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Heritage assessment of vegetation series of Corsica

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Abstract
From 2011 to 2015 symphytosociological investigations were carried out in Corsica in order to typify and map vegetation series and geoseries. This paper proposes a bioevaluation of vegetation series through the identification of natural and semi-natural habitats of Community interest.

Key words: Corsica, dynamico-catenal phytosociology, vegetation series and geoseries, habitats of Community interest.

Introduction

The national program for mapping natural and semi-natural vegetations of France (CarHAB) initiated by the Ministry of Ecology, Sustainable Development and Energy (MEDDE) in 2010, aims to establish an information system of natural and semi-natural vegetations of France, in order to propose tools to answer questions dealing with national conservation policies (protected areas strategy, ...) and to answer European obligations (assessment of the conservation status of habitats of Community interest...). Within this contexte, a research project based on the dynamico-catenal phytosociological method, was carried out in Corsica from 2012 to 2015. Its objective is to characterize the vegetation series and geoseries, highligting their ecology, their structure, the dynamic trajectories, the role of anthropogenic factors on vegetation dynamics and the catenal position in the plant landscape (Rivas-Martínez, 1987; Blasi, 2010; Loidi *et al*., 2011). This work allowed to define 78 serials and geoserials units: 34 series, 14 minoriseries and 30 geopermaseries (Lefort, 2013; Tanné, 2014; Delbosc, 2015; Delbosc *et al*., 2015). The aim of this study is to evaluate the heritage value of vegetation series by assessing the habitats of Community interest (HCI) present in the dynamic stages that compose them (Biondi *et al*., 2005; Penas *et al*., 2005; Bagella *et al*., 2007; Galdenzi *et al*., 2011; Biondi *et al*., 2012). Therefore, the aim of this study is essentially to define conservation issues of symphytosociological and geosymphytosociological heritage. First we compare the number of HCI between vegetation series and then we analyze these results by floor vegetation to define conservation issues.

Materials and methods

Area study

Corsica is a Mediterranean island located at the center of the Mediterranean basin which considered one of 25 biodiversity hotspots (Médail & Quézel, 1999; Myers *et al*., 2000). The island extend for about 852,000 ha and presents an altitudinal gradient form the sea level up to 2,706 m that concerns 7 floors vegetation from the coast to the alpine floor (Gamisans, 1975, 1991; Paradis, 2004). From 2012 to 2015, phytosociological and symphytosociological investigations were conducted on several sectors of Corsica (Fig. 1) in order to typify and map vegetation series and geoseries (Delbosc, 2015).

Natura 2000 network in Corsica

The Natura 2000 network has been set up in application of both european directives: Birds Directive (79/409/EEC) and Habitats Directive (EU Directive 92/43/EEC) for the conservation of habitats and species of community interest. In Corsica, this network represents 43 sites identified as special areas of conservation and 17 sites as special protection areas. This network represents 255,004 ha among which 169,807 ha are terrestrial areas and 85,197 ha are marine areas.

Past and current human impacts

The history of the pastoral society has induced many changes in the Corsican landscape. Until the 1940s, the economy of the Asco valley was practically self-sufficient, mainly based on a farming activity. This mountain farming (slopes arranged in terraces, plateau) was based on a rotating system grazing-crop-fallow (Simi, 1954, 1981). After the Second World War, the hard-

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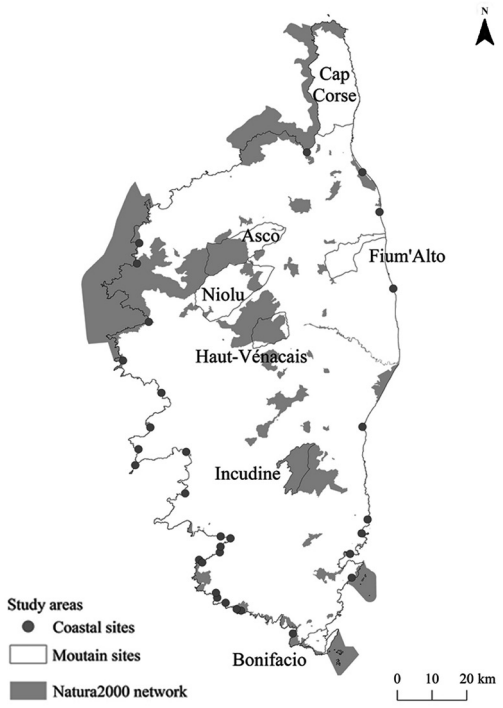

Fig. 1 - Natura 2000 network in Corsica (INPN, 2015).

ness of living conditions and the transition to a market economy has favored the rural exodus and led to a massive land abandonment, like in many mountain areas in Corsica (Ravis-Giordani *et al*., 2004). Fire is the most aggressive factor which participates to the forest degradation of the island. Fire has been considered for a long time as a factor influencing the vegetation dynamics (Flahault, 1924; Trabaud, 1995).

Methods

The typology of the vegetation series and geoseries Corsica was established by Delbosc (2015) according to dynamico-catenal phytosociological method (Tüxen, 1979; Géhu & Rivas-Martínez, 1981; Géhu, 1986; Rivas-Martínez, 1987). This symphytosociological study allows to define the main ecological patterns of Corsica and replace each vegetation in a dynamic trajectory.

