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Flora and vegetation of south west part of Vlora Bay, Albania

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Abstract

A detailed study of flora and vegetation of south west part of Vlora bay is presented in this paper. Field work was carried out in the period 2014 - 2016. The total number of species recorded to be grown in the area was 155, implementing 134 genus and 46 families. Considering the total number of species found it can be concluded that the main number of species was represented by three families being respectively Poaceae 28 species, Asteraceae 16 species, Fabaceae 13. In the life – spectrum were over represented Therophytes 34, 19 % and Hemicryptophytes 32, 26 % of the total number of species. Twenty-four chorological groups are distinguished, where the Euri- 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 Albanian flora. Similar to the situation elsewhere, the biodiversity of south west 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 and vegetation, life forms, medicinal plants, chorology, endangered species .

1. Introduction

Vlora is a coastal town situated where the Adriatik sea meets the Ionian Sea, it also holds about 150 km of coastline.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 Flora Europea (Tutin et al. 1964-1980)[17] and Flora of Albania (Paparisto et al.,1984-2000) [12]. For syntaxonomic nomenclature and synonyms we followed Rivas-Martinez et al. 1999[16]. For classification of plants, we followed the Danish botanist C.Raunkiaer, based on the position of perennating 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)[13]. Threatened degree will base on “Red Book” (Threatened and rare plants species of Albania), Tirana, 1995[18] . The resulting tables are based on 32 releve’s were made in the period between 2014 and 2016.

3. Results and Discussion

The south west part of Vlora is characterized by a considerable richness of flora and vegetation. The flora consists of 155 wild species (Table 1), distributed in 46 families (shown in Table 2).The main number of species was represented by three families: Poaceae the larges taxonomic group 28 species, followed by Asteraceae 16 species and Fabaceae 13 species (shown in Figure 1).We included the 46 families with the number of species founded in south west part of Vlora location.

Table 1. **List of plant species recorded in the studied area with their families, life forms, chorological form, flowering time and genus**

No	Plants name	Families	Life form	Chorology	Flowering Time	Genus
1	Acacia saligna (Labill.) H. L. Wendl.	Fabaceae	Ph	Australia	II-V	Acacia
2	Acanthus spinosus L.	Acanthaceae	H	Medit.	V-VI	Acanthus
3	Alopecurus myosuroides Hudson	Poaceae	T	Subcosmop.	IV-VI	Alopecurus
4	Amaranthus albus L.	Amaranthaceae	T	Adv	VII-IX	Amarnthus
5	Amaranthus graecizans L.	Amaranthaceae	T	Paleosubtrop	VIII-IX	Amarnthus
6	Anagallis arvensis L.	Primulaceae	T	EuriMedit.	IV-X	Anagallis
7	Anchusa variegata L.Lehm	Boraginaceae	H	Medit.	VI-IX	Anchusa
8	Anthemis cotula L.	Asteraceae	T	EuriMedit.	V-IX	Anthemis
9	Anthemis tinctoria L.	Asteraceae	H	Evrop. Jugore	V-IX	Anthemis
10	Artemisia coerulescens L.	Asteraceae	Ch	EuriMedit.	IX-X	Artemisia
11	Arum italicum Miller	Araceae	G	Stenomedit.	III-V	Arum
12	Arundo donax L.	Poaceae	G	Subcosmop.	VII-IX	Arundo
13	Asparagus acutifolius L.	Asparagaceae	NP	Steno-Medit.-Altit.	VIII-IX	Asparagus
14	Asphodelus aestivus Brot.	Xanthorrhoeaceae	G	Africa- Medit	I-IV	Asphodelus
15	Aster squamatus (Spreng.) Hieron	Asteraceae	T	Adv.-Neotropic	IX-X	Aster
16	Atriplex hastata L.	Chenopodiaceae	T	Cirkumbor	VII-IX	Atriplex
17	Avena fatua L.	Poaceae	T	Eur-asiat	IV-VI	Avena
18	Avena sterilis L.	Poaceae	T	EuriMedit.	IV-VI	Avena
19	Baldellia ranunculoides (L.) Parl.	Alismataceae	I rad	Medit.Atl.(Steno)	IV-VI	Baldellia
20	Bellis perennis L.	Asteraceae	H	Evrop. – Kaukaz.	XII-IV	Bellis
21	Beta vulgaris L. subsp. maritima (L.) Arcangeli	Chenopodiaceae	H	EuriMedit.	VI-VIII	Beta
22	Bolboschoenus maritimus (L.) Palla	Cyperaceae	G	Kozm.	VI-IX	Scirpus
23	Brachypodium pinnatum (L.) Beauv.	Poaceae	H	Eur-asiat	V-VII	Brachypodium

