

Preliminary results of floristic and vegetation surveys in three coastal humid areas in the Puglia region (southern Italy)

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Abstract: Di Pietro, R., Dibitonto, P., Garziano, G., Sciandrello, S., Wagensommer, R. P., Medagli, P., Tomaselli, V. *Preliminary results of floristic and vegetational surveys in three coastal humid areas in the Puglia region (southern Italy)*. *Lazaroa* 30: 99-107 (2009).

This paper presents the preliminary results of an INTERREG project (III A Italy-Greece 2000-2006) concerning the improvement and management of common ecosystems. This project includes several humid areas located within the northwestern regions of Greece and the Italian region of Apulia. Owing to their similar paleogeographical and paleoclimatical accidents these areas exhibit several floristic and coenological peculiarities which lead to their inclusion in the Adriatic Province of the eastern Mediterranean biogeographical sub-region. The project involves making a GIS which permits the acquisition, processing, analysis, storage and feedback in graphic and alphanumeric form of the ecological data collected in three of the most significant coastal humid protected areas of the Apulia region, namely "Torre Guaceto", "Le Cesine", and "Saline di Punta della Contessa". The importance of these humid areas can be inferred simply by observing the high number of Dir. 92/43/EEC habitats they contain.

It is well-known that there are many negative factors which are currently threatening the Mediterranean retro-dunal ecosystems such as air and water pollution, urbanization, the impact of mass tourism, coastal erosion, lowering of the ground water table (etc.). These areas therefore urgently require a system of constant monitoring and, where necessary, actions to restore vegetation. All this demands a background of landscape knowledge concerning the small-scale vegetation pattern (actual heterogeneity) and the potential vegetation types (potential heterogeneity) as well. The three Apulian areas in the present study can easily be distinguished from each other from a floristic and coenological point of view. In addition to the slight (but probably crucial) differences in their physical environments, the existing diversity in the vegetation is more closely related to the minor and "unofficial" biogeographical boundaries prevailing in the part of the Apulian region and to the variation of the ecological optimum of several diagnostic species (*Quercus ilex*, *Quercus calliprinos*, *Erica forskalii*, *Cladium mariscus*, *Plantago albicans*, *Limonium apulum*....) than to the effective interruption of their distribution areas.

Keywords: humid coastal areas, dune ecosystems, erosion, conservation, Apulia, Italy.

Resumen: Di Pietro, R., Dibitonto, P., Garziano, G., Sciandrello, S., Wagensommer, R. P., Medagli, P., Tomaselli, V. *Resultados preliminares de la revisión florística y de la vegetación de tres áreas costeras de la región de Puglia (sur de Italia)*. *Lazaroa* 30: 99-107 (2009).

En este trabajo se presentan los resultados preliminares del proyecto INTERREG (III A Italia-Grecia 2000-2006) que engloba algunas áreas húmedas de Grecia (Epiro e Islas Iónicas) y de la Península Itálica (Apulia). Estas áreas, además de presentar una muy parecida historia paleo-geográfica y paleo-climática, presentan algunas peculiaridades florísticas y cenológicas que las adscriben a la Provincia Adriática, Subregión Mediterránea Oriental. El fin de este proyecto es la realización de un GIS capaz de transformar los datos ecológicos medidos en las diferentes áreas de estudio, en forma numérica y gráfica. Tres son las áreas italianas que se presentan en este trabajo: Torre Guaceto; Le Cesine y las salinas de Punta della Contessa, todas pertenecientes a la región de Puglia. Estas zonas están caracterizadas por un elevado número de humedales protegidos por la directiva 92/43 EEC. Por esta razón, es necesario un intenso monitoreo y, donde se hace necesaria una restauración de la cubierta vegetal, únicamente posible gracias al conocimiento de la vegetación a pequeña y también a gran escala.

Las tres áreas estudiadas son fácilmente distinguibles, a nivel florístico y cenológico, presentan pequeñas (pero probablemente fundamentales) diferencias del medio físico relacionadas con la variación del optimum ecológico de algunas especies características (*Quercus ilex*, *Quercus calliprinos*, *Erica manipuliiflora*, *Cladium mariscus*, *Plantago albicans*, *Limonium apulum*....)