The heritage assessment of vegetation series is based on the HCI which are present in each serial unit.

These symphytosociological and phytosociological works allow to describe the HCI of vegetation series and geoseries with correspondance to Natura 2000 habitats description (Bensettiti (coord.), 2001-2005).

Results

Considering the Fauna and Flora Habitats Directive (FFHD), Corsica has 112 habitats of Community interest distributed in most of the vegetation floors. Among the 112 HCI of FFHD present in Corsica (Reymann *et al*., 2017), 57 were identified in our area. HCI which have not been identified concern marine habitats, temporary pools and aquatic habitats. They also concern ponctual habitats in Corsica as 5330-4 Mediterranean thermophilous thickets to *Genista aetnensis* (Biv.) DC. Some sectors which have not been observed, like the eastern plain where the west rocky coast are composed singular habitats as 92A0-7 the alder forest of *Alnus glutinosa* (L.) Gaertn. and *Fraxinus angustifolia* Vahl subsp. *oxycarpa* (Willds) or 5330-1 Mediterranean thermophilous thickets of *Euphorbia dendroides* L.

Among the 78 geopermaserial and serial units identified, 61 have at least one HCI. Table 1 shows the HCI for each vegetation series.

Analysis of habitat of Community interest

Because the geopermaseries and vegetation series characterize different plant landscape units, the analysis has focused initially on a comparison of the number of HCI between geopermaseries then a comparison of the number of HCI between minoriseries and to finish a comparison of the number of HCI between series.

The numbers of geopermasigmeta, minorisigmeta and sigmeta of figures correspond to the typology explained in Table 1.

Habitat of Community interest of geopermaseries

Figure 2 shows that the *Salsola kali-Euphorbio peplis geopermasigmetum* and *Arthrocnemo glauci-Salicornio emerici geopermasigmetum* are geopermasigmeta which comprise the most of HCI. However, three geopermaserial units no comprise HCI (*Saxifrago tridactylites-Sedo stellati geopermasigmetum*, *Sedo rupestris-Hieracio pilosellae geopermasigmetum*, *Phragmito australis geopermasigmetum*).

Habitat of Community interest of minoriseries

Figure 3 shows that all the minoriseries encompass HCI. Three of them encompass 2 HCI (*Pistacio lentisci-Junipero macrocarpae minorisigmetum*, *Clematido cirrhosae-Pistacio lentisci minorisigmetum* variant at *Smilax aspera*, *Paronychio polygonifoliae-Armerio multicepitis minorisigmetum*).

Habitat of Community interest of series

Galio rotundifolii-Pino laricii sigmetum variant at *Luzula pedemontana* is the only unit that comprise 5 HCI. Figure 4 shows that 11 vegetation series not include HCI (*Buxo sempervirentis-Querco ilicis sigmetum*, *Ostryo carpinifoliae-Querco ilicis sigmetum*, *Oenantho pimpinelloides-Querco pubescentis sigmetum*, *Stellario montanae-Buxo sempervirentis sigmetum*, *Fraxino orni-Acero monspessulani sigmetum*, *Acero monspessulani-Querco ilicis sigmetum*, *Sorbo aucupariae-Acero pseudoplatani sigmetum*, *Apio graveolentis-Alno glutinosae sigmetum, Angelico sylvestris-Alno*

Tab. 1 - Habitat of Community interest for each vegetation series.

