

**FLORA SITUATION IN SOUTH-WESTERN PART OF VLORA BAY, ALBANIA**

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**Abstract**

This article offers a detailed survey of flora and vegetation of south-western part of Vlora bay. Field work was carried out in the period 2016 - 2017. The total number of species recorded to be grown in the area was 155, 134 genus and 46 families. Considering the total number of species found it can be concluded that the majority of species was represented by three main families, being respectively: Fabaceae 13 species; Asteraceae 16 species and Phocaea 28 species. In the life-spectrum were over represented Therophytes 34, or 19% and Hemicryptophytes 32, or 26% of the total number of species. Twenty-four chorological groups are distinguished, where the Euro-Mediterranean elements (about 49%) predominated. Of all plant species recorded, a considerable part belonged to medicinal plants, which covered about 19% of the total number. Among the found species seven of them belong to endangered species according to the Red Book of the Albanian flora. Similar to the situation elsewhere, the biodiversity of south western part of Vlora bay is different today than in the past. Throughout the evolutionary history of the ecosystem, changes caused by natural factors took place. During the last half century, human activities contributed significantly to these changes.

**Keywords:** Flora, Vegetation, Life Forms, Medicinal Plants, Chorology, Endangered Species

**1. Introduction**

Vlora lies in the south western coastal region of Albania, at the southern end of the Adriatic Sea and the northern part the Ionian Sea. The 150 km of Vlora coastline accounts for about 30% of the entire coast of Albania and in its proximity is located the Albanian Riviera.

The west part of Vlora Bay includes many different types of habitats where the most important are: Narta Lagoon which has been declared as a landscape protected area, Sandy dunes in Zverneci Bay, Zverneci village covered with a forest of Mediterranean cypress (evergreen trees), Mediterranean pine forest. This part of Vlora city reserves also many

cultural and historic sites, like wooden pedestrian bridge leading to the monastery of Saint Mary on Zverneci Island. Economic activities in the coastal areas are constantly expanding. A permanently increasing pollution has already resulted in disruption of or highly negative impacts on fragile ecosystems, impacts on quality of life of resident populations and loss of habitats and species. The resulting impacts on the Mediterranean coastal and marine biodiversity might be considered as dramatic. Present and future trends concerning adverse global phenomena, climate change in particular, are expected to worsen the situation. This area is not only a brilliant interweaving of natural heritage with the environment, but is also considered an important potential at the national level, where tourism development is considered one of the most important scenarios of economic growth. Biodiversity is an irreplaceable value of income economic, scientific, educational, cultural, recreational and spiritual ones for the community of the area. The coastal area of Vlora region is a protected area where nature and biodiversity conservation should provide a platform for the types of tourism and infrastructure interventions, which are suitable for the protection of Navy, wetlands and land habitats. This diversity has always been under the impact of human pressure on the environment. Coastal habitats such as wetlands, lagoons, sand dunes and forests are threatened in particular because of the high concentration of human activity and increase the level of environmental pollution in these areas, which has resulted in the disappearance of a number of special largest species and reducing populations of some other species.

## **2. Material and Methods**

Only plants spontaneously growing in the study area, both native and alien plants are included in the floristic list. Families, genera and species are arranged alphabetically within the major units of classification, Gymnospermae, Dicotyledoneae and Monocotyledoneae. Species names are according to European Flora (Tutin, 1993] and Albanian Flora (Paparisto, 2000). For syntaxonomic nomenclature and synonyms we followed Rivas-Martinez et al. [1999]. For classification of plants, we followed the Danish botanist C. Raunkiaer, based on the position of buds in relation to the soil surface. For nomenclature Plants associations are classified based on principles of Zurich–Montpellier school.

Information concerning the distribution and life form of the taxa is taken from the above literature and additionally from Pignatti (1982). Endangerment degree was based on

“Red Book” [Endangered and rare plants species of Albania, Tirana, 1995]. The resulting tables are based on 32 relives made in the period between 2016 and 2017.