Palabras clave: Áreas costeras húmedas, ecosistemas dunares, conservación, erosión, Puglia, Italia.

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INTRODUCTION

The constant problems concerning the maintenance of the high degree of floristic and coenological biodiversity in the Mediterranean coastal environments make it necessary to define monitoring and management tools and a Community policy aimed at promoting an integrated approach at the inter-regional level. The fragility of these ecosystems often requires severe protection measures and environmental planning models which call for close collaboration between scientific and administrative institutions.

The proposed study is part of an INTERREG project III A Italy-Greece 2000-2006 (*Development of an integrated informative system for the monitoring and the management of Natura 2000 protected areas in Greece and Italy*) whose Measure 3.1 is designed to improve and manage common ecosystems. The programme covers the Greek regions of Epirus and the Ionian Islands, and the Italian region of Apulia. These regions have a common geographical characteristic: they are all connected by the Adriatic-Ionian Sea and share several rare plant species and plant communities with a strictly amph-Adriatic distribution. The project involves the constitution of a GIS which permits the acquisition, processing, analysis, storage and feedback in graphic and alphanumeric form of the ecological data collected in Greece and in three of the most significant coastal wetland areas of the Apulia region, namely Torre Guaceto, Saline di Punta della Contessa (both located in the district of Brindisi), and Le Cesine (in the district of Lecce). These three sites belong to the Natura 2000 ecological network and are also national or regional protected areas: the Torre Guaceto State Natural Reserve, the Saline di Punta della Contessa Regional Natural Park, Le Cesine State Natural Reserve.

The main activities covered by the INTERREG project concern the integration and updating of the knowledge of plant communities and floristic emergences in the three study areas in terms of both actual and potential vegetation. This paper contains a summary of the preliminary results from the Italian sites.

MATERIALS AND METHODS

The vegetation sampling was carried out using the phytosociological approach of the Zurich-Montpellier school (BRAUN-BLANQUET, 1964). A total of over 200 phytosociological relevés were taken.

The floristic studies involved collecting data on rare species data with regards both distribution and number of individuals in the populations. The rare species list was selected on the basis of the Red Book and Red Lists of Italian Plants (CONTI & al., 1992; CONTI & al., 1997). Furthermore, for each rare species, a geographical distribution grid was carried out in UTM Datum ED50 coordinates composed of 200x200 m square plots.

The nomenclature of the species follows CONTI & al. (2005, 2007).

Land use maps were made according to the 5th level of the CORINE legend, and Natura 2000 Habitat maps according to the European Directive 92/43/EEC

RESULTS AND DISCUSSION

CONSERVATION (HABITAT DIRECTIVE)

The complete update of the Habitats list is still in progress for all the study areas, and may be reviewed taking into consideration future field investigations.

TORRE GUACETO (BRINDISI). In 1981 Torre Guaceto was declared as a Wetland of International Importance, according to the Ramsar International Convention (Feb. 2, 1971). The Torre Guaceto National Nature Reserve covers an area of more than 1100 ha and has a coastal perimeter of about 8 km. Most of the Reserve is characterized by a traditional pattern of agricultural land-use with old olive groves. The other part of the reserve has a higher degree of naturalness with typical communities of undisturbed coastal areas. The spatial sequence from the sea shore to the inland areas consists of shores, dunes, Mediterranean maquis, retro-dunal humid depressions. At present Torre Guaceto is considered both a SCI (251 ha) and a SPA (548 ha).

The following is a list of the habitat types identified following the Directive 92/43/EEC (Habitats Directive):

1120* *Posidonia* beds (*Posidionion oceanicae*)

1210 Annual vegetation of drift lines

1240 Vegetation of the sea cliffs with endemic *Limonium* sp. pl.

1410 Mediterranean salt meadows (*Juncetalia maritimi*)

2110 Embryonic shifting dunes

2120 Shifting dunes along the shorelines with *Amphiphila arenaria* (white dunes)

2230 *Malcolmietalia* dune grasslands

2250* Coastal dunes with *Juniperus* sp. pl.

