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The Role of Vegetation Monitoring in the Conservation of Coastal Habitats N2000: A Case Study of a Wetland Area in Southeast Sicily (Italy)

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Abstract: The coastal wetlands are among the most vulnerable and threatened environments of the Mediterranean area. Targeted actions for their conservation require in-depth knowledge of current and past natural vegetation. In this paper, we surveyed the vegetation composition and the spatio-temporal changes of a coastal wetland area in southeastern Sicily ("Saline di Priolo" SAC). Based on 128 phytosociological surveys and several plant collections, a total of 304 taxa, 28 plant communities, and 16 habitats have been identified. Furthermore, three new plant associations were described, including two in wetland and one in rocky coast environments. For the classification of plant communities and habitats, a hierarchical clustering was performed by using Euclidean coefficient and beta-flexible algorithm. The life form spectrum of the current flora highlights the dominance of therophytes and hemicryptophytes. The Mediterranean species are largely prevailing with 123 taxa. The cartographic analysis performed with ArcGis 10.3 shows a radical reduction in the wetland habitats in the last 70 years, and a strong alteration of the ecological succession of the psammophilous-hygrophilous vegetation. Moreover, landscape configuration of the coastal vegetation and habitat types was well highlighted by a set of specific landscape metrics. In particular, our outcomes identify three habitats (2110, 2210, and 5220* EU code) with bad conservation status, among which we identified one of priority conservation (*Zyziphus* arborescent matorral) that requires urgent restoration measures.

Keywords: conservation; diachronic analysis; landscape fragmentation; plant diversity

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1. Introduction

Mediterranean wetlands and their adjacent areas are extremely important for biodiversity and human wellbeing, but their integrity has often been compromised [1]. Fortunately, in recent times, opinion movements and policy actions aimed at wetland recovery and protection have arisen [2]. Wetlands are essential ecosystems for preserving animal and plant diversity in the Mediterranean region. These biotopes host highly specialized plant communities linked to the substrate type, water quality, flooding time, and bioclimate, in which rare species grow with specific ecophysiological adaptations [3]. These habitats are disappearing due to human pressure, especially when these regions are subject to land reclamation [4]. This is the case of southern Italy, Sicily, and nearby islands, where numerous coastal wetlands have been subjected to severe degradation in recent decades [5,6]. In Sicily, coastal wetlands are located mainly in the west, between Trapani and Mazara del Vallo and in the southeastern sectors of the island, and along the coastal strip between Siracusa and Catania. The knowledge about the coastal saltmarsh vegetation in Sicily was investigated by several phytosociological studies [5,7–12]. In southeastern Sicily, the Special Area of Conservation (SAC) "Saline di Priolo" (ITA090013), despite several environmental

changes occurring in the last 70 years, is distinguished by a significant diversity of habitats and plant species. This area includes the Natural Reserve "Saline di Priolo" and comprises different environments, including beaches, cliffs, brackish marshes, grasslands, temporary ponds, etc. The SAC "Saline di Priolo", in addition to an extensive system of coastal wetlands and saltmarshes, also includes the "Magnisi" peninsula, and the archaeological sites known as Thapsos and "Biggemi" lagoon. This area is under considerable anthropogenic pressure from nearby industrial activity; in fact, immediately next to the protected area is the Syracuse petrochemical hub. It is a vast industrialized area (the largest Italian petrochemical hub, and the second in Europe) created in the 1950s which extends over an area of 40 km^2 on the east coast of Sicily, including the territory of the municipalities of Augusta, Priolo Gargallo, and Melilli up to the gates of Syracuse, and exerting a dramatic environmental pressure on the surrounding territories [13]. As regards the flora and vegetation of the Priolo wetland, only a few significant investigations have been carried out [9,12,14–16]. This study is aimed at providing a comprehensive and updated list of the flora and habitats present in the area, also including species of conservational interest and alien species, with new insights for future management activities of the territory. A diachronic approach, using mapping and monitoring of the flora, vegetation, and habitat of the Nature Reserve and SAC "Saline di Priolo" over the last 70 years, has been carried out, as part of the "MEDISWET" project of the MAVA foundation (Action Activity 7.1.18). Moreover, quantifying the landscape's spatial structure provides a better understanding of the ongoing impact on ecological processes. In this framework, landscape metrics (LMs) are an essential tool to analyze the spatial arrangement of the landscape structure over time [17,18]. The application of LM is particularly suitable to coastal areas because these landscapes are prone to rapid transformations [19].

2. Materials and Methods

2.1. Study Area

The study area is located on the coastal side of the Hyblean plateau (southeastern Sicily), which is one of the northernmost promontories of the African plate. The Hyblaean plateau (or Hyblaean–Maltese Plateau) is a crust of the continental type isostatically raised and well-defined on its edges, different from the other ones in Sicily, and extending south to the Maltese Islands, from which it is separated by a continental shelf [20]. From a floristical point of view, the Hyblean territory hosts a lot of peculiar endemic and rare species, such as *Urtica rupestris*, *Zelkova sicula*, *Trachelium lanceolatum*, *Anthemis pignattiorum*, *Limonium pachynense*, *Romulea variicolor*, *Elatine macropoda*, and *Solenopsis laurentia* subsp. *hyblaea* [21,22]. Moreover, it is an area extremely rich in terms of vegetation, hosting a great variety of vegetation types, as well as numerous habitat types according to the Annex I of the 92/43 EEC Directive (or Habitat Directive), including several priority habitat types such as 3170* "Mediterranean Temporary Ponds". The "Saline di Priolo" SAC extends over 252.5 ha and its perimeter falls within the Priolo Gargallo municipal area. Average annual rainfall is around 500 mm and average annual temperatures are around 18 °C [23]. From a bioclimatic point of view, the area under investigation falls within the thermo-Mediterranean zone, with a dry ombrotype [24].

2.2. Phytosociological Data and Taxonomy

The field surveys were carried out mostly from spring 2021 to autumn 2022, according to the Braun–Blanquet phytosociological approach [25]; these relevés were integrated with other data previously collected in 2008, thus achieving a dataset consisting in a total of 128 relevés. Specimens were identified following the second edition of the Flora d'Italia [26–29], while the nomenclature of vascular plants follows Portal of the Flora of Italy and subsequent updates [30,31], and the regional distribution "rarity" follows Giardina et al. [32].

2.3. Statistical Analysis and Classification

For vegetation classification and identification of plant communities, a hierarchical clustering was performed in the program PC-ORD 6 [33], by using Euclidean coefficient and beta-flexible algorithm, according to [34]. Syntaxonomic classification follows Biondi et al. [35] and Mucina et al. [36]. Natural vegetational types were classified into habitat types according to the Italian interpretation manual of habitats [37].

2.4. Landscape and Diachronic Analysis

To evaluate the conservation status of the vegetation and habitat types throughout the last 70 years, a diachronic analysis using aerial orthophotos taken in 1955 and 2015 has been carried out, with the production of vegetation and habitat maps achieved with ArcGis 10.3 software. Finally, in order to analyze and evaluate vegetation mosaics and changes in spatial arrangement of the landscape structure over the considered timespan, a set of landscape metrics (LMs) was selected and applied to the two habitat maps (1955 and 2015). Considering the differences in spatial and thematic resolution between the two years of observation, implying a certain level of uncertainty in identifying the single plant associations in the 1955 orthophotos, the landscape metrics were applied to the habitat maps, which have a thematic resolution less detailed than the phytosociological vegetation map. In selecting the most appropriate LM for the fragmentation assessment in coastal Mediterranean environments, we referred to Cushman et al. [38] and to Tomaselli et al. [19]; a limited set of metrics was selected, specifically CA (Class Area), NumP (Number of Patches), MPS (Mean Patch Size), MPAR (Mean Perimeter–Area Ratio), MSI (Mean Shape Index), and AWMSI (Area-Weighted Mean Shape Index), and the analysis was carried out by using the Patch-Analyst extension of ArcGis.

3. Results and Discussions

3.1. The Vascular Flora: Trait Analysis

A total of 304 taxa were recorded, of which there were 196 for the "Saline di Priolo" and 178 for the Magnisi peninsula (Floristic Appendix A). Overall, 59 families were recorded, with the most represented being *Asteraceae* with 15% (45 sp.), followed by *Poaceae* with 13% (39 sp.) and *Fabaceae* with 12% (38 sp.). The life forms detected show the typical Mediterranean pattern. In fact, the therophytes, with 123 species, represent 40% of the whole flora, followed by the hemicryptophytes with 31% (94 sp.). The percentage of geophytes is also considerable, with 13% (39 sp.), followed by phanerophytes (16 sp.) with 6%, nanophanerophytes (6 sp.) with 2%, and hydrophytes (4 sp.) with 1%. The chorological analysis shows the clear prevalence of the *Mediterranean* chorotype, which represents 42% of the taxa (129 sp.), whereas the *Euro-Mediterranean* (62 sp.) and *Cosmopolitan* (33 sp.) make up, respectively, 20% and 11% of the flora. The *Mediterranean-Turanian* and *Paleotemperate* chorotypes follow (each with 14 sp.) with 15%, while the endemic species (6 sp.) constitute the 2%, which is still relevant considering the limited size of the study area.

3.2. Taxa of Relevant Interest

Field surveys highlighted some rare or endemic species, such as *Limonium syracusanum*, *Ziziphus lotus*, *Poterium spinosum*, *Bulliarda vaillantii*, *Damasonium bourgaei* (*Magnisi peninsula*), *Teucrium scordium* subsp. *scordioides*, *Limonium narbonense*, *Euphorbia hirsuta*, and *Cressa cretica* ("Saline di Priolo") (Figure 1).

The most interesting ones are briefly commented on in the following paragraphs.

Limonium syracusanum Brullo (Plumbaginaceae).

Suffruticose chamaephyte endemic to the Hyblean Ionian coast, between Augusta and Capo Passero (south-eastern Sicily) [39]. The species characterizes the halophilous phytocoenoses of the rocky coasts of the *Crithmo-Limonietea* class, together with *Crithmum maritimum* and *Arthrocaulon meridionale*. It is included in the red list of Italian flora [40] with the status of least concern (LC). The species has been observed along the reefs of the north and northeastern sector of the Magnisi peninsula, near the lighthouse.

Figure 1. Photo plate illustration of some species of the "Saline di Priolo" SAC: (**A**) *Limonium syracusanum*; (**B**) *Poterium spinosum*; (**C**) *Ziziphus lotus*; (**D**) *Damasonium bourgaei*; (**E**) *Euphorbia hirsuta*; (**F**) *Bulliarda vaillantii*; (**G**) *Convolvulus soldanella*; (**H**) *Limonium narbonense*.

Ziziphus lotus (L.) Lam. (Rhamnaceae).

Xerophilous deciduous shrub species with a southern Mediterranean–Saharan range. Reported in the red list of Italian flora [40] with the status of least concern (LC). In Sicily, the species is rather rare and, in addition to the studied site, it was reported only for the western sector in M. Pellegrino and Mazara del Vallo [32]. Recently, La Mantia and Scuderi [16] gave a more detailed distribution of the species, confirming the location close to

"Saline di Priolo". At the regional level, Conti et al. [41] reported this species as vulnerable, while Orsenigo et al. [42] listed it as near threatened (NT). In the Magnisi Peninsula, the species was observed for the first time by Zodda [43]; at present, it is represented by a few individuals, limited to a small area on the limestone plateau.

Poterium spinosum L. (Rosaceae).

Thorny chamaephyte with East Mediterranean distribution. In Italy, the species is present in Apulia, Basilicata, Calabria, Sicily, and Sardinia. In Sicily, the species is localized exclusively in the Hyblaean area, preferring both carbonate and volcanic substrates [44]. Gargano et al. [45] classified the species as endangered at the national level (EN). Recently, Orsenigo et al. [42] confirmed the status as endangered (EN) for the Italian territory. In the study area, the species was sporadically observed along the coast, in the southern part of the peninsula, and in the garrigues dominated by *Thymbra capitata* and *Micromeria graeca*.

Bulliarda vaillantii (Wild.) DC. (Crassulaceae).

Small therophyte with Mediterranean–tropical distribution. It is an amphibious species typical of Mediterranean temporary ponds (Habitat 3170*: Mediterranean temporary ponds). It is a characteristic species of the annual amphibious communities referred to as *Lythro hyssopifoliae-Crassuletum vaillantii* of the *Isoeto-Nanojuncetea* class. In Italy it is present in Sicily, Apulia, Basilicata, Lazio, Tuscany, Liguria, and Sardinia. In the study area, the species is localized in the small temporary ponds in the central part of the Magnisi peninsula.

Damasonium bourgaei Coss. (Alismataceae).

Rooting hydrophyte with an Atlantic–Mediterranean distribution. Annual species typical of Mediterranean temporary ponds, growing on carbonate and volcanic substrate. It characterizes the annual amphibious communities of the *Isoeto-Nanojuncetea* class (Habitat 3170*: Mediterranean temporary ponds). In Italy it is present in Apulia, Basilicata, Sardinia, and Sicily. *D. bourgaei* was reported for many coastal sites of Sicily, but at present, it can be considered quite rare. In the Magnisi peninsula, the species is rather localized.

Teucrium scordium L. subsp. *scordioides* (Schreb.) Arcang. (Lamiaceae).

Scapose hemicryptophyte with a Euro-Caucasian to NW African distribution range. It typically grows in wet meadows, where it forms hygrophilous communities together with *Juncus subulatus*, *Lotus corniculatus* subsp. *preslii*, *Phyla nodiflora*, and *Potentilla reptans*. In Sicily, it is threatened by the reduction in its natural habitat [32]. In the study area "Saline di Priolo", it is very localized.

Limonium narbonense Mill. (Plumbaginaceae).

Rosulated hemicryptophyte with Euro-Mediterranean distribution. Perennial halophilous species typical of the coastal saltmarshes. This species, together with other halophytes, such as *Arthrocaulon meridionale*, *Salicornia perennis* subsp. *alpini*, and *Halimione portulacoides*, characterizes the perennial halophilous vegetation belonging to *Salicornietea fruticosa* class. In the "Saline di Priolo", *L. narbonense* is quite common.

Euphorbia hirsuta L. (Euphorbiaceae).

