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ROLE OF NATIONAL PARKS IN TURKEY-A CASE STUDY FROM DILEK PENINSULA-GREAT MENDERES DELTA NATIONAL PARK

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Abstract

A survey was conducted in Dilek peninsula-Great Menderes Delta national park, with an area of 10.985 ha. Studies were undertaken during 1998-2001. Vegetation types including 3 new associations namely *Urgino-Quercetum cocciferae, Querco-Oleatum europaea* and *Pistacio-Ceratonietum siliquae* are reported for the first time from the area together with a list of over 50 endemics and endangered taxa like *Campanula tomentosa*. Land degradation practices due to demographic pressures, land clearence, fires and tourism are discussed.

Introduction

Although Turkey is included in the holarctic phytogeographical division but it embodies three different floristic regions namely: Irano-Turanian, Mediterranean and Euro-Siberian. The country shows more features of a continent as regards plant diversity. As such there is a great need for a protection of this diversity. The best possible way for this is an *insitu* conservation.This can be done through establishment of large number of protection sites, one of these being national parks. First step towards establishment of national parks in Turkey were taken in 1940 but the law was passed in 1956. In 1958 Yozgat Pine Grove was announced as a national park. During last four decades 33 national parks with an area of 678.753 ha have been established; this area together with 16 nature parks, 35 nature protected areas, 58 national monuments and 141 protection sites lie around 831.572 ha. The aim of national parks is a long term protection and preservation of natural values thus creating a possibility for the public to see these scenic sites. These usually include areas of ecological importance, threatened wildlife species/communities, and/or representative examples of typical plant formations. The natinal parks can be regarded as the most significant ecological reserves as well. In most of the protected sites nature conservation and recreation go together. In addition to a protection of species and genetic diversity, their function in Turkey is partly compromised by land use and management practices in particular tourism.

Present investigation deals with one of these sites, namely Dilek Peninsula-Great Menderes Delta national park established in 1966, a biogenetic reserve separated for the protection of mediterranean macchias. The Great Menderes Delta part was added to it in 1994 thus bringing the total area to 27.675 ha. This study was started after the big fire of 1996 with an aim to follow the changes in plant diversity.

Materials and Methods

***Study area*:** The area is included in the mediterranean phytogeographical region of Turkey within the borders of State of Aydin and C1 grid square; In the north lies Kusadasi bay, in the east and south Great Menderes (Meander) river, and in the west

Aegean Sea, covering a total area of 10985 ha. The international wetland forming the deltaic zone is 100 km^2 in area, trespassed by a part of 435 km long Menderes river The altitude varies from 0-1360 m, with steep slopes in the west. Climate is typical mediterranean, with dry hot summers and mild winters, experiencing an annual average temperature of 18^0 C, but 13^0 C at higher altitudes. It goes down to 8 ^{0}C in January and rises up to 27 ^{0}C in July. The precipitation in the form of rain varies between 900-1400 mm.

The area abounds in paleozoic metamorphic rocks covered by mesozoic calcareous formations (Yuksel, 1971). At some places we come across conglomerates, sandstone and clayey sedimentary deposits. Several alluvial deposits are met with in Soke plain, Davutlar, Tuzburgazi, and Gullubahce. Soils are dominated by alfisols (Table 1) embodying reddish brown soils rich in iron and aluminium oxide, non-calcareous brown forest and colluvial soils with a loamy texture, slightly acidic to basic in character.

Seasonal plant collection trips were undertaken during 1996-2000. The quadrates were selected at the same time. Identification of plants was done with the help of 10 volumes of "Flora of Turkey and East Aegean Islands "(Davis, 1965- 1988).Vegetation analysis was carried out using the method of Braun-Blanquet (1932). From assorted vegetation types and sufficiently homogeneous areas, a total of 97 sample plots representing the vegetation were set up, taking into consideration both habitat and floristic composition. "Minimal area" system was followed for the quadrate size (400, 100 m^2 in associations) estimation. General ecological features are given in the quadrat headings of phytosociological tables.

In the tables 2,3,4, (.) depicts not present. The figures in the colums indicate abundance-coverage and sociability degrees of the species, adopted in Braun-Blanquet's approach. The Roman numerals in last column indicate presence scale of a species in all columns forming the table. Nomenclature of associations followed in accordance with the rules and regulations of plant sociology given by Weber *et al.* (2000). Soil samples were analysed by the methods outlined in detail by Ozturk *et al.* (1997).

Results and Discussion

***General plant cover*:** The area shows a great biodiversity, with typical phrygana, macchia and forest formations. This rich diversity has attracted the attention of several plant scientists notable among them being Rechinger (149 taxa in 1943, 1950), Kayacik (45 taxa in 1965), Pesmen (1967), Meyer (1969), Secmen *et al.* (1974), Akman *et al.* (37 taxa in 1978), Erdem *et al.* (1994), Ozturk *et al.* (1994), Celik *et al.* (1997), Gokmen *et al.* (1997). However, only detailed study has been undertaken by Uslu (1985), who listed 870 taxa belonging to 453 genera and 105 families. Out of these 3 species namely *Lathyrus grandiflorus*, *Allium commutatum* and *Pistacia saportae* are reported as new to Turkey.