### 3. Results and Discussion

The south western part of Vlora is characterized by a considerable richness of flora and vegetation. The flora consists of 155 wild species, distributed in 46 families (shown in Table 1).

**Table 1.** Plant families with the number of species recorded.

No.	Families	No of species	No.	Families	No of species
1	Acanthaceae	1	24	Labiatae	3
2	Adoxaceae	1	25	Lauraceae	3
3	Alismataceae	1	26	Linaceae	1
4	Amaranthaceae	5	27	Malvaceae	2
5	Anacardiaceae	1	28	Oleaceae	1
6	Apiaceae	6	29	Orchidaceae	1
7	Araceae	1	30	Papaveraceae	2
8	Asparagaceae	1	31	Pinaceae	3
9	Asteraceae	16	32	Plantaginaceae	7
10	Boraginaceae	3	33	Poaceae	28
11	Brassicaceae	3	34	Polygonaceae	5
12	Caryophyllaceae	9	35	Primulaceae	1
13	Cupressaceae	2	36	Ranunculaceae	1
14	Cyperaceae	5	37	Rosaceae	5
15	Dennstaedtiaceae	1	38	Rutaceae	1
16	Equisetaceae	1	39	Salicaceae	1
17	Ericaceae	1	40	Scrophulariaceae	2
18	Euphorbiaceae	1	41	Solanaceae	1
19	Fabaceae	13	42	Tamaricaceae	2
20	Gentianaceae	1	43	Typhaceae	2
21	Geraniaceae	2	44	Urticaceae	3
22	Hypericaceae	1	45	Verbenaceae	1
23	Juncaceae	2	46	Xanthorrhoeaceae	1

The main number of species was represented by three families: Phocaea the largest taxonomic group 28 species, followed by Asteraceae 16 species and Fabaceae 13 species (Figure 1).