3170* Mediterranean temporary ponds

5330 Thermo-Mediterranean and pre-desert scrub

9340 *Quercus ilex* forests

SALINE DI PUNTA DELLA CONTESSA (BRINDISI). The Saline di Punta della Contessa Natural Park was established in 2002. It is both a SCI (214 ha) and a SPA (214 ha). It is formed by a system of pools which develop in the retro-dunal coastal areas. Various stands of Mediterranean maquis are also present containing an evident predominance of shrubby communities of *Calicotome infesta*.

The following is a list of the habitat types currently identified on the basis of Directive 92/43/EEC (Habitats Directive), as reported on the BioItaly form:

1120* *Posidonia beds (Posidonion oceanicae)*

1150* Coastal lagoons

1210 Annual vegetation of drift lines

1410 Mediterranean salt meadows (*Juncetalia maritimi*)

1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornietea fruticosi*)

1510* Mediterranean salt steppes (*Limonieta*)

2120 Shifting dunes along the shorelines with *Ammophila arenaria*

2230 *Malcolmietalia* dune grasslands

3170* Mediterranean temporary ponds

LE CESINE (LECCE). The Le Cesine National Natural Reserve was established in 1978 under the Ramsar Convention (1971). It is both a SCI (811 ha) and a SPA (647 ha). This area contains mainly wetland sites where an intricate coenological pattern occurs. Several helophytic stands merged with stripes of halophilous and dry therophytic vegetation contribute to the creation of very peculiar natural mosaics. In addition to the two larger water pools, there are also various channels, marshes and humid grasslands. Furthermore there is also woody vegetation composed of *Pinus halepensis* and *Quercus ilex* which are mixed with a matrix of Mediterranean maquis dominated by *Pistacia lentiscus*, *Myrtus communis*, *Phillyrea latifolia* and *Quercus calliprinos*.

The following is a list of the habitat types identified on the basis of Directive 92/43/EEC (Habitats Directive):

1120* *Posidonia beds (Posidonion oceanicae)*

1150* Coastal lagoons

1210 Annual vegetation of drift lines

1410 Mediterranean salt meadows (*Juncetalia maritimi*)

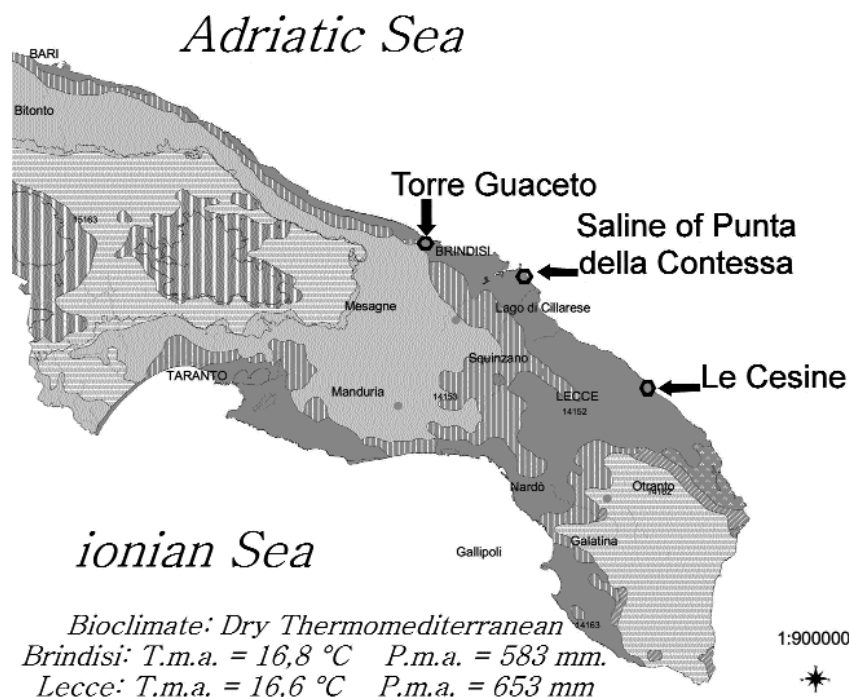


Figure 1.— Study area and bioclimatic features.

