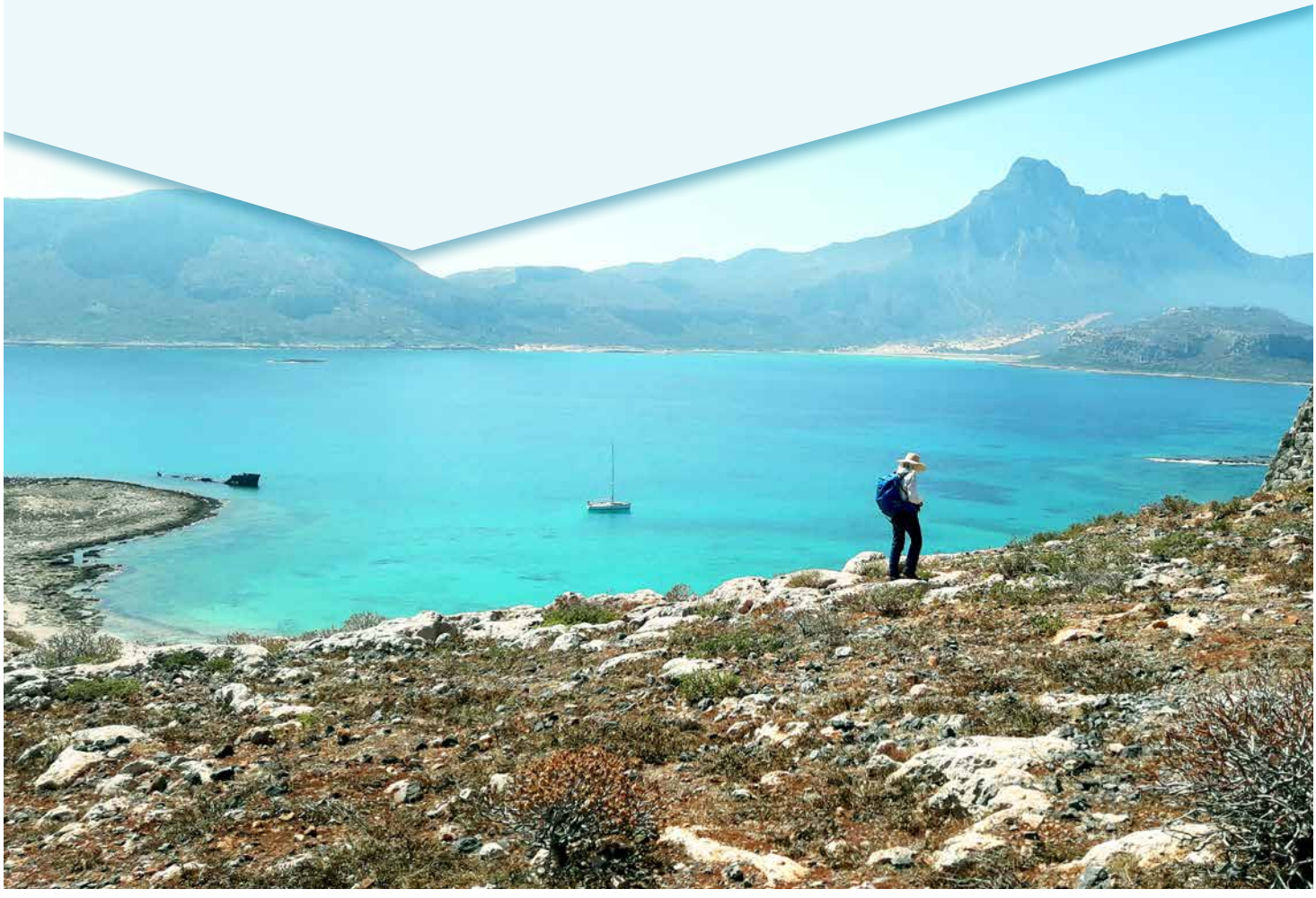
CARE
MEDIFLORA

CARE-MEDIFLORA

A conservation project for threatened plants in Mediterranean islands

2016 – 2019

PROJECT SUMMARY



PROJECT PARTNERS

- Mediterranean Plant Specialist Group – IUCN/SSC
- Sóller Botanical Garden Foundation, Balearic Islands
- Office of the Environment of Corsica – Conservatoire Botanique National de Corse
- Hortus Botanicus Karalitanus – University of Cagliari, Sardinia
- Department of Biological, Geological and Environmental Sciences, University of Catania, Sicily
- CIHEAM Mediterranean Agronomic Institute of Chania, Crete (Lead Partner)
- Agricultural Research Institute, Cyprus
- Department of Forests, Cyprus