	Name of sigmataxon	EUR 28 code	EUR 28 Title
1	*Pistacio lentisci-Junipero macrocarpae minorisigmetum*	2250*	Coastal dunes with *Juniperus* spp.
		2260	*Cisto-Lavenduletalia* dune sclerophyllous scrubs
2	*Sileno corsicae-Ammophilo arundinaceae geopermasigmetum*	1210	Annual vegetation of drift lines
		2110	Embryonic shifting dunes
		2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
3	*Echinophoro spinosae-Ammophilo arundinaceae geopermasigmetum*	1210	Annual vegetation of drift lines
		2110	Embryonic shifting dunes
		2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
		2210	*Crucianellion maritimae* fixed beach dunes
4	*Crucianello maritimae-Armerio pungentis geopermasigmetum*	1210	Annual vegetation of drift lines
5	Maritime pine edaphoxerophilous dry thermomediterranean serie on coastal gravel terraces [Sigmetum not defined]	2270-2*	Wooded dunes with *Pinus pinea* and/or *Pinus pinaster*
6	*Scrophulario ramosissimae-Genisto salzmannii minorisigmetum*	2210	*Crucianellion maritimae* fixed beach dunes
7	*Helichryso italici-Scrophulario ramosissimae minorisigmetum*	2210	*Crucianellion maritimae* fixed beach dunes
8	*Salsolo kali-Euphorbio peplis geopermasigmetum*	1210	Annual vegetation of drift lines
		2110	Embryonic shifting dunes
		2210	*Crucianellion maritimae* fixed beach dunes
		1310-4	*Salicornia* and other annuals colonising mud and sand 15.12 - Mediterranean halo-nitrophilous pioneer communities (*Frankenion pulverulentae*) : formations of halo-nitrophilous annuals (*Frankenia pulverulenta*, *Suaeda splendens*, *Salsola soda*, *Cressa cretica*, *Parapholis incurva*, *P. strigosa*, *Hordeum marinum*, *Sphenopus divaricatus*) colonising salt muds of the Mediterranean region, susceptible to temporary inundation and extreme drying
		2230	*Malcolmietalia* dune grasslands
9	*Helichryso italici-Cisto salviifolii minorisigmetum*	2210	*Crucianellion maritimae* fixed beach dunes
10	*Glaucio flavi-Crithmo maritimi geopermasigmetum*	1220	Perennial vegetation of stony banks
11	*Arthrocnemo glauci-Salicornio emerici geopermasigmetum*	1310	*Salicornia* and other annuals colonising mud and sand 15.12 - Mediterranean halo-nitrophilous pioneer communities (*Frankenion pulverulentae*) : formations of halo-nitrophilous annuals (*Frankenia pulverulenta*, *Suaeda splendens*, *Salsola soda*, *Cressa cretica*, *Parapholis incurva*, *P. strigosa*, *Hordeum marinum*, *Sphenopus divaricatus*) colonising salt muds of the Mediterranean region, susceptible to temporary inundation and extreme drying
		1320	Spartina swards (*Spartinion maritimae*)
		1410-1	Mediterranean salt meadows (*Juncetalia maritimi*) 15.51 - tall rush saltmarshes dominated by *Juncus maritimus* and/or *J. acutus*
		1410-2	Mediterranean salt meadows (*Juncetalia maritimi*) 15.55 - halophilous marshes along the coast and the coastal lagoons (*Puccinellion festuciformis*)
		1420	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
12	*Clematido cirrhosae-Pistacio lentisci minorisigmetum variant at Smilax aspera*	9320	*Olea* and *Ceratonia* forests
		5410-3	West Mediterranean clifftop phryganas (*Astragalo-Plantaginetum subulatae*)
13	*Helichryso microphylli-Asterisco maritimi minorisigmetum*	5410-3	West Mediterranean clifftop phryganas (*Astragalo-Plantaginetum subulatae*)
14	*Helichryso microphylli-Astragalo terraccianoi minorisigmetum*	5410-3	West Mediterranean clifftop phryganas (*Astragalo-Plantaginetum subulatae*)
15	*Euphorbio pithyusae-Helichryso microphylli minorisigmetum*	1240-3	Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.
16	*Euphorbio pithyusae-Helichryso italici minorisigmetum*	5410-3	West Mediterranean clifftop phryganas (*Astragalo-Plantaginetum subulatae*)
17	*Crithmo maritimi-Limonio articulati geopermasigmetum*	1240-2	Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.
18	*Crithmo maritimi-Limonio contortiramei geopermasigmetum*	1240-2	Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.
19	*Crithmo maritimi-Limonio patrimoniense geopermasigmetum*	1240-1	Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.
20	*Crithmo maritimi-Limonio bonifaciensis geopermasigmetum*	1240-1	Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.
21	*Galio scabri-Querco suberis sigmetum*	9330-3	*Quercus suber* forests 45.21 - Tyrrhenian cork-oak forests
22	*Erico arboreae-Junipero turbinatae sigmetum*	5210-5	Arborescent matorral with Juniperus spp. 32.132 - *Juniperus phoenicea* arborescent matorral
23	*Oleo sylvestris-Junipero turbinatae sigmetum*	5210	Arborescent matorral with Juniperus spp. 32.132 - *Juniperus phoenicea* arborescent matorral
24	*Clematido cirrhosae-Pistacio lentisci minorisigmetum variant at Tamus communis*	9320-3	*Olea* and *Ceratonia* forests
25	*Galio scabri-Querco ilicis sigmetum variant at Lathyrus venetus*	9340-11	*Quercus ilex* and *Quercus rotundifolia* forests
		9540-1.5	Mediterranean pine forests with endemic Mesogean pines 42.824 - Corsican mesogean pine forests
26	*Galio scabri-Querco ilicis sigmetum variant at Fraxinus ornus var. ornus*	9340-11	*Quercus ilex* and *Quercus rotundifolia* forests
27	*Galio scabri-Querco ilicis sigmetum variant at Hedysarum spinosissimum and Phagnalon rupestre*	9340-11	*Quercus ilex* and *Quercus rotundifolia* forests
		6220	Pseudo-steppe with grasses and annuals of the *Thero-Brachypodietea*
		5410.3	West Mediterranean clifftop phryganas (*Astragalo-Plantaginetum subulatae*)
28	*Buxo sempervirentis-Querco ilicis sigmetum*	-	-
29	*Ostryo carpinifoliae – Querco ilicis sigmetum*	-	-