1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornietea fruticosi*)
 2120 Shifting dunes along the shorelines with *Amphiphila arenaria* (white dunes)
 2230 *Malcolmietalia* dune grasslands
 5330 Thermo-Mediterranean and pre-desert scrub
 6420 Mediterranean tall humid grassland of the *Molinio-Holoschoenion*
 7210* Calcareous marshes with *Cladium mariscus* and species of the *Caricion davallianae*

FLORA AND VEGETATION

Although the three study areas are included in a stretch of coastal land of about 50 km each wetland site exhibits some typical vegetation aspects not shared with the others.

TORRE GUACETO. The floristic literature contains references to the Torre Guaceto site (BRAGGIO MORUCHIO, 1990; MARIOTTI, 1990; MARIOTTI, 1992; MARIOTTI & al., 1992; BECCARISI & al., 2002; BECCARISI & al., 2003a; BECCARISI & al., 2003b).

The coastal area of Torre Guaceto is characterised

by peculiar prairies of marine phanerogams. This vegetation is dominated by *Posidonia oceanica* and plays a primary role in stabilizing the seabed.

Most of the reserve is characterised by extensive stands of *Phragmites australis* that cover about 60% of the entire area and are related to reclaiming works which took place between 1930 and 1940. The 8 km of mainly rocky coastal line is the site of a very particular *Crithmo-Limonietea* community namely the *Crithmo-Limonietum apuli*, floristically characterised by the presence of *Limonium apulum* (a southern Apulia endemic species belonging to the collective group of *Limonium cancellatum*) (Figure 2). The sandy substrates of some parts of the coastline also contain *Pistacio-Juniperetum macrocarpae* shrublands. Quite far from the sea and on more evolved soils, there are evergreen holm-oak woods. Still related to sandy soils but in the inner zones of the Nature Reserve, there are scattered stands of *Alkanna tinctoria* and *Plantago albicans* communities. *Plantago albicans* is an interesting species with a discontinuous distribution in southern Italy and whose southernmost regional limit is precisely in the Torre Guaceto area; it therefore does not appear on the floristic lists of the other studied areas. In this

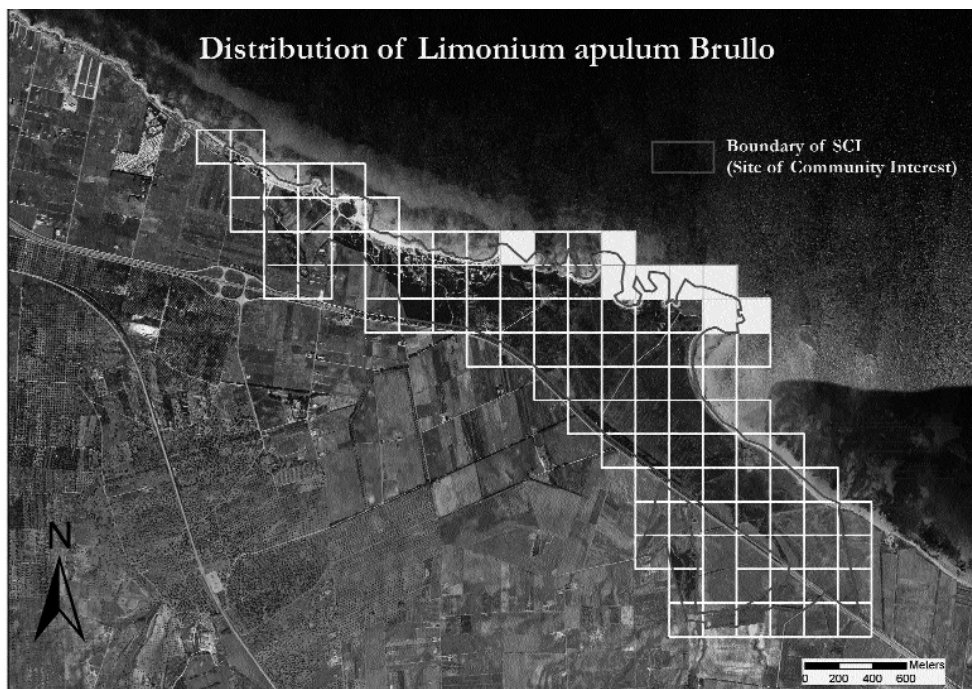


Figure 2. Distribution grids for of *Limonium apulum* in the Torre Guaceto Reserve.