24	Briza media L.	Poaceae	H	Eurosib.	V-VIII	Briza
25	Bromus sterilis L.	Poaceae	T	Eurimedit.	IV-VI	Bromus
26	Bupleurum rotundifolium L.	Apiaceae	T	Subcosmop.	V-VI	Bupleurum
27	Capsella bursa pastoris (L.) Medicus	Brassicaeae	H	Kozm.	I-VII	Capsella
28	Carduus thoermeri Weinm	Asteraceae	H	Subballk.	VI-VIII	Carduus
29	Carex divisa Huds.	Cyperaceae	G	Euri-Medit.Atl	IV-VI	Carex
30	Centaurium erythraea Rafn	Gentianaceae	H	Paleotemp	V-IX	Centaurium
31	Cerastium glomeratum Thuill.	Caryophyllaceae	T	Kozm.	I-XII	Cerastium
32	Chenopodium album L.	Chenopodiaceae	T	Subcosmop.	VI-IX	Chenopodium
33	Chrysopogon gryllus (L.) Trin.	Poaceae	H	S-Europ.-Sudsib	VI-VII	Chrysopogon
34	Cichorium intybus L.	Asteraceae	H	Paleotemp	VI-IX	Cichorium
35	Cirsium arvense (L.) Scop	Asteraceae	G	Eur-asiat	V-IX	Cirsium
36	Convolvulus arvensis L.	Convolvulaceae	G	Paleotemp	V-X	Convolvulus
37	Conyza canadensis (L.) Cronq	Asteraceae	T	North Amer	VI-X	Conyza
38	Crithmum maritimum L.	Apiaceae	Ch	EuriMedit.	VI-VIII	Crithmum
39	Cupressus sempervirens	Cupressaceae	Ph	E-Euri-Medit.	II-V	Cupressus
40	Cynodon dactylon (L.) Pers	Poaceae	G	Kozm.	VI-IX	Cynodon
41	Cyperus fuscus L.	Cyperaceae	T	Paleotemp.	VII-IX	Cyperus
42	Cyperus rotundus L.	Cyperaceae	G	Subcosmop.	VI-XI	Cyperus
43	Dactylis glomerata L.	Poaceae	H	Paleotemp.	VI-IX	Dactylis
44	Daucus carota L.	Apiaceae	H	Paleotemp	IV-X	Daucus
45	Dezmazeria marina (L.) Druce	Poaceae	T	Medit. – Atl.	III-V	Dezmazeria
46	Dictamnus albus L.	Rutaceae	Ch	S-Europ.-Sudsib	V-VI	Dictamnus
47	Digitaria sanguinalis L.	Poaceae	T	Kozm.	VI-XI	Digitaria
48	Dittrichia viscosa (L.) W. Greuter	Asteraceae	H	Eurimedit.	VIII-X	Dittrichia
49	Dorycnium hirsutum (L.) Ser.	Fabaceae	Ch	Eurimedit.	V-VI	Dorycnium