30	*Galio scabri-Querco ilicis sigmetum variant at Quercus pubescentis*	9340-11	*Quercus ilex* and *Quercus rotundifolia* forests
31	*Stachydo glutinosae-Genisto corsicae minorisigmetum variant at Juniperus oxycedrus*	-	-
32	*Stachydo glutinosae-Genisto corsicae minorisigmetum*	-	-
33	*Saxifrago tridactylites-Sedo stellati geopermasigmetum*	-	-
34	*Sedo rupestris-Hieracio pilosellae geopermasigmetum*	-	-
35	*Oenantho pimpinelloides-Querco pubescentis sigmetum*	-	-
36	*Stellario montanae-Buxo sempervirentis sigmetum*	-	-
37	*Ilici aquifoliae-Querco ilicis sigmetum*	9380	Forests of *Ilex aquifolium*
		4090-7	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
38	*Junipero oxycedri-Querco ilicis sigmetum*	4090-7	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
39	*Galio rotundifolii-Pino laricii sigmetum variant at Erica arborea*	9530-2.1*	(Sub-)Mediterranean pine forests with endemic black pines 42.64 - Corsican laricio pine forests - *Pinus laricio* forests of the mountains of Corsica (1000 to 1800 m) on granitic soils
		4090-7	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
		6170-15	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica
40	*Cardamino chelidoniae-Buxo sempervirentis sigmetum*	4090-7	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
41	*Digitalo luteae-Castano sativae sigmetum*	9260-4	*Castanea sativa* woods
42	*Fraxino orni-Acero monspessulani sigmetum*	-	-
43	*Asperulo odorae-Taxo baccatae sigmetum*	9580.1*	Mediterranean *Taxus baccata* woods 42.A72 - Corsican yew woods - Formations of *Taxus baccata*, *Ilex aquifolium*, *Buxus sempervirens* restricted to cool, montane areas in the Tenda range, the San Pedrone range and the Cap Corse mountains
44	*Acero monspessulani-Querco ilicis sigmetum*	-	-
45	*Helichryso italici-Genisto salzmannii minorisigmetum*	4090-7	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
46	*Genisto salzmanni-Alysso robertiani minorisigmetum*	4090-7	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
47	*Sedo brevifolii-Diantho godroniani geopermasigmetum*	8220	Siliceous rocky slopes with chasmophytic vegetation 62.24 - Cyrno-Sardian siliceous montane cliff vegetation (Potentillion crassinerviae): *Potentilla crassinervia*, *Armeria leucocephala*, *Silene requienii*, *Saxifraga pedemontana* ssp. *cervicornis*.
48	*Elymo corsici-Ptychoto saxifragae geopermasigmetum*	8220	Siliceous rocky slopes with chasmophytic vegetation 62.24 - Cyrno-Sardian siliceous montane cliff vegetation (Potentillion crassinerviae): *Potentilla crassinervia*, *Armeria leucocephala*, *Silene requienii*, *Saxifraga pedemontana* ssp. *cervicornis*.
49	*Arrhenathero sardoi geopermasigmetum*	8220-11	Siliceous rocky slopes with chasmophytic vegetation 62.24 - Cyrno-Sardian siliceous montane cliff vegetation (Potentillion crassinerviae): *Potentilla crassinervia*, *Armeria leucocephala*, *Silene requienii*, *Saxifraga pedemontana* ssp. *cervicornis*.
50	*Poo balbisii-Fago sylvaticae sigmetum*	9530-2.3*	(Sub-)Mediterranean pine forests with endemic black pines 42.64 - Corsican laricio pine forests - *Pinus laricio* forests of the mountains of Corsica (1000 to 1800 m) on granitic soils;
		4090-8	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
		6170-15	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica
51	*Galio rotundifolii-Pino laricii sigmetum variant at Luzula pedemontana*	9530-2.3*	(Sub-)Mediterranean pine forests with endemic black pines 42.64 - Corsican laricio pine forests - *Pinus laricio* forests of the mountains of Corsica (1000 to 1800 m) on granitic soils;
		9530-2.2*	(Sub-)Mediterranean pine forests with endemic black pines 42.64 - Corsican laricio pine forests - *Pinus laricio* forests of the mountains of Corsica (1000 to 1800 m) on granitic soils;
		9560*	Endemic forests with *Juniperus* spp.
		4090-8	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
		6170-15	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica
52	*Festuco sardoae-Phyteumo serrati geopermasigmetum*	8220-11	Siliceous rocky slopes with chasmophytic vegetation 62.24 - Cyrno-Sardian siliceous montane cliff vegetation (Potentillion crassinerviae): *Potentilla crassinervia*, *Armeria leucocephala*, *Silene requienii*, *Saxifraga pedemontana* ssp. *cervicornis*.
53	*Armerio leucocephalae-Potentillo crassinerviae geopermasigmetum*	8220-11	Siliceous rocky slopes with chasmophytic vegetation 62.24 - Cyrno-Sardian siliceous montane cliff vegetation (Potentillion crassinerviae): *Potentilla crassinervia*, *Armeria leucocephala*, *Silene requienii*, *Saxifraga pedemontana* ssp. *cervicornis*.
54	*Doronico corsici-Narthecio reverchonii geopermasigmetum*	6430.12	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
		6170.18	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica

55	*Dryopterido oreadi-Arrhenathero sardoi geopermasigmetum*	8220-11	Siliceous rocky slopes with chasmophytic vegetation 62.24 - Cyrno-Sardian siliceous montane cliff vegetation (Potentillion crassinerviae): *Potentilla crassinervia* , *Armeria leucocephala* , *Silene requientii* , *Saxifraga pedemontana* ssp. *cervicornis.*
56	*Paronychio polygonifoliae-Armerio multicepitis minorisigmetum*	6170-16	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica
		4090-8	Endemic oro-Mediterranean heaths with gorse 31.75 - Cyrno-Sardian hedgehog-heaths. *Carici-Genistetalia* (*Carlinetalia macrocephalae*)
57	*Sorbo aucupariae-Acero pseudoplatani sigmetum*	-	-
58	*Geo montani-Phleo brachystachyi geopermasigmetum*	6170-15	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica
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59	*Valeriano rotundifoliae-Adenostylo briquetii geopermasigmetum*	6430.11	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels 37.8 - Hygrophilous perennial tall herb communities of montane to alpine levels of the Betulo-Adenostyletea class.
		8110-4	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsetalia ladani*)
60	*Acino corsici-Tanaceto tomentosi geopermasigmetum*	6170-15	Alpine and subalpine calcareous grasslands 36.37 - Oro-Corsican grasslands of the subalpine (oro-Mediterranean) and alpine levels of the highest mountains of Corsica
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61	*Doronico grandiflori-Oxyrio digynae geopermasigmetum*	6430-12	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels 37.8 - Hygrophilous perennial tall herb communities of montane to alpine levels of the *Betulo-Adenostyletea* class.
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		6430-11	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels 37.8 - Hygrophilous perennial tall herb communities of montane to alpine levels of the *Betulo-Adenostyletea* class.
62	*Dryopteridi carthusianae-Alno glutinosae sigmetum*	7110.1	Active raised bogs
63	*Apio graveolentis-Alno glutinosae sigmetum*	-	
64	*Angelico sylvestris-Alno glutinosae sigmetum*	-	
65	*Sparganio neglecti-Alno glutinosae sigmetum*	-	
66	*Fraxino angustifoliae-Ulmo minoris sigmetum*	91F0	Riparian mixed forests of *Quercus robur* , *Ulmus laevis* and *Ulmus minor* , *Fraxinus excelsior* or *Fraxinus angustifolia* , along the great rivers (*Ulmenion minoris*)
67	*Eupatorio corsici-Alno glutinosae sigmetum*	92A0-4	*Salix alba* and *Populus alba* galleries
68	*Scrophulario auriculatae-Alno glutinosae sigmetum*	92A0-4	*Salix alba* and *Populus alba* galleries
69	*Scolopendrio officinale-Alno glutinosae sigmetum*	92A0-4	*Salix alba* and *Populus alba* galleries
70	*Cyclamino repandi-Phillyreo sigmetum latifoliae*	-	
71	*Athyrio filix-feminae-Gentiano asclepiadeae sigmetum*	92A0-4	*Salix alba* and *Populus alba* galleries
72	*Galio rotundifolii-Alno suaveolentis sigmetum*	6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels 37.7 - Wet and nitrophilous tall herb edge communities, along water courses and woodland borders belonging to the *Glechometalia hederaceae* and the *Convolvuletalia sepium* orders (*Senecion fluviatilis* , *Aegopodion podagrariae* , *Convolvulion sepium* , *Filipendulion*).
73	*Nasturtio officinalis geopermasigmetum*	3150-1	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation
		3260-1	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation
		3260-2	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
74	*Dittricho viscosae-Salico purpureae geopermasigmetum*	92A0	*Salix alba* and *Populus alba* galleries
75	*Rubo ulmifolii-Nerio oleandri geopermasigmetum*	92D0-1	Southern riparian galleries and thickets (*Nerio-Tamaricetea and Securinegion tinctoriae*)
76	*Lemno minoris geopermasigmetum*	3150.3	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation
77	*Phragmito australis geopermasigmetum*	-	
78	*Cresso creticae-Crypsido aculeatae geopermasigmetum*	1410	Mediterranean salt meadows (*Juncetalia maritimi*)
		3150-1	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation

glutinosae sigmetum, *Sparganio neglecti-Alno glutinosae sigmetum*, *Cyclamino repandi-Phillyreo sigmetum latifoliae*).

In view of these results three main points emerge:

- coastal geopermaseries are those that have the largest number of HCI;
- with the exception of two minoriseries, all identified units have at least one HCI;
- azonal units (swampy vegetation and rivers) are the units that have the least HCI.

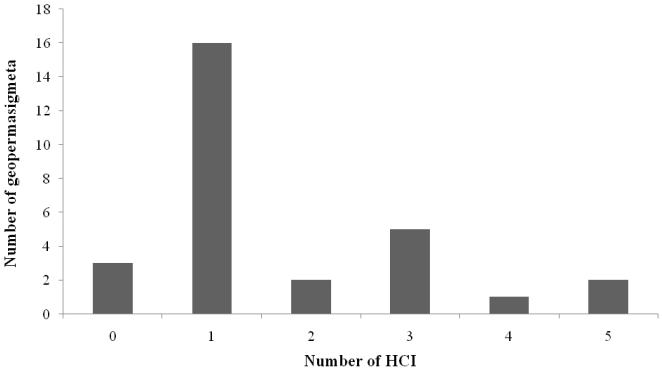

Fig. 2 - Repartition of the number of geosigmeta according to the number of HCI.

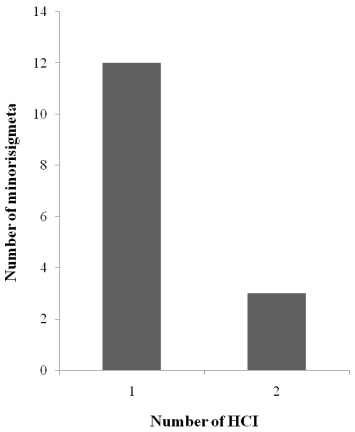

Fig. 3 - Repartition of the number of minorisigmeta according to the number of HCI.