type of environment, especially where a certain degree of human disturbance occurs, it is possible to find the rare species *Convolvulus lineatus*, which is indicated as endangered at the regional level (CONTI & al., 1997). In retro-dunal environments stands of *Schoeno-Plantaginetum crassifoliae* and *Inulo-Juncetum maritimi* occur. Both these communities give shelter to rare orchids such as *Orchis palustris*, considered as endangered both in Italy and in Apulia region (CONTI & al., 1997; ALESSANDRINI & MEDAGLI, 2008), and *O. laxiflora*. Another species of great biogeographical importance is *Erica forskalii* (= *Erica manipuliflora*). This species is one of the guide species for the East-European Mediterranean garrigues of the *Cisto-Micromerietea*, and has its current westernmost limit precisely in the Apulia region in a restricted area ranging from Torre Guaceto (northernmost limit in Italy) to Gallipoli. In the Torre Guaceto protected area this species occurs extremely sporadically, with 2 and 7 individuals respectively, and in only two sites, dominated by a *Cistus* sp.pl. and *Thymus capitatus* garrigue. The parasite species *Cytinus ruber* has been found on some plants of *Cistus creticus* subsp. *eriocephalus*; this species is considered as vulnerable in the Apulia region (CONTI & al., 1997).

SALINE DI PUNTA DELLA CONTESSA. Saline di Punta della Contessa wetland site is about 20 km south of Torre Guaceto, near the outskirts of the town Brindisi.

The most interesting vegetation types in the Saline di Punta della Contessa Park are the retro-dunal salt marshes with a predominance of *Salicornia* and *Sarcocornia* species, which are located in the northern part of the Nature Reserve. In particular the associations *Suaedo-Salicornietum patulae*, *Puccinellio-Sarcocornietum alpini*, *Junco-Sarcocornietum fruticosae* and *Arthrocnemo-Juncetum subulati* form intricate mosaics which are related to the different degree of salt content in the soil as well as to the duration of the water permanence.

The southern side of the Reserve lies within a military area, in an Air Force firing range, and as a result has always been free from disturbances deriving from tourism, and industrial or agricultural activities. For this reason this part of the Reserve is at present covered by extensive stands of evergreen shrublands (*Myrto-Pistacietum lentisci*, *Calicotome infesta* comm.) or garrigues (*Saturejo-Ericetum manipuliflorae*).

Amongst the species of higher interest there are the previously mentioned *Erica forskalii* (which is more abundant here than in Torre Guaceto), *Bassia hirsuta*,

a therophyte considered vulnerable at the national level (CONTI & al., 1997) and *Cressa cretica*, which is very



Figure 3.— Distribution grid for *Cressa cretica* in the Saline di Punta della Contessa Park.

rare in the area (Figure 3) and which is considered endangered in Italy (CONTI & al., 1997).

LE CESINE. The huge retro-dunal area of Le Cesine is located southeast of the town of Lecce. Of all the areas studied this has the highest diversity in terms of plant communities and rare species.

The Le Cesine area includes large retro-dunal pools which are flooded for most of the year and permit the development of wide stands of halophytic vegetation (*Schoeno-Plantaginetum crassifoliae*, *Agropyro-Inuletum crithmoidis*, *Suaedo-Salicornietum patulae* and *Suaedo-Bassietum hirsutae*) and helophytic vegetation (*Soncho-Cladietum marisci*, *Spartino-Juncetum maritimi* and *Phragmitetum communis*) to be developed. Particularly important is the occurrence of *Cladium mariscus* which is normally linked to temperate bioclimatic contexts and is therefore extremely rare in thermo-Mediterranean situations.