Rhizomatous geophyte with Mediterranean–Macaronesian distribution. The species mainly grows in wet meadows. In the Saline di Priolo, it thrives together with *Teucrium scordium* subsp. *scordioides*, *Lotus corniculatus* subsp. *preslii*, *Phyla nodiflora*, and *Potentilla reptans*. In the Saline di Priolo, the species is very localized, on the edges of small wet areas in contact with *Tamarix africana*. In the last 50 years, the species has undergone a strong reduction in its range along the Sicilian coast; in fact, today there are few areas where the species is conserved [32].

Cressa cretica L. (Convolvulaceae).

It is a thermo-cosmopolitan halophilous species growing in sandy or muddy saline habitats. In the study area, the species is rare due to reduction in or alteration of its natural habitat (1310 "*Salicornia* and other annuals colonizing mud and sand"). *Cressa cretica*, together with other annual succulent plants with a summer cycle, characterizes the *Cressetum creticae*, halo-subnitrophilous and termophilous vegetation colonizing abandoned

fields after farming on clayey and salty soils [5]. According to Oresenigo et al. [42], it is classified as "endangered" (EN) in Italy.

3.3. Plant Community Description

A total of 28 plant communities (seven annuals and twenty-one perennials) belonging to 18 phytosociological classes has been identified by cluster analysis (Appendix B).

3.3.1. Coastal Dune Vegetation (Figure 2; Table S1)

The psammophilous vegetation immediately adjacent the aphytoic belt is characterized by annual herbaceous communities ascribable to the association *Salsolo-Cakiletum maritimae* (habitat 1210 "Annual vegetation of drift lines"). On the embryonic dunes, it is possible to distinguish two different associations. The first one is the perennial herbaceous vegetation of the *Cypero capitati-Agropyretum juncei*, with the dominance of *Thinopyrum junceum* (habitat 2120 "Embryonic shifting dunes"); the second one is the *Sileno coloratae-Ononidetum variegatae*, annual vegetation characterized in particular by *Ononis variegata* and *Silene niceensis* (habitat 2230 "Malcolmietalia dune grasslands"). In the backdune, where the substrate is more stable and richer in organic matter, a chamaephytic vegetation occurs, known as the *Centaureo sphaerocephalae-Ononidetum ramosissimae*. In Sicily, these psammophilous communities are quite widely represented [11,46] despite their bad conservation status.

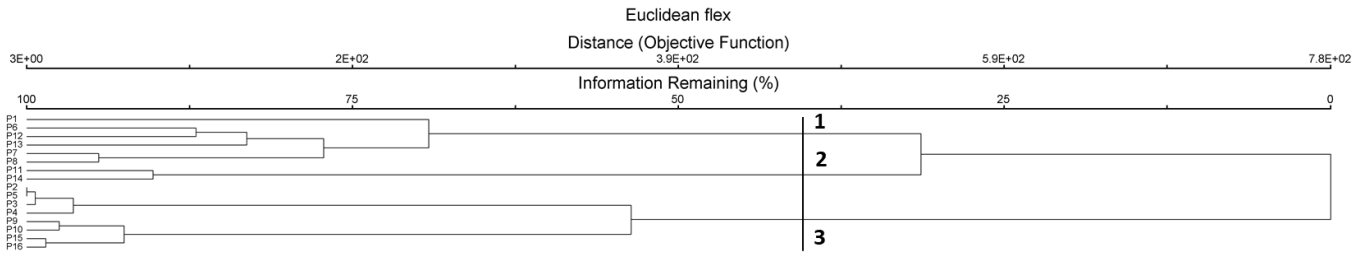

Figure 2. Cluster analysis of coastal dune communities. Plant communities: 1. *Cypero capitati-Agropyretum juncei*; 2. *Centaureo sphaerocephalae-Ononidetum ramosissimae*; 3. *Sileno coloratae-Ononidetum variegatae*.

3.3.2. Rocky Coast Vegetation (Figures 3 and 4; Table S2)

The coastal rocky outcrops of the Manghisi peninsula are colonized by halophytic communities belonging to the classes *Salicornietea fruticosae*, *Crithmo-Staticetea*, and *Saginetea maritimae*. The first belt, closest to the sea and subjected to salt spray, as well as the brackish rocky pools periodically inundated behind the cliffs, are home to a vegetation dominated by *Arthrocaulon meridionale*, a succulent chenopod shrub usually linked to seasonally inundated saltmarshes, and by *Limonium virgatum* and *Limbarda crithmoides*. This vegetation is attributable to the *Limonio virgati-Arthrocnemetum macrostachyi*, an association belonging to the class *Salicornietea fruticosae*, described by Biondi et al. [47] from southern Apulia and already reported for Sicily by Minissale and Sciandrello [11]. Immediately inwards follows the *Limonietum syracusani* (habitat 1240 "Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp."), a perennial association of the *Crithmo-Staticetea* and dominated by *Limonium syracusanum* and *Crithmum maritimum*, with a few other halophilous/subalophilous species. On corroded surfaces, more or less flat, with thin soil, subjected to disturbance, a prostrate perennial vegetation dominated by *Lotus cytisoides* and *Frankenia hirsuta* develops, taking the place of the *Limonietum syracusani*. The subhalophilous ephemeral communities, characterized by small therophytic, xerophilous plants with a short spring cycle growing in the small limestone rocky pools covered by a thin layer of sandy–loamy soil rich in salts and nitrates and periodically inundated by salt water, are referred to *Parapholido incurvae-Spergularietum marinae*, a new association described here (Holotypus: rel.2, Table 1), characterized by the dominance of *Parapholis incurva* and

Spergularia marina (=*S. salina*) and belonging to the *Sileno sedoidis-Catapodion balearici* alliance (class *Saginetea maritimae*, order *Saginetalia maritimae*). This annual spring vegetation is in catenal contact with the perennial communities belonging to the *Crithmo-Staticetea* class.

Table 1. *Parapholido incurvae-Spergularietum marinae* ass. nova hoc loco—sampling plots of main features of plant community investigated. According to the Braun-Blanquet method in each relevé the complete list of vascular plant species was recorded and for each species the cover value (percentage of soil surface) was assessed (+: <1% cover; 1: 1–5% cover; 2: 5–25% cover; 3: 25–50% cover; 4: 50–75% cover; 5: >75% cover). Asterisk (*) indicates the holotypus of the new association.

Relevé number	1	2 *	3	4	5	6	7	8	9	10	11	
Original relevé number	17	18	19	20	21	22	23	24	25	26	27	
Number Cluster	4	4	4	4	4	4	4	4	4	4	4	
Surface (mq)	2	2	3	3	2	2	2	2	2	2	2	
Coverage (%)	60	70	80	60	100	80	70	85	85	85	85	
Altitude (m a.s.l.)	2	3	2	3	2	2	8	6	6	6	6	
Floristic richness	6	8	10	4	11	14	4	7	6	7	7	presence
Char. Ass.												
Parapholis incurva (L.) C.E. Hubb.	2	2	3	3	3	2	2	4	3	4	3	11
Char. Sileno sedoidis-Catapodion balearici de Foucault and Bioret 2010 corr. Tomaselli et al. 2020												
Catapodium balearicum (Willk.) H. Scholz	+	1	.	.	.	.	.	.	.	.	.	2
Silene sedoides Poir.	.	+	.	.	.	.	.	.	.	.	+	2
Char. Saginetea maritimae Westhoff, Van Leeuwen and Adriani 1962, Saginetalia maritimae Westhoff, Van Leeuwen & Adriani 1962												
Spergularia marina (L.) Besser	3	4	+	1	+	3	1	1	+	1	2	11
Beta vulgaris subsp. *maritima* (L.) Arcang.	+	+	1	.	+	1	.	1	+	1	.	8
Medicago littoralis Rohde ex Loisel.	+	+	+	.	3	1	.	.	.	+	+	7
Plantago coronopus L.	+	1	1	1	.	.	.	.	.	.	.	4
Mesembryanthemum nodiflorum L.	.	.	1	.	.	.	.	+	.	.	.	2
Matthiola tricuspidata (L.) W.T. Aiton	.	.	.	.	.	+	.	.	.	.	.	1
Other species												
Lotus cytisoides L.	.	.	+	1	+	.	+	+	1	+	.	7
Frankenia hirsuta L.	.	.	+	.	+	.	2	1	1	+	1	7
Trifolium resupinatum L.	.	1	.	.	+	+	.	+	+	+	+	7
Anthemis arvensis L.	.	.	1	.	1	+	.	.	.	.	.	3
Silene colorata Poir.	.	.	.	.	+	+	.	.	.	.	.	2
Glaucium flavum Crantz	.	.	.	.	+	+	.	.	.	.	.	2
Crithmum maritimum L.	.	.	.	.	.	+	.	.	.	.	.	1
Plantago macrorhiza Poir.	.	.	.	.	.	+	.	.	.	.	.	1
Trifolium nigrescens Viv.	.	.	.	.	.	+	.	.	.	.	.	1
Medicago truncatula Gaertn.	.	.	+	.	.	.	.	.	.	.	.	1
Lotus ornithopodioides L.	.	.	.	.	.	+	.	.	.	.	.	1
Reichardia picroides (L.) Roth	.	.	.	.	+	.	.	.	.	.	.	1
Sonchus asper (L.) Hill	.	.	.	.	.	+	.	.	.	.	.	1
Tamarix africana Poir.	.	.	.	.	.	.	.	.	.	.	+	1

3.3.3. Coastal Wetland Vegetation (Figure 5; Table S3)
Helophytic and Herbaceous Perennial Communities of Fresh and Brackish Waters

The wetland areas close to the industrial area, subjected to long periods of submersion, are covered by perennial vegetation dominated by helophytes, known as the class *Phragmito-Magnocaricetea*. In particular, according to the flooding period and water depth, the following zonation has been observed: in deeper waters (60–80 cm), the *Typhetum domingensis*; in shallow waters (50–60 cm), the *Eleocharido-Alismetum lanceolati*, characterized by the dominance of *Eleocharis palustris* and *Alisma lanceolatum*; in correspondence of small ponds in proximity of the sea, with 40–50 cm water depth, drying in summer, with clayey-sandy soils, the *Bolboschoeno-Alismetum lanceolati* occurs, a new association described here (Holotypus: rel. 6, Table 2), characterized by the dominance of *Alisma lanceolatum* and *Bolboschoenus maritimus*, and which can be referred to the *Glycerio-Sparganion neglecti* alliance (*Nasturtio-Glycerietalia fluitantis* order). The edges of the "Saline di Priolo" are covered by monophytic vegetation dominated by *Phragmites australis*, belonging to the *Phragmitetum communis*. This latter association is widespread in Sicily along both the coastal strip and the middle and final stretch of watercourses, where there is stagnant water with a certain degree of eutrophication. Often, when favored by waters rich in nitrates, it replaces the natural halophilic vegetation of the *Salicornietea fruticosae* class [5].

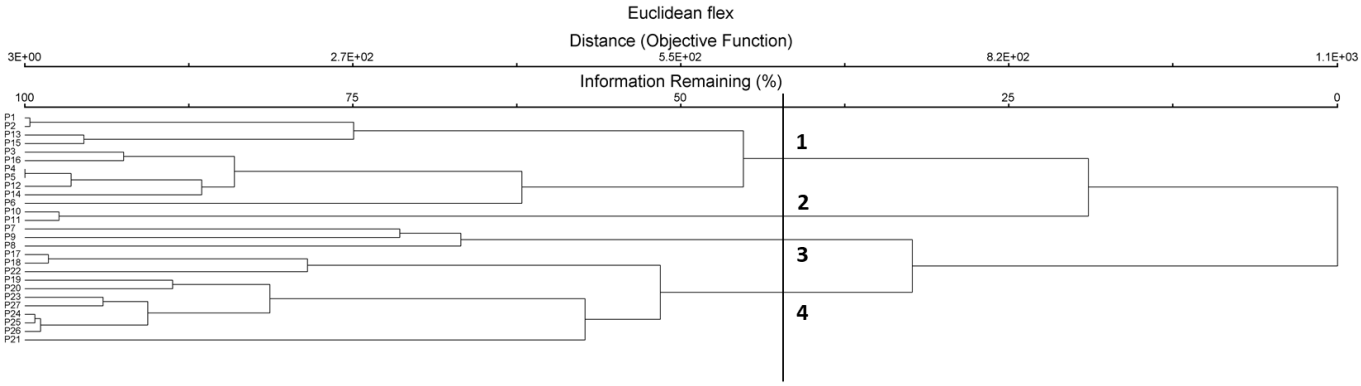

Figure 3. Cluster analysis of rocky coast communities. Plant communities: 1. *Limonietum syracusani*; 2. *Limonio-Arthrocnemetum macrostachyi*; 3. *Lotus cytisoides* and *Frankenia hirsuta* comm.; 4. *Parapholido incurvae-Spergularietum marinae* ass. nova.

The edges of depressed areas, with clayey–sandy soils periodically flooded, develop a perennial herbaceous vegetation enriched by floristic elements typical of the *Molinio-Arrhenatheretea* class, such as *Lythrum junceum*, *Potentilla reptans*, *Juncus articulatus*, *Oenanthe globosa*, *Trifolium fragiferum*, *Euphorbia hirsuta*, *Teucrium scordium*, *Kickxia commutata*, *Phyla nodiflora*, etc. Due to its ecological and floristic features, a new association with the name *Euphorbio hirsutae-Lotetum preslii* is described here (Holotypus: rel. 2, Table 3), characterized by the dominance of *Lotus corniculatus* subsp. *preslii* and *Euphorbia hirta*, which is referred to the *Paspalo-Agrostion semiverticillati* alliance (*Paspalo-Heleochloetalia*).