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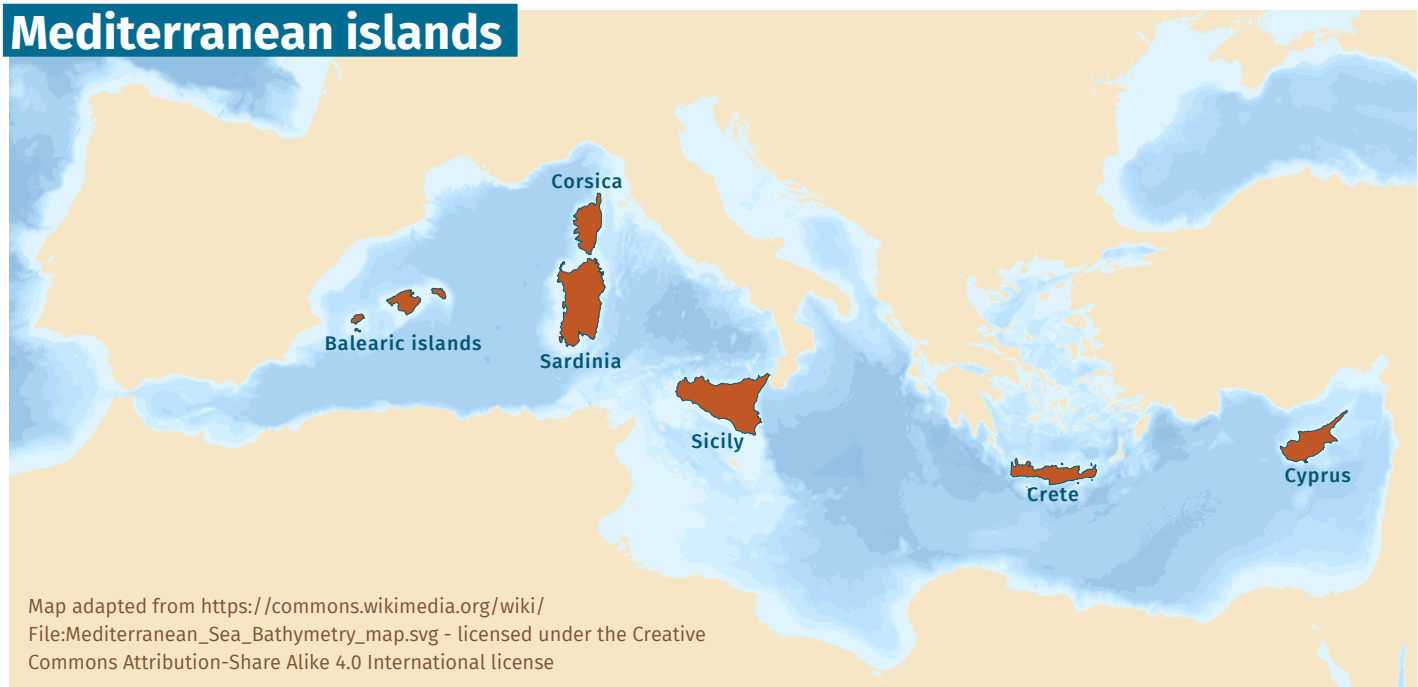
CARE-MEDIFLORA: A conservation project for threatened plants in Mediterranean islands



Map adapted from https://commons.wikimedia.org/wiki/File:Mediterranean_Sea_Bathymetry_map.svg - licensed under the Creative Commons Attribution-Share Alike 4.0 International license

CARE-MEDIFLORA, "Conservation Actions for Threatened Mediterranean Island Flora: *ex situ* and *in situ* joint actions", aims at improving knowledge and conservation of threatened island plants representative of the entire Mediterranean basin, through the implementation of urgent actions and campaigns. The emphasis is on *in situ* conservation measures that in several cases need to be supported by *ex situ* techniques.

CARE-MEDIFLORA has been implemented by institutions of 6 Mediterranean islands and the IUCN/SSC Mediterranean Plant Specialist Group, who jointly worked to address short-term and long-term conservation needs, including:

- *in situ* conservation of 51 of the most endangered plant species of the Mediterranean islands through *in situ* translocations and other management measures
- *ex situ* conservation of 436 of the most endangered plant species through the collection, seed banking and duplication of accessions representative of the overall diversity of the species
- dissemination and awareness raising of the local and institutional stakeholders
- sharing good conservation practises among the partners
- reinforcement and enlargement of GENMEDA - Network of Mediterranean Plant Conservation Centres.

The project results are shared with conservation plant specialists from countries all around the Mediterranean, to increase collaboration among institutions dealing with *in situ* and *ex situ* conservation, and with local stakeholders, to raise awareness about the vulnerability of the insular flora and share the good practices and lessons learnt.

Islands involved: Balearic Islands, Corsica, Sardinia, Sicily, Crete, Cyprus

Project duration: April 2016 – June 2019

CARE-MEDIFLORA is funded (80 %) by the MAVA Foundation.

The MAVA Foundation supports the conservation of biodiversity for the benefit of people and nature by funding, mobilising and strengthening partner institutions and the conservation community.

Website: mava-foundation.org

Mediterranean islands and plants

Anthemis tomentosa, threatened plant in Cyprus, ©Department of Forests of Cyprus

Mediterranean islands, within the Mediterranean hotspot, represent a centre of plant diversity featured by an endemic richness rate higher than most of the mainland areas.

This plant richness is severely threatened by several physical and biological factors and, consequently, many plants of these islands require urgent protection measures.

Because of their limited area, discrete nature, and simplified food webs, islands have often been considered "natural laboratories" for ecological studies. Moreover, areas like the Mediterranean insular territories are ideal test sites because of both high rates of endemism and a large number of environmental/anthropogenic threats to plant biodiversity. Such similarities and differences represent a great opportunity to join and harmonize methods and methodologies focused on endangered plant conservation in such peculiar and unique natural laboratories.

Few projects aiming to develop knowledge and methodologies in plant conservation on islands have been developed and implemented so far.

Endemism

A taxon whose distribution is confined to a given area is said to be endemic to that area.

&

A species which is only found in a given region or location and nowhere else in the world is endemic to this region.

Which plants are of priority for the Mediterranean islands?

Plants that need conservation measures because they are threatened, vulnerable or important for a particular island.

For the selection of plants the following **four criteria** were used in the 'CARE-MEDIFLORA' project:

Threat degree

Threat degree according to the Red List Categories (CR, EN and VU) of the International Union for the Conservation of Nature (IUCN)

This criterion indicates if the plant species selected is included in the IUCN Red List of Threatened Species, which is the most complete global inventory of species risk assessments. The threat levels for the selection of species in the CARE-MEDIFLORA project are:

- Critically endangered (CR)
- Vulnerable (VU)
- Endangered (EN)

More on: www.iucnredlist.org

Regional responsibility

Regional responsibility for endemic plants, peripheral and isolated plant populations

"Regional responsibility" is the first order of priority at local level because it establishes a high priority to plants whose distribution is endemic to a certain region. In fact, regions (islands in the context of this project) have a particular responsibility for the conservation of species or genetic characteristics of species on the edge of their distribution because they do not exist anywhere else in the world.