The vegetation of coastal dune is also very diversified, with an occurrence of communities such as *Sal-*

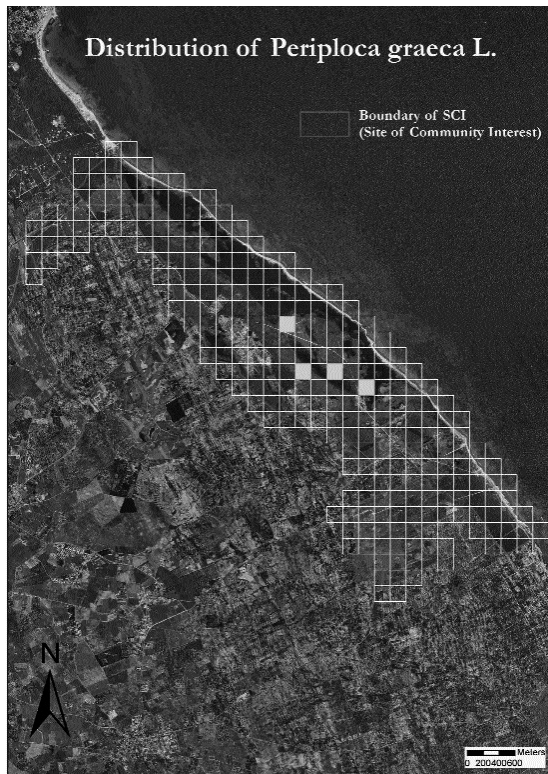


Figure 4.— Distribution grid for *Periploca graeca* in the Le Cese Reserve.

solo-Cakiletum maritimae, *Cypero-Agropyretum juncei* and *Pistacio-Juniperetum macrocarpae*.

The most interesting species include some which are also present in the other areas but which at Le Cese have a higher degree of abundance such as *Erica forskalii*, *Cytinus ruber* and *Orchis palustris*, this latter forms one of the richest populations of the whole Italy.

There are also other species of interest which have been found exclusively in this area and are linked to *Cladium mariscus* and *Phragmites australis* communities such as *Hydrocotyle vulgaris*, *Ipomoea sagittata* and *Linum maritimum*, of which the first two are considered as endangered at national level and the third as endangered in Apulia region (CONTI & al., 1997).

Particularly interesting from a biogeographical point of view is the record of *Periploca graeca* (Figure 4), a species which is considered vulnerable in Italy and endangered in Apulia (CONTI & al., 1997). It is coenologically linked to the evergreen shrublands developed at the edges of *Phragmites australis* stands.

POTENTIAL VEGETATION

It is well-known that potential vegetation types are of great importance since they express the natural equilibrium between vegetation and biotic and abiotic factors. They are also used as “neutral models” in cases of environmental planning and restoration ecology.

The three protected wetland areas included in this studies are all divided into two parts; the first bordering the sea and representing the effective SCI “Site of community importance” area, with an external part known as “external protection area”. The SCI area has very high potential heterogeneity due to an extremely intricate vegetation mosaic, formed by spatial contacts between many types of permanent plant communities (halophytic, hygrophitic, helophytic, psammophilous, shrubby, woody ...etc.), often with a very limited minimum area ranging from less than 1 m² to 1000 m². In contrast, the “external protection area” is entirely covered by various types of cultivated groves where nothing remains to deduce the natural potentiality of the area. In order to hypothesise as to the possible vegetation types of these cultivated areas we have first analysed the bioclimatic features of the area. All the study areas exhibit a dry thermo-Mediterranean thermotype with mean annual temperatures ranging between 16,6°C and 16,8°C and mean annual rainfall between 583 and 653 mm/year (BLASI, 2006; Figure 1). Normally this type of climate is related to climatophilous evergreen sclerophyllic woodlands. In the vicinity of the study areas only three stands of woodlands have been found, all of which exhibit a predominance of *Quercus ilex*. Some residual stands of mixed woods of *Quercus ilex* and *Quercus virgiliana* woods or even monophytic *Quercus virgiliana* stands were found only in some depressions of the surface profile (less than 3 meters from the highest point to the lowest point) where the clayey substrates allow the permanence of pools in winter and, as a consequence, a higher water retention in summer.