During this investigation 780 taxa from 103 families and 430 genera were collected. Main families recorded are Leguminosae, Compositae, Gramineae, Labiatae, Cruciferae, Caryophyllaceae, Liliaceae and Umbelliferae whereas major genera are *Trifolium, Vicia, Allium, Euphorbia* and *Quercus*. Nearly 58 % of these are mediterranean, 1.8 % euro-siberian and 0.98 % irano-turanian elements. *Juniperus phoenicea, Viburnum tinus, Quercus ilex, Acer sempervirens* occuring at restricted sites in Turkey are all growing together naturally in this park. These are found together with such Euro-Siberian elements as *Castanea sativa, Quercus frainetto, Tilia argentata,* widely distributed in the north. Main vegetation types are outlined below.

Table 1. Physico-chemical characteristics of soils supporting different associations.

Localities	Altitude (m)	Slope (%)	Sand (%)	Silt (%)	Clay (%)	Texture	PH	$CaCO_3$ (%)	Total salt (%)	Total N (%)	Organic matter (%)	C/N ratio
1	20	15	31.3	35.9	32.8	Silty loam	7.66	21.1	0.047	0.17	4.40	15.0
2	20	-	73.0	21.9	5.1	Sandy loam	6.60	-	Trace	0.05	0.70	8.0
3	105	10	17.1	28.7	54.2	Clay	7.30	0.9	0.068	0.140	3.74	15.5
4	475	60	67.6	27.0	5.4	Sandy loam	7.07	0.4	Trace	0.050	0.65	7.6
5	540	50	42.6	42.4	15.0	Loam	5.73	-	Trace	0.054	0.71	7.5
6	320	5	48.6	40.0	11.4	Loam	7.71	14.3	Trace	0.42	7.38	10.2
7	460	10	56.4	30.2	13.4	Sandy loam	7.10	-	Trace	0.07	1.44	11.8
8	150	50	43.3	45.9	10.8	Loam	6.58		0.275	0.046	0.68	8.5

1. Juniperus phoenica (476) Karina-Gorunmezdere, **2.** Ceratonia siliqua-Pistacia lentiscus (446) Güzelcamli, Kalamaki, **3.** Arbutus andrachne (437) Guzelcamli, Icmeler, **4.** Quercus ilex (431) Güzelcamli, Kirkbasamak, **5.** Cestanea sativa (428) Güzelcamli, Tasdelen, **6.** Pinus brutia (45) Kalamaki, Armutalan (50) **7.** Pinus brutia (50)Tuzburgazi-Gullubahce, **8.** Cupressus sempervirens (471) Güzelcamli, Kalamaki

***Phrygana*:** It dominates on the southern slopes facing the Great Menderes between Atburgazi and Soke, around Ilyasaga-Dipburun, with generally 5-30 cm tall herbs and 30-60 cm tall bushes. Typical association is *Sarcopterietum spinosi* with such characteristics as; *Sarcopterium spinosum, Lophochloa phleoides, Valantia hispida* and *Hippocrepis ciliata*. Syntaxonomically it is represented in the alliance *Cistion orientale*, order *Cisto-Micromerietalia* and class *Cisto-Micromerietea* (Uslu, 1985).

***Macchias*:** These are widespread in the Marmara, Ege and Mediterranean parts from 0 to 1000 m, and as enclaves along the Black Sea coast, dominated by evergreen sclerophyllous plant cover which has developed secondarily after a destruction of forests (Ozturk, 1995). The plants form a dense cover theirby protecting the soils from erosion and increase the biogeochemical activity at the same time. Previously 5 associations, namely *Juniperetum phoeniceae, Arbutetum andrachnis, Quercetum ilicis, Quercetum coccifera*e and *Ceratonieto-Pistacietum lentisci* have been reported in this formation from Dilek (Uslu, 1985).

Characteristics of these associations are: *Juniperus phoenicea, Prasium majus, Knautia degenii ,Atractylis cancellata, Arbutus andrachne, Hypericum empetrifolium, Gladiolus illyricus, Quercus ilex, Clematis cirrhosa, Dryopteris pallida, Quercus coccifera, Lamium amplexicaule, Phillyrea latifolia, Arbutus unedo, Laurus nobilis, Ceratonia siliqua, Pistacia lentiscus, Allium subhirsutum* and *Carduus argentatus* all belonging to class Quercetea ilicis, alliances Quercion ilicis and Oleo-Ceratonion, order Quercetalia ilicis.

We have recorded three new associations (Tables 2,3,4) from the study area:

***Urgino maritimae-Quercetum cocciferae* ass. nov.**

(Holotype: Table 2, Quadrat no. 4)

Physionomically this association (Table 2) is composed of a herbaceous and a shrub layer, 7-56 cm. and 0.6- 3.5 m. tall respectively. The association is found on northeast, north, south and east slopes occupying micaschist and quartisit mother rock. Its characteristic species are: *Quercus coccifera, Urginea maritima* and *Lamium amplexicaule*. The location is Ilyasaga Police Station in the Karina area. Syntaxonomically it belongs to *Quercion ilicis* Br.-Bl. (1931) 1936 allliance, *Quercetalia ilicis* Br.-Bl. 1947 order and *Quercetea ilicis* Br.-Bl. 1947 class.

***Querco cocciferae-Oleetum europaeae* ass. nov.**

(Holotype: Table 3, Quadrat no. 39)

The association is distributed (Table 3) around Karina on northeast, south, southeast and southwest slopes on calcareous and micaschist mother rock with two strata: lower one 5-60 cm tall herbaceous and upper one of shrubs 0.7-3.2 m tall. The characteristic species are: *Olea europaea, Quercus coccifera, Clematis cirrhosa* and *Myrtus communis*, belonging syntaxonomically to *Oleo-Ceratonion* Br.-Bl. 1936 allliance, *Quercetalia ilicis* Br.-Bl. 1947 order and *Quercetea ilicis* Br.-Bl. 1947 class.