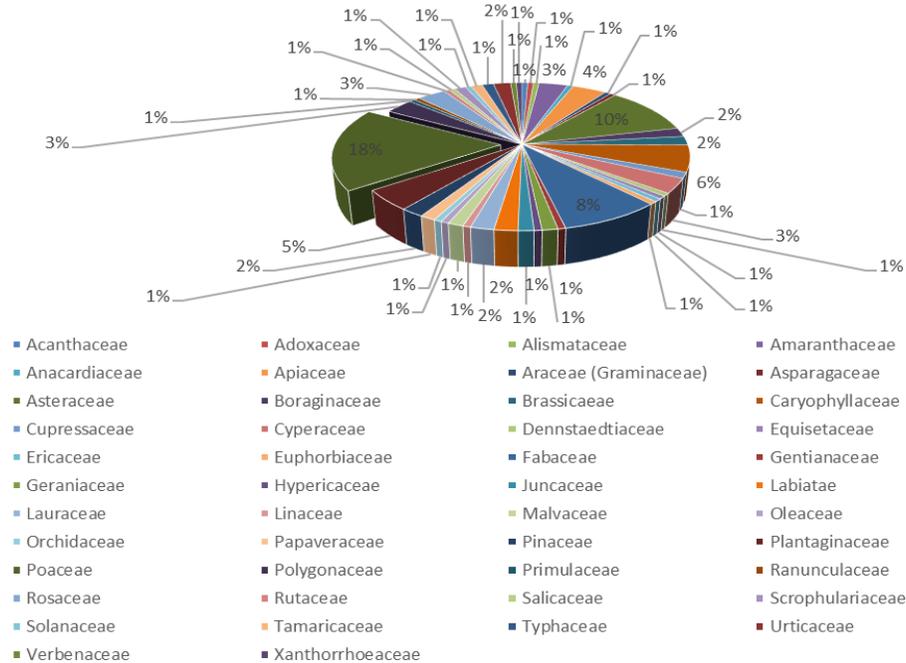


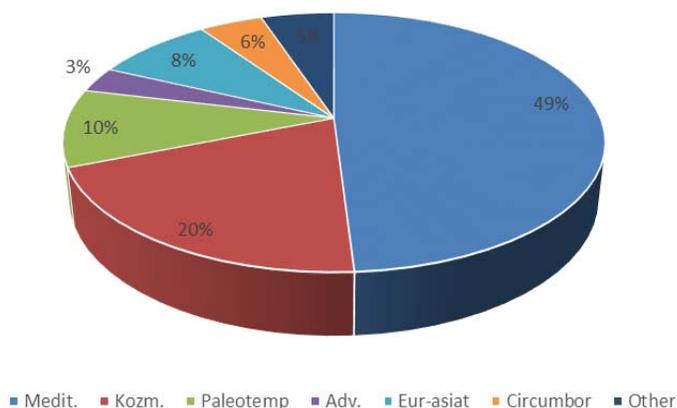
Figure 1. Family richness.

We included the 46 families with the number of species founded in south west part of Vlora location.

Table 2. Summary in percentage of chorological types.

Medit.	49	%	Cozm.	20	%	Adv.	3.2	%
Europ								
E-Euro- Medit.			Kozm.			Eur-asiat	8.4	%
E-Steno-Medit.			Subcosmop.					
Medit.			Termokozm.			Circumbor	4.5	%
Africa- Medit								
N-Steno-Medit.			Paleotemp	9.7	%	Other	5.2	%
W.Europ								
W-Steno-Medit			Paleosubtrop					
SE-Europ			Paleotemp					
Stenomedit.								

Regarding the phytogeographical analysis of the south west part of Vlora shows that the total distribution of the taxa in the studied areas can be assigned to seven chorological groups (Table 2), the Mediterranean elements predominate with 49%, including Euro-Medit, Steno-Medit, Africa-Medit, Cosmopolitan (20%), Paleotemp elements are presented (9.7%), Eurasia (8.4%), Circumboreal and Adventive have a lower number of taxa (Figure 2).



**Figure 2.** Chorological spectrum.

Regarding the life forms spectrum according Raunkiaer's system, dominated species are the Therophytes (annuals and biennials) 34%, followed by Hemicryptophytes (H) 32%. Lower percentage participation corresponds to Geophytes (G) 13%, Phanerophytes (Ph) 10% and Chamaephytes (Ch) 5%, others has a lower percentage (Table 3).

**Table 3** Raunkiaer's life forms (the plant structures that survive the unfavorable season).

No	Raunkiaer's life forms	No. of species	Percentage
1	Therophytes (Th.)	53	34.19%
2	Hemicryptophytes (H.)	50	32.26%
3	Geophytes (G.)	21	13.55%
4	Chamaephytes (Ch.)	8	5.16%
5	Phanerophytaea (Ph.)	16	10.32%
6	Nanophanerophytaeas (NP)	6	3.87%
7	I rad	1	0.65%

A total of 33 phytosociological relevés. The vegetation relevés were made and elaborated according to the standard procedures of the Braun-Blanquet methods of Zurich-Montpellier phytosociology (Braun-Blanquet 1964). Syntaxonomical review is presented in following list:

1. Ass. Cakilo-Xanthietum strumarii Beguinot 1941, Pign. 1953 [syn: Cakilo-Xanthietum italici (Beg. 1941) Pign.1953; Salsola kali-Cakiletum maritimae Costa et Mansanet 1981 corr. Rivas-Martinez, Costa & Loidi 1992] (Rivas-Martínez, 1999).
2. Ass. Eryngio-Sporobolium virginici Gehu 1989.

3. Ass. Euphorbio paraliae-Agropyretum junceiformis Tüxen in Br.-Bl. & Tüxen 1952, corr. Darimont, Duvigneaud & Lambinon 1962.