It is therefore possible to assume that most of the cultivated groves in the external protection areas surrounding the natural reserves would be potential *Quercus ilex* woodlands. The possible presence and abundance of *Quercus virgiliana* would be related to the presence of a slope gradient (Figure 5).

Compared to the *Quercus ilex* woodlands which may be found in the rest of Peninsular Italy and in the hilly and mountainous sectors of the Apulia region (Murge plateau, Gargano promontory) the woodlands

of the study area are characterised by a complete dominance of sclerophyllic component and by the absence of thermophilous deciduous trees such as *Carpinus orientalis*, *Acer monspessulanum*, *Fraxinus ornus*, *Acer campestre*, *Ostrya carpinifolia* etc. Phytosociological references are difficult to find since the *Cyclamino hed-erifolii-Quercetum ilicis* proposed in BIONDI & al., 2004 always includes deciduous species in the woody and/or shrubby layer, while the *Pistacio-Quercetum ilicis*, which is characterised by the complete dominance of *Pistacio-Rhamnetalia* species in the undergrowth (BRULLO & MARCENÒ, 1985), is considered restricted to the island of Sicily.

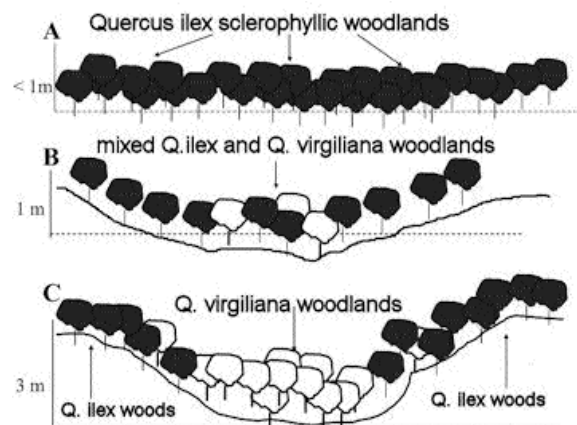


Figure 5. —Hypothetical scheme of the potential woodland type distribution in the external protection areas related to the difference of level.

APPENDIX: SYNTAXONOMICAL SCHEME

PHRAGMITO-MAGNOCARICETEA Klika in Klika & Novák 1941

Phragmitetalia Koch 1926

Phragmition Koch 1926

Phragmitetum communis (Koch 1926) Schmale 1939

Soncho-Cladietum marisci (Br.-Bl. & O.Bolòs 1958) Cirujano 1980

Nasturtio-Glycerietalia Pign. 1954

Scirpetalia compacti Hejny in Holub *et al.* 1967 *corr.* Rivas *et al.* 1980

Scirpion compacti Dahl & Hadac 1941 *corr.* Rivas-Martínez *et al.* 1980

Scirpetum compacti Van Langendonck 1931 *corr.* Bueno & F. Prieto in Bueno 1997

CRITHMO-LIMONIETEA Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

Crithmo-Limonietalia Molinier 1934

Crithmo-Limonion Molinier 1934

Crithmo-Limonietum apuli Bartolo, Brullo, Signorello 1989

AMMOPHILETEA Br.-Bl. & R.Tx. ex Westhoff *et al.* 1946

Ammophiletalia Br.-Bl. 1933

Ammophilion australis Br.-Bl. 1921 *em.* Gèhu, Rivas-Martínez & R.Tx. in Rivas-Martínez *et al.* 1980

Medicagini-Ammophiletum australis Br.-Bl. 1921 *corr.* Prieto & Diaz 1991

Agropyrenion farcti Rivas-Martínez, Costa, Castroviejo & Valdes Bermajo 1980

Cypero capitati-Agropyretum juncei Kühnholtz-Lordat (1923) Br.-Bl. 1933

CAKILETEA MARITIMAE R.Tx. & Preising in Br.-Bl. & R.Tx. 1952

Cakiletalia integrifoliae R.Tx. ex Oberd. 1949 *corr.* Rivas-Martínez, Costa & Loidi 1992