Table 2. ***Urgino maritimae-Quercetum cocciferae*** **ass. nov.**

Quadrat no. (*: Holotype)	1	2	3	4*	5	6	7	8	9	10	11	12	13	14	15	Presence
Size of quadrat (m^2)	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Altitude (m)	1250	1270	1300	1300	1270	1200	1200	1225	1230	1150	1320	1240	1200	1175	1170	
Direction	NE	SE	N	SE	SW	NW	N	S	N	SW	NE	NE	E	E	E	
Inclination (°)	10	10	20	30	30	40	40	30	10	30	30	40	50	30	10	
Mother rock (QM:Quartisit and Micaschist)	QM	QM	QM	QM	QM	QM	QM	QM	QM	QM	QM	QM	QM	QM	QM	
Height of tree layer (m)	.	15	.	15	15	20	20	.	15	20	.	15	.	10	15	
Coverage of tree layer (%)	.	45	.	45	40	45	45	.	40	40	.	40	.	50	50	
High of shrub layer (m)	3	2.5	3	3.5	2	3	3	2	2	2	2	2	2	2.5	2.5	
Coverage of shrub layer (%)	70	70	75	75	60	65	75	75	70	65	70	70	70	70	70	
Hight of herb layer (cm)	20	30	25	25	20	56	25	35	35	25	40	40	20	50	50	
Coverage of herb layer	30	55	30	40	50	50	25	45	50	60	40	50	35	45	45	
Characteristic species of the association																
Quercus coccifera	33	34	33	45	32	32	33	34	33	33	32	34	33	34	33	15
Urginea maritime	+1	+1	+1	+1	.	+1	+1	+1	+1	.	+1	+1	+1	.	+1	12
Lamium amlexicaule	+1	+1	.	+1	+1	.	+1	.	+1	+1	.	+1	+1	+1	+1	11
Centaurea calolepis	.	+1	+1	+1	.	+1	+1	+1	.	+1	+1	.	+1	+1	.	10
Gagea graeca	+1	.	.	+1	.	+1	.	.	+1	+1	.	.	+1	.	+1	7
Characteristic species of the alliance ***Quercion ilicis*:**																
Phillyrea latifolia	+2	+2	12	.	+2	+2	11	11	+2	+2	+2	.	+2	+2	11	13
Arbutus unedo	11	11	11	11	.	11	11	.	.	11	11	11	.	11	.	10
Laurus nobilis	.	.	11	11	.	11	.	11	11	.	11	11	11	.	11	9

Table 2 (Cont'd.)

Jasminum fruticans	+1	+1	.	+1	+1	+1	.	+1	.	+1	.	.	+1	.	+1	9
Teucrium chamaedrys	+1	.	+1	+1	.	.	+1	.	+1	.	+1	+1	.	+1	.	8
Quercus ilex	.	.	.	11	.	.	11	.	11	11	.	.	.	.	11	5
Characteristic species of the order ***Quercetalia ilicis*:**																
Prasium majus	+1	+1	+1	+1	.	+1	.	+1	+1	+1	+1	+1	+1	.	+1	12
Pistacia terebinthus subsp. *palaestina*	11	.	11	12	11	.	+2	12	.	.	11	+2	12	11	11	11
Pinus brutia	.	12	.	+2	12	12	12	.	+2	+2	.	12	.	22	12	10
Phillyrea latifolia	11	.	11	.	11	11	.	11	.	11	.	11	.	11	.	8
Laurus nobilis	+2	11	.	11	.	11	11	.	.	+2	.	.	+1	.	.	7
Arbutus andrachne	.	11	.	12	11	.	.	+2	11	.	+2	.	.	.	.	6
Juniperus oxycedrus subsp. *oxycedrus*	+1	.	+1	.	.	.	.	+1	.	+1	.	+1	+1	+1	.	6
Characteristic species of the class ***Quercetea ilicis*:**																
Paliurus spinachristi	+1	.	+1	11	.	.	+1	.	+1	11	.	+1	+1	+1	+1	10
Geranium purpureum	+1	+1	.	+1	+1	+1	.	.	+1	.	+1	.	+1	+1	+1	10
Osyris alba	.	.	+1	.	+1	+1	+1	+1	.	+1	+1	.	+1	.	+1	9
Crataegus monogyna subsp. *azeralla*	.	11	.	11	11	.	.	.	11	.	.	11	11	11	11	8
Asparagus acutifolius	+1	.	+1	.	.	+1	.	+1	.	+1	.	+1	.	+1	+1	8
Olea europaea var. *oleaster*	+1	.	.	+1	.	.	+1	+1	+1	.	+1	+1	+1	.	.	8
Thymbra spicata	.	+1	.	+1	+1	+1	.	.	+1	+1	.	.	.	+1	.	7
Myrtus communis	11	.	11	.	11	.	11	11	.	.	11	.	.	.	.	6
Melissa officinalis	+1	.	+1	.	.	.	.	+1	+1	+1	.	.	.	.	+1	6
Ruscus aculeatus	.	+1	.	.	+1	.	+1	.	.	.	.	+1	+1	+1	.	6

Table 2 (Cont'd.)