The large wetland area of the "Saline di Priolo", permanently flooded by more or less deep salt and brackish waters, is characterized by the hydrophytic submerged communities of *Enteromorpho intestinalidis-Ruppietum maritimae*; this vegetation is characterized by the dominance of *Ruppia maritima*, which occasionally grows with green algae as *Enteromorpha intestinalis*. In the study area, these communities are quite frequent, favored by waters rich in nitrates from the surrounding agricultural fields, and are usually in catenal contact with the bank vegetation, generally represented by annual halophilous communities of the *Thero-Suaedetea* class (habitat 1310 "Annual pioneer vegetation in Salicornia and other species of muddy and sandy areas") and by perennial halophilous communities of the *Salicornietea fruticosae* class (habitat 1420 "Mediterranean and thermo-Atlantic grasslands and fruit groves (*Sarcocornetea fruticosi*)"). These latter communities are characterized by

the presence of perennial Amaranthaceae species, and differ in species composition and cover in relation to the flooding period, thus characterizing a typical zonation from the innermost to the outer part of the brackish basin. Usually, in the inner part area of the saltmarsh, subjected to long periods of submersion, the *Junco subulati-Sarcocornietum alpini* and the *Arthrocaulo meridionalis-Juncetum subulati* are found; in the more peripheral part of the saltmarsh, rarely subjected to submersion, the *Agropyro scirpei-Inuletum crithmoidis* and the *Halimiono-Suaedetum verae* communities occur. These latter are halo-nitrophilic communities that, at present, have a very scattered distribution in the study area. The innermost parts of the saltmarshes, drying up in the summer–autumn period, are populated by succulent annual species of Amarantaceae with a summer cycle, such as *Salicornia perennans* (=*Salicornia patula*) and *Suaeda maritima*, ascribable to the *Suaedo-Salicornietum patulae* association. This vegetation is typical of salty soils rich in organic matter. Usually, it alternates with *Ruppia maritima* communities over the growing season, with *Ruppietum maritimae* hydrophytic communities growing during the flooding period, and the *Suaedo-Salicornietum patulae* in the summer/autumn season, on the dried-up substrata. On soils rich in sandy–silty components and subjected to short periods of submersion, the presence of *Juncus acutus* communities is significant. This pythocoenosis comprises hygro-halophilous hemicryptophytes and geophytes, such as *Scirpoides holoschoenus*, *Juncus subulatus*, and *Carex extensa*, which allow us to refer, despite the absence of *Juncus maritimus*, to the *Juncetum maritimo-acuti*. Small marginal areas rarely subject to flooding, on sandy soils, are covered by an herbaceous dense vegetation dominated by *Elytrygia atherica*, a species that forms dense and paucispecific populations. In correspondence with depressed areas characterized by a periodic supply of sandy–silty material, a sub-halophilous arboreal vegetation characterized by *Tamarix africana* and *T. gallica* develops. In some stretches, this woody vegetation is enriched with halophilous species typical of the class *Salicornietea fruticosae*. In particular, the presence of *Limbarda crithmoides* allows us to ascribe this phytocoenosis to the *Inulo crithmoidis-Tamaricetum africanae*. This association, included in the *Tamaricion africanae* (*Nerio-Tamaricetea*), has already been reported for the saltmarshes of southeastern Sicily [5]. Moreover, in the "Saline di Priolo", close to the industrial area, grows a patch of woody vegetation dominated by *Ulmus minor*, probably of anthropogenic origin, in contact with the *Juncus acutus* community.

Temporary Ponds

On the carbonatic substrata of the Magnisi peninsula, in correspondence with small carbonate rocky pools with silty soil periodically flooded, this amphibious ephemeral vegetation occurs during the winter–spring period. From a phytosociological point of view, this vegetation type falls within the *Isoëto-Nanojuncetea* class, referable to the habitat 3170* "Mediterranean temporary ponds". The pools with shallow waters and thin soil, subjected to early drying in spring, are covered by amphibious vegetation dominated by *Bulliarda vaillantii* and *Lythrum hyssopifolia* and referrable to the *Lythro hyssopifoliae-Crassuletum vaillantii* association. In the nearby area of "Capo Murro di Porco", the association *Pulicario grecae-Damasonietum bourgaei* has been described, which is very similar to the *Lythro hyssopifoliae-Crassuletum vaillantii* community detected in the Magnisi peninsula due to the presence of *Damasonium bourgaei*.

Figure 4. Photo plate illustrating different habitat types. (**A**,**B**) Psammophylous vegetation of the coast dunes (Saline di Priolo); (**C**,**D**) rocky coast vegetation with *Limonium syracusanum* and *Crithmum maritimum*. (Penisola di Magnisi); (**E**) rocky coast with *Artemisia arborescens* vegetation mixed with *Hyparrhenia hirta* dry grassaland; (**F**) Garrigues with *Tymbra capitata* (Penisola di Magnisi); (**G**,**H**) Subhalophilous ephemeral communities with *Spergularia marina* and *Parapholis incurva* (Penisola di Magnisi).

Table 2. *Bolboschoeno-Alismetum lanceolati* ass. nova hoc loco—sampling plots of main features of plant community investigated. According to the Braun-Blanquet method in each relevé the complete list of vascular plant species was recorded and for each species the cover value (percentage of soil surface) was assessed (+: <1% cover; 1: 1–5% cover; 2: 5–25% cover; 3: 25–50% cover; 4: 50–75% cover; 5: >75% cover). Asterisk (*) indicates the holotypus of the new association.

Relevé number	1	2	3	4	5	6 *	7	8	
Original relevé number	22	23	24	26	27	30	31	32	
Number Cluster	4	4	4	4	4	4	4	4	
Surface (mq)	16	16	16	16	16	16	16	16	
Coverage (%)	80	75	85	90	100	90	90	90	
Altitude (m a.s.l.)	5	5	5	5	3	2	2	2	
Floristic richness	8	17	11	9	10	12	11	7	presence
Char. Ass.									
Bolboschoenus maritimus (L.) Palla	4	1	2	1	4	2	4	2	8
Char. Glycerio-Sparganion neglecti Br.-Bl. and Sissing in Boer 1942									
Alisma lanceolatum With.	2	4	4	4	3	4	4	4	8
Char. Phragmito-Magnocaricetea Klika in Klika and Novák 1941									
Phragmites australis (Cav.) Trin. ex Steud.	+	.	.	1	.	+	1	1	5
Veronica anagallis-aquatica L.	+	1	+	.	.	+	.	+	5
Eleocharis palustris (L.) Roem. and Schult.	.	+	.	.	1	1	.	.	3
Typha domingensis (Pers.) Steud.	.	.	.	.	.	.	1	1	2
Carex otrubae Podp.	.	+	.	.	.	.	.	.	1
Transgr. Molinio-Arrhenatheretea R.Tx.1937									
Potentilla reptans L.	.	+	+	+	+	1	+	.	6
Lotus corniculatus L. subsp. *preslii* (Ten.) P.Fourn.	.	1	+	+	.	1	1	.	5
Lythrum junceum Banks and Sol.	+	1	1	+	.	.	.	.	4
Phyla nodiflora (L.) Greene	.	.	.	.	.	2	1	1	3
Juncus articulatus L.	.	.	.	.	.	2	+	1	3
Trifolium fragiferum L.	.	+	+	.	.	.	.	.	2
Other species									8
Symphyotrichum squamatum (Spreng.) G.L. Nesom	.	+	+	+	+	+	+	.	6
Mentha pulegium L.	+	1	+	+	+	.	.	.	5
Ranunculus trilobus Desf.	.	+	1	+	+	.	.	.	4
Tamarix africana Poir.	1	.	.	.	1	.	1	.	3
Plantago media L.	.	+	.	.	.	+	+	.	3
Holcus lanatus L.	.	1	+	.	.	.	.	.	2
Juncus hybridus Brot.	.	+	.	.	.	.	.	.	1
Isolepis cernua (Vahl) Roem. and Schult.	.	.	.	.	.	+	.	.	1
Juncus acutus L.	.	.	.	.	+	.	.	.	1
Carex extensa Gooden.	.	+	.	.	.	.	.	.	1
Vitex agnus-castus L.	.	.	.	.	+	.	.	.	1
Rumex pulcher L.	.	+	.	.	.	.	.	.	1
Chara sp.	1	.	.	.	.	.	.	.	1

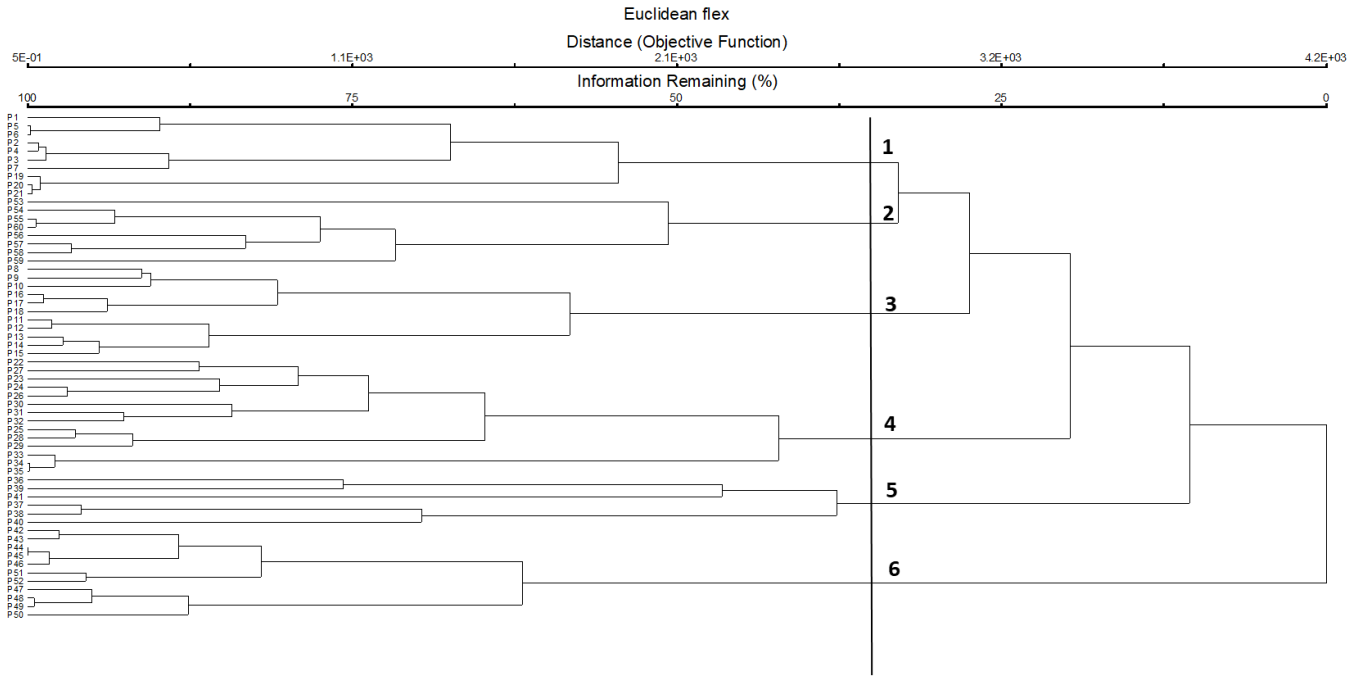

Figure 5. Cluster analysis of coastal wetland vegetation. Plant communities: 1. *Junco subulati-Sarcocornietum alpini/Arthrocaulo meridionalis-Juncetum subulati/Suaedo-Salicornietum patulae*; 2. *Lythro hyssopifoliae-Crassuletum vaillantii*; 3. *Agropyro scirpei-Inuletum crithmoidis/Halimiono-Suaedetum verae*; 4. *Phragmition/Scirpion compacti/Glycerio-sparganion*; 5. *Euphorbio hirsutae-Lotetum preslii/Juncus acutus* comm.; 6. *Limbardo crithmoidis-Tamaricetum africanae*.

Table 3. *Euphorbio hirsutae-Lotetum preslii* ass. nova hoc loco—sampling plots of main features of plant community investigated. According to the Braun-Blanquet method in each relevé the complete list of vascular plant species was recorded and for each species the cover value (percentage of soil surface) was assessed (+: <1% cover; 1: 1–5% cover; 2: 5–25% cover; 3: 25–50% cover; 4: 50–75% cover; 5: >75% cover). Asterisk (*) indicates the holotypus of the new association.

Relevé number	1	2 *	
Original relevé number	40	41	
Number Cluster	5	5	
Surface (mq)	16	16	
Coverage (%)	100	90	
Altitude (m a.s.l.)	2	6	
Floristic richness	18	20	presence
Char. Ass.			
Lotus corniculatus L. subsp. *preslii* (Ten.) P.Fourn.	3	3	2
Euphorbia hirsuta L.	2	2	2
Char. Paspalo-Agrostion semiverticillati Br.-Bl. in Br.-Bl. Roussine and Negre 1952 and Paspalo-Heleochloetalia Br.-Bl. ex Rivas Goday 1956			
Symphyotrichum squamatum (Spreng.) G. L. Nesom	1	+	2
Char. Molinio-Arrhenatheretea R.Tx.1937			
Phyla nodiflora (L.) Greene	1	3	2
Lythrum junceum Banks & Sol.	3	1	2
Potentilla reptans L.	+	2	2
Juncus articulatus L.	1	+	2
Scirpoides holoschoenus (L.) Soják	1	+	2
Teucrium scordium L.	+	+	2
Oenanthe globulosa L.	.	+	1
Kickxia commutata (Bernh. ex Rchb.) Fritsch	.	1	1
Trifolium resupinatum L.	+	.	1

Table 3. *Cont.*

Other species			
Bolboschoenus maritimus (L.) Palla	+	+	2
Dipsacus fullonum L.	+	.	1
Rubus ulmifolius Schott	1	.	1
Tamarix africana Poir.	1	.	1
Schenkia spicata (L.) G. Mans.	.	2	1
Cynodon dactylon (L.) Pers.	.	2	1
Daucus carota L. subsp. *maritimus* (Lam.) Batt.	+	.	1
Xanthium italicum Moretti	.	1	1
Ranunculus trilobus Desf.	1	.	1
Mentha pulegium L.	.	1	1
Plantago media L.	.	1	1
Carex extensa Gooden.	1	.	1
Juncus acutus L.	2	.	1
Phragmites australis (Cav.) Trin. ex Steud.	.	+	1
Alisma lanceolatum With.	.	+	1
Typha domingensis (Pers.) Steud.	.	+	1