Cakilion maritimae Pignatti 1953

Salsolo-Cakiletum maritimae Costa & Mansanet 1981 *corr.* Rivas-Martínez *et al.* 1992

JUNCETEA MARITIMI Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

Juncetalia maritimi Br.-Bl. ex Horvatic 1934

Juncion maritimi Br.-Bl. ex Horvatic 1934

Spartino-Juncetum maritimi O. Bolòs 1962

Inulo-Juncetum maritimi Brullo in Brullo *et al.* 1988

Plantaginion crassifoliae Br.-Bl. (1931) 1952

Schoeno-Plantaginietum crassifoliae Br.-Bl. in Br.-Bl., Roussine & Nègre 1952

- SARCOCORNIETEA FRUTICOSAE* Br.-Bl. & R.Tx. ex A. & O. Bolòs 1950
Sarcocornietalia fruticosae Br.-Bl. 1933
Sarcocornion alpini Rivas-Martínez, Lousa, T.E. Diaz, Fernandez-Gonzalez & J.C. Costa 1990
Puccinellio-Sarcocornietum alpini Castroviejo & Cirujano 1980
Arthrocnemion glauci Rivas-Martínez in Rivas-Martínez et al. 1980
Arthrocnemum-Juncetum subulati Brullo & Furnari 1976
Sarcocornion fruticosae Br.-Bl. 1933 em. Brullo & Furnari 1988
Junco-Sarcocornietum fruticosae Brullo, Guarino, Ronsisvalle 2000
Inulion crithmoidis Brullo & Furnari 1988
Agropyro scirpei-Inuletum crithmoidis Brullo in Brullo et al. 1988
- THERO-SALICORNIETEA* Pign. 1953 em R.Tx. in R.Tx. et Oberd. 1958
Thero-Salicornietalia R.Tx. ex Géhu & Géhu-Franck 1984
Salicornion patulae Géhu & Géhu-Franck 1984
Suaedo-Salicornietum patulae Brullo & Furnari ex Géhu & Géhu-Franck 1984
Suaedo maritimae-Bassietum hirsutae Br.-Bl. 1928
- Thero-Suaedetalia* Br.-Bl. & O. Bolòs 1958
Thero-Suaedion Br.-Bl. in Br.-Bl., Roussine & Nègre 1952
Cressetum creticae Brullo & Furnari 1976
- HELLANTHEMETEA GUTTATI* (Br.-Bl. in Br.-Bl. et al. 1952) Rivas Goday & Rivas-Martínez 1963
Malcolmietalia Rivas Goday 1958
Alkanno-Maresion nanae Rivas Goday ex Rivas Goday & Rivas-Martínez 1963 corr. Diaz-Garretas et al. 2001
Alkanna tinctoria and *Plantago albicans* comm.
- CISTO-MICROMERIETEA* Oberd. 1954
Cisto-Ericetalia Horvatic 1958
Cisto-Ericion Horvatic 1958
Saturejo-Ericetum manipuliflorae Brullo, Minissale, Signorello, Spampinato 1986
Thymus capitatus comm.
- QUERCETEA ILICIS* Br.-Bl. ex A. & O. Bolòs 1947
Quercetalia ilicis Br.-Bl. ex Molinier 1934 em. Rivas-Martínez 1975
Quercion ilicis Br.-Bl. ex Molinier 1934 em. Brullo, Di Martino & Marcenò 1977
Quercus ilex comm.
- Pistacio-Rhamnetalia alaterni* Rivas-Martínez 1975
Oleo-Ceratonion Br.-Bl. 1936 em. Rivas-Martínez 1975
Arbutum unedi-Quercetum calliprini Brullo, Minissale, Signorello, Spampinato 1987
Myrto communi-Pistacietum lentisci (R.Mol. 1954) Riv.-Mart. 1975
Calicotome infesta comm.
- Juniperion turbinatae* Rivas-Martínez (1975) 1987
Pistacio-Juniperetum macrocarpae Bartolo, Brullo & Marcenò 1982

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