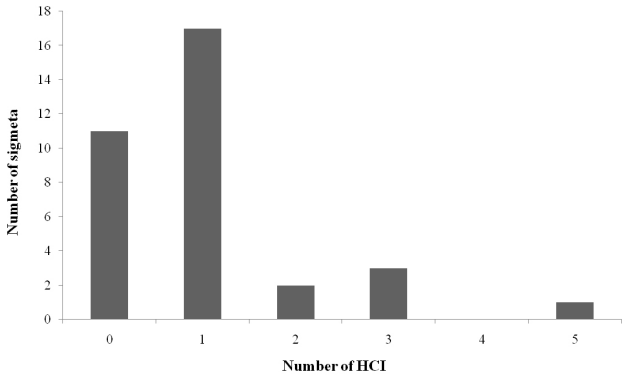

Fig. 4 - Repartition of the number of sigmeta according to the number of HCI.

Analysis of priority community interest habitats

Among vegetation series having HCI, 5 of them encompass a priority HCI: *Pistacio lentisci-Junipero macrocarpae minorisigmetum*, edaphoxerophilous corsican serie dry thermomediterranean at *Pinus pinaster* on coastal gravel terraces, *Galio rotundifolii-Pino laricii sigmetum* variant at *Erica arborea*, *Asperulo odoraе-Taxo baccatae sigmetum*, *Poo balbisii-Fago sylvaticae sigmetum*, *Galio rotundifolii-Pino laricii sigmetum* variant at *Luzula pedemontana*.

Only *Galio rotundifolii-Pino laricii sigmetum* variant at *Luzula pedemontana* includes two priority HCI.

Conservation issues

Figure 5 shows the number of HCI by type of serial units and by floor vegetation. The coastline is part of the island that includes the largest number of HCI. Supramediterranean and mountain-oro-mediterranean floor are those which comprise the most HCI with respectively 9 and 8 HCI.

Map of conservation issues

On the basis of the data obtained for the whole Corsica, we analyzed the distribution of habitats of community interest at the scale of the Asco valley.

Figure 6 indicates that the number of habitats of Community interest is more important on the western part of the valley which is characterized mainly by moutain vegetation. However, on the east side of the valley the number of habitats of Community interest is low (on average 1 HCI).

Discussion

These results must be interpreted according to the type of serial or geoserial unit. The level of integration that represents geoserial units are composed by a greater number of vegetation which are considered as habitats of Community interest. This is the case of coastal geopermaseries which have an average of 6 to 10 syntaxa against 2 to 3 syntaxa for minoriserial and serial units.

These first results raise questions about some remarkable vegetations without any HCI:

- the presence of a Mediterranean beech forest corresponding to the *Poo balbisii-Fagetum sylvaticae* Gamisans 1975 is not currently recognized in the European referential of habitat EUR28 “Interpretation Manual of European Union habitats”, but deserves special attention. The occurrence of remarkable trees, and the age of these forests provide to these beech forests an exceptional interest representing a major conservation issue (Gamisans, 1981; Rota & Cancellieri, 2013);
- the swampy azonal serial units (*Apio graveolentis-Alno glutinosae sigmetum*, *Angelico sylvestris-Alno glutinosae sigmetum*, *Sparganio neglecti-Alno glutinosae sigmetum*) do not encompass any habitat of