Policy plant species

This criterion indicates if the plant species selected is listed in Annexes II and V of the Habitats Directive of the European Union (92/43/EEC). In addition, plants listed in other specific national or regional regulations were considered.

Wetland plants

Wetland plants are eco-physiologically linked to such peculiar habitats as wetlands and have a particular interest for conservationists because of their vulnerability to climate change. This criterion indicates if the plant species selected is a wetland species or grows in a wetland habitat.

Kosteletzkya pentacarpos, threatened plant in Corsica, ©Conservatoire Botanique National de Corse of the Office of the Environment of Corsica

Maresia nana var. *glabra*, threatened, endemic plant variety in Cyprus, ©Department of Forests of Cyprus

Lamyropsis microcephala, threatened, extremely narrow endemic plant in Sardinia, ©Hortus Botanicus Karalitanus of University of Cagliari

What is *in situ* and *ex situ* plant conservation?

In situ and *ex situ* are both methods of conservation of species diversity.

The basic difference between them lies in the place where the process is carried out, whether it is in or outside the natural habitat.

Ex situ

Ex situ strategies (i.e. conservation of species outside their natural habitats) represent alternative ways to preserve plant diversity. Germplasm conservation, including seed banking, pollen tissue storage and vegetative cloning, allows to preserve most of the genetic material in a small space.

In situ

In situ conservation of species means the maintenance or recovery of viable populations of species in their natural surroundings. The main aim and long-term goal of *in situ* conservation of target species is to protect, manage and monitor selected populations in their natural habitats so that the natural evolutionary processes can be maintained, thus allowing new variation to be generated in the gene pool that will allow the species to adapt to changing environmental conditions. According to Article 8 of the Global Strategy for Plant Conservation (GSPC), *in situ* conservation is generally considered the primary approach for species conservation, while *ex situ* conservation plays a complementary role, providing "safety back-up" and an insurance policy against extinction in the wild.

CONSERVATION MEASURES

In situ conservation measures include all measures aiming at improving the conservation status of the selected species/populations. The **optimal action** consists in **plant translocations** (including reintroduction and/or reinforcement), but also complementary active management measures (passive defence measures such as fencing the area where the threatened species/populations occur, eradication or control of invasive plants, or restoration of the natural vegetation within or around the area, thus reconnecting isolated remnants).

PLANT TRANSLOCATION

Plant translocation is a general term that describes the controlled placement of plant material into a natural or managed ecological area. Plant translocation is a relatively recent development and a potentially important tool for conservation. The goal of translocation conducted in response to a conservation imperative is two-fold: to ensure the long-term survival of a threatened plant species and/or to restore elements of biological diversity. This term includes the concept of population reintroduction, reinforcement and introduction.

REINTRODUCTION
Refers to the establishment of a plant species in an area in which it was present previously, but in which it has now disappeared.

REINFORCEMENT
Is an effort to increase population size or diversity by adding individuals to an existing population.

INTRODUCTION
Is an action carried out on species recently extinct in their historic habitat, which is no longer able to support the species for various anthropogenic or natural factors. Therefore, in order to avoid the extinction of the species, as an extreme act of preservation *in situ*, it can be expected to introduce such species in a territory which does not coincide with the historic habitat, but currently presents suitable ecological conditions.

Project outputs & results

Based on the criteria agreed, project partners compiled their 6 local priority lists into a common one with a total of 735 target plant species of priority for conservation actions.

Then 436 taxa were selected for conservation measures: 343 threatened species (see project criteria on page 3), 630 under the "regional responsibility" criterion, 71 included in the Habitats Directive and 80 wetland plant species. One selected species may satisfy more than one criteria.

Seed storage, ©Sóller Botanic Garden Seed Bank

After the selection of target plant species, partners identified plant populations:

- that need urgent *in situ* conservation measures
- where seed collection should be performed for *ex situ* conservation and use for *in situ* actions.

740 accessions (seedlots) from 429 species were collected and stored in partners' seed banks; collection, curation and storage of seeds were performed according to national and international regulations and standards for germplasm conservation (such as those developed by the international networks of GENMEDA and ENSCONET).

359 accessions were duplicated in other seed banks for security reasons and as a precautionary measure, aiming at ensuring the long term conservation of the collected germplasm.

410 seed germination experiments were completed, providing data for the eco-physiology of the target species.

Over 27,000 plants (corresponding to 162 target species) were propagated in partner nurseries for the needs of project *in situ* conservation actions, for availability in future restoration actions and for *ex situ* conservation in botanical gardens.

63 *in situ* conservation actions & measures (for 51 plant species) were implemented:

- translocations (including reintroduction, reinforcement and introduction)
- control/removal of invasive/ornamental species
- management measures such as erection of protective fences

Management and monitoring plans were prepared for each *in situ* action.