3.3.4. Dry Grasslands and Garrigues/Shrubs (Figures 6 and 7; Table S4)

The degradation of the Mediterranean maquis with *Pistacia lentiscus* allows the expansion of garrigues with *Tymbra capitata* or grassland dominated by *Hyparrhenia hirta* (habitat 6220, "Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea"). From a phytosociological point of view, the grassland is very rich in thermo-xerophilous floristic elements typical of the *Hyparrhenion hirtae* alliance, such as *Hyparrenia hirta*, *Andropogon distachyos*, *Asphodelus ramosus*, *Ferula communis*, *Lathyrus clymenum*, *Thapsia garganica*, *Foeniculum vulgare* subsp. *piperitum*, *Carlina corymbosa*, *Daucus carota*, *Eryngium campestre*, *Moraea sisyrinchium*, *Lobularia maritima*, etc. The habitat includes arid Mediterranean grasslands, typical of shallow oligotrophic soils, characterized by a high number of hemicryptophyte species, generally mixed with annual herbaceous species. This environment is also occupied by therophytic spring vegetation, linked to small layers of soil placed on rocky ledges or in small corrosion pools, and usually forming a mosaic with the perennial herbaceous vegetation or garrigues. It is dominated by the presence of some annual Crassulaceae, such as *Sedum caeruleum*, *S. stellatum*, *Crassula tillaea*, etc. This plant community is referrable to the *Thero-Sedetum caerulei* association, a pioneer coenosis in contact with garrigue vegetation dominated by *Tymbra capitata*. On the Magnisi peninsula, the *Tymbra capitata* vegetation occupies small and limited areas, on carbonate rocky outcrops, due to the frequent summer fires which hinder the evolutionary process of these chamaephytic communities towards the evergreen Mediterranean shrub. For these reasons, there are few diagnostic species of *Cisto-Micormerietea*, such as *Micromeria graeca* subsp. *tenuifolia*, *Poterium spinosum*, and *Phagnalon saxatile*. The rocky slopes facing west of the Magnisi peninsula are home to communities dominated by *Artemisia arborescens* that, for their ecological, structural, and floristic features, can be referred to the *Atriplici halimi-Artemisietum arborescentis* association [48], despite the lack of the characteristic species *Atriplex halimus*. This vegetation is in contact towards the coast with the halophilous coastal vegetation of the *Crithmo-Limonieta*, while landwards, it is contact with the *Hyparrhenia* steppe grasslands. It can be considered as a permanent edaphic halo-nitrophilous community whose evolution is prevented by anthropic disturbance, combined with the action of coastal winds. Similar communities have been found on Lachea island, near Catania. Furthermore, the peninsula is affected by extensive annual meadows dominated by *Stipellula capensis*, mainly favored by summer fires and by perennial herbaceous formations dominated by *Oloptum miliaceum*, linked to grazing.

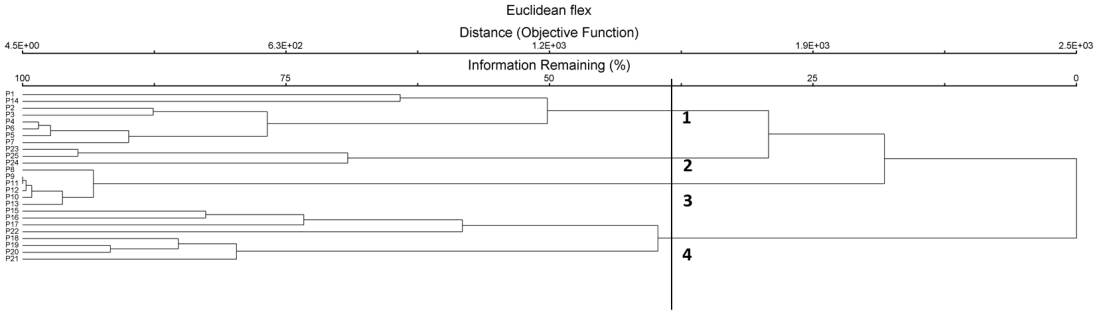

Figure 6. Cluster analysis of dry grasslands, garrigues, and shrubs. Plant communities: 1. *Artemisia arborescens* comm./*Hyparrhenietum hirto-pubescentis*/*Thymbra capitata* comm.; 2. *Thero-Sedetum caerulei*; 3. *Oloptum miliaceum* comm.; 4. *Stipellula capensis* comm.

Figure 7. Photo plate illustrating different habitat types. (**A**) Saline di Priolo during the summer; (**B**) *Juncus acutus* community (Saline di Priolo); (**C**) *Phragmites australis* community in contact with wetlands of Saline di Priolo; (**D**) *Tamarix* sp pl. vegetation; (**E**) *Bolboschoeno-Alismetum lanceolati* ass. nova (Saline di Priolo); (**F**) *Suaedo-Salicornietum patulae* (Saline di Priolo); (**G**) *Euphorbio hirsutae-Lotetum preslii* ass. nova (Saline di Priolo); (**H**) *Elymetum atherici* (Saline di Priolo).

3.4. Diacronic Analysis—Landscape Composition and Configuration

The photointerpretation of the oldest aerial photos (1955) allowed the identification of 10 main types of plant communities, which is a limited number of classes if compared to the number of types (19) derived from the photointerpretation of the recent aerial photos (2015) (Figures 8 and 9). This discrepancy is partly due to a greater spatial and thematic resolution of the aerial images than of the map in 2015, but also to the presence of artificial, synanthropic, and semi-natural classes which were not present in 1955, the landscape being completely natural at that time. In fact, the comparison of the two periods highlights that the anthropogenic transformations and the almost complete occupation of the coastal environments by industrial settlements have caused a sharp reduction in the dune and wetland systems, due to the leveling and removal of sand and to the reclamation activities (Table 4). In particular, the results show a reduction in the aquatic vegetation (*Ruppion maritimae*) of the Saline di Priolo, decreasing from 85 ha (22.6%) in 1955 to only 26 ha (7.4%) in 2015, and the disappearance of the Priolo salt-works, an ancient system for the production of sea salt from sea water, which once occupied an area of 5 hectares. As is well-known, salt-works and salt pans are anthropic modifications of coastal lagoons and, although of anthropic origin, they maintain some of the floristic and faunal peculiarities of the natural systems. The saltmarsh communities (*Juncetea maritimi*, *Salicornietea fruticosae*), in catenal contact with aquatic vegetation, have also undergone a strong reduction from 93 ha (37%) in 1955 to only 25 ha (8%) in 2015. The annual habitats of the coastline (*Euphorbion peplidis/Maresion nanae*) and perennial dune habitat characterized by *Elytrigia juncea* (*Elytrigienion junceae*) suffered a reduction from 40 ha (11%) to 12 ha (3.5%). The industrial transformation of the area has been a very important driver of changes affecting the coastal environments, mainly because of the massive installation, covering a surface of 96 ha (27.3%); it is the widest land-use typology of the studied area together with reforestation, at 44 ha (12.6%), and uncultivated/abandoned lands colonized by pioneer grassland vegetation (*Echio-Galactition*), with an area of 96 ha (27%). A surprising piece of data concerns the current extension of the woodland cover (about 7 ha), in the Saline di Priolo, of *Tamarix* sp. pl. vegetation, which in the past was not present, probably due to the high salt concentrations in the soil linked to the activities of salt extraction (salt-works).

Table 5 shows the results of the landscape metrics applied to the two habitat maps. Two habitat types identified in 1955 are not shown in the 2015 map, either because they disappeared (2110) or because they were so reduced that they could not be graphically represented (habitat cover less than minimum mappable area). On the other hand, habitat types 1430, 3140, 5220, and 6220 reported in the 2015 habitat map are not present in the 1955 map due to the mere fact that they often cover limited surfaces and do not have a basic cartographic product with sufficient resolution, so it was not possible to identify them. Habitat 9320, detected in 2015, was not present in 1955. For all these reasons, we decided to concentrate our considerations on the habitats strictly relevant to the coastal strip and salt-marshes (except 1310), namely 1150, 1210, 1240, 1410, and 1420.

The values for CA and NumP are shown (Figure 10A,B). It is quite evident, as already mentioned above, that there has been a strong decrease in surface area for all habitat types under consideration (particularly dramatic for habitat 1420), together with a high fragmentation (increase in the number of patches, particularly evident in 1240). This result is in accordance with the values of MPS (Figure 10C), which shows a strong decrease for all habitat types (but particularly evident in 1210, 1240, and 1420), a trend resulting from the sharp reduction and fragmentation process of coastal environments. As is well-known, the Shape index describes the ratio between the perimeter of the patch and the square root of the patch area; AWMSI equals the average shape index (SHAPE) of patches of the corresponding patch type, weighted by patch area. In general, values increase as the shapes of patches become more complex [49]. In Figure 10D,E, AWMSI values are shown; no major differences are detectable between the two years of observation, which means that, despite the ongoing dynamics, the spatial complexity in individual classes is more or less the same. MPAR is another measure of shape complexity, but because it is not standardized to a

certain shape (e.g., a square), it describes the patch complexity in a straightforward way. Also, in this case, no particular changes can be evidenced between 1955 and 2015, except for habitat 1240, with a sharp increase in MPAR, probably linked to the fragmentation of the habitat into numerous small patches of irregularly linear shape. The case study of the Saline di Priolo is a paradigmatic example of how, in just a few decades, it is possible to destroy entire stretches of coastal environments with negative consequences on the structure and composition of coastal habitats and vascular flora. The comparison of aerial photos over a period of 60 years shows a dramatic change in the natural landscape, with a permanent loss of land in correspondence with the industrial settlements, the almost complete leveling of the dune system, and the extensive wetland reclamation (Figure 11). Another similar dramatic example of extensive destruction of coastal environments due to industrial installations has occurred in Macconi di Gela, along the southern coast of Sicily, with sharp changes in the dune complexes and wetlands [46].

3.5. Conservation Status

The floristic vegetation survey activities and cartographic processing have highlighted fifteen habitat types according to the Habitat Directive (Table 6), of which four are of priority conservation interest (1150, 3170, 5220, 6220). Of these fifteen, five habitat types turned out to be in the favorable conservation status, nine in the inadequate conservation status, and three in the bad conservation status, the latter one being a priority conservation habitat (5220* Zyziphus arborescent matorrals) with a decreasing trend. Furthermore, habitat 2210, "Fixed dunes of the coast (*Crucianellion maritimae*)", reported in the Natura 2000 sheet of the "Saline di Priolo" SAC, is considered to have disappeared or have been previously erroneously reported. Furthermore, the habitats 1410, "Mediterranean salt meadows (*Juncetalia maritimi*)", and 1420, "Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornietea fruticosi*)", which once covered larger areas, are now very reduced and fragmented, resulting in an inadequate conservation status. Our results regarding the dune system, in line with Prisco et al. [50], highlighted the dramatically bad conservation status of dune habitats.

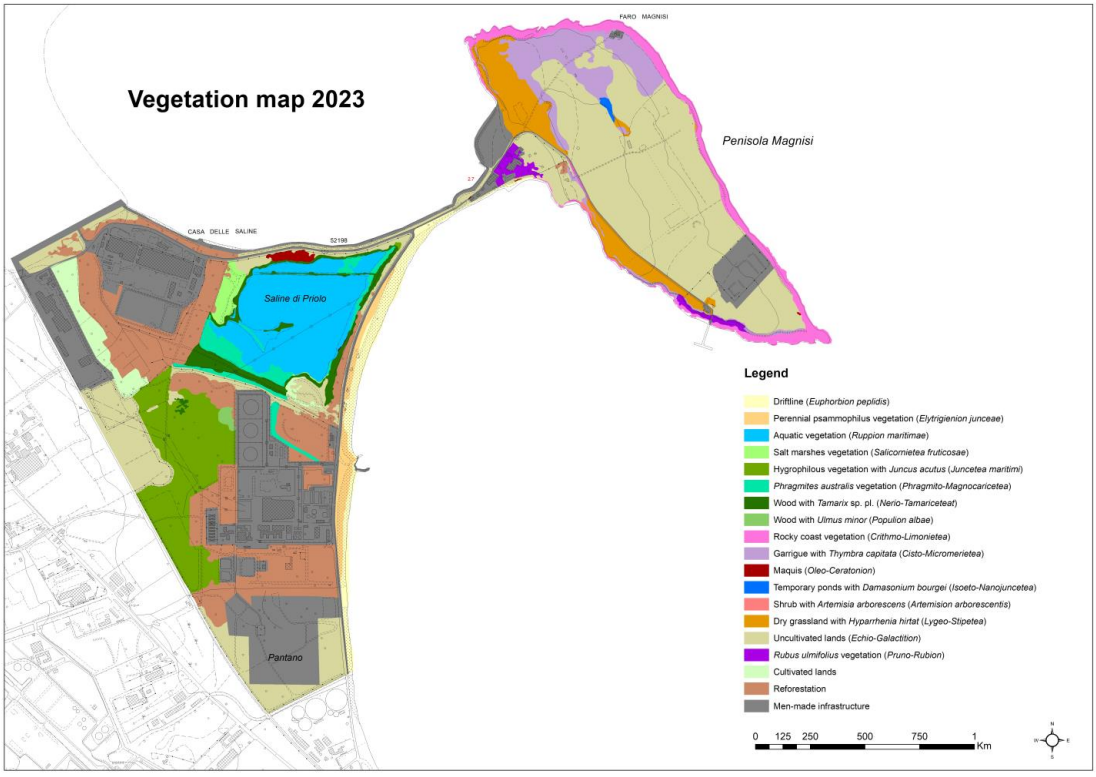

Figure 8. Current vegetation map of "Saline di Priolo and Penisola di Magnisi" (2023).