4. Ass. Medicagini marinae- Ammophiletum australis Br.-Bl. 1921 corr. F. Prieto & T. E. Díaz 1991 [Medicagini marinae- Ammophiletum arenariae Br.-Bl. 1921, Ammophiletum Echinophoro spinosae - Ammophiletum arenariae (Br.-Bl. 1933) Gehu, Riv.- Mart. & R. Tx. 1972, Eryngi maritimi - Ammophiletum arundinaceae Gehu 1987.

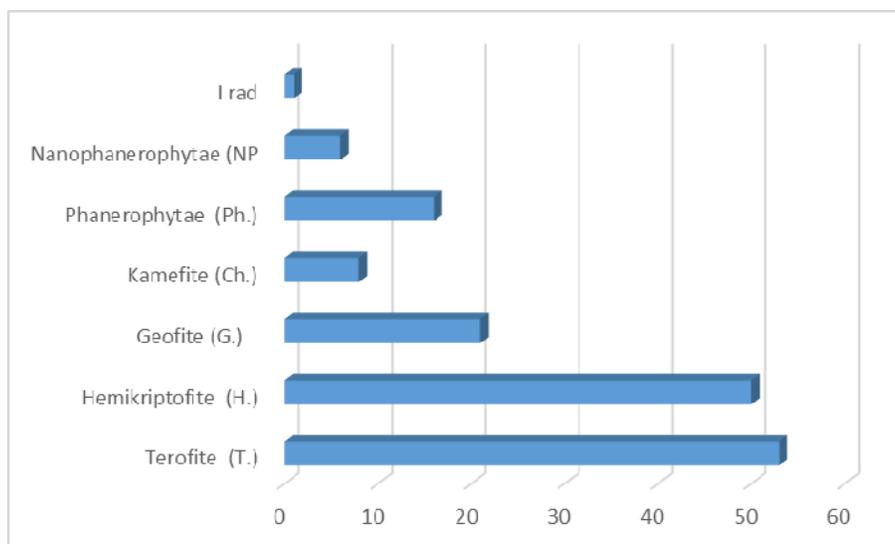


Figure 3. Proportional percentage of life forms in the study area.

Therophytes and Hemicryptophytes made up the large majority of the recorded species. These life forms are well represented in the European Flora (Ellenberg, 1988). The main family Phocaea is represented with genera like Alopecurus, Arundo, Avena, Brachypodium, Briza, Bromus, Chrysopogon, Cynodon, Dactylis, Dezmazeria, Digitaria, Echinochloa, Erianthus, Hordeum, Paspalum, Phragmites, Poa, Polypogon, Psilurus, Puccinellia, Saccharum, Setaria, Sorghum, Sporobulus, Vulpia (Pignatti, 1982).

The shrub layer is represented by typical Mediterranean species such as Pistacia lentiscus, Erica manipuliflora, Myrtus communis etc, characteristic species of the Class Quercetea ilicis (cover 40-50% of total area, shrub <2 m). At the “Soda” forest the shrub layer is totally absent. The reason is related to the very high density of woody layer. The most common species in a hydro- higrophyllous vegetation are Typha angustifolia, Typha latifolia, Phragmites australis, Scirpus maritimus, Bolboschoenus maritimus (Mullaj, 1999).

Halophilic species are represented by Suaeda marittima, Halimione portulacoides, Limonium anfractum, Juncus acutus (Pignatti, 1982).

Plants such as Spiny rush (*Juncus acutus*) grow once the mud has been vegetated by the pioneer specie.

The *Salicornia europaea* (pioneer marsh communities) takes place in the space of just a few months between summer and early autumn. *Salicornia europaea* stands may form a distinct zone in the lower marsh. At some sites, particularly those on sandy substrates, patches of *Salicornia europaea* may be separated from the main marsh front by several hundred meters of bare flat. The natural function of dune areas in coastal defend is of vital importance in low-lying areas where the sand volume forms a strategic reserve against sea level rise.