50	Echinochloa crus-galli (L.) Beauv.	Poaceae	T	Subcosmop.	VI-X	Echinochloa
51	Echium italicum L.	Boraginaceae	H	Eurimedit.	IV-VIII	Echium
52	Echium plantagineum L.	Boraginaceae	T	EuriMedit.	I-IV	Echium
53	Equisetum arvense L.	Equisetaceae	G	Cirkumbor	III-V	Equisetum
54	Erianthus ravenae (L.)Beauv	Poaceae	H	Medit.-Turan	VII-X	Erianthus
55	Erica manipuliflora Salisb.	Ericaceae	Ch	E-Steno-Medit. - Altit.	VIII-IX	Erica
56	Euphorbia helioscopia L.	Euphorbiaceae	T	Kozm.	XII-V	Euphorbia
57	Fumaria officinalis L.	Papaveraceae	T	Paleotemp	V-VIII	Fumaria
58	Geranium dissectum L.	Geraniaceae	T	Eur-asiat	IV-IX	Geranium
59	Geranium molle L.	Geraniaceae	T	Eur-asiat	III-IX	Geranium
60	Glaucium flavum Crantz	Papaveraceae	H	EuriMedit.	V-X	Glaucium
61	Halimione portulacoides(L.) Aellen	Amaranthaceae	Ch	Circumbor	VI-VII	Halimione
62	Hordeum marinum Hudson	Poaceae	T	Eurimedit.	VI-IX	Hordeum
63	Hordeum murinum L.	Poaceae	T	Cirkumbor	IV-X	Hordeum
64	Hypericum perforatum L.	Hypericaceae	H	Paleotemp.	V-III	Hypericum
65	Juncus acutus L.	Juncaceae	H	EuriMedit.	IV-VII	Juncus
66	Juncus effusus L.	Juncaceae	H	Kozm.	V-VII	Juncus
67	Juniperus oxycedrus L.	Cupressaceae	Ph	Eurimedit.	II-IV	Juniperus
68	Laurus nobilis L	Lauraceae	Ph	Stenomedit.	III-IV	Laurus
69	Limonium anfractum (Salmon) Salmon	Plumbaginaceae	H	N-Steno-Medit.	VI-VII	Limonium
70	Linum maritimum L.	Linaceae	H	W-Steno-Medit	VI-IX	Linum
71	Malva sylvestris L.	Malvaceae	H	Eurosib.	III-VII	Malva
72	Medicago arborea L.	Fabaceae	Ph	Medit.	V-VI	Medicago
73	Mentha piperita L.	Labiatae	H	Paleotemp.	VII-VIII	Mentha
74	Myrtus communis L.	Myrtaceae	Ph	Stenomedit.	VI-VII	Myrtus
75	Oenanthe pimpinelloides L.	Apiaceae	H	Medit.Atl.(Euri)	V-VII	Oenanthe
76	Olea europaea L.	Oleaceae	Ph	Steno-Medit. - Altit	IV-VI	Olea