Characteristic species of the class **Cisto-Micromerietea:**																
Cistus creticus	+2	+2	.	+1	+1	.	11	+2	+1	.	+2	.	.	+1	+2	10
Salvia fruticosa	+1	12	.	11	.	+1	.	+1	.	+2	11	+1	.	11	11	10
Hyparhania hirta	+1	.	+1	+1	.	+1	.	.	+1	+1		.	+1	.	.	7
Genista acanthoclada	.	.	+2	.	.	.	+2	.	+2	.	.	.	.	.	.	3
Tamus communis	+1													+1	+1	3
Characteristic species of the superclass **Querco-Fagea:**																
Vicia cracca subsp. *stenophylla*	+1	+1	+1	+1	.	.	+1	+1	+1	+1	.	+1	+1	+1	+1	12
Poa nemoralis	+1	.	.	.	+1	+1	+1	+1	+1	.	+1	+1	.	+1	.	9
Fragaria vesca	.	.	+1	+1	+1	.	+1	+1	.	.	+1	+1	.	+1	.	8
Hedera helix	.	.	11	.	11	.	.	.	.	.	11	.	.	.	.	3
Others:																
Poa bulbosa	+1	+1	+1	+1	.	+1	+1	+1	.	+1	+1	+1	+1	+1	+1	13
Salvia viridis	11	11	+1	+1	.	.	+1	+1	+1	.	.	+1	+1	+1	+1	11
Valeriana dioscoridis	+1	.	.	.	+1	+1	+1	+1	.	+1	+1	.	+1	+1	+1	10
Urtica dioica	+1	.	.	+1	+1	.	+1	+1	+1	.	+1	+1	.	+1	+1	10
Anchusa undulata	.	.	+1	.	+1	+1	.	.	+1	+1	.	+1	+1	+1	+1	9
Alliaria petiolata	.	+1	+1	.	.	.	+1	+1	.	+1	.	+1	+1	.	.	7
Rosa canina	+2	.	.	11	.	.	.	.	11	.	11	.	.	11	.	5
Alyssum minus	+1	+1	.	.	.	.	.	.	.	+1	.	+1	.	.	+1	5
Lamium amplexicaule	+1	.	+1	.	.	+1	.	.	+1	+1	.	.	.	.	.	5
Trifolium afine	.	+1	.	+1	+1	.	.	.	.	+1		+1	.	.	.	5
Alyssum foliosum	.	.	.	.	.	+1	+1	+1	.	.	+1	.	.	.	.	4
Capsella bursapastoris	.	.	+1	.	.	.	.	+1	.	.	+1	.	.	+1	.	4
Dactylis glomerata	.	.	.	+1	.	.	.	+1	.	+1	+1	.	.	.	.	4
Trifolium globosum	.	+1	+1	.	.	.	+1	.	.	.	.	.	+1	.	.	4

Table 3. ***Querco cocciferae-Oletum oleasterae*** **ass. nov.**

Quadrat no. (*: Holotype)	30	31	32	33	34	35	36	37	38	39*	40	41	42	
Size of quadrat (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	
Altitude (m)	100	100	100	70	70	150	200	215	170	150	150	210	215	
Direction	NE	SE	SE	S	S	S	SW	SW	S	S	S	S	S	
Inclination (°)	10	10	12	30	25	25	30	15	30	40	40	45	10	
Mother rock (C:Calcareous and Micaschist)	C	C	C	C	C	C	C	C	C	C	C	C	C	Presence
Height of tree layer (m)	10	10	10	15	.	10	15	10	10	10	10	.	15	
Coverage of tree layer (%)	30	30	30	20	.	30	30	30	20	30	30	.	40	
High of shrub layer (m)	2	2	2.5	2	3.6	2	2.5	2	2	3	2	2	2	
Coverage of shrub layer (%)	60	60	60	80	80	70	70	65	70	80	60	65	70	
Hight of herb layer (cm)	40	45	40	60	80	55	45	30	30	50	35	60	30	
Coverage of herb layer (%)	45	40	55	50	60	40	65	30	50	60	40	40	50	
Characteristic species of the association:														
Olea europaea var. *oleaster*	22	33	34	33	34	34	33	33	34	44	23	23	33	13
Quercus coccifera	+2	12	23	.	.	12	22	22	22	12	+2	.	.	9
Orchis palustris	.	+1	.	.	+1	+1	+1	.	+1	+1	.	+1	+1	8
Tulipa armena	+1		+1	.	+1	.	.	.	.	+1	.	.	.	4
Paracaryum aucheri	.	.		+1	.	.	.	+1	.	+1	.	.	+1	4
Characteristic species of the alliance **Oleo-Ceratonion:**														
Myrtus communis	11	.	11	11	.	.	11	11	11	11	11	.	11	9
Clematis cirrhosa	+1	+1	.	+1	+1	+1	+1	+1	.	+1	.	.	.	8
Capparis spinosa	.	+1	.	+1	+1	.	+1	.	+1	+1	.	+1	+1	8
Prasium majus	+1	.	+1	.	+1	+1	.	+1	+1	.	+1	.	.	7
Ephedra campylopoda	.	+1	.	+1	.	+1	.	+1	.	+1	.	+1	+1	7

Table 3 (Cont'd.)