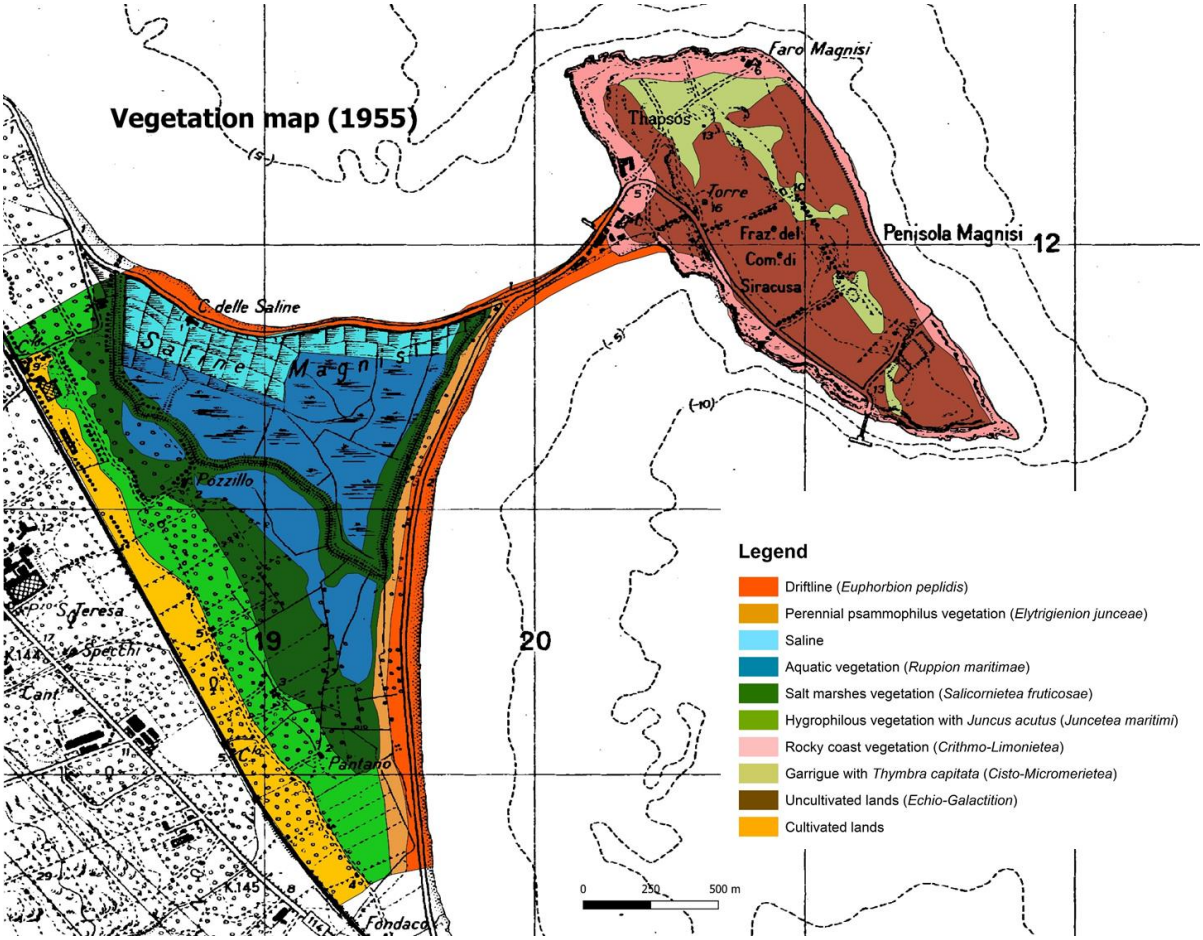

Figure 9. Historical vegetation map of "Saline di Priolo and Penisola di Magnisi" (1955).

Table 4. Surface comparison from the historical stereophoto (1955) and current aerial photos (2023).

	1955	**%**	**2023**	**%**
Driftline (*Euphorbion peplidis*)	29	7.8	9	2.6
Shifting dunes (*Elytrigienion junceae*)	11	2.8	4	1.2
Saline	19	5.2	0	0.0
Aquatic vegetation (*Ruppion maritimae*)	85	22.6	25.9	7.4
Salt-marsh vegetation (*Salicornietea fruticosae*)	53	14.1	2.2	0.6
Hygrophylous vegetation with *Juncus acutus* (*Juncetea maritimi*)	40	10.6	23	6.5
Phragmites australis vegetation (*Phragmito-Magnocaricetea*)	0	0.0	5.89	1.7
Woods with *Tamarix* sp. pl. (*Nerio-Tamaricetea*)	0	0.0	6.6	1.9
Woods with *Ulmus minor (Populion albae)*	0	0.0	0.557	0.2
Rocky coast vegetation (*Crithmo-Limonietea*)	28	7.4	11.35	3.2
Garrigue with *Thymbra capitata* (*Cisto-Micromerietea*)	16.13	4.3	14.31	4.1
Maquis with *Ziziphus lotus* (*Oleo-Ceratonion*)	0	0.0	0.87	0.2
Shrub with *Artemisia arborescens* (*Artemision arborescentis*)	0	0.0	0.117	0.0
Temporary ponds with *Damasonium bourgaei* (*Isoeto-Nanojuncetea*)	0	0.0	0.315	0.1
Hyparrhenia hirta dry grassland (*Lygeo-Stipetea*)	0	0.0	12.6	3.6
Uncultivated lands (*Echio-Galactition*)	67	17.8	96	27.3
Rubus ulmifolius vegetation (*Pruno-Rubion*)	0	0.0	3	0.8

Table 4. *Cont.*

	1955	%	2023	%
Cultivated lands	28.15	7.5	6	1.7
Reforestation	0	0.0	44.4	12.6
Man-made infrastructure	0	0.0	96	27.3
	376,274		362,261	

Table 5. Summary table of the landscape metrics applied to the different habitats in the 1955 and 2015 maps; the grey rows refer to those habitat types which it was possible to detect cartographically only on one of the two dates and which therefore were not the subject of temporal analysis.

Habitat Type	AWMSI		MSI		MPAR		MPS		NumP		CA		TLA
	1955	2015	1955	2015	1955	2015	1955	2015	1955	2015	1955	2015	2015
1150	1.74	2.23	1.62	1.88	1854.84	211289.33	17.3	8.51	3	3	54.9	25.54	352.55
1210	4.74	3.68	4.74	3.92	3083.97	382176.50	29.21	1.32	1	2	29.21	2.63	352.55
1240	5.31	6.23	5.31	2.82	3540.334	61161.51	27.8	1.26	1	9	27.8	11.34	352.55
1310	2.10	/	2.10	/	1676.777	/	19.45	/	1	/	19.45	/	352.55
1410	2.69	2.36	2.69	2.36	1495.051	174.30	40.16	23.04	1	1	40.16	23.04	352.55
1420	3.94	3.94	2.55	3.37	2231.837	23406.60	26.06	1.09	2	2	52.12	2.19	352.55
1430	/	2.18		2.18		2264.90		0.12		1		0.12	352.55
2110	3.67	/	3.67	/	3990.6974	/	10.5	/	1	/	11.7	/	352.55
3170	/	1.50		1.50		947.90		0.31		1		0.31	352.55
5220	/	1.20		1.20		3427.80		0.02		1		0.02	352.55
5420	2.70	3.33	1.84	3.19	3998.618	53336.03	5.4	1.79	3	8	16.13	14.30	352.55
6220	/	2.57		1.94		35172.79		1.62		11		17.87	352.55
9320	/	1.96		1.96		5281.10		0.02		1		0.02	352.55

Table 6. Conservation status and trend of the habitats of the "Saline di Priolo" SAC. FV—favorable; U1—inadequate; U2—bad; (=) trend stable; (-) trend decreasing; (x) trend unknown. Asterisk (*) indicates a priority habitat.

Habitat	ha	%	Conservation Status and Trend
1150 * Coastal lagoons	25.9	17.7	FV
1210 Annual vegetation of drift lines	9	6.1	FV
1240 Vegetated sea cliffs of the Mediterranean coasts with endemic Limonium spp.	11.35	7.7	U1 (-)
1310 Salicornia and other annuals colonizing mud and sand	0.1	0.1	U1 (=)
1410 Mediterranean salt meadows (Juncetalia maritimi)	23	15.7	U1 (x)
		0.0	
1420 Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetiea fruticosi)	2.2	1.5	U1 (x)
1430 Halo-nitrophilous scrubs (Pegano-Salsoletea)	0.12	0.1	FV
2110 Embryonic shifting dunes	4	2.7	U2 (=)
2210 Crucianellion maritimae fixed beach dunes	?	0	U2 (-)
2230 Malcolmietalia dune grasslands	0.2	0.1	U1 (x)
3170 * Mediterranean temporary ponds	0.32	0.2	U1 (=)
5220 * Arborescent matorral with Zyziphus	0.1	0.1	U2 (-)
5420 Sarcopoterium spinosum phryganas	14.3	9.8	FV
6220 * Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	12.6	8.6	FV
92D0 Southern riparian galleries and thickets (Nerio-Tamaricetea and Securinegion tinctoriae)	6.6	4.5	U1 (-)
9320 Olea and Ceratonia forests	0.8	0.5	U1 (-)
	110.6		

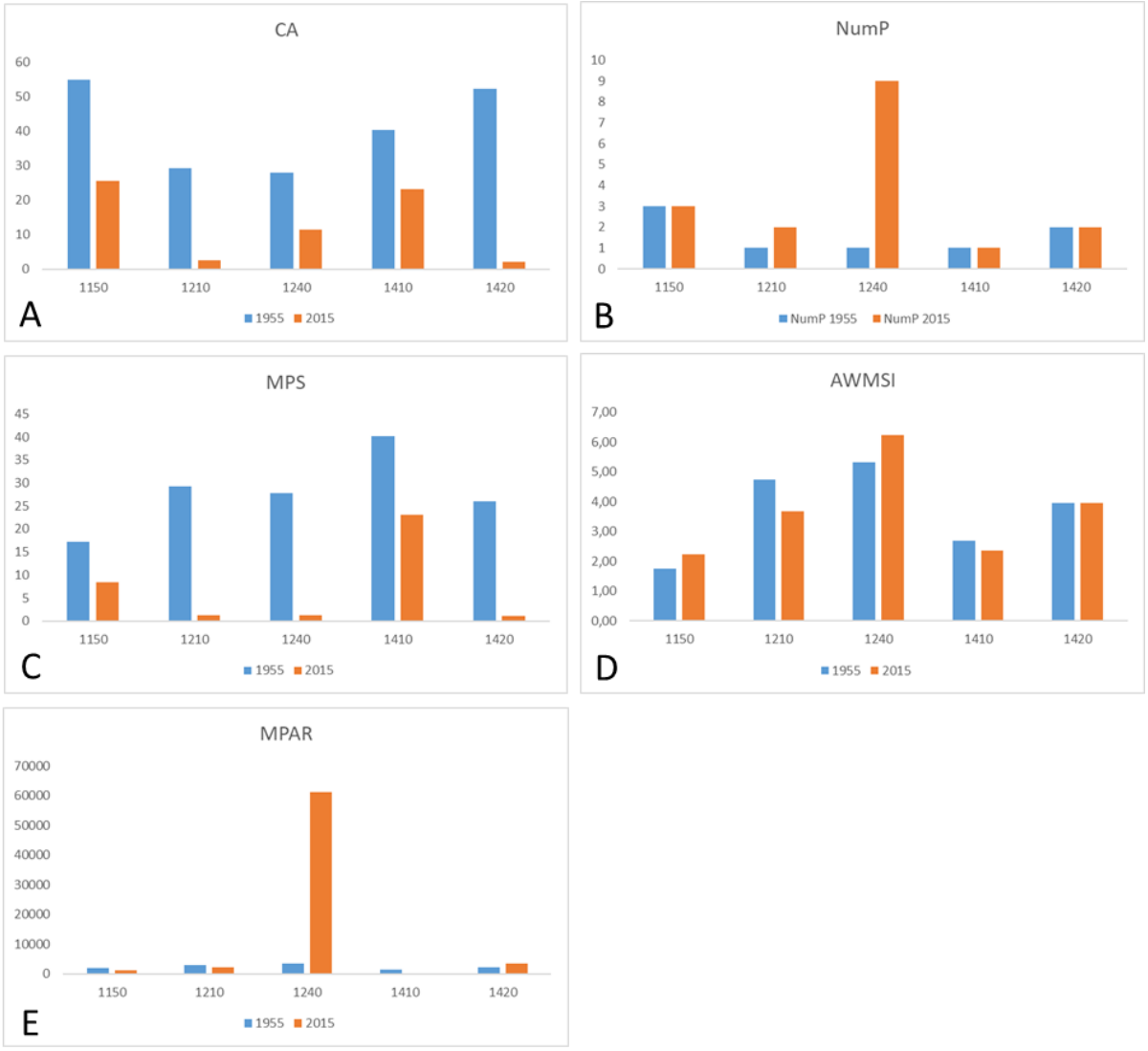

Figure 10. CA (Class Area) and NumP (Number of Patches) (**A**,**B**); MPS (Mean Patch Size) (**C**); AWMSI (Area-Weighted Mean Shape Size) and MPAR (Mean Perimeter–Area Ratio) (**D**,**E**) of habitat types 1150, 1210, 1240, 1410, and 1420 in 1955 and 2015.

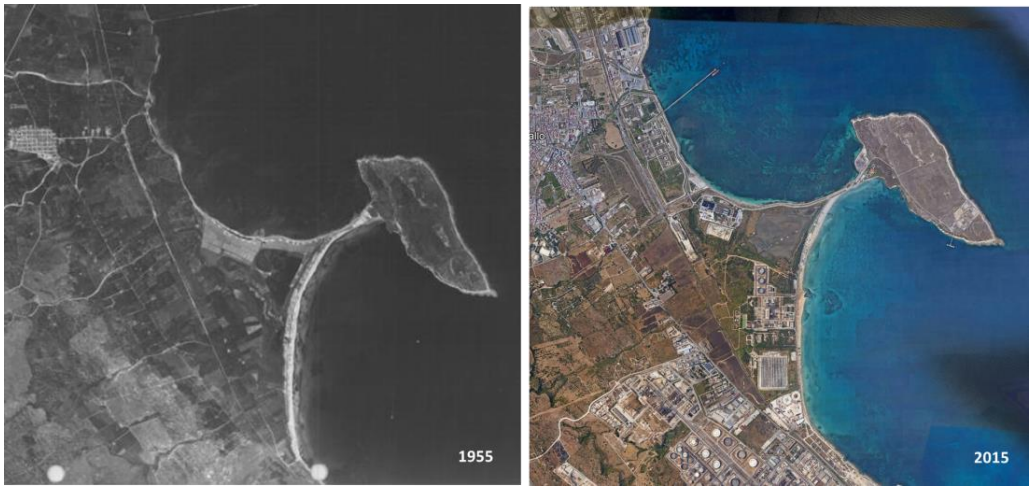

Figure 11. Aerial photos of 1955 and 2015.

