marine fauna. In his PhD study (1962 - 1981), he reported the first data on echinoderms of the Albanian coastal area. He was a distinguished and devoted lecturer of Invertebrate Zoology and later taught Hydrobiology, teaching with passion in FNS, UT (1962 - 1997). Prof. Gjijnuri led studies on different groups of the fauna of the Albanian coast, on crustaceans, macrobenthos, birds and fish. Prof. Gjijnuri endeavoured to enhance nature protection in Albania. He became leader of the NGO movement on nature protection and an active member or delegate of several international environmental organizations, such as RAMSAR (1991), Benthos Committee of CIESM (1992), EUCC (1993), GLOBE Europe (1998) and MEDWET (1998). He contributed, on a national platform, as a member of the Council of Tirana Municipality (1995-99) and as a Deputy in the House of Parliament (1997-2001), where he served as a member in charge of the Commission of Health and Environment.

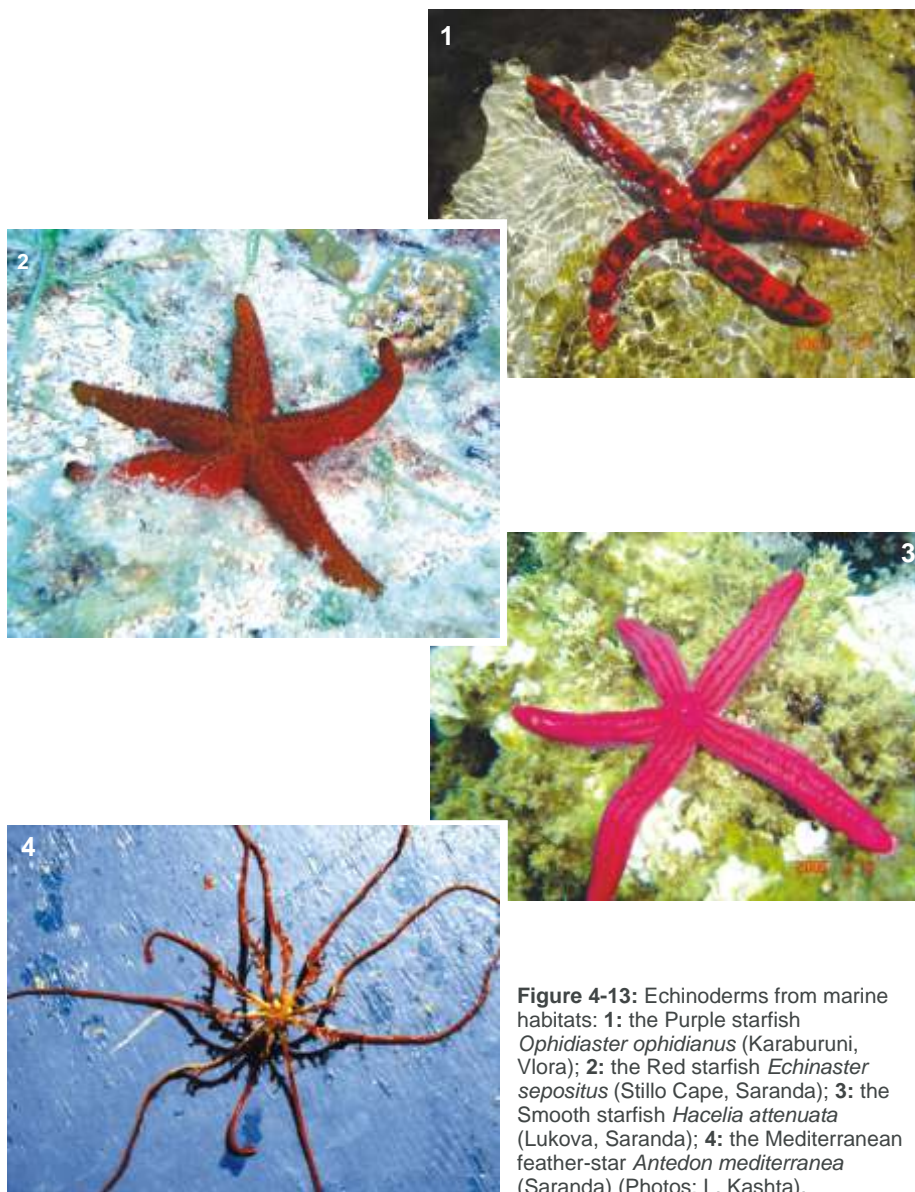


Figure 4-13: Echinoderms from marine habitats: **1:** the Purple starfish *Ophiaster ophidianus* (Karaburuni, Vlora); **2:** the Red starfish *Echinaster sepositus* (Stillo Cape, Saranda); **3:** the Smooth starfish *Havelia attenuata* (Lukova, Saranda); **4:** the Mediterranean feather-star *Antedon mediterranea* (Saranda) (Photos: L. Kashta).