77	Orchis coriophora (Pollini) K.Richt.	Orchidaceae	G	EuriMedit.	IV-VI	Orchis
78	Origanum vulgare L	Lamiaceae	H	Eur-asiat	VI-IX	Origanum
79	Orchis x paparisti	Orchidaceae	G	Endem	IV-VI	Salep
80	Orchis albanica	Orchidaceae	G	Endem	IV-VI	Salep shqiptar
81	Parietaria diffusa L.Mert. & W.D.J.Koch	Urticaceae	H	EuriMedit.	I-XII	Parietaria
82	Paspalum paspalodes (Mich.) Schribner	Poaceae	G	Subcosmop.	VII-IX	Paspalum
83	Phragmites australis Trin.	Poaceae	G	Subcosmop.	VI-X	Phragmites
84	Pinus halepensis Mill.	Pinaceae	Ph	Medit.	III-V	Pinus
85	Pinus pinaster Aiton	Pinaceae	Ph	Medit.	VII-X	Pinus
86	Pinus pinea L.	Pinaceae	Ph	Euri-Medit.	IV-V	Pinus
87	Pistacia lentiscus L.	Anacardiaceae	Ph	Eur.(stenMedit)	III-V	Pistacia
88	Plantago coronopus L.	Plantaginaceae	T	EuriMedit.	III-X	Plantago
89	Plantago crassifolia Forssk	Plantaginaceae	H	Stenomedit.	V-VI	Plantago
90	Plantago lancolata L.	Plantaginaceae	H	Eur-asiat	IV-VI	Plantago
91	Plantago major L.	Plantaginaceae	H	Eur-asiat	III-IX	Plantago
92	Plantago maritima L.	Plantaginaceae	H	S-Europ.-Sudsib	VI-VII	Plantago
93	Poa annua L.	Poaceae	T	Kozm.	I-XII	Poa
94	Poa trivialis L.	Poaceae	H	Eur-asiat	V-IX	Poa
95	Polygonum arenarium Walds. et Kit.	Polygonaceae	T	SE-Europ	V-X	Polygonum
96	Polygonum aviculare L.	Polygonaceae	H	Kozm.	VI-X	Polygonum
97	Polygonum maritimum L.	Polygonaceae	H	Subcosmop.	V-VIII	Polygonum
98	Polypogon monspeliensis (L.) Desf	Poaceae	T	Subtrop	III-V	Polypogon
99	Populus canadensis L.	Salicaceae	Ph	Kozm.Hybrid	III-IV	Populus
100	Prunella vulgaris L.	Labiatae	H	Cirkumbor	IV-X	Prunella
101	Pseudorlaya pumila (L.) Grande	Apiaceae	T	Stenomedit.	IV-V	Pseudorlaya
102	Psilurus incurvus (Gouan) Schinz et Thell.	Poaceae	T	Eurimedit.	IV-V	Psilurus
103	Psoralea bituminosa L.	Fabaceae	H	Eurimedit.	V-VI	Psoralea
104	Pteridium aquilinum (L.) Kuhn	Dennstaedtiaceae	G	Kozm.	V-IX	Pteridium
105	Puccinellia festuciformis (Host.)Parl.	Poaceae	H	Stenomedit.	VI-VIII	Puccinellia
106	Quercus ilex	Fagaceae	Ph	Steno-Medit. - Altit	III-VI	Quercus
107	Quercus pubescens Willd.	Fagaceae	Ph	SE-Europ	IV-V	Quercus
108	Ranunculus tricophyllus Chaix	Ranunculaceae	G	Europ.	IV-VI	Ranunculus
109	Raphanus raphanistrum L.	Brassicaeae	T	Euri-Medit.	III-VI	Raphanus
110	Rapistrum rugosum (L.)All.	Brassicaeae	T	Euri-Medit.	V-VII	Rapistrum
111	Reichardia picroides (L.) Roth.	Asteraceae	H	Stenomedit.	I-XII	Reichardia
112	Rosa canina L.	Rosaceae	NP	Eurasiat.-Altit.	V-VII	Rosa
113	Rubus hirtus aggr.	Rosaceae	NP	Circumbor.-Altit	VI-VII	Rubus
114	Rubus idaeus L.	Rosaceae	NP	Europa-Asia occid.(Caucaso)-Altit.	V-VI	Rubus
115	Rubus ulmifolius Schott.	Rosaceae	NP	Eurimedit.	V-VII	Rubus
116	Rumex conglomeratus Murr.	Polygonaceae	H	Euroaziat-CW	VI-VIII	Rumex
117	Rumex crispus L.	Polygonaceae	H	Subcosmop.	V-VII	Rumex
118	Saccharum ravennae (L.) Murray	Poaceae	H	Medit.	VI-VIII	Saccharum
119	Sagina procumbens L.	Caryophyllaceae	H	Subcosmop.	IV-VII	Sagina
120	Salicornia europaea L.	Chenopodiaceae	T	W.Europ	VIII-IX	Salicornia
121	Salsola soda	Amaranthaceae	T	Paleotemp.	V-VIII	Salsola
122	Sambucus ebulus L.	Adoxaceae	G	Eurimedit.	V-VII	Sambucus
123	Sanguisorba minor Scop.	Rosaceae	H	Paleotemp.-Altit.	VII-VIII	Sanguisorba
124	Sarcocornia fruticosa (L.) A. J. Scott	Amaranthaceae	Ch	Eurimedit.	VII-VIII	Salicornia
125	Scirpus holoschoenus L.	Cyperaceae	G	Euri-Medit.	VI-IX	Scirpus
126	Scolymus hispanicus L.	Asteraceae	H	Eurimedit.	VI-VIII	Scolymus