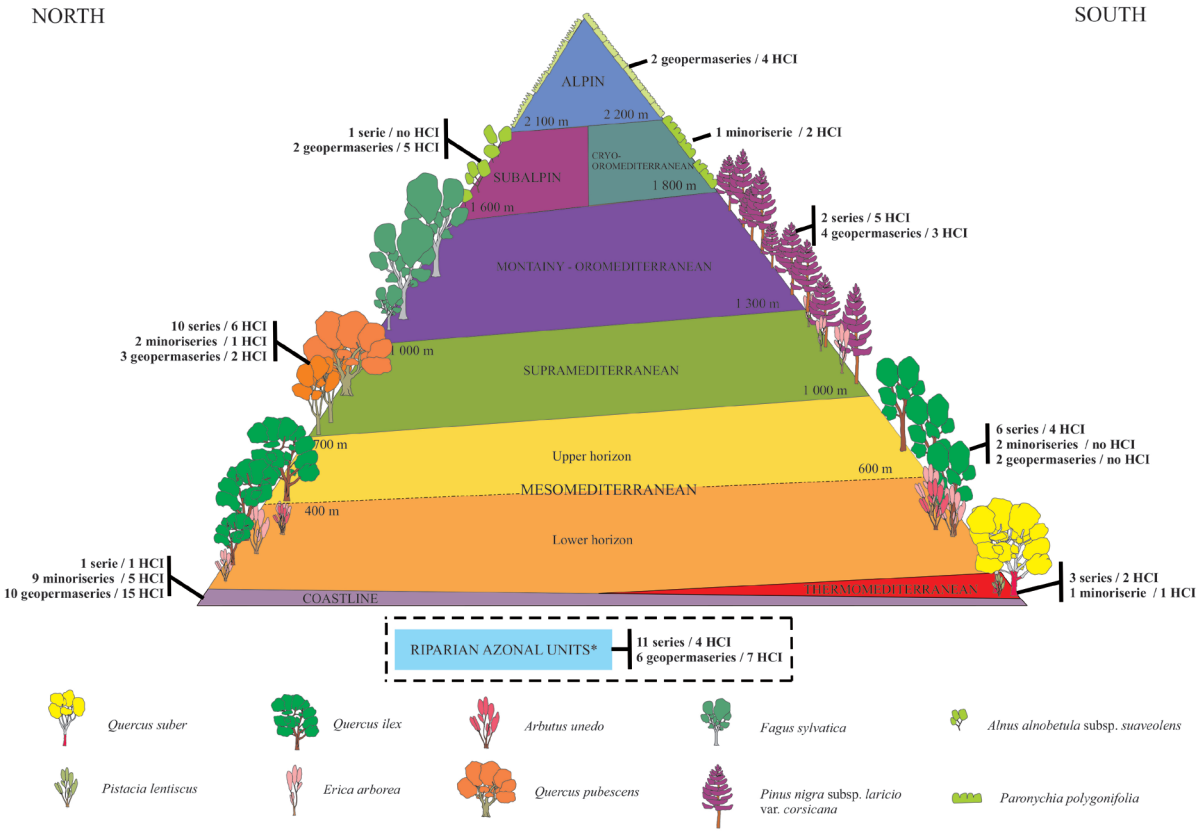

Fig. 5 - Conservation issues for plant landscape in each floor vegetation (after Gamisans, 1991, modified).

Community interest. Gamisans (2013) highlighted their limited distribution in Corsica and their floristic interest which have not been recognized in the DHFF. The riparian plant landscape have a complex structure characterized by a geomorphological feature that gives them an ecological and biological value (Quézel & Médail, 2003). The complexity of riparian plant landscape is explained by the presence of various geormophologics sets (benches, floodplain, permanent and temporary water courses) that favour the expression of original vegetation (medioeuropean vegetation of *Salicetea purpurea* Moor 1958 or *Nerio oleandri-Tamaricetea africanae*, over hanging canopy or alluvial forest formed of *Querco roboris-Fagetea sylvaticae*. Introduction of exotic species (*Ailanthus altissima* (Mill.) Swingle in particular) represents a major threat on this riparian geoseries.

Beyond the presence/absence of HCI in the vegetation series, one must integrate a surface size and range of habitats of Community interest. In the study areas surveyed from 2012 to 2015, some series appear ponctually and are represented only by one habitat in the plant landscape like the *Asperulo odorae-Taxo baccatae sigmetum*. Fire and grazing can:

- on the one hand, reduced the expression of this serie which has been identified on supramediterranean ubacs of Cap Corse. Sylvatic formations of *Buxus sempervirens* and *Taxus baccata* is extremely degraded and may disappear if the intensity and frequence of fire and grazing continue;
- on the other hand, in some cases, anthropogenic pressures such as fire and grazing, maintaining open areas and favor the expression of HIC. This is the case of supramediterranean and mountain series of *Pinus nigra* subsp. *laricio* var. *corsicana* (*Galio rotundifolii-Pino laricii sigmetum variant at Erica arborea*, *Galio rotundifolii-Pino laricii sigmetum* variant at *Luzula pedemontana*) mainly consisting of heathland and grassland HCI: 4090-7 Supramediterranean heathland of Corsica; 4090-8 mountain heathland of Corsica; 6170-15 meso-xerophilous mountain grasslands of Corsica. This outcomes show that agropastoral and anthropogenic pressures can be favorable to maintaining HCI.

The heritage assessment vegetation series and geoseries of Corsica initiated in this work is the first step of amore consistent work. It requires bioassessment of the dynamic, stages composing each series (Biondi *et al*., 2005; Penas *et al*., 2005; Galdenzi *et al*., 2011). Bioassessment methods need quantitative data to take into account several criteria such as diversity, rarity, originality, quality botanical, area and distance tothe-potential vegetation (Costa *et al*., 1987; Martin Osorio & Asensi Marfil, 1987; Penas *et al*., 2005; Biondi *et al*., 2006; Bioret *et al*., 2011).