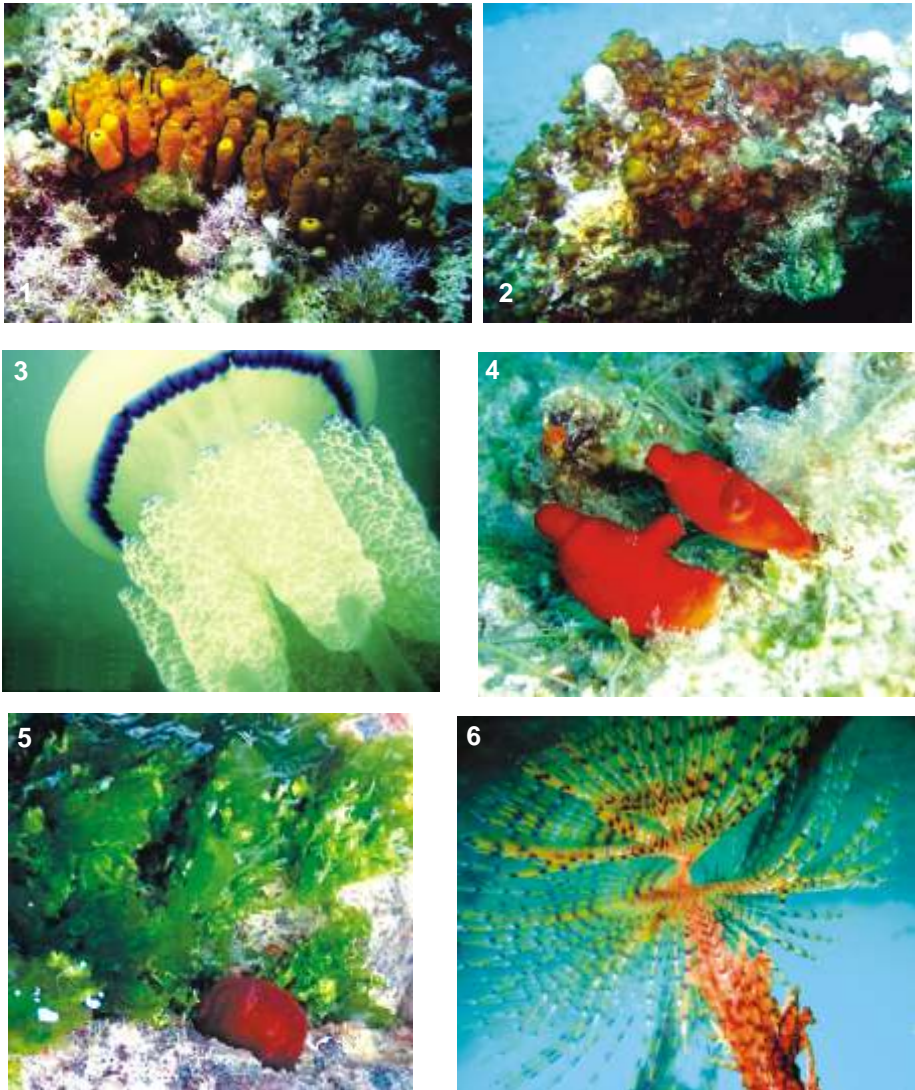


Figura 4-14: Fauna in marine habitats: 1: the Gold-sponge *Aplysina aerophoba*, Stillo Cape, Saranda; 2: the Chicken liver sponge *Chondrilla nucula*, Stillo Cape, Saranda; 3: the Rhizostome jellyfish *Rhizostoma pulmo* (schyphomedusa), Shengjini; 4: *Halocynthia papillosa*, Stillo Cape, Saranda; 5: the Beadlet anemone *Actinia equina* and a green alga *Ulva* spp., Fteli, Saranda; 6: the European fan worm *Sabella spallanzanii*, Saranda (Photos: L. Kashta).

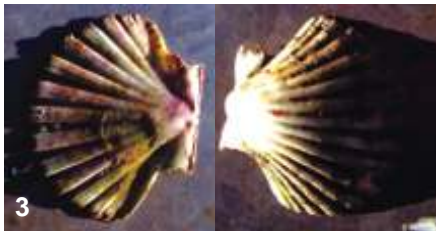
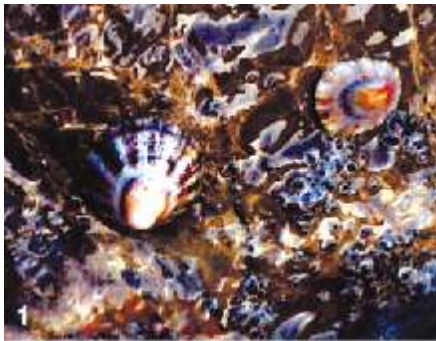




Figure 4-15: Coral species from marine habitats: **1:** the Red coral *Corallium rubrum* (Sazani, Vlorë); **2:** the Mediterranean coral *Cladocora caespitosa* (Saranda); **3:** *Alcyonium palmatum* (soft coral) (Photos: L. Kashta).