Characteristic species of the order ***Quercetalia ilicis*:**														
Ruscus aculatus	+1	+1	.	.	+1	+1	+1	+1	+1	.	+1	+1	+1	10
Pistacia terebinthus subsp. *palaestina*	11	+2	12	11	11	+2	+1	.	.	11	11	+2	.	10
Laurus nobilis	+1	+1	+1	.	.	+1	+1	.	.	+1	.	+1	+1	8
Phillyrea latifolia	12	.	.	11	11	.	.	12	11	11	.	.	+2	7
Pinus brutia	12	.	+2	+2	.	.	12	+2	.	12	.	.	12	7
Prasium majus	+1	.	.	+1	+1	.	+1	.	.	+1	.	+1	.	6
Arbutus andrachne	.	11	11	.	.	11	.	.	.	.	11	.	+2	5
Quercus infectoria subsp. *boissieri*	.	11	.	.	.	21	.	.	11	.	11	.	.	4
Cynosurus echinatus	.	.	.	.	.	.	.	+1	.	.	+1	.	.	2
Characteristic species of the class ***Quercetea ilicis*:**														
Asparagus acutifolius	+1	+1	.	+1	+1	+1	+1	+1	.	+1	.	+1	+1	10
Gonocytisus angulatus	+1	11	.	+1	11	.	.	+1	11	11	.	+1	.	8
Olea europeae var. *oleaster*	11	.	11	.	11	11	.	11	.	.	11	11	11	8
Smilax aspera	.	.	.	+1	+1	+1	+1	.	.	+1	+1	+1	+1	8
Adenocarpus complicates	11	.	.	11	+1	+1	.	.	.	11	+1	.	11	7
Osyris alba	+1	.	+1	.	.	.	+1	+1	+1	.	.	+1	.	7
Geranium purpureum	+1	.	+1	.	.	+1	+1	.	+1	+1	.	+1	.	7
Paliurus spinachristi	11	11	.	11	11	.	.	.	11	.	.	.	.	5
Sytrax officinalis	.	.	11	.	11	11	.	+1	.	.	11	.	.	5
Melissa officinalis	.	.	.	.	.	+1	+1	+1	+1	.	+1	.	.	5
Characteristic species of the class ***Quercetea pubencentis*:**														
Quercus pubescens	+2	11	.	12	.	+1	.	+2	.	12	.	12	.	7

Table 3 (Cont'd.)

Lathyrus digitatus	+1	+1	+1	.	+1	.	+1	.	+1	+1	.	.	.	7
Salvia tomentosa	.	.	+1	.	+1	+1	.	.	+1	.	+1	.	+1	6
Hypericum perforatum	+1	.	.	+1	.	.	+1	+1	.	+1	.	+1	.	6
Styrax officinalis	.	+2	11	.	.	11	.	.	11	.	11	.	+2	5
Characteristic species of the superclass **Querco-Fagea:**														
Vicia cracca subsp. *stenophylla*	+1	+1	+1	.	.	.	+1	+1	+1	+1	+1	+1	+1	10
Brachypodium sylvaticum	+1	.	.	+1	+1	+1	.	+1	.	+1	+1	+1	+1	9
Fragaria vesca	+1	.	+1	+1	+1	+1	+1	.	+1	.	+1	.	.	8
Crataegus monogyna subsp. azeralla	.	11	+1	.	+1	.	.	+1	.	+1	+1	.	+1	7
Tamus communis	.	+1	+1	.	+1	.	+1	+1	.	+1	.	+1	.	7
Lapsana communis	.	.	+1	+1	.	+1	.	+1	+1	.	+1	.	.	6
Poa nemoralis	+1	+1	+1	.	.	.	+1	+1	+1	.	.	.	.	6
Others:														
Trifolium campestre	11	11	+1	+1	+1	11	+1	+1	+1	+1	+1	+1	+1	13
Poa bulbosa	+1	+1	+1	+1	.	+1	+1	+1	+1	+1	+1	+1	+1	12
Medicago minima var. *minima*	.	+1	.	+1	.	+1	.	+1	+1	+1	+1	+1	+1	9
Alyssum minus	+1	+1	+1	.	.	.	+1	.	+1	+1	+1	+1	+1	9
Urtica membranacea	.	.	.	+1	.	+1	+1	+1	+1	+1	.	+1	+1	8
Sanguisorba minor subsp. *muricata*	+1	+1	.	+1	+1	+1	.	.	.	.	+1	+1	+1	8
Picnomon acarna	+1	.	+1	+1	+1	.	.	.	+1	+1	.	+1	+1	8
Echinaria capitata	.	.	+1	.	.	+1	+1	+1	+1	+1	+1	.	.	7
Muscari neglectum	+1	+1	+1	+1	.	+1	+1	.	.	.	.	.	.	6
Valerianella vesicaria	+1	.	.	.	.	.	+1	+1	+1	+1	.	.	.	5
Vulpia ciliata	.	+1	.	.	+1	.	.	+1	.	.	+1	.	+1	5

***Pistacio lentisci-Ceratonietum siliquae* ass. nov.**

(Holotype: Table 4, Quadrat no. 24)

This association is characterised by the species like *Ceratonia siliqua, Pistacia lentiscus, Allium subhirsutum* and *Phagnolon rupestre* (Table 4) belonging to the alliance *Oleo-Ceratonion* Br.-Bl. 1936, order *Quercetalia ilicis* Br.-Bl. 1947 and class *Quercetea ilicis* Br.-Bl. 1947. The herbaceous layer is 5-20 cm tall whereas shrub layer is 0.5-2.5 m and tree layer 4-8 m tall. It is mainly seen around Guzelcamli area on calcareous mother rock.

Ephedra camplyopoda, Phyla canescens, Amaranthus albus and ***Atractylis gummifera*** have been recorded newly by us from C1 grid square.