Helichrysum massanellanum seed collection, ©Sóller Botanic Garden Seed Bank

Living plant collection nursery, ©Sóller Botanic Garden Seed Bank

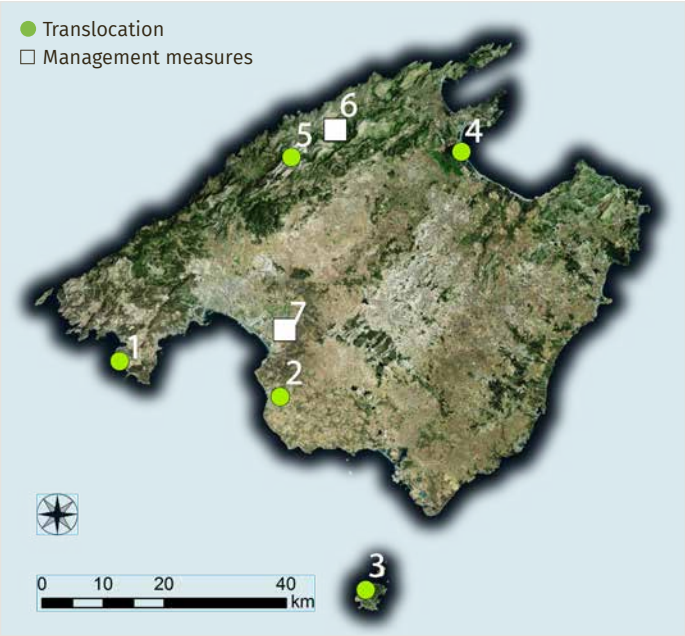
All the *in situ* activities were implemented in collaboration with the local relevant authorities of each island, responsible for the management of natural areas. Moreover, the local authorities were actively involved both in the actions and in the monitoring programmes.

Balearic islands

Conservation actions implemented by **Sóller Botanic Garden Foundation**

In situ

The Sóller Botanic Garden Foundation implemented *in situ* conservation actions for 8 taxa in 9 localities in Mallorca and Cabrera in collaboration with the local authorities and private landowners.



Map with localities of in situ actions (see Table)

TAXON	LOCALITY	CONSERVATION ACTIONS*
1. *Dorycnium fulgurans*	Punta Prima, Calvià	Reinforcement of population, removal of invasive species & information signs
	Cap Negret, Calvià	Introduction of a new population
2. *Myosurus minimus*	Son Mut Nou, Llucmajor	Introduction of a new population
3. *Ononis crispa*	Cabrera National Park	Reinforcement of population
4. *Linum maritimum*	Pont dels Anglesos, Albufera d'Alcúdia	Re-introduction of population, removal of competing species
	Comú de Muro	Introduction of a new population
5. *Ononis zschackei*	Cuber, Escorca	Reinforcement of population & fences
6. *Isoetes histrix & Isoetes duriei*	Clot d'Albarca, Lluc, Escorca	Translocation, low fences, removal of competing species & management plan for grazing and agricultural crops
7. *Ranunculus bullatus*	S'Aranjassa, Palma	Removal of invasive species & translocation

*Short and long term monitoring of the conservation actions is included.

Seed bank

Ex situ

124 germplasm accessions collected from 70 taxa and stored in Sóller Botanic Garden Seed Bank.

50 accessions of 42 taxa duplicated in two Seed banks of REDBAG (Spanish network of Germplasm Banks).

112 germination tests performed for 63 taxa.

Over 9000 plants of 17 taxa produced for *in situ* actions and *ex situ* plantations.

Living plant collection nursery

EXAMPLE OF CONSERVATION ACTION

Re-introduction of *Linum maritimum* in S'Albufera Natural Park (Mallorca)

The sea flax is a perennial plant with long stems from 40 to 90 cm. It has yellow flowers in clusters forming a corymbiform panicle which is very easy to see because of the big flowers and the long stems. *Linum maritimum* lives in humid and saline meadows. This habitat is rare in Mallorca and the plants of the only two existing populations in the Island (Capdepera and S'Albufera) had disappeared. Thanks to the conservation of seeds and plants in the Soller Botanic Garden since many years ago, now the population of S'Albufera has been reintroduced with great success.

Linum maritimun plants in re-introduced population

COLLABORATORS FOR CONSERVATION ACTIONS IN BALEARIC ISLANDS

- Servei de Protecció d'Espècies. Balearic Islands Government.
- S'Albufera Natural Park
- Cabrera Archipelago maritime-terrestrial National Park
- Peninsula de Llevant Natural Park
- Serra de Tramuntana Paratge Natural
- Grupotel Parc Natural & Spa
- Landowners of Cabrianes, Son Mut Nou, Clot d'Albarca and S'Aranjassa
- GOB Menorca
- Social & Environmental Observatory Minorca (OBSAM)
- Calvià Town Hall

Dorycnium fulgurans seeds

Ononis zschakei seedlings in the nursery

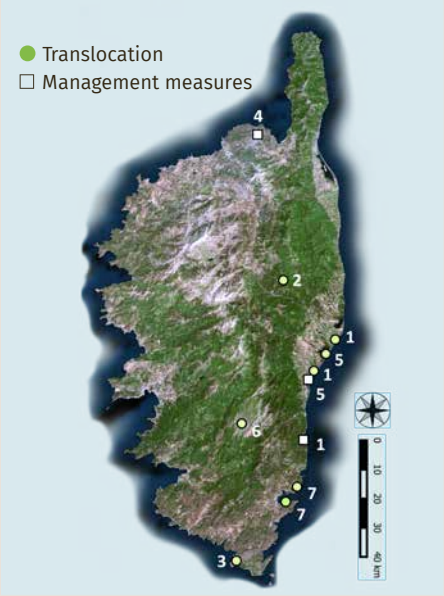
Ononis crispa plants for restoring population in Cabrera island

Corsica

Conservation actions implemented by the **National Botanical Conservatory of Corsica**

In situ

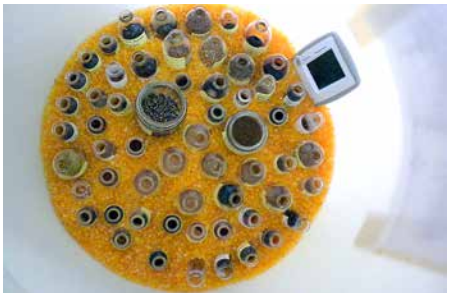
The National Botanical Conservatory of Corsica (CBNC) of the Office of the Environment of Corsica implemented *in situ* conservation actions for 7 taxa in 11 localities in Corsica in collaboration with the local authorities.