Two serial and geoserial units can be considered as

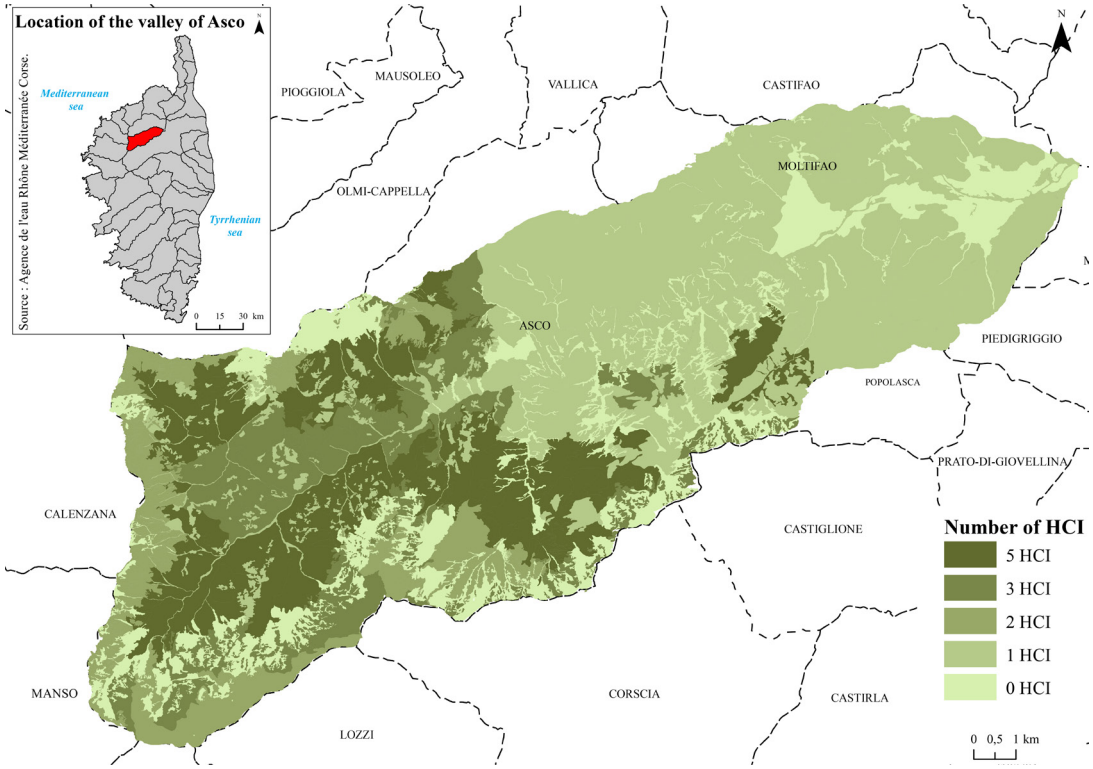

Fig. 6 - Conservation issues of the Asco valley.

major conservation issues.

The *Dryopteridi carthusianae-Alno glutinosae sigmetum* represents a major challenge for the conservation of plant landscape of Corsica. It develops on peaty singular ecological envelops and is recorded on two sites on the island (Valdu and Bagliettu, commune of Moltifao) and covers only 34 ha (Delbosc *et al*., 2015). Valdu is the largest Sphagnum peat bog in Corsica and probably one of the largest in the Mediterranean region (Gamisans *et al*., 1998). Besides a plant landscape interest, these peaty complexes containa dozen of remarkable taxa (Calvez & Dupuy, 1995; Branthomme & Varelides, 1996; Ferrandini, 1996; Laitung, 1997; Reille, 1997; Gamisans *et al*., 1998). The main threat is the increasing colonization of alien invasive species *Ailanthus altissima*.

The *Rubo ulmifolii-Nerio oleandri geopermasigmetum* represents vegetation dominated by two protected species at the regionally level (*Vitex agnus-castus* and *Nerium oleander*) and recorded in a few riparian sites of the island (Paradis, 2006; Paradis & Piazza, 2011). This geopermaseries develops in particular hydrodynamics riparian forests: it is located near the temporary rivers mouths of gravel and pebble terraces which become often dry in summer. The presence of protected species and of one HCI, linked to its singular ecology and its limited distribution provide a high heritage value to this geopermaseries.

The mapping distribution of the number of habitats of Community interest on the Asco valley should be linked with the socio-economic context of the valley. Besides its floristic-phytosociological representativeness, the plant landscape of the Asco valley integrates ancient and recent history of the Corsican pastoral society (Ravel, 1911; Ravis-Giordani, 1983). The fire regime, recurrent and increasingly intense, profoundly changed the structure of the substrate and more widely the density and opening of the canopy of forest habitat (Reille *et al*., 1980; Pons & Quézel, 1985). In the mesomediterranean and supramediterranean areas, the shorter and more intense fires contributed to eliminate original deciduous vegetations and promoted the installation of *Quercus ilex* (Gamisans, 1986).

Today, a large part of the valley is grazed by goats, sheep and cattle that play a major role in the structure and texture of vegetation.

This context partly explains the distinction between the western part of the valley, richer in many HCI, and the east part, characterize by a lower number of HCI.

This study should be complemented by a more detailed assessment at the level of plant communities but also at plant landscape. On the scale of the plant community, it would be interesting to analyze the floristic composition (native taxa, endemic, invasive alien), dynamic stage of vegetation series and catenal arrangement of vegetations in each geopermaseries. This criteria are necessary to analyze the ecological functionality of serial and geoserial units and provide simple and rapid measurement of the ecological characteristics and grade of dynamic evolution of the

phytocoenoses (Acosta *et al*., 2000; Giupponi *et al*., 2013). At plant landscape level, it would be interesting to analyze the spatial distribution of habitats from vegetation maps (Stanisci *et al*., 2014; Biondi *et al*., 2005; Penas *et al*., 2005; Galdenzi *et al*., 2011). Vegetation mapping works realized in Corsica and particularly those on the Biguglia lake (Gamisans & Piazza, 1992; Gamisans, 2006; Delbosc *et al*., 2015) and the Haut-Venacais (Gamisans *et al*., 1981; Tanné, 2014) are examples. The information obtained from these studies allows to assess the response of HCI to different scenario of anthropogenic pressures (frequentation, fires, grazing, invasive alien species...) according to a diachronic approach.

Within this context, the maps of vegetation series and geoseries can be used as complementary tools for assessing the potential dynamic of current vegetation, and for bioassessment or conservation of HCI (Biondi *et al*., 2005; Penas *et al*., 2005; Biondi *et al*., 2007; Galdenzi *et al*., 2011; Batista *et al*., 2012; Biondi, 2012; Galdenzi *et al*., 2012).

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