***Forest vegetation*:** Nearly 20 million ha (26 %) of the total area of Turkey is covered by forests. Out of this 9 million ha are highly productive and 11 million ha are as degraded forest. The distribution starts mainly from 100 m but at places they lie just on the coast. In our study area forests are distributed between 0-1200 m. These include 4 associations namely: *Cupressetum sempervirentis, Castanetum sativae , Pinetum brutiae* and *Pinetum pallasianae*, characterised by *Cupressus sempervirens, Acer sempervirens, Cupressus sempervirens, Laurus nobilis, Quercus ilex, Quercus coccifera, Smilax aspera, Phillyrea latifolia, Coronilla emerus, Arbutus andrachne, Castanea sativa, Luzula forsteri, Paeonia mascula, Pinus brutia, Lathyrus aphaca* var. *pseudaphaca, Limodorum abortium, Pinus nigra ssp. pallasiana, Ranunculus reuterianus, Campanula lyrata, Poa bulbosa* and *Sedum amplexicaule* belonging alliances *Oleo-Ceratonion, Quercetalis ilicis, Quercion frainetto, Adenocarpo-Pinion*, orders *Quercetalia ilicis, Querco-Carpinetalia orientalis Querco-Cedretalia libani* and classes *Quercetea ilicis* and *Quercetea pubescentis* (Uslu, 1985).

The coastal zone around the park is rich too. One commonly comes across taxa. like *Aeluropus littoralis, Arthrocnemum fruticosum, Alhagi pseudalhagi, Atriplex davisii, Carlina lanata, Centaurium erythraea* ssp. *erythraea, Chenopodium album* var.*album, Frankenia hirsuta, Halimione portulacoides, Halocnemum strobilaceum, Hordeum marinum* var.*marinum, Imperata cylindrica* var. *cylindrica, Inula critlmoides, I. viscosa, Lagurus ovatus, Juncus acutus, J. maritimus, J. subulatus, Limonium bellidifolium, L. gmelinii, Nerium oleander, Parapholis incurva, Petrosimonia brachiata, Phragmites australis, Plantago crassifolia, P. lagopus, Polypogon monspeliensis, Puccinellia distans* ssp.*distans, Salicornia europaea, Salsola kali, Sueda prostrata* ssp. *prostrata* and *Tamarix smyrnensis* (Guvensen, 1994; Ozturk *et al.*, 2000).

Two psammophytic plant associations are *Sporobolo - Elymetum farcti* and *Ammophiletum arundinaceae* characterised by *Sporobolus pungens, Elymus farctus, Euphorbia peplis, Medicago marina, Ammophila areanria* subsp. *arundinaceae* and *Maresia nana*. These are included in the classes *Ammophiletea arenaria* and *Ammophiletea arundinaceae*, order *Ammophiletalia arundinaceae* and alliance *Ammophilion arundinaceae* (Uslu, 1985).

In the deep waters of Kalamaki *Posidonia oceanica* community is widespread and this serves as an indicator of unpolluted waters.

Table 4. ***Pistacio lentisci-Ceratonietum siliquae*** **ass. nov.**

Quadrat no. (*: Holotype)	16	17	18	19	20	21	22	23	24*	25	26	27	28	29	Presence
Size of quadrat (m^2)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Altitude (m)	300	320	300	200	210	200	170	170	150	150	80	20	20	20	
Direction	E	E	E	E	.	NW	NW	E	E	.	NW	E	E	E	
Inclination (°)	30	20	20	20	.	30	30	20	10	.	10	20	20	20	
Mother rock (C:Calcareous)	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Height of tree layer (m)	10	10	10	.	.	.	.	15	.	.	.	10	10	.	
Coverage of tree layer (%)	40	45	40	.	.	.	.	45	.	.	.	40	40	.	
High of shrub layer (m)	3	3	2,5	2	2	2.5	2.5	3	3.6	2.5	2.5	2	2.5	2	
Coverage of shrub layer (%)	80	80	80	80	85	75	70	70	90	85	85	85	75	70	
Hight of herb layer (cm)	70	45	30	75	80	30	50	60	50	75	80	55	40	60	
Coverage of herb layer	40	40	60	50	40	50	60	70	50	40	40	20	30	40	
Characteristic species of the association:															
Ceratonia siliqua	43	43	44	44	44	43	43	33	55	45	44	44	43	44	14
Pistacia lentiscus	11	11	22	.	11	12	11	22	11	.	.	11	12	12	11
Allium subhirsutum	.	+1	.	+1	+1	+1	+1	.	+1	+1	+1	.	+1	+1	10
Phagnolon rupestre	.	+1	.	+1	.	+1	+1	+1	.	.	+1	+1	+1	.	8
Characteristic species of the alliance **Oleo-Ceratonion:**															
Olea europaea	11	11	.	11	.	.	11	11	11	11	11	.	11	11	10
Ephedra campylopoda	.	+1	.	+1	+1	+1	.	+1	+1	+1	.	+1	+1	.	9
Prasium majus	+1	.	+1	.	+1	+1	.	+1	+1	.	+1	+1	.	+1	9
Capparis spinosa	.	+1	.	+1	+1	.	+1	.	+1	+1	.	+1	+1	.	8
Myrtus communis	11	.	11	11	.	.	.	11	11	.	11	.	11	.	7
Clematis cirrhosa	.	+1	.	.	+1	+1	.	.	.	+1	.	+1	.	+1	6

Table 4 (Cont'd.)