4. Conclusions

Vegetation analysis with the phytosociological method is basic for detecting and assessing the terrestrial habitats in line with the objectives of the European Habitats Directive 92/43/EEC. Although the study area is strongly altered by human pressures, the study allowed us to identify notable habitat diversity and floristic richness. As demonstrated by the diachronic analysis carried out, the area has undergone notable transformations, which occurred especially in the 1950s and 1960s with the industrialization of the area. Despite that, the wetland system is still able to support specialized flora, vegetation, and fauna, and provide meaningful ecosystem services. In conclusion, the knowledge of current and past vegetation acquired in this study can represent a valid basic tool for the protected area to plan targeted conservation actions for the most threatened and endangered habitats.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/land13010062/s1. Table S1: Coastal dune vegetation; Table S2: Rocky coast vegetation; Table S3: Coastal wetland vegetation; Table S4: Dry grasslands and garrigues/shrubs.

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Data Availability Statement: Data is contained within the article.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Species List of the Vascular Plants Recorded from the "Saline di Priolo" SAC (SE Sicily)

Table A1. Chorology: Steno-Medit./Medit.—Mediterranean; Endem. sic.—Endemic to Sicily; Endem. Ital.—Endemic to Italy; Euro-Med.—Euro-Mediterranean; Medit.-Turan.—Mediterranean-Turanian; Medit.-Atl.—Mediterranean-Atlantic; Neotrop.—Neotropical; Paleotemp.—Paleotemperate; Cosmop.—Cosmopolitan; Eurasiat.—Eurasiantic; Circumbor.—Curcumboreal; Europ.-Caucas.—Europe-Caucasic; Paleotrop.—Paleotropical. Life form: T—Therophytes; Ch—Chamaephytes; H—Hemicryptophytes; G—Geophytes; P—Phanerophytes; NP—Nanophanerophytes; I—Hydrophytes.

N.	Family	Corology	Life Form	Species	Saline Priolo	Penisola Magnisi
1	Asteraceae	Medit.-Atl.	Ch	*Achillea maritima* (L.) Ehrend. and Y.P. Guo	1	
2	Amaranthaceae	SW-Medit.	Ch	*Achyranthes sicula* (L.) All.	1	1
3	Rosaceae	Eurasiat.	H	*Agrimonia eupatoria* L.	1	
4	Lamiaceae	Euri-Medit.	T	*Ajuga chamaepitys (L.) Schreb.*	1	1
5	Alismataceae	Subcosmop.	I	*Alisma lanceolatum* With.	1	
6	Amaryllidaceae	Europ.	G	*Allium sphaerocephalon* subsp. *arvense* (Guss.) Arcang.		1
7	Amaryllidaceae	Steno-Medit.	G	*Allium roseum* L.	1	
8	Amaryllidaceae	Steno-Medit.	G	*Allium commutatum* Guss.		1
9	Amaryllidaceae	Steno-Medit.	G	*Allium subhirsutum* L.	1	
10	Asteraceae	Steno-Medit.	T	*Anacyclus clavatus* (Desf.) Pers.		1
11	Poaceae	Paleotrop.	H	*Andropogon distachyos* L.		1
12	Apiaceae	Euri-Medit.	H	*Anethum piperitum* Ucria	1	1

Table A1. *Cont.*

N.	Family	Corology	Life Form	Species	Saline Priolo	Penisola Magnisi
13	Poaceae	Paleosubtrop.	T	*Anisantha rigida* (Roth) Hyl.	1	
14	Poaceae	Medit.-Turan.	T	*Anisantha rubens* (L.) Nevski	1	
15	Poaceae	Medit.-Turan.	T	*Anisantha sterilis* (L.) Nevski	1	
16	Poaceae	Paleotemp.	T	*Anisantha tectorum* (L.) Nevski	1	1
17	Asteraceae	Steno-Medit.	T	*Anthemis arvensis* L.	1	1
18	Apiaceae	Subcosmop.	T	*Torilis arvensis* (Huds.) Link	1	
19	Plantaginaceae	Endem. Ital.	Ch	*Antirrhinum siculum* Mill.		1
20	Asteraceae	S-Medit.	NP	*Artemisia arborescens* (Vaill.) L.		1
21	Asteraceae	Steno-Medit.	H	*Carlina corymbosa* L.		
22	Lamiaceae	Steno-Medit.	T	*Stachys major* (L.) Bartolucci and Peru		
23	Amaranthaceae	Medit.	Ch	*Arthrocaulon meridionale* Es.Ramírez, Rufo, Sánchez Mata, V.Fuente	1	1
24	Araceae	Steno-Medit.	G	*Arum italicum* Mill.	1	
25	Poaceae	Subcosmop.	G	*Arundo donax* L.	1	
26	Asparagaceae	Steno-Medit.	G	*Asparagus acutifolius* L.	1	1
27	Asphodelaceae	Subtrop.	H	*Asphodelus fistulosus* L.	1	1
28	Asphodelaceae	Steno-Medit.	G	*Asphodelus ramosus* L.	1	1
29	Asteraceae	Steno-Medit.	T	*Asteriscus aquaticus* (L.) Less.		1
30	Fabaceae	S-Medit.	T	*Astragalus epiglottis* L.		1
31	Fabaceae	S-Medit.	T	*Astragalus boeticus* L.	1	1
32	Fabaceae	Medit.-Turan.	T	*Astragalus hamosus* L.		1
33	Fabaceae	Steno-Medit.	T	*Astragalus pelecinus* (L.) Barneby		1
34	Amaranthaceae	Circumbor.	T	*Atriplex prostrata* Boucher ex DC.	1	
35	Poaceae	Medit.-Turan.	T	*Avena barbata* Pott ex Link	1	1
36	Poaceae	Medit.-Turan.	T	*Avena sterilis* L.		1
37	Orobanchaceae	Euri-Medit.	T	*Bellardia trixago* (L.) All.	1	
38	Asparagaceae	Endem. Ital.	G	*Bellevalia dubia* (Guss.) Rchb.		1
39	Asteraceae	Steno-Medit.	T	*Bellis annua* L.		1
40	Amaranthaceae	Euri-Medit.	H	*Beta vulgaris* subsp. *maritima* (L.) Arcang.	1	1
41	Brassicaceae	Medit.-Turan.	T	*Biscutella didyma* L.	1	
42	Cyperaceae	Cosmop.	G	*Bolboschoenus maritimus* (L.) Palla	1	
43	Poaceae	Medit.-Turan.	T	*Brachypodium distachyon* (L.) P. Beauv.	1	1
44	Poaceae	Europ.-Caucas.	T	*Bromus racemosus* L.		1
45	Crassulaceae	Subatl.	T	*Bulliarda vaillantii* (Willd.) DC.		1
46	Apiaceae	Euri-Medit.	T	*Bupleurum tenuissimum* L.	1	
47	Brassicaceae	Medit.-Atl.	T	*Cakile maritima* Scop.	1	
48	Capparaceae	Steno-Medit.	NP	*Capparis orientalis* Veill.	1	1
49	Brassicaceae	Cosmop.	T	*Cardamine hirsuta* L.	1	
50	Asteraceae	Steno-Medit.	T	*Carduus argyroa* Biv.		1
51	Asteraceae	Medit.-Turan.	H	*Carduus pycnocephalus* L.	1	
52	Cyperaceae	Steno-Medit.	G	*Carex hispida* Willd. ex Schkuhr	1	
53	Cyperaceae	Medit.-Atl.	H	*Carex extensa* Gooden.	1	
54	Cyperaceae	Atl.	H	*Carex otrubae* Podp.	1	
55	Cyperaceae	Eurosiber.	H	*Carex vulpina* L.		1
56	Cyperaceae	Euri-Medit.	H	Carex distans L.	1	
57	Asteraceae	Endem. Ital.	H	*Carlina hispanica* Lam.	1	1
58	Asteraceae	Euri-Medit.	T	*Carthamus lanatus* L.	1	1
59	Poaceae	Medit.-Atl.	T	*Catapodium balearicum* (Willk.) H. Scholz		1
60	Asteraceae	SW-Medit.	H	*Centaurea sicula* L.		1
61	Asteraceae	Steno-Medit.	H	*Centaurea sphaerocephala* L.	1	
62	Gentianaceae	Paleotemp.	T	*Centaurium tenuiflorum* (Hoffmanns. and Link) Fritsch	1	
63	Characeae		I	Chara sp.	1	
64	Asparagaceae	Steno-Medit.	G	*Squilla maritima* (L.) Steinh.	1	1

Table A1. *Cont.*

N.	Family	Corology	Life form	Species	Saline Priolo	Penisola Magnisi
65	Asteraceae	Cosmop.	H	*Cichorium intybus* L.		1
66	Asteraceae	Orof. NE-Medit.	H	*Cirsium creticum* subsp. *triumfettii* (Lacaita) K. Werner	1	
67	Boraginaceae	Euri-Medit.	H	*Cynoglossum creticum* Mill.	1	1
68	Lamiaceae	Medit.-Mont.	Ch	*Clinopodium nepeta* (L.) Kuntze		1
69	Convolvulaceae	Steno-Medit.	H	*Convolvulus althaeoides* L.	1	1
70	Convolvulaceae	Cosmop.	G	*Convolvulus soldanella* L.	1	
71	Asteraceae	Medit.	H	*Crepis bursifolia* L.	1	
72	Convolvulaceae	Cosmop.	Ch	*Cressa cretica* L.	1	
73	Apiaceae	Euri-Medit.	Ch	*Crithmum maritimum* L.	1	1
74	Convolvulaceae	Eurasiat.	T	*Cuscuta epithymum* (L.) L.		1
75	Poaceae	Steno-Medit.	T	*Cutandia maritima* (L.) Benth. ex Barbey	1	
76	Poaceae	Steno-Medit.	T	*Cutandia divaricata* (Desf.) Barbey	1	
77	Poaceae	Cosmop.	G	*Cynodon dactylon* (L.) Pers.	1	1
78	Cyperaceae	Steno-Medit.	G	*Cyperus capitatus* Vand.	1	
79	Poaceae	Steno-Medit.	H	*Dactylis glomerata* subsp. *hispanica* (Roth) Nyman		1
80	Poaceae	Paleotrop.	T	*Dactyloctenium aegyptium* (L.) Willd.		1
81	Alismataceae	Atl.	I	*Damasonium bourgaei* Coss.		1
82	Apiaceae	Paleotemp.	H	*Daucus carota* L.	1	1
83	Apiaceae	Cosmop.	H	*Daucus carota* L. subsp. *carota*	1	
84	Apiaceae	W-Medit.	H	*Daucus carota* L. subsp. *maritimus* (Lam.) Batt.	1	
85	Brassicaceae	W-Medit.	T	*Diplotaxis erucoides* (L.) DC.		1
86	Dipsacaceae	Euri-Medit.	H	*Dipsacus fullonum* L.	1	
87	Asteraceae	Euri-Medit.	H	*Dittrichia viscosa* (L.) Greuter	1	1
88	Apiaceae	Euri-Medit.	H	*Echinophora spinosa* L.	1	
89	Boraginaceae	Steno-Medit.	H	*Echium arenarium* Guss.	1	
90	Boraginaceae	Endem. Sic.	H	*Echium italicum* subsp. *siculum* (Lacaita) Greuter and Burdet	1	
91	Boraginaceae	Steno-Medit.	H	*Echium parviflorum* Moench	1	
92	Cyperaceae	Subcosmop.	G	*Eleocharis palustris* (L.) Roem. and Schult.	1	
93	Geraniaceae	Subcosmop.	T	*Erodium cicutarium* (L.) L'Hér.		1
94	Geraniaceae	Steno-Medit.	T	*Erodium laciniatum* (Cav.) Willd.	1	
95	Apiaceae	Euri-Medit.	H	*Eryngium campestre* L.		1
96	Apiaceae	SW-Medit.	H	*Eryngium dicothomum* Desf.		1
97	Apiaceae	Medit.-Atl.	G	*Eryngium maritimum* L.	1	
98	Euphorbiaceae	Cosmop.	T	*Euphorbia helioscopia* L.		1
99	Euphorbiaceae	Medit.	G	*Euphorbia hirsuta* L.	1	
100	Euphorbiaceae	Cosmop.	T	*Euphorbia peplus* L.		1
101	Euphorbiaceae	W-Medit.	H	*Euphorbia segetalis* L.		1
102	Euphorbiaceae	Steno-Medit.	H	*Euphorbia terracina* L.	1	
103	Apiaceae	Euri-Medit.	H	*Ferula communis* L.		1
104	Poaceae	Subcosmop.	T	*Festuca danthonii* Asch. and Graebn.	1	1
105	Poaceae	Subcosmop.	T	*Festuca myuros L.*		1
106	Poaceae	Medit.-Atl.	T	*Festuca fasciculata* Forssk.	1	
107	Moraceae	Medit.-Turan.	P	*Ficus carica* L.	1	1
108	Asteraceae	Steno-Medit.	T	*Filago pygmaea* L.		1
109	Frankeniaceae	Steno-Medit.	Ch	*Frankenia hirsuta* L.		1
110	Frankeniaceae	Steno-Medit.	T	*Frankenia pulverulenta* L.		1
111	Asteraceae	Steno-Medit.	H	*Galactites tomentosus* Moench	1	1
112	Rubiaceae	Eurasiat.	T	*Galium aparine* L.	1	
113	Geraniaceae	Cosmop.	T	*Geranium dissectum* L.		1
114	Geraniaceae	Paleotemp.	T	*Geranium rotundifolium* L.	1	1
115	Iridaceae	Euri-Medit.	G	*Gladiolus italicus* Mill.	1	1