« « « **Figure 4-16:** Benthic invertebrates from marine habitats of Albania: **1:** the Limpet *Patella aspera* and *Chthamalus depressus* (Qefali, Saranda); **2:** the Date mussel *Lithophaga lithophaga*, Raguza, Vlorë; **3:** the Clam *Pecten jacobaeus* (Raguza, Vlorë); **4:** the Tun snail *Tonna galea*; **5:** the Mediterranean blue mussel *Mytilus galloprovincialis* (Shengjini); **6:** the Pen shell *Pinna nobilis* (Ksamili, Saranda) (Photos: S. Beqiraj).

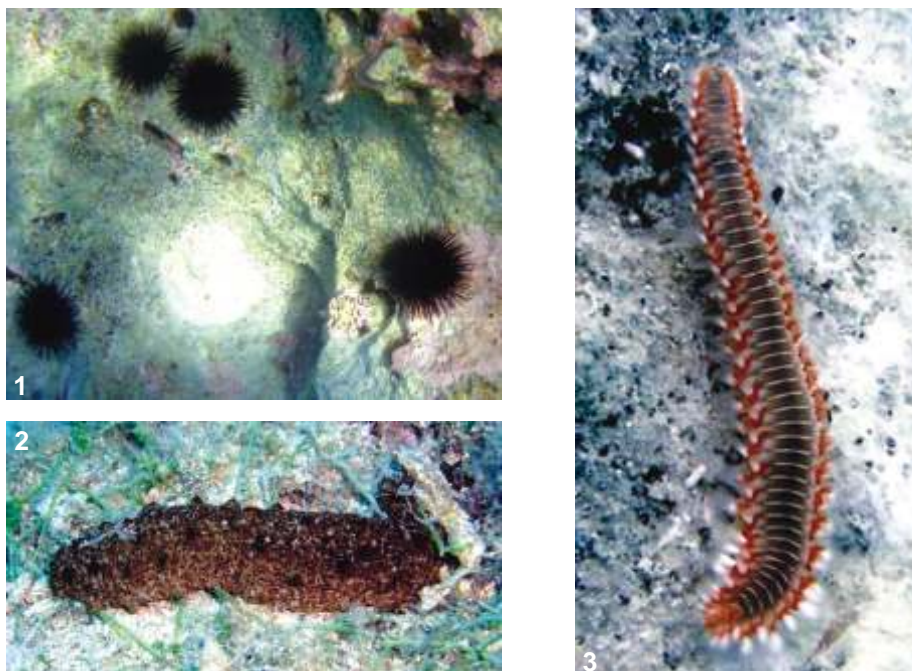


Figure 4-17: Fauna in marine marine habitats: **1:** the Sea urchins *Arbacia lixula*, Kakome, Saranda; **2:** *Holothuria tubulosa* (echinoderm), Stillo Cape, Saranda; **3:** the Sea worm *Hermodice carunculata*, Karaburuni, Vlora (Photos: L. Kashta).

Table 4-3: Marine fish species.		
Scientific name	Common name	Albanian name
<i>Anguilla anguilla</i>	European eel	Ngjala e bute
<i>Aphanius fasciatus</i>	Mediterranean killifish or South european toothcarp	Çeliku me rripa
<i>Arnaglossus laterna</i>	Scaldfish	Gjuheza gojemadhe
<i>Dicentrarchus labrax</i>	European seabass	Levereku
<i>Lichia amia</i>	Garrick	Lojba, Lica, Glica
<i>Lithognathus mormyrus</i>	Steenbras	Murra, Murra me rripa
<i>Mugil cephalus</i>	Mullet	Qefulli i veres
<i>Mugil labrosus</i>		Qefulli
<i>Pagrus pagrus</i>	Red porgy	Pagri i zakonshëm, Gjansa
<i>Solea</i> spp.	Sole	Shojze deti
<i>Sparus aurata</i>	Bream	Kocja, Ullorja

Figure 4-18: Mediterranean chromis (*Chromis chromis*) in *Possidonia* meadows, Stillo Cape, Saranda (Photo: L. Kashta).



About 250 species of fish are known from the marine waters of Albania (Fig. 4-18); the most common are listed in table 4-3.