Zverneci islet in the south of the lagoon is covered with evergreen forest of *Cupressus sempervirens*. The woody layer is dominated by *Cupressus sempervirens* (90-95%) and in a low scale by the species of *Quercus ilex*, *Quercus pubescens* and *Pinus* spp. The vegetation cover is very dense. The shrub layer is dominated by the species of *Myrtus communis*, *Pistacia lentiscus*, *Laurus nobilis*, *Rubus* spp, etc. (Miho, 2013). The herb layer is rarer and the most frequent species are: *Chrysopogon gryllus*, *Asparagus acutifolius*, *Dactylis glomerata*, *Desmazieria marina* etc. Under this zone, dominated by *Cupressus sempervirens* (from 1-2 m till 20 m above sea-level).

The cliffs (soft rock) support a plant community dominated by halophylic species much as: *Suaeda maritima*, *Limonium anfractum*, *Halimione portulacoides*. In pine forest two endemic plant species are found: *Orchis albanica* and *Orchis x paparisti*. Many rare and threatened plant species occur inside the Zverneci islet in the south of the Lagoon is covered with evergreen forest of *Cupressus sempervirens*, a unique forest in Albania.

Threatened species according to IUCN categories (En endangered, Vu vulnerable)

According to threat status given in the Red Book of Vascular Flora of Albania: *Hypericum perforatum*, *Laurus nobilis*, *Orchis coriophora*, *Origanum vulgare*, *Stachys maritime*, *Erica manipuliflora*, are critically endangered (En) species. *Pinus pinea* and *Tamarix hampeana* are vulnerable species (Vu) (Vangjeli, 1995).

Medicinal plants

*Laurus nobilis*, *Origanum vulgare*, *Verbena officinalis*, *Fumaria officinalis*, *Mentha piperita*, *Urtica dioica*, *Myrtus communis*, *Plantago lanceolata*, *Plantago major*. All these plant species are a great national asset with economic and scientific values for our country (Papadhopulli, 1987).

Coastal dunes with *Juniperus* spp. (habitat code 2250).

Formations of *Juniperus oxycedrus* subsp. *macrocarpa* occupy a small part of the area mostly in the northern part, distributed mainly on sandy dunes, close to the Mediterranean coniferous forest. It is an important habitat with priority status, included in Annex I to Directive 92/43/EEC. The presence of this specie is an important factor in impeding the movement of sand quantities pushed away by the sea winds towards the continent. This type of vegetation extended only on some parts of the area.

In the past, reclamation was carried out on a large scale in this area. As elsewhere in coastal region of Albania even in this area, forestation with maritime pines (*Pinus maritima*, *Pinus pinaster* and *Pinus pinea*) has had a major impact on much of the dune landscape throughout the area. More than 60% of dunes are now forested. In some cases the dune systems in this area have been forested (especially the first belt) with the use of non- native trees *Acacia saligna*. The process of forested of the dune systems started 3-4 decades earlier.

#### Agricultural lands

Small pockets of arable land are found in all parts of the study area. Most agricultural areas are on fairly poor soils. Some areas of former agriculture land which have been abandoned for several years now support a semi-natural assemblage of species. Often they are under the action of intensive grazing. The most important crops cultivated in these areas are Corn and Alfa alfa. Horticulture in the study area is presented by vineyards, fig trees, etc.

#### 4. Conclusions

In the study area are found nine medicinal plants with a great national asset, economic and scientific values for Albania. Because of strong physicochemical influence of seawater and human impact, only the individual annuals of pioneer *Cakilo-Xanthietum italici* ass. are present in the first zone. In the next zone, with degree of the still remarkable sand salinity, species from the Asoc. *Eryngio-Sporoboletum virginici* and Asoc. *Euphorbio paraliae-Agropyretum junceiformis* are prevalent. The distribution of asoc. *Eryngio-Sporoboletum virginici* and asoc. *Euphorbio paraliae-Agropyretum junceiformis* is often overlapping, depending on the terrain configuration. Third vegetation zone is characterized by decreased sand salinity and moisture, so that species from the Asoc. *Medicagini marinae-Ammophiletum australis* develop this vegetation belt.