Map with localities of *in situ* actions for 7 taxa (see Table), by Mauro Fois

TAXON	LOCALITY	CONSERVATION ACTIONS*
1. *Anchusa crispa*	Del Sale (Aleria)	Introduction of population
	Gradugine (Prunelli di Fiumorbu)	Introduction of population
	Favona (Sari-Sulinzara)	Fence erection & placement of information signs
2. *Astragalus alopecurus*	Punta Alta (Fughjichja)	Reinforcement of population, placement of protective cages & fence erection
3. *Centranthus trinervis*	Trinità di Bunifaziu	Reinforcement of population & control of natural vegetation
4. *Elatine brochonii*	Chiuvina (Santu Petru di Tenda)	Control of invasive species
5. *Kosteletzkya pentacarpos*	Pinia (Ghisunaccia)	Reinforcement of population
	Palo (Serra-di-Fiumorbu)	Control of natural vegetation
6. *Ranunculus sylviae*	Bucchinera-Cuscionu (Sarra di Scupamena)	Introduction of population
7. *Silene velutina*	Cornuta Islet (Zonza)	Reintroduction of population, control of natural vegetation & placement of protective cages
	Casetta Bianca (Portivechju)	Reinforcement of population

*Short and long term monitoring of the conservation actions is included.



Germplasm accessions

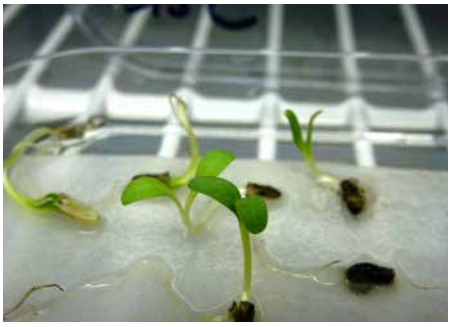
Ex situ

105 germplasm accessions collected from 57 taxa , stored in National Botanical Conservatory of Corsica (CBNC) Seed Bank and 50 duplicated in other seed bank (INRA)

40 germination experiments performed for 39 taxa

Over 1600 plants of 24 taxa produced for *in situ* actions.

Drying place



Germination test

Seed bank

EXAMPLE OF CONSERVATION ACTION

Introduction on protected sites of a threatened species in Corsica: *Anchusa crispa* Viv.

Anchusa crispa is a rare and endangered species, endemic to Corsica and Sardinia, protected at national level and listed in the Annex II and IV of the Habitats Directive 92/43/EEC. Specific to sandy littoral, it undergoes numerous anthropic impacts linked in particular to the tourist activities. Endangered on the eastern coast of Corsica, it was decided to create two new populations on protected sites belonging to the "Conservatoire du Littoral". The sites of introduction were chosen according to precise criteria (ecological conditions, no threats, property rights...). Despite these optimal conditions, some factors, such as increasing strength and frequency of storms, are difficult to foresee. Thus, the stations created were almost completely destroyed by the storm Adrian in October 2018. Despite this, many seeds produced on the sites in 2018 sprouted in the spring of 2019. For the time the seedlings seem to be maintained. A monthly monitoring carried out by the Territorial Collectivity of Corsica and the CBNC follows the evolution of these new populations. This example demonstrates once again the difficulties encountered in this type of operation and the need to preserve "natural" populations.

Plant production (27/11/2017)

Plantation (29/11/2017)

Plantation (29/11/2017)

Monitoring (28/03/2018)

Plant on 29/11/2017

Plant on 28/03/2018

COLLABORATORS FOR CONSERVATION ACTIONS IN CORSICA

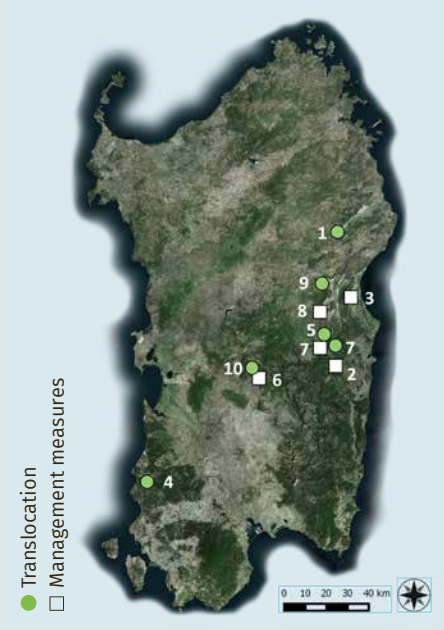
- National and Regional Administration & National and Regional Scientific Committees
- Local authorities (Territorial collectivity; municipalities: Focicchia, Santo Pietro di Tenda, Serra di Scopamene, Zonza; municipalities community of Alta Rocca)
- Management Bodies of NATURA 2000 sites
- National Institute for Agricultural Research (INRA) of San Giuliano (duplication seed bank)
- Associations (CEN Corse, CPIE Centre-Corse) and private stakeholders (landowners and socio-professionals)

Sardinia

Conservation actions implemented by **Hortus Botanicus Karalitanus (HBK)**

In situ

HBK, part of the University of Cagliari, implemented *in situ* conservation actions for 10 taxa, in 9 localities of Sardinia, in collaboration with the local authorities.