Fishing sector in Albania is fragmented concerning responsibilities and communication, with fish production and fishery inspections being housed in two different departments of the Ministry of Environment, Forests and Water Administration, with fish diseases being covered by the Animal Health Directorate in the Ministry of Agriculture, Food and Consumer Protection (MAFCP). Processed fish products are controlled by the Department of Food Safety in the MAFCP and the National Food Authority.

Fishing is primarily capture based in inland fresh and in marine waters. Capture from lagoons and other coastal areas does take place on a limited scale. A fishing fleet of about 250 boats is dispersed in four main harbors: Durresi (80) (Fig. 4-19), Vlora (80), Shengjini (40) and Saranda (40), with about 850 employees. They are situated in the coastal lagoons, harbors and other sites along the coast line. About 100 boats are equipped with engines.

The fishing industry is mainly concentrated on trawler fishing, but also purse seiners and pelagic fishing are used. Mean annual fish catch with bottom trawling (demersal trawling) in the sea during the last decade was up to 30'000 t, where only 4% is caught at the Albanian coast, the rest came from the Italian coast.



Figure 4-19: View from Albanian fishing fleet in Durrësi Harbor (Photo: L. Kashta).

Traditional fishing is based on utilization of gillnets, hooks, and other selective gears along the coast and in the coastal lagoons. In the lagoons there are gillnets and fish barriers. The fixed fishing gear (*dajlan*) based on the principle of V shaped traps is made of plastic pipes and is placed in the main interconnecting channels between coastal lagoons and the sea.

Fish farming and mussel production is increasing along the Albanian coastal area and the marine zone. More than 160 fish farms were licensed in Albania up to 2009, covering an aquatic surface of about 2'317 km²; more than 50 fish farms were located in the coastal zone and the lagoons. Sea fish farms have been increasing along the Saranda (Ksamili) and Vlora littoral zones (Himara, Karaburuni). They are based on cage production, mainly for sea bass and sea bream. More than 480 cages in 20 fish farms mainly along the Ionian coast were licensed up to 2009 (Fig. 4-20). Concrete mussel rafts or floating rafts are utilized mainly in Butrinti lagoon where production was up to 1500 t in 2012 (see also Chapter 13).



Figure 4-20: Fish cages in Karaburuni (Vlora) (Photo: <http://www.dfishery.gov.al/SQ/pdf/PMP.pdf>)

Loggerhead turtle (*Caretta caretta*) (Fig. 4-21), a globally endangered species, was found common in the Patogu area (Kurbini), together with green turtle (*Chelonia mydas*) (see also Chapter 8).



Figure 4-21: Sea turtles turning back to the Adriatic sea in Rodoni Bay, Durresi after tagging; see also figure 8-18 (Photo: I. Haxhiu).

Albanian marine and littoral habitats are visited by some rare marine mammals, as confirmed by occasional surveys and accidental entrapment in fishing gear. Despite the lack of specific studies, it is assumed that other species might visit Albanian waters when their presence in other Adriatic areas of the region is considered. The Monk seal (*Monachus monachus*) has been found in coastal waters in the Karavasta region and in the Ionian Riviera (Stillo and Qefali capes in Saranda, Palasa and Karaburuni). In 1963 individual *Monachus monachus* found in Butrinti (near Pavlla mouth) have been preserved in the Museum of Natural Sciences in Tirana (Fig. 4-22). The Short-beaked dolphin (*Delphinus delphis*), the Bottlenose dolphin (*Tursiops truncatus*) and the Striped dolphin (*Stenella coeruleoalba*) have been confirmed by different occasional sightings the sea by fishermen and from surveys and strandings. The Bottlenose dolphin often visits the Rodoni bay.

The presence of the Sperm whale (*Physeter macrocephalus*, sin. *P. catodon*) was confirmed for the first time in June 1956; eight individuals, 5 adult females and 3 calves, were found in shallow water near the mouth of the Mati river (Rodoni Bay). Unfortunately they were killed by the Coastal Marine Guard, the skeleton of one is now exhibited in the Museum of Natural Sciences in Tirana. A few days later a dead calf was found also in the Vlora bay. Fishermen reported that a Cuvier's beaked whale (*Ziphius cavirostris*) had toured the marine waters in Rodoni and Lalzi; a specimen of it was caught by fishing nets in 1976 in Durresi. A Sea lion (family *Otariidae*) was caught near Patogu in 1996; it is not known how this animal from the Pacific had entered the Mediterranean and then crossed to the Adriatic Sea.

Figure 4-22: Cetaceans in the Museum of Natural Sciences, Tirana University (see Chapter 2); **1:** part of the skeleton of Sperm whale (*Physeter macrocephalus*, sin. *P. catodon*) (from Patogu); **2:** the Short-beaked common dolphin (*Delphinus delphis*); **3:** the Monk seal (*Monachus monachus*) (from Saranda) (Photos: F. Bego and A. Miho).