Table A1. *Cont.*

N.	Family	Corology	Life Form	Species	Saline Priolo	Penisola Magnisi
116	Papaveraceae	Euri-Medit.	H	*Glaucium flavum* Crantz		1
117	Asteraceae	Steno-Medit.	T	*Glebionis coronaria* (L.) Spach		
118	Amaranthaceae	Circumbor.	Ch	*Halimione portulacoides* (L.) Aellen	1	
119	Asteraceae	Steno-Medit.	T	*Hedypnois rhagadioloides* (L.) F.W. Schmidt	1	1
120	Asteraceae	Euri-Medit.	T	*Helminthotheca echioides* (L.) Holub	1	
121	Brassicaceae	Subatl.	H	*Hirschfeldia incana* (L.) Lagr.-Foss.	1	1
122	Poaceae	Circumbor.	H	*Holcus lanatus* L.	1	
123	Poaceae	Euri-Medit.	T	*Hordeum murinum* subsp. *leporinum* (Link) Arcang.	1	1
124	Asteraceae	Steno-Medit.	H	*Hyoseris radiata* L.		1
125	Poaceae	Paleotrop.	H	*Hyparrhenia hirta* (L.) Stapf		1
126	Hypericaceae	Steno-Medit.	H	*Hypericum triquetrifolium* Turra		1
127	Asteraceae	Steno-Medit.	T	*Hypochaeris achyrophorus* L.	1	1
128	Cyperaceae	Subcosmop.	H	*Isolepis cernua* (Vahl) Roem. and Schult.	1	
129	Juncaceae	Euri-Medit.	H	*Juncus acutus* L.	1	1
130	Juncaceae	Circumbor.	G	*Juncus articulatus* L.	1	
131	Juncaceae	Cosmop.	T	*Juncus bufonius* L.		1
132	Juncaceae	Paleosubtrop.	G	*Juncus fontanesii* J.Gay	1	
133	Juncaceae	Euri-Medit.	T	*Juncus hybridus* Brot.	1	1
134	Juncaceae	Subcosmop.	G	*Juncus maritimus* Lam.	1	
135	Juncaceae	S-Medit.	G	*Juncus subulatus* Forssk.	1	
136	Plantaginaceae	Steno-Medit.	H	*Kickxia commutata* (Bernh. ex Rchb.) Fritsch	1	
137	Poaceae	Euri-Medit.	T	*Lagurus ovatus* L.	1	
138	Fabaceae	Euri-Medit.	T	*Lathyrus annuus* L.	1	
139	Fabaceae	Euri-Medit.	T	*Lathyrus aphaca* L.	1	1
140	Fabaceae	Euri-Medit.	T	*Lathyrus cicera* L.		1
141	Fabaceae	Steno-Medit.	T	*Lathyrus clymenum* L.		1
142	Fabaceae	Steno-Medit.	T	*Lathyrus ochrus* (L.) DC.	1	1
143	Malvaceae	Steno-Medit.	H	*Malva arborea (L.) Webb and Berthel.*		
144	Brassicaceae	Euri-Medit.	T	*Lepidium coronopus* (L.) Al-Shehbaz		1
145	Asteraceae	Medit.Atl.	Ch	*Limbarda crithmoides* (L.) Dumort.	1	1
146	Plumbacinaceae	Euri-Medit.	H	*Limonium narbonense* Mill.	1	
147	Plumbaginaceae	Endem. Sic.	Ch	*Limonium syracusanum* Brullo	1	1
148	Plantaginaceae	W-Medit.	T	*Linaria triphylla* (L.) Mill.		1
149	Linaceae	Euri-Medit.	H	*Linum usitatissimum* subsp. *angustifolium* (Huds.) Thell.		1
150	Brassicaceae	Steno-Medit.	Ch	*Lobularia maritima* (L.) Desv.	1	1
151	Poaceae	Paleotemp.	H	*Lolium arundinaceum* (Schreb.) Darbysh.	1	
152	Fabaceae	Euri-Medit.	H	*Lotus corniculatus* L. subsp. *preslii* (Ten.) P.Fourn.	1	
153	Fabaceae	Steno-Medit.	Ch	*Lotus cytisoides* L.	1	1
154	Fabaceae	Steno-Medit.	T	*Lotus edulis* L.		1
155	Fabaceae	Steno-Medit.	T	*Lotus ornithopodioides* L.		1
156	Primulaceae	Cosmop.	T	*Lysimachia arvensis* (L.) U. Manns and Anderb.	1	1
157	Lythraceae	Subcosmop.	T	*Lythrum hyssopifolia* L.		1
158	Lythraceae	Steno-Medit.	H	*Lythrum junceum* Banks and Sol.	1	
159	Malvaceae	Subcosmop.	H	*Malva sylvestris* L.	1	
160	Solanaceae	Steno-Medit.	H	*Mandragora autumnalis* Bertol.		1
161	Lamiaceae	Euri-Medit.	H	*Marrubium vulgare* L.	1	1
162	Brassicaceae	Steno-Medit.	T	*Matthiola tricuspidata* (L.) W.T. Aiton	1	1
163	Fabaceae	Euri-Medit.	T	*Medicago littoralis* Rohde ex Loisel.	1	1
164	Fabaceae	Euri-Medit.	Ch	*Medicago marina* L.	1	

Table A1. *Cont.*

N.	Family	Corology	Life Form	Species	Saline Priolo	Penisola Magnisi
165	Fabaceae	Euri-Medit.	T	*Medicago minima* (L.) L.	1	1
166	Fabaceae	Euri-Medit.	T	*Medicago polymorpha* L.		1
167	Fabaceae	Steno-Medit.	T	*Medicago truncatula* Gaertn.		1
168	Lamiaceae	Euri-Medit.	H	*Mentha pulegium* L.	1	1
169	Euphorbiaceae	Paleotemp.	T	*Mercurialis annua* L.	1	1
170	Aizoaceae	S-Medit.	T	*Mesembryanthemum nodiflorum* L.		1
171	Lamiaceae	Endem. Ital.	Ch	*Micromeria graeca subsp. tenuifolia* (Ten.) Nyman	1	1
172	Lamiaceae	S-Medit.	Ch	*Micromeria nervosa* (Desf.) Benth.		1
173	Plantaginaceae	Euri-Medit.	T	*Misopates orontium* (L.) Raf.	1	
174	Iridaceae	Steno-Medit.	G	*Moraea sisyrinchium* (L.) Ker Gawl.		1
175	Asparagaceae	Euri-Medit.	G	*Muscari comosum* (L.) Mill.		1
176	Asparagaceae	Steno-Medit.	G	*Muscari parviflorum* Desf.		1
177	Myrtaceae	Steno-Medit.	P	*Myrtus communis* L.	1	
178	Ranunculaceae	Euri-Medit.	T	*Nigella damascena* L.		1
179	Asteraceae	Steno-Medit.	T	*Notobasis syriaca* (L.) Cass.		1
180	Apiaceae	Steno-Medit.	H	*Oenanthe globulosa* L.	1	
181	Oleaceae	Steno-Medit.	P	*Olea europaea* L. var. *sylvestris* (Mill.) Lehr	1	1
182	Poaceae	Medit.-Turan.	H	*Oloptum miliaceum* (L.) Röser and H.R. Hamasha	1	
183	Fabaceae	Steno-Medit.	T	*Onobrychis caput-galli* (L.) Lam.	1	1
184	Fabaceae	Euri-Medit.	H	*Ononis natrix* subsp. *ramosissima* (Desf.) Batt.	1	1
185	Fabaceae	Medit.-Turan.	T	*Ononis reclinata* L.	1	1
186	Fabaceae	Steno-Medit.	T	*Ononis variegata* L.	1	
187	Asteraceae	Steno-Medit.	H	*Onopordum illyricum* L.		1
188	Orchidaceae	Steno-Medit	G	*Ophrys bertolonii* Moretti	1	
189	Cactaceae	Americ.	P	*Opuntia dillenii* (Ker Gawl.) Haw.	1	
190	Cactaceae	Neotrop.	P	*Opuntia ficus-indica* (L.) Mill.		1
191	Asparagaceae	Steno-Medit.	G	*Ornithogalum gussonei* Ten.		1
192	Oxalidaceae	Africana	G	*Oxalis pes-caprae* L.	1	1
193	Asteraceae	Euri-Medit.	H	*Pallenis spinosa* (L.) Cass.		1
194	Amaryllidaceae	Steno-Medit.	G	*Pancratium maritimum* L.	1	
195	Poaceae	Euri-Medit.	T	*Parapholis cylindrica* (Willd.) Romero Zarco		1
196	Poaceae	Medit.-Atl.	T	*Parapholis filiformis* (Roth) C.E. Hubb.	1	
197	Poaceae	Medit.-Atl.	T	*Parapholis incurva* (L.) C.E. Hubb.	1	1
198	Urticaceae	Euri-Medit.	H	*Parietaria judaica* L.	1	
199	Asteraceae	Steno-Medit.	Ch	*Phagnalon saxatile* (L.) Cass.		1
200	Poaceae	Steno-Medit.	H	*Phalaris coerulescens* Desf.	1	
201	Poaceae	Subcosmop.	G	*Phragmites australis* (Cav.) Trin. ex Steud.	1	
202	Verbenaceae	Pantrop.	H	*Phyla nodiflora* (L.) Greene	1	
203	Anacardiaceae	S-Medit.	P	*Pistacia lentiscus* L.		1
204	Plantaginaceae	Euri-Medit.	H	*Plantago coronopus* L.		1
205	Plantaginaceae	Steno-Medit.	T	*Plantago lagopus* L.	1	1
206	Plantaginaceae	Steno-Medit.	H	*Plantago macrorhiza* Poir.		1
207	Plantaginaceae	Eurasiat.	H	*Plantago media* L.	1	
208	Plantaginaceae	Steno-Medit.	H	*Plantago serraria* L.		1
209	Poaceae	Euri-Medit.	T	*Poa infirma* Kunth	1	1
210	Poaceae	Paleosubtrop.	T	*Polypogon monspeliensis* (L.) Desf.	1	
211	Rosaceae	Paleotemp.	H	*Potentilla reptans* L.	1	
212	Rosaceae	Steno-Medit.	NP	*Poterium spinosum* L.		1
213	Asparagaceae	Steno-Medit.	G	*Prospero autumnale* (L.) Speta		1
214	Asteraceae	Steno-Medit.	T	*Pulicaria sicula* (L.) Moris	1	
215	Asteraceae	Steno-Medit.	H	*Pulicaria dysenterica* (L.) Bernh.	1	

Table A1. *Cont.*

N.	Family	Corology	Life Form	Species	Saline Priolo	Penisola Magnisi
216	Rosaceae	Eurasiat.	P	*Pyrus spinosa* Forssk.		1
217	Ranunculaceae	W-Medit.	T	*Ranunculus trilobus* Desf.	1	
218	Asteraceae	Steno-Medit.	H	*Reichardia picroides* (L.) Roth		1
219	Resedaceae	Steno-Medit.	H	*Reseda alba* L.	1	
220	Rhamnaceae	Steno-Medit.	P	*Rhamnus alaternus* L.	1	1
221	Iridaceae	Steno-Medit.	G	*Romulea ramiflora* Ten.		1
222	Rosaceae	Steno-Medit.	NP	*Rosa sempervirens* L.	1	
223	Poaceae	Paleotemp.	T	*Rostraria cristata (L.) Tzvelev*		1
224	Rubiaceae	Steno-Medit.	P	*Rubia peregrina* L.	1	
225	Rosaceae	Euri-Medit.	NP	*Rubus ulmifolius* Schott	1	
226	Polygonaceae	Euri-Medit.	H	*Rumex pulcher* L.	1	1
227	Polygonaceae	Eurasiat.	H	*Rumex conglomeratus* Murray		
228	Polygonaceae	Subcosmop.	H	*Rumex crispus L.*	1	
229	Polygonaceae	W-Medit.	H	*Rumex thyrsoides* Desf.		1
230	Ruppiaceae	Cosmop.	I	*Ruppia maritima* L.	1	
231	Amaranthaceae	Euri-Medit.	Ch	*Salicornia fruticosa* (L.) L.		
232	Amaranthaceae	W-Europ.	T	*Salicornia perennans* Willd.	1	
233	Amaranthaceae	Steno-Medit.	Ch	*Salicornia perennis* subsp. *alpini* (Lag.) Castrov.	1	
234	Salicaceae	Steno-Medit.	P	*Salix pedicellata* Desf.	1	
235	Amaranthaceae	Paleotemp.	T	*Salsola tragus* L.	1	
236	Lamiaceae	Euri-Medit.	H	*Salvia verbenaca* L.		1
237	Gentianaceae	Euri-Medit.	T	*Schenkia spicata* (L.) G. Mans.	1	
238	Cyperaceae	Euri-Medit.	G	*Scirpoides holoschoenus* (L.) Soják	1	
239	Asteraceae	SW-Medit.	H	*Scolymus grandiflorus* Desf.		1
240	Asteraceae	Euri-Medit.	H	*Scolymus hispanicus* L.	1	
241	Fabaceae	S-Medit.	T	*Scorpiurus vermiculatus L.*		1
242	Crassulaceae	SW-Medit.	T	*Sedum caeruleum* L.	1	1
243	Asteraceae	Cosmop.	T	*Senecio vulgaris* L.	1	
244	Caryophyllaceae	S-Medit.	T	*Silene bellidifolia* Jacq.		1
245	Caryophyllaceae	Steno-Medit.	T	*Silene colorata* Poir.	1	1
246	Caryophyllaceae	Steno-Medit.	T	*Silene niceensis* All.	1	
247	Caryophyllaceae	Steno-Medit.	T	*Silene sedoides* Poir.		1
248	Caryophyllaceae	Paleotemp.	H	*Silene vulgaris* (Moench) Garcke		1
249	Asteraceae	Medit.-Turan.	H	*Silybum marianum* (L.) Gaertn.	1	1
250	Brassicaceae	E-Medit.	T	*Sinapis alba L.*	1	
251	Dipsacaceae	Steno-Medit.	H	*Sixalix atropurpurea* (L.) Greuter and Burdet	1	1
252	Apiaceae	Medit.-Atl.	H	*Smyrnium olusatrum* L.	1	
253	Asteraceae	Eurasiat.	H	*Sonchus asper* (L.) Hill		1
254	Asteraceae	Steno-Medit.	G	*Sonchus bulbosus* (L.) Kilian and Greuter	1	
255	Asteraceae	Cosmop.	H	*Sonchus oleraceus* L.	1	1
256	Asteraceae	Steno-Medit.	H	*Sonchus tenerrimus* L.		1
257	Caryophyllaceae	Subcosmop.	T	*Spergularia marina* (L.) Besser	1	1
258	Poaceae	Subtrop.	G	*Sporobolus virginicus* (L.) Kunth	1	
259	Lamiaceae	Steno-Medit.	Ch	*Stachys major* (L.) Bartolucci and Peruzzi		1
260	Lamiaceae	Steno-Medit.	T	*Stachys romana* (L.) E.H.L. Krause	1	1
261	Poaceae	Steno-Medit.	T	*Stipellula capensis* (Thunb.) Röser and H.R. Hamasha	1	1
262	Amaranthaceae	Cosmop.	T	*Suaeda maritima* (L.) Dumort.	1	
263	Amaranthaceae	Cosmop.	NP	*Suaeda vera* J. F. Gmelin	1	1
264	Asteraceae	Neotrop.	H	*Symphyotrichum squamatum* (Spreng.) G. L. Nesom	1	
265	Tamaricaceae	W-Medit.	P	*Tamarix africana* Poir.	1	1
266	Tamaricaceae	S-Medit.	P	*Tamarix arborea* (Ehrenb.) Bunge	1	