Map with localities of *in situ* actions for 10 taxa (see Table), by Mauro Fois

TAXON	LOCALITY	CONSERVATION ACTIONS*
1. *Astragalus gennarii*	Monte Albo (Lula)	Translocation and protective fence erection
2. *Centaurea magistrorum*	Monte Luas (Villagrande Strisaili)	Protective fences erection and removal of invasive species
3. *Centranthus amazonum*	Codula di Luna (Urzulei)	Management action (closure of the path near the population)
4. *Dianthus morisianus*	Portixeddu (Buggerru)	Translocation and protective fence erection
5. *Gentiana lutea* subsp. *lutea*	Monte Genziana (Talana)	Translocations, protective fences erection
6. *Ophioglossum vulgatum*	Funtanamela (Laconi)	Management actions (protective fences erection and removal of alien species)
7. *Rhamnus persicifolia*	Rio Is Eras (Talana)	Management measure for the patriarch (artificial river bank)
	Monte Genziana (Talana)	Translocation and removal of alien plants
8. *Ribes multiflorum* subsp. *sandalioticum*	Monte Novo San Giovanni (Orgosolo)	Protective fences erection
9. *Ribes sardoum*	Monte Corrasi (Oliena)	Translocation
10. *Senecio morisii*	Funtanamela (Laconi)	Translocation, removal of alien plants and protective fences erection

*Short and long term monitoring of the conservation actions is included.

Protective fence for the translocation of *Gentiana lutea* subsp. *lutea (photo by G. Bacchetta)*

Ex situ

127 germplasm accessions collected from 84 taxa

52 accessions from 40 taxa duplicated in other seed bank

23 germination experiments performed for 20 taxa

Over 11190 plants of 20 taxa produced for *ex situ* plantations

Protective fence for the *Centaurea magistrorum* population (photo by G. Bacchetta)

Seed curation (photo by M. Porceddu)

Plant production of *Rhamnus persicifolia (photo by A. Cuena-Lombraña)*

EXAMPLE OF CONSERVATION ACTION

Translocation of *Senecio morisii* in Funtanamela (Laconi)

Senecio morisii J. Calvo & Bacch. is a geophyte rhizomatous plant growing in watercourses of plain to montane levels; *S. morisii* is a narrow endemic species to Sardinia that occurs in six populations located in the Sarcidano and Ogliastra regions (Central-Eastern Sardinia).

Currently, there is limited information about this plant species, being recently described. The species grows in water courses of plain to montane levels with the *Ranunculion fluitantis* and *Calli-tricho-Batrachion* vegetation.

The main threats for the species are grazing, extension of the current roads and recreational activities.

Senecio morisii was assessed as Vulnerable (VU) on the IUCN Italian and Global Red Lists.

Flowering of *Senecio morisii (photo by G.Bacchetta)*

CONSERVATION ACTIONS CARRIED OUT IN THE CARE-MEDIFLORA PROJECT

- Seeds were collected for *in situ* conservation actions and several plants were produced and cultivated in the Botanical Garden.
- In February 2018 two sites in Funtanamela (Laconi municipality) were selected and protective fences were erected to limit the uncontrolled grazing.
- Inside these areas all exotic plants were removed.
- In March 2018, 125 individuals multiplied *ex-situ*, were transplanted in the 2 selected sites (fenced to avoid the grazing) and each plant was labelled for the future monitoring.
- All plants were monitored monthly.

Transplanting of *Senecio morisii* individuals (photo by G. Fenu)

Introduced and labelled plants of *Senecio morisii* (photo by G. Fenu)

Monitoring of reintroduced plants (photo by G. Fenu)

COLLABORATORS FOR CONSERVATION ACTIONS IN SARDINIA

- Fo.Re.S.T.A.S Agency – Authonomous Region of Sardinia

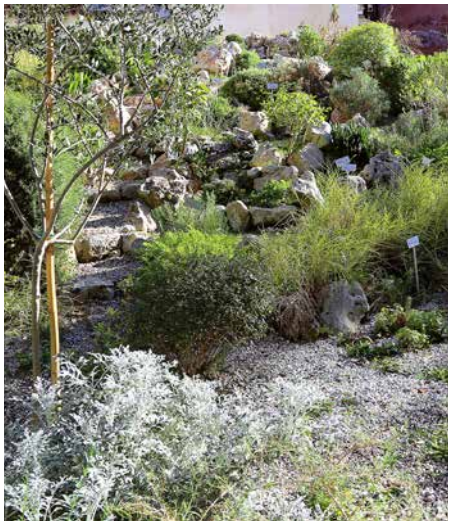
Sicily

Conservation actions implemented by the **Department of Biological, Geological and Environmental Sciences, University of Catania**

In situ

The Department of Biological, Geological and Environmental Sciences of the University of Catania (UNICT) implemented *in situ* conservation actions for 7 taxa in 9 localities in Sicily in collaboration with the local authorities.

Map with localities of *in situ* actions for 7 taxa (see Table), by Mauro Fois



Botanical Garden of Catania

TAXON	LOCALITY	CONSERVATION ACTIONS*
1. *Dianthus rupicola* subsp. *rupicola*	N.R. "Isola Lachea e Faraglioni dei Ciclopi" (Catania)	Translocation (new population), eradication of invasive alien species, restoration of the natural vegetation
2. *Tripolium pannonicum*	N.R. "Saline di Priolo" (Syracuse)	Translocation (new population), eradication of invasive alien species, restoration of the natural vegetation
3. *Urtica rupestris*	N.R. "Grotta Monello" (Syracuse)	Population reinforcement
	N.R. "Villasmundo-S. Alfio" (Syracuse)	Translocation (2 new populations), fencing
		Fencing (existing population)
4. *Origanum onites*	N.R. "Grotta Palombara" (Syracuse)	Fencing (existing population)
		Translocation (new population)
5. *Astragalus raphaelis*	N.R. "Vallone Piano della Corte" (Enna)	Translocation (new population)
	SCI "Monte Chiapparo" (Enna)	Translocation (new population)
6. *Leopoldia gussonei*	N.R. "Biviere di Gela" (Gela)	Translocation (new population)
7. *Betula aetnensis*	Regional Park "Mt. Etna" (S. Alfio)	Fencing 4 areas

*Short and long term monitoring of the conservation actions is included.