127	Setaria pumila (Poiret) Roem & Schult.	Poaceae	T	Subcosmop.	VII-X	Setaria
128	Solanum nigrum L.	Solanaceae	T	Kozm.	III-XI	Solanum
129	Sonchus asper (L.) Hill	Asteraceae	T	Eur-asiat	I-XII	Sonchus
130	Sorghum halepense (L.) Pers.	Poaceae	G	Termokozm.	VII-X	Sorghum
131	Spartium junceum L.	Fabaceae	NP	EuriMedit.	V-VI	Spartium
132	Sporobulus pungens (Schreber) Kunth	Poaceae	G	Subtrop. - Altit.	VII-VIII	Sporobulus
133	Stachys maritima Gouan	Lamiaceae	H	Stenomedit.	VII-VIII	Stachys
134	Stellaria media (L.) Cirillo	Caryophyllaceae	T	Kozm.	I-XII	Stellaria
135	Suaeda marittima (L.)Dumort	Chenopodiaceae	T	Kozm.	VII-VIII	Suaeda
136	Tamarix dalmatica Baum	Tamaricaceae	Ph	E-Steno-Medit.	V-VI	Tamarix
137	Tamarix hampeana Boiss & Heldr	Tamaricaceae	Ph	Ballk-jugper		Tamarix
138	Thymus longicaulis C.Presl	Labiatae	Ch	Eurimedit.	IV-VIII	Thymus
139	Trifolium campestre Schreb	Fabaceae	T	Paleotemp.	IV-VII	Trifolium
140	Trifolium nigriscens Viviani	Fabaceae	T	EuriMedit.	III-VI	Trifolium
141	Trifolium subterraneum L.	Fabaceae	T	Eurimedit.	IV-VI	Trifolium
142	Trigonella corniculata (L.) L.	Fabaceae	T	N-Steno-Medit.	III-V	Trigonella
143	Trigonella maritima Poir.	Fabaceae	T	Medit.	III-V	Trigonella
144	Typha angustifolia L.	Typhaceae	G	Cirkumbor	VI-VII	Typha
145	Typha latifolia L.	Typhaceae	G	Kozm.	VI-VIII	Typha
146	Urtica dioica L.	Urticaceae	T	Subcosmop.	V-XI	Urtica
147	Urtica urens L.	Urticaceae	T	Subcosmop.	X-IV	Urtica
148	Verbascum blattaria L.	Scrophulariaceae	H	Paleotemp	V-VIII	Verbascum
149	Verbascum sinuatum L.	Scrophulariaceae	H	EuriMedit.	V-VIII	Verbascum
150	Verbena officinalis L.	Verbenaceae	H	Paleotemp.	I-XII	Verbena
151	Veronica persica Poir.	Plantaginaceae	T	Adv. - Eurasia - Altit	I-XII	Veronica
152	Vicia cracca L.	Fabaceae	H	Eur-asiat	V-VIII	Vicia
153	Vulpia myuros (L.) C. C. Gmel.	Poaceae	T	Subcosmop.	IV-VI	Vulpia
154	Xanthium spinosum L.	Asteraceae	T	Adv.-S-America	VII-X	Xanthium
155	Xanthium strumarium L.	Asteraceae	T	Adv.-America	VII-X	Xanthium