Table A1. *Cont.*

N.	Family	Corology	Life Form	Species	Saline Priolo	Penisola Magnisi
267	Tamaricaceae	W-Medit.	P	*Tamarix gallica* L.	1	
268	Lamiaceae	Europ.-Caucas.	H	*Teucrium scordium* L.	1	
269	Apiaceae	S-Medit.	H	*Thapsia garganica* L.		1
270	Poaceae	Submedit.	H	*Thinopyrum flaccidifolium* (Boiss. and Heldr.) Moustakas	1	
271	Poaceae	Euri-Medit.	G	*Thinopyrum junceum* (L.) Á. Löve	1	
272	Lamiaceae	Steno-Medit.	Ch	*Thymbra capitata* (L.) Cav.		1
273	Thymelaeaceae	S-Medit.	Ch	*Thymelaea hirsuta* (L.) Endl.	1	
274	Apiaceae	Steno-Medit.	T	*Tordylium apulum* L.		1
275	Apiaceae	Subcosmop.	T	*Torilis arvensis* (Huds.) Link	1	
276	Asteraceae	Euri-Medit.	H	*Tragopogon porrifolius* L.		1
277	Fabaceae	Paleotemp.	T	*Trifolium campestre* Schreb.	1	1
278	Fabaceae	Euri-Medit.	T	*Trifolium cherleri* L.	1	1
279	Fabaceae	Paleotemp.	H	*Trifolium fragiferum* L.	1	
280	Fabaceae	Euri-Medit.	T	*Trifolium nigrescens* Viv.	1	1
281	Fabaceae	Paleotemp.	H	*Trifolium resupinatum* L.		1
282	Fabaceae	Euri-Medit.	T	*Trifolium scabrum* L.	1	1
283	Fabaceae	Euri-Medit.	T	*Trifolium stellatum* L.		1
284	Fabaceae	Paleotemp.	T	*Trifolium tomentosum* L.		1
285	Fabaceae	S-Medit.	T	*Trigonella sulcata* (Desf.) Coulot and Rabaute		1
286	Poaceae	Steno-Medit.	T	*Trisetaria aurea* (Ten.) Banfi and Galasso		1
287	Poaceae	Medit.-Turan.	T	*Triticum vagans* (Jord. and Fourr.) Greuter		1
288	Typhaceae	Pantrop.	G	*Typha domingensis* (Pers.) Steud.	1	
289	Typhaceae	Circumbor.	G	*Typha angustifolia* L.	1	
290	Ulmaceae	Europ.-Caucas.	P	*Ulmus minor* Mill.	1	
291	Asteraceae	Euri-Medit.	T	*Urospermum picroides* (L.) Scop. ex F.W. Schmidt	1	1
292	Urticaceae	S-Medit.	T	*Urtica membranacea* Poir.	1	
293	Asteraceae	Neotrop.	T	*Symphyotrichum squamatum* (Spreng.) G.L. Nesom		
294	Rubiaceae	Steno-Medit.	T	*Valantia muralis* L.		1
295	Scrophulariaceae	Euri-Medit.	H	*Verbascum sinuatum* L.	1	1
296	Plantaginaceae	Cosmop.	H	*Veronica anagallis-aquatica* L.	1	
297	Fabaceae	Euri-Medit.	T	*Vicia hybrida* L.		1
298	Fabaceae	S-Europ.	T	*Vicia melanops* Sm.	1	1
299	Fabaceae	Steno-Medit.	T	*Vicia sativa* L.		1
300	Fabaceae	Steno-Medit.	H	*Vicia villosa* Roth	1	1
301	Fabaceae	Euri-Medit.	T	*Ervum gracile* DC. (=Vicia tenuissima (Bieb.) Sch. and Th.)	1	1
302	Lamiaceae	Medit.-Turan.	P	*Vitex agnus-castus* L.	1	
303	Asteraceae	S-Europ.	T	*Xanthium italicum* Moretti	1	
304	Rhamnaceae	S-Medit.	P	*Ziziphus lotus* (L.) Lam.		1

Appendix B. Syntaxonomical Scheme of the Vegetation Units Recorded from the "Saline di Priolo" SAC (SE Sicily)

CAKILETEA MARITIMAE Tüxen and Preising ex Br.-Bl. and Tüxen 1952
EUPHORBIETALIA PEPLIS Tüxen 1950
EUPHORBION PEPLIS Tüxen 1950
1. Salsolo-Cakiletum maritimae Costa and Mansanet 1981 corr. Rivas-Martínez et al., 1992
EUPHORBIO PARALIAE-AMMOPHILETEA AUSTRALIS Géhu and Rivas-Martínez in Rivas Martínez, Asensi, Díez-Garretas, Molero, Valle, Cano, Costa and Díaz 2011

AMMOPHILETALIA AUSTRALIS Br.-Bl. 1933
AMMOPHILION AUSTRALIS Br.-Bl. 1921 corr. Rivas-Martìnez, Costa Izco in Rivas-Martìnez, Lousa, T.
E.Diaz, Fernandez-Gonzalez and J.C.Costa 1990
2. Cypero capitati-Agropyretum juncei Kühnholtz-Lordat (1923) Br.-Bl. 1933
ONONIDION RAMOSISSIMAE Pignatti 1952
3. Centaureo sphaerocephalae-Ononidetum ramosissimae Br.-Bl. e Frei in Frei, 193
HELIANTHEMETEA GUTTATI (Br.-Bl. in Br.-Bl., Roussine and Nègre 1952) Rivas Goday and Rivas-Martìnez 1963 em. Rivas-Martìnez 1978
CUTANDIETALIA MARITIMAE Rivas- Martìnez, Díez-Garretas, and Asensi 2002
ALKANNO-MARESION NANAE Rivas Goday ex Rivas Goday and Rivas-Martínez 1963 corr. Diaz-Garretas et al., 2001
4. Sileno coloratae-Ononidetum variegatae Gèhu and Gèhu-Franck 1986
RUPPIETEA MARITIMAE Tuxen ex Den Hartog and Segal 1964
RUPPIETALIA MARITIMAE Tuxen ex Den Hartog and Segal 1964
RUPPION MARITIMAE Br.-Bl. ex Br.-Bl., Roussine and Nègre 1952
5. Enteromorpho intestinalidis-Ruppietum maritimae Westhoff ex R.Tx. and Böckelmann 1957
PHRAGMITO-MAGNOCARICETEA Klika in Klika and Novák 1941
PHRAGMITETALIA Koch 1926
PHRAGMITION Koch 1926
6. Phragmitetum communis (Koch 1926) Schmale 1939
7. Typhetum domingensis Brullo, Minissale and Spamp. 1994
NASTURTIO-GLYCERIETALIA Pign. 1954
GLYCERIO-SPARGANION Br.-Bl. and Sissing in Boer 1942
8. Eleocharido-Alismetum lanceolati Minissale and Spampinato 1987
9. *Bolboschoeno maritimi-Alismetum lanceolati* ass. nov. hoc loco
MOLINIO-ARRHENATHERETEA R.Tx.1937
PASPALO-AGROSTION SEMIVERTICILLATI Br.-Bl. in Br.-Bl. Roussine and Negre 1952
PASPALO-HELEOCHLOETALIA Br.-Bl. ex Rivas Goday 1956
10. Euphorbio hirsutae-Lotetum preslii ass. nov. hoc loco
SALICORNIETEA FRUTICOSAE Br.-Bl. et Tx. ex A. Bolòs y Vayreda et. O. de Bolòs in A. Bolòs et Vayreda 1950
SALICORNIETALIA FRUTICOSAE Br.-Bl. 1933
SALICORNION FRUTICOSAE Br.-Bl. 1933
11. Junco subulati-Sarcocornietum alpini Brullo et Sciandrello in Giusso et al., 2008
ARTHROCNEMION GLAUCI Rivas-Mart. et Costa M. 1984
12. Arthrocaulo meridionalis-Juncetum subulati Brullo et Furnari 1976 *nom. corr*. Sciandrello et al., 2019
13. Limonio virgati-Arthrocnemetum macrostachyi Biondi, Casavecchia and Guerra 2006
SUAEDION BREVIFOLIAE Br.-Bl. et O. de Bolòs 1958 (= *Suaedion verae* Brullo et Furnari 1988)
14. Halimiono-Suaedetum verae Molinier et Tallon 1970 corr. Géhu 1984
INULION CRITHMOIDIS Brullo et Furnari 1988
15. Agropyro scirpei-Inuletum crithmoidis Brullo in Brullo et al., 1988
THERO-SUAEDETEA SPLENDENTIS Rivas-Martínez 1972
THERO-SALICORNIETALIA Tüxen in Tüxen et Oberdorfer ex Géhu et Géhu-Franck 1984
Salicornion patulae Géhu et Géhu-Franck ex Rivas-Martínez 1990
16. Suaedo-Salicornietum patulae Brullo et Furnari ex Géhu et Géhu-Franck 1984
JUNCETEA MARITIMI Br.Bl. in Br.-Bl., Roussine and Nègre 1952
JUNCETALIA MARITIMI Br.Bl. ex Horvatic 1934
JUNCION MARITIMI Br.Bl. ex Horvatic 1934
17. Juncetum maritimo-acuti Horvatic 1934 (*Juncus acutus* comm.)
HALO-ARTEMISION COERULESCENTIS Pignatti 1953
18. Elymetum atherici Pellizzari, Merloni et Piccoli 1998 (=*Thinopyrum acutum* (DC.) Banfi)
SAGINETEA MARITIMAE Westhoff, Van Leeuwen et Adriani 1962
SAGINETALIA MARITIMAE Westhoff, Van Leeuwen et Adriani 1962
SILENO SEDOIDIS-CATAPODION BALEARICI de Foucault and Bioret 2010 corr. Tomaselli et al., 2020
19. Parapholido incurvae-Spergularietum marinae ass. nov. hoc loco
ISOËTO-NANOJUNCETEA Br.-Bl. and R. Tx. ex Westhoff, Dijk and Passchier 1946
Isoëtetalia Br.-Bl. 1936

Isoëtion Br.-Bl. 1936
20. Lythro hyssopifoliae-Crassuletum vaillantii Bagella et al., 2009
NERIO-TAMARICETEA Br.-Bl. et O.Bolòs 1958
TAMARICETALIA AFRICANAE Br.-Bl. et O. Bolòs 1958
TAMARICION AFRICANAE Br.-Bl. et O.Bolòs 1958
21. Inulo crithmoidis-Tamaricetum africanae Gamisans 1992 (=*Limbardo crithmoidis-Tamaricetum africanae* Sciandrello et al., 2019)
CRITHMO-LIMONIETEA Br.-Bl. in Br- Bl., Roussine and Nègre1952
CRITHMO-LIMONIETALIA Molinier 1934
CRITHMO-LIMONION MOLINIER 1934
22. Limonietum syracusani Bartolo, Brullo and Marcenò 1982
PEGANO HARMALAE-SALSOLETEA VERMICULATAE Br-Bl and O.Bolòs 1958
SALSOLO VERMICULATAE-PEGANETALIA HARMALAE Br.-Bl. and O. Bolòs 1954
Artemision arborescentis Géhu et al., 1986
23. Atriplici halimi-Artemisietum arborescentis Biondi 1988 (*Artemisia arborescens* comm.)
CISTO-MICROMERIETEA Oberd. 1954
CISTO-ERICETALIA Horvatic 1958
CISTO-ERICION Horvatic 1958
24. Thymbra capitata comm.
LYGEO SPARTI-STIPETEA TENACISSIMAE Rivas-Martinez 1978
CYMBOPOGONO-BRACHYPODIETALIA RAMOSI Horvatić 1963
HYPARRHENENION HIRTAE Brullo, Minissale and Spamp. in C. Brullo et al., 2010
25. Hyparrhenietum hirto-pubescentis A.and O. Bolòs and Br.-Bl. in A.and O. Bolòs 1950
BROMO-ORYZOPSION MILIACEAE O.Bolòs 1970
26. *Oloptum miliaceum* comm.
STIPO-TRACHYNIETEA DISTACHYAE Brullo in Brullo, Scelsi and Spampinato 2001
TRACHYNIETALIA DISTACHYAE Rivas-Martínez 1978
TRACHYNION DISTACHYAE Rivas-Martínez 1978
27. *Thero-Sedetum caerulei* Brullo 1975
CHENOPODIETEA Br.-Bl. in Br.-Bl. et al., 1952
BROMETALIA RUBENTI-TECTORUM (Rivas Goday et Rivas-Martinez 1973) Rivas-Martinez and Izco 1977
ECHIO PLANTAGINEI-GALACTITION TOMENTOSAE O. Bolòs and Molinier 1969
28. *Stipellula capensis* comm.

Appendix C. Localities and Dates of Phytosociological Relevés

Table 1: *Parapholido incurvae-Spergularietum marinae* ass. nova (Rel. 17–22, Scogliera Penisola Magnisi, 30.03.2021, Cambria, Minissale, Sciandrello, Rel. 23–27 Scogliera Penisola Magnisi, 09.04.2021 (Cambria, Minissale, Sciandrello, Tavilla).

Table 2: *Bolboschoeno-Alismetum lanceolati* ass. nova (Rel. 22–24, 26–27, 30–32, pozze Saline di Priolo, 21.04.2021, Cambria, Minissale, Ranno, Sciandrello, Tavilla)

Table 3: *Euphorbio hirsutae-Lotetum preslii* ass. nova (Rel. 40–41, Saline Priolo, pozza lunga 21.09.2021, Sciandrello).

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