Many rare and endangered plant species found inside the Zverneci islet in the southern part of the Lagoon are under the unique evergreen *Cupressus sempervirens* forest. The importance of this area is illustrated by the fact that eight of the threatened plant species in the Red Book of Albania are found here. Bordering areas between water and land have a great ecological value. Human activities should be allowed only in well-defined areas in accordance with a master plan for the sustainable development of these areas, in accordance with special local conditions, such as hydrological regime, tectonic subsidence, etc.

## 5. References

1. Beguinot A: La vita delle piante vascolari. in "La laguna di Venezia". Ferrari, Venezia 1941, 3 (2): 1-369
2. Braun-Blanquet J: Pflanzensoziologie, Grundzüge der Vegetationskunde: Springer Verlag, Wien 1964
3. Ellenberg H: Vegetation ecology of central Europe: Cambridge University Press, Cambridge 1988
4. Géhu J.M, Biondi E, Arnold-Apostolides N: Données synsystématiques et synchorologiques sur la végétation du littoral sédimentaire de la Grèce continentale. Doc. Phytosoc, n.s 1987 10(2): 43-92.
5. Géhu J.M, Biondi E: Essai de typologie phytosociologique des habitats et des végétations halophiles des littoraux sédimentaires périméditerranéens et thermo-atlantiques. Fitosociol 1995 30:201-212
6. Géhu J.M, Biondi E: Synoptique des associations végétales du littoral adriatique italien. Giorn. Bot. Ital. 1952 130 (1): 257-270
7. Géhu J.M, Uslu T: Donnees sur la vegetation littorale de la Turquie du NordOuest. Phytocoenologia 1989 17:449– 505
8. Miho A, Kashta L, Beqiraj S: Between the Land and the Sea: Ecoguide to discover the transitional waters of Albania; 2013
9. Mullaj A, Papparisto A: Speciet invazive të Shqipërisë. Biodiversity Enabling Activity II to the Assessment of Capacity Building needs to Address the Priorities of Albania's Biodiversity Strategy and Action Plan.2007: 17-18
10. Mullaj A, Xhulaj M: Flora dhe vegjetacioni i gjirit të Vlorës. Studime Biologjike 1999: 72-83
11. Papadhopulli G: Bimët dhe mjekësore të Shqipërisë: Tiranë; 1987
12. Papparisto K, Qosja Xh, Demiri M, Mitrushi J, Balza E, Ruci B, Mullaj A: Flora e Shqipërisë: Akademia e Shkencave, Tiranë. 1984-2000
13. Pignatti S: Introduzione allo studio fitosociologico della pianura veneta orientale con particolare riguardo alla vegetazione litoranea. Archivio Botanico Biogeografico Italiano; 1953
14. Pignatti S: La vegetazione alofila della natural plant communities of North America). Itinera Geobotanica; 1999 12:5-316
15. Pignatti S: Flora d'Italia (3 voll): Edagricole; 1982
16. Rivas-Martínez S, Sanchez-Mata D & Costa M: North American boreal and western temperate forest vegetation (Syntaxonomical synopsis of the potential natural plant communities of North America). Itinera Geobotanica; 1999 12:5-316
17. Tutin T.G, Burges N.A, Chater A.O, Edmondson G.R, Heywood W.H, Moore D.M, Valentine D.H, Walters S.M & Webb D.A : (eds.) Flora Europaea: 2nd edition; 1993 Cambridge University Press
18. Vangjeli J, Ruci B, Mullaj A: Red book threatened and rare plants species of Albania. 1995