Characteristic species of the order ***Quercetalia ilicis*:**															
Pistacia terebinthus subsp. *palaestina*	22	.	22	22	.	22	+2	+2	23	12	22	.	+2	.	10
Ruscus aculeatus	+1	+1	.	.	+1	+1	+1	.	.	+1	+1	+1	+1	.	9
Arbutus andrachne	.	+2	.	+2	+2	.	.	+2	+2	+2	.	.	+2	11	8
Phillyrea latifolia	11	11	.	11	.	.	11	.	11	.	11	11	11	.	8
Laurus nobilis	.	.	11	.	11	11	.	11	11	.	11	.	11	.	7
Pinus brutia	.		.	+2	12	12	12	.	+2	.	.		.	22	6
Quercus infectoria subsp. *boissieri*	+2	+2	+2	.	.	.	.	+2	.	.	.	11	11	.	6
Quercus ilex	.	.	.	11	.	.	11	.	11	11	11	.	.	.	5
Characteristic species of the class ***Quercetea ilicis*:**															
Geranium purpureum	+1	+1	.	+1	+1	+1	+1	.	+1	.	+1	.	+1	+1	10
Melis tenuifolia	+1	+1	+1	.	+1	.	+1	+1	+1	+1	+1	+1	.	.	10
Smilax aspera	+1	.	.	+1	+1	.	.	+1	+1	+1	.	+1	.	+1	8
Paliurus spina-christi	.	11	+1	+1	.	+1	+1	.	11	.	+1	.	.	.	7
Osyris alba	.	+1	+1	.	+1	.	+1		+1	.	.	+1	.	+1	7
Asparagus acutifolius	.	+1	.	.	+1	.	+1	.	+1	+1	.	+1	.	.	6
Hypericum empetrifolium	.	.	.	+1	.	.	.	+1	+1	+1	.	.		+1	5
Thymbra spicata	.	.	+1	.	.	.	+1	.	+1	.	+1	.	.	.	4
Melisa officinalis	.	.	.	+1	.	+1	+1	.	+1	.	.	.	.	.	4
Characteristic species of the class ***Quercetea pubescentis*:**															
Lathyrus digitatus	+1	+1	.	+1	+1	+1	+1	.	+1	+1	+1	+1	+1	+1	12
Cephalonthera rubra	.	+1	+1	+1	+1	+1	.	+1	.	.	+1	.	+1	.	8
Quercus pubescens	+2	.	.	+2	.	+2	+2	.	.	.	+2	+2	.	.	6
Colutea cilicica	.	.	11	11	.	.	.	.	11	11	.	.	11	+2	6
Styrax officinalis	11	+2	+2	.	.		.		11	1	.	.	.		5
Briza humilis	+1	.	.	+1	+1	.	+1	+1	.	.	.	.	.	.	5

Table 4 (Cont'd.)

Characteristic species of the superclass **Querco-Fagea:**															
Vicia cracca subsp. *stenophylla*	+1	+1	+1	+1	.	.	+1	+1	+1	+1	.	+1	+1	+1	11
Poa nemoralis	+1	.	.	.	+1	+1	+1	+1	+1	.	+1	+1	.	+1	9
Fragaria vesca	.	.	+1	+1	+1	.	+1	+1	.	+1	+1	+1	.	+1	9
Hedera helix	11	.	.	11	11	.	11	.	11	11	.	.	11	.	7
Epilobium montanum	.	+1	+1	.	.	+1	.	+1	+1	.	.	.	+1	+1	7
Tamus communis	+1	.	.	+1	.	+1	.	.	.	.	+1	+1	.	.	5
Brachypodium sylvaticum	.	+1	.	.	+1	.	+1	.	.	+1	.	.	.	.	4
Others															
Dactylis glomerata	+1	+1	+1	.	.	+1	.	+1	+1	+1	+1	+1	.	+1	10
Bromus diandrus	.	+1	+1	+1	+1	+1		.	+1	+1	+1	+1	+1	.	10
Lathyrus aphaca var. *pseudoaphaca*	+1	.	+1	.	.	+1	+1	+1	+1	.	+1	+1	.	+1	9
Anagallis arvensis subsp. *courulea*	+1	+1	.	+1	+1	.	+1	+1	.	+1	.	.	+1	+1	9
Trifolium campestre	.	+1	+1	+1	.	+1	.	+1	+1	.	+1	+1	.	.	8
Erophila verna	+1	.	+1	.	+1	.	+1	.	+1	+1	.	+1	.	+1	8
Rumex acetocella	.	+1	.	+1	+1	.	+1	+1	.	+1	+1	.	+1	.	8
Crepis sancta	.	.	+1	.	.	+1	+1	.	.	+1	.	+1	+1	+1	7
Trifolium afine	+1	+1	.	.	+1	+1	.	+1	.	.	+1	.	.	+1	7
Muscari neglectum	.	+1	.	+1	+1	.	+1	+1	.	.	.	+1	+1	.	7
Sanguisorba minor subsp. *minor*	+1	.	+1	.	.	+1	.	.	+1	.	+1	.	+1	+1	7
Poa bulbosa	.	.	.	+1	+1	.	+1	+1	+1	.	.	+1	.	+1	7
Echinaria capitata	+1	.	+1	+1	.	+1	.	.	.	+1	.	+1	+1	.	7
Bromus madritensis	.	+1	.	+1	.	.	+1	.	+1	+1	.	.	+1	+1	7
Picnomon acarna	+1	+1	+1	.	+1	.	.	+1	.	.	+1	+1	.	.	7
Sherardia arvensis	+1	.	.	.	+1	+1	+1	.	.	+1	.	+1	+1	.	7
Potentilla recta	.	+1	.	+1	.	.	.	+1	.	.	+1	.	+1	+1	6
Filago pyramidata	+1	.	+1	+1	.	+1	.	.	+1	+1	.	.	.	.	6
Ornithopus compressus	.	+1	.	.	+1	.	.	+1	.	.	.	+1	+1	.	5
Aegilops ovata	+1	.	.	+1	.	.	.	+1	.	.	+1	.	.	+1	5
Valerianella vesicaria	+1	.	+1	.	.	+1	.	.	.	+1	.	.	.	.	4
Avena barbata	.	.	.	.	+1	.	+1	+1	+1	.	.	.	.	.	4
Hordeum bulbosum	+1	+1	.	.	.	.	.	.	.	.	+1	.	+1	.	4