Table 2. **Plant families with the number of species recorded.**

No.	Families	No of species
1	Acanthaceae	1
2	Adoxaceae	1
3	Alismataceae	1
4	Amaranthaceae	5
5	Anacardiaceae	1
6	Apiaceae	6
7	Araceae	1
8	Asparagaceae	1
9	Asteraceae	16
10	Boraginaceae	3
11	Brassicaeae	3
12	Caryophyllaceae	9
13	Cupressaceae	2
14	Cyperaceae	5
15	Dennstaedtiaceae	1
16	Equisetaceae	1

No.	Families	No of species
24	Labiatae	3
25	Lauraceae	3
26	Linaceae	1
27	Malvaceae	2
28	Oleaceae	1
29	Orchidaceae	1
30	Papaveraceae	2
31	Pinaceae	3
32	Plantaginaceae	7
33	Poaceae	28
34	Polygonaceae	5
35	Primulaceae	1
36	Ranunculaceae	1
37	Rosaceae	5
38	Rutaceae	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

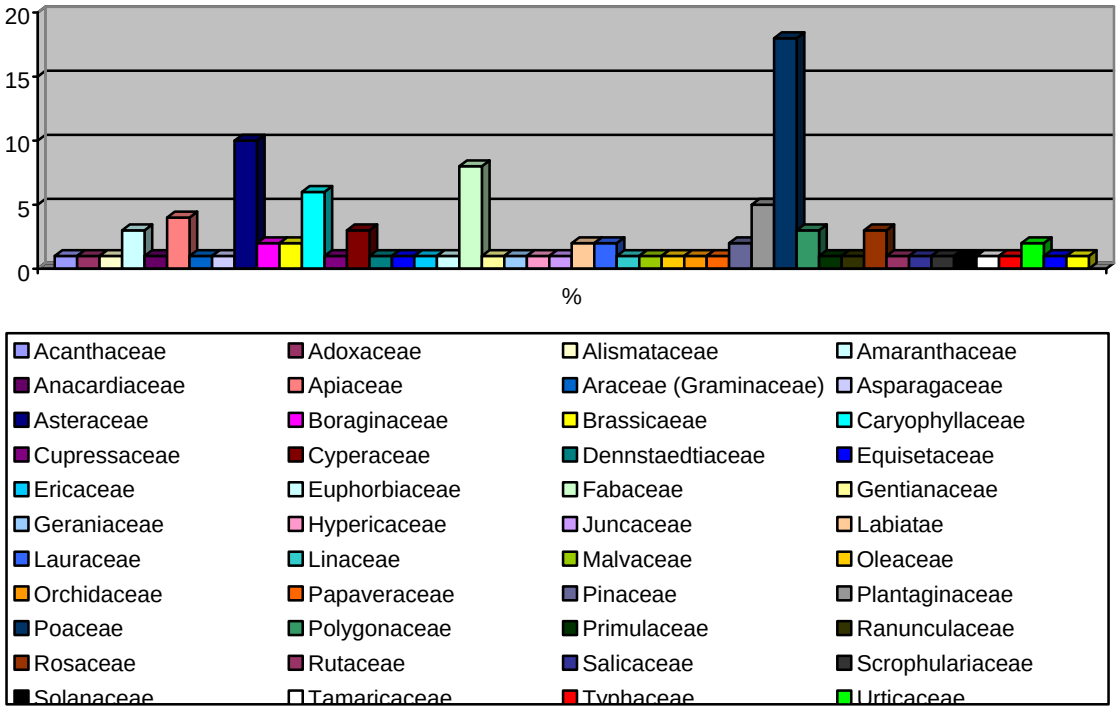

Figure 1. Family richness.

Regarding to 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 (Tab. 3), the Mediterranean elements predominate with 49%, including Euri-Medit, Steno-Medit, Africa-Medit, Cosmopolitan (20%), Paleotemp elements are presented (9.7%), Eurasiat (8.4%), Circumboreal and Adventive have a lower number of taxa (Figure 2).