Urtica urpestris plant production

Ex situ

154 germplasm accessions collected from 107 taxa stored in the UNICT Seed Bank and 55 duplicated in another seed bank (CAG)

113 germination experiments performed for 47 taxa

Over 2,000 plants of 20 taxa produced for *in situ* actions

EXAMPLE OF CONSERVATION ACTION

Translocation of *Dianthus rupicola* Biv. subsp. *rupicola* in the Nature Reserve “Isola Lachea e Faraglioni dei Ciclopi” (Catania)

Dianthus rupicola Biv. subsp. *rupicola* is an endemic species, exclusively found in southern Italy (Campania, Basilicata and Calabria) and Sicily. In addition, it is listed in the Annex II and IV of the Habitat Directive (92/43/EEC). The primary growing sites for this perennial plant are represented by coastal cliffs, typically quite steep, where it gives origin to a chasmophytic vegetation occurring on really thermo-xerophilous environmental conditions.

Despite its localization on almost inaccessible stands, as cliffs or steep rocks, *D. rupicola* is severely threatened by habitat modifications, e.g. quarrying or wall cleaning, and, most relevant, by invasive alien species which, at global level, represent one of greatest drivers of biodiversity loss.

The new population was created in the Lachea islet (Catania), a few hundred meters away from the Sicilian coast, which falls within a protected area owned by the University of Catania and actively managed by CUTGANA.

The main steps followed for the conservation of this species are:

- Seed collection, bank activities, and plant production
- Establishment of a new population
- Manual eradication of invasive alien species (mostly *Opuntia ficus-indica* L.) in an area of ca. 10.000 sqm
- Restoration of the natural vegetation by using native thermo-xerophilous species (e.g. *Matthiola incana* (L.) R.Br., *Euphorbia dendroides* L., etc.)
- Implementation of a monitoring plan

Eradication of *Opuntia ficus-indica*

Translocation of *Dianthus rupicola* subsp. *rupicola*

Dianthus rupicola subsp. *rupicola*

COLLABORATORS FOR CONSERVATION ACTIONS IN SICILY

- CUTGANA (Centro Universitario per la Tutela e Gestione degli Ambienti Naturali e degli Agro-Ecosistemi)
- Riserva Naturale Orientata “Saline di Priolo”
- LIPU (Lega Italiana Protezione Uccelli)
- Regione Siciliana
- Dipartimento Regionale Azienda Foreste Demaniali (Ufficio Provinciale di Catania)
- Dipartimento Regionale Azienda Foreste Demaniali (Ufficio Provinciale di Siracusa)
- Corpo Forestale della Regione Siciliana
- Ente Parco dell’Etna
- Riserva Naturale Integrale “Grotta Monello”
- Riserva Naturale Integrale “Complesso Speleologico Villasmundo-S. Alfio”
- Riserva Naturale Integrale “Grotta Palombara”
- Riserva Naturale Orientata “Vallone di Piano della Corte”
- Riserva Naturale Integrale “Isola Lachea e Faraglioni dei Ciclopi”

Crete

Conservation actions implemented by the CIHEAM Mediterranean Agronomic Institute of Chania

In situ

The Mediterranean Plant Conservation Unit of CIHEAM Mediterranean Agronomic Institute of Chania (MAICh) implemented *in situ* conservation actions for 10 taxa in 6 localities* in Crete in collaboration with the local authorities.

*Right: Map with localities of *in situ* actions (see Table for names of localities).

TAXON	LOCALITY	CONSERVATION ACTIONS*
1. *Androcymbium rechingeri*	Elafonisi (Kantanos-Selino)	Reinforcement of populations, fence erection, placement of protective cages & information signs
2. *Bellevalia brevipedicellata*		
3. *Limonium elaphonisicum*		
4. *Viola scorpiuroides*		
5. *Bolanthus creutzburgii* subsp. *zaffranii*	Palaiochora (Kantanos-Selino)	Reinforcement of population & placement of protective cages
6. *Datisca cannabina*	Nea Roumata (Platanias)	Reinforcement of population, removal of introduced ornamental species & placement of information signs
7. *Chaerophyllum creticum*	Omalos (Platanias)	Reinforcement of population, fence erection & placement of information signs
8. *Horstrissea dolinicola*	Petradolakia (Anogeia)	Reinforcement of population, placement of protective cages, fence erection & creation of Plant Micro-Reserve
9. *Limonium creticum*	Matala (Faistos)	Reinforcement of populations, removal of invasive species, placement of protective cages & information signs
10. *Reseda minoica*		

*Short and long term monitoring of the conservation actions is included.

MAICh Seed Bank

Ex situ

102 germplasm accessions collected from 63 taxa

100 seedlots of 61 taxa stored in MAICh Seed Bank and 50 duplicated in other seed bank

43 germination experiments performed for 38 taxa

Over 5000 plants of 40 taxa produced for *in situ* actions and ex situ plantations

Collection of *Phoenix theophrasti* seeds

Plant production of *Bolanthus creutzburgii* subsp. *zaffranii*

EXAMPLE OF CONSERVATION ACTION

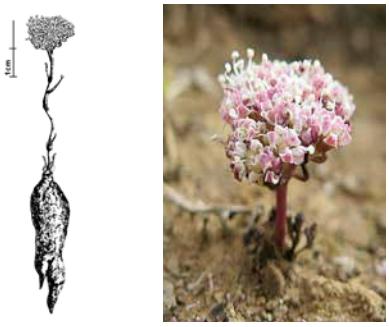
Reinforcement & creation of a Plant Micro-Reserve for *Horstrissea dolinicola*

In situ & *ex situ* conservation actions were carried out for the unique population of *Horstrissea dolinicola* Greuter, Gerstberger & Egli in the location Petradolakia on Mt. Ida (Psiloritis mountain) at an altitude of 1500 m in central Crete. *H. Dolinicola* is a perennial geophyte with usually only about 10% of its total length emerging above ground level at flowering time in July-August. It grows only in a few limestone sinks (dolines) where many goats and sheep graze during the summer season.