***Endemics*:** Out of approximately 10000 pteridophytes and flowering plants nearly 3300 are endemics, some being relicts (Ekim *et al.*, 1989). This number lies around 2500 for the whole of European continent. Among the neighbouring countries 1500 have been reported from Iran, 1000 from Greece, 300 from Syria-Lebanon, 200 from Iraq and 55 from Bulgaria (Ozturk *et al.* 1998).This stresses the importance of plant diversity in Turkey. The maximum number of endemics is seen in the Irano-Turanian phytogeographical region followed by the Mediterranean, which includes our study area too. These plants are destroyed by agronomic practices, grazing, drainage of swamps, fires, dam constructions, industrialisation and urbanisation, pesticide applications, and pollution.

The endemics found in the study area are: *Achillea phrygia, Ajuga bombycina, Alkanna phrygia, Alyssum aurantiacum, Anthemis dipsacea, A. wiedemanniana, Aristolochia hirta, A.insica, Asperula lilaciflora ssp. phrygia, Astragalus karputanus, A. ptilodes var. ptilodes, Aubrieta canescens* ssp. *canescens, Campanula lyrata ssp. lyrata, C. lyrata* subsp.*icarica, C. tomentosa, C. raveyi, Centaurea calolepis, Cirsium sipyleum, Consolida phrygia* ssp. *phrygia, Crocus olivieri* subsp. *balansae, Cyclamen mirabile, Dianthus cibrarius, D. lydus, Digitalis cariensis, Euphorbia anacampseros* var. *anacampseros, Ferulago humilis, Fritillaria bithynica, Galium brevifolium* ssp. *brevifolium, Gladiolus anatolicus, Gysophila tubulosa, Haplophyllum myrtifolium, Hieracium patentissimum, Lotus macrotrichus, Malope anatolica, Minuartia juressi* subsp. *asiatica, Nepeta nuda* ssp. *lydiae, N. pilinux, Papaver virchowii, Paracaryum aucheri, Ranunculus reuterianus, Scabiosa reuteriana, Scrophularia floribunda, Sideritis leptoclada, Trigonella cretica, Tulipa armena var. lycica, Velezia pseudorigida, V. hispida, Verbascum phrygium, V. mykales, V. parviflorum, V. smyrnaeum, Ziziphora taurica* ssp. *cleonioides*

This national park has been the last habitat for the extinct species Anatolian Leopard and the coastal part is inhabited by the famous Mediterranean Monk Seal. The deltaic wetland part too shows a rich biodiversity embodying nearly 300 bird species in particular the critically endangered species like Dalmatian Pelicans and Pygmy cormorant.

***Land degradation*:** The study area is one of the most beautiful and scenic parks in Turkey being rich floristically and faunistically. It has suffered a lot from the deposition of sediments in the past. This is clear from the history of the area. The famous port city of Priene, one of the 12 cities of Ions mentioned by Herodotus from the Aegean coast, is nowadays 8 km away from the sea (Nurlu *et al.*, 1997). The demographic pressure has added to this degradation together with the touristic activities as well as summer house conustructions. Nearly 500,000 tourists visit this park in summer. From time to time the area faces severe pressures from intentionally created fires. Out of over 30 big fires in Turkey since 1975 one has taken place in a part of our study area on the Soke side in the year 1996 destroying 1438 ha of macchia and red pine forest. Postfire plant cover on the Soke side revealed 357 vasculer plant taxa, belonging to 224 genera, 61 families. Previously Leguminosae and Compositae toped the list but after fire Leguminosae and Gramineae have dominated (Celik *et al.*, 1997). Genera encountered during prefire period were *Trifolium* and *Vicia*. These have been replaced by *Trifolium* and *Ranunculus* after the fire. Over utilization of the land for cotton cultivation has produced adverse effects and today 20,470 ha of the land in the vicinity of this biogenetic reserve is faced with salinity-alkalinity problems (Akbas *et al.*, 1999).

Conclusions

Once we were part and parcel of the "Biosphere" functioning without our intervention and destroyed flourishing areas more than "climate". "Mediterranean Basin" suffered a lot from these activities. Many areas now burried in soil due to land degradation have resulted in a loss of biodiversity too. To save our coming generations from a similar fate, there is an immediate need to start establishing conservation measures by increasing the number of protected areas. This number in the turkish Mediterranean zone 21 (4 national parks, 3 nature protected areas, 2 nature parks 9 specially protected areas, 3 dunes). List should be extended by adding Sandras mountains (Mugla), Babadag (Denizli), Besparmak mountains completely (Soke-Aydin), Kozak plateau (Bergama-Izmir). The GIS mapping should be done for such Mediterranean natural plant formations as phrygana, macchias and forests. Municipalities should protect areas embodying "ecologically important biotopes".

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