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.(Tab.3)

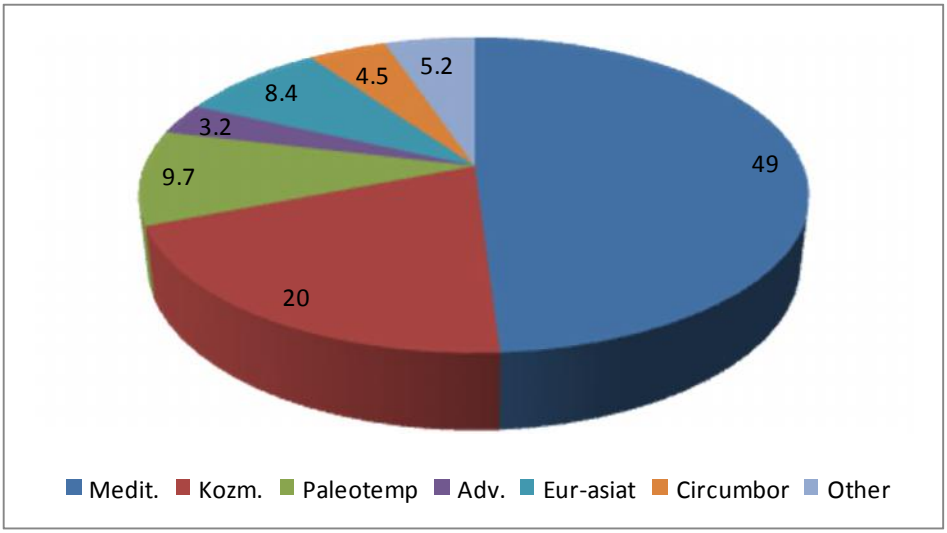

Figure 2. Chorological spectrum.

Table 3. Raunkiaer's life forms (the plant structures that survive the unfavourable 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 phytosociology (Zurich-Montpellier). (Braun-Blanquet 1964) [9]. Sintaxonomical review is presented in following list:

1. **Ass. *Cakilo - Xanthietum strumarii*** Beguinot 1941, [1] Pign. 1953[15] [syn: *Cakilo-Xanthietum italici* (Beg. 1941) Pign.1953; *Salsola kali - Cakiletum maritimae* Costa et Mansanet 1981 corr. Rivas-Martinez, Costa & Loidi 1992] [16]

2. Ass. Eryngio-Sporoboletum virginici Gehu 1989 [6]

3. **Ass. *Euphorbio paraliae-Agropyretum junceiformis*** Tüxen in Br.-Bl. & Tüxen 1952 [7] , 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.] [7] [5].

Therophytes and Hemicryptophytes made up the large majority of the recorded species. These life forms are well represented in the European Flora (Ellenberg 1988) [3]. The main family Poaceae 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 [13].

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 forest of "Soda" 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-higrophylous vegetation are *Typha angustifolia, Typha latifolia, Phragmites australis, Scirpus maritimus. Bolboschoenus maritimus.* [9]

Halophilic species are represented by Suaeda marittima, Halimione portulacoides, Limonium anfractum, Juncus acutus [14]

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

The *Salicornia europaea* [9] (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 metres 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*. [9] The vegetation cover is very dense. The shrub layer is dominated by the species of *Myrtus communis, Pistacia lentiscus, Laurus nobilis, Rubus spp,* etc. [8] 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*. [8] [9]

In pine forest two endemic plant species are found: *Orchis albanica and Orchis x paparisti*. [9] Many rare and threatened plant species occur inside the 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) [18]

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. [11]

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*) [9] 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*. [10] 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* (Miser) and *Alfa alfa* (Jonxhe). 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 our country. 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. The importance of this area is illustrated by the fact that eight of the threatened plant species in the Red Book of Albania occur in this area. 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 sustainable development of these areas, in accordance with a special local conditions, such as hydrological regime, tectonic subsidence.

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