The site where the species occurs is very small and both the range and the number of individuals are declining. It is considered as one of "The Top 50 Mediterranean Island Plants" (http://top50.iucn-mpsg.org/species/41) according to the Mediterranean Islands Plant Specialist Group (IUCN / SSC).

The *in situ* actions include reinforcement of the population and the creation of a Plant Micro-Reserve aiming to address the threats of overgrazing and trampling as well as the expansion of animal housing facilities. Seed collection was performed for *in situ* conservation.

All actions were carried out in cooperation with the Forest Directorate of Rethymno, which is responsible for the management and protection of the area.



Sketch (left) & flower (right) of *H. dolinicola*

H. Dolinicola seedling

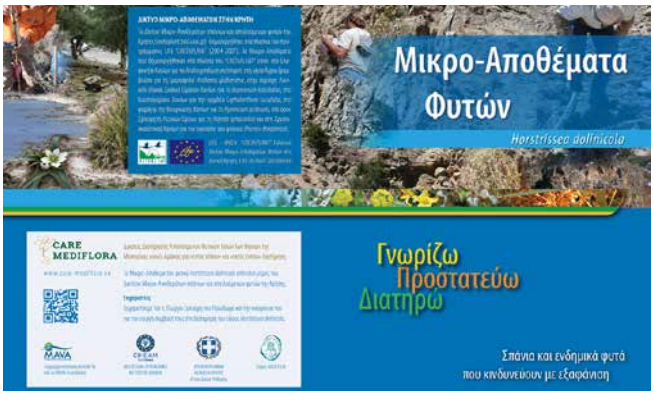
Seedlings planted within protective cage

Doline where *H. Dolinicola* grows

View of locality of *H. dolinicola* reinforcement action

COLLABORATORS FOR CONSERVATION ACTIONS IN CRETE

- Decentralised Administration of Crete - Forest Directorates of Chania, Rethymno and Heraklion
- Municipalities of Platanias, Anogeia and Kantanou-Selinou
- Environmental Education Centre of Anogeia
- Archaeological Service and staff of Matala archaeological site
- Management Bodies of NATURA 2000 sites
- National and Kapodistrian University of Athens



Leaflet for Micro-Reserve of *H. dolinicola*

Cyprus

Conservation actions implemented by the **Department of Forests & Agricultural Research Institute of Ministry of Agriculture, Rural Development and Environment**

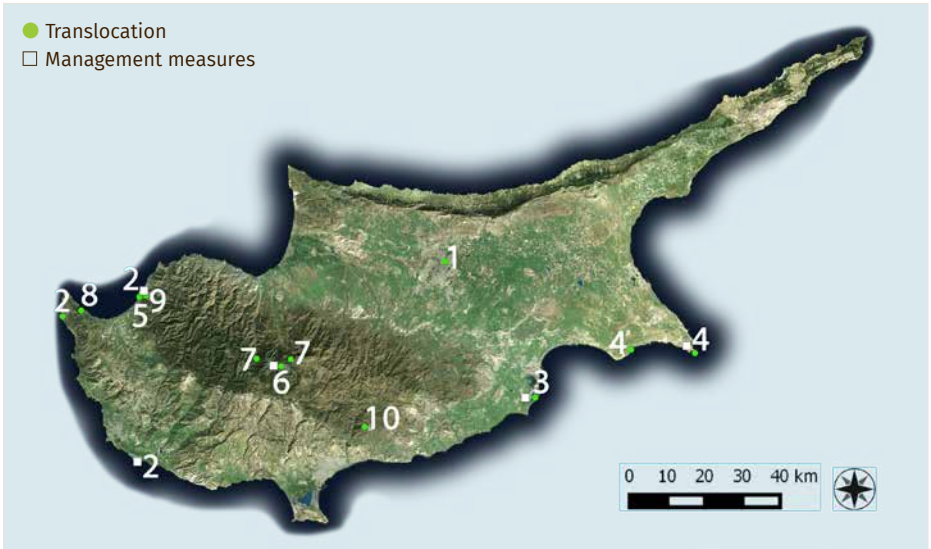
In situ

In situ conservation actions were implemented for 10 taxa in 12 localities in Cyprus in collaboration with the local authorities.

TAXON	LOCALITY	CONSERVATION ACTIONS*
1. *Allium marathasicum*	Troodos mountain	Population reinforcement
2. *Anthemis tomentosa*	Akamas (Paphos)	Translocation to Akamas and Yialia; placement of restriction barriers & control of invasive species (*Acacia saligna*) at Timi
	Yialia (Paphos)	
	Timi (Paphos)	
3. *Arum sintenisii*	Akamas (Paphos)	Reintroduction of the species
4. *Astragalus suberosus*	Potamos Liopetriou (Ammochostos)	Translocation to Potamos Liopetriou & Cavo Greko-Somera; control of invasive species (*Acacia saligna*) at Cavo Greko-Somera
	Gavo Greko-Somera (Ammochostos)	
5. *Crypsis hadjikyriakou*	Pashia Livadi (Lemesos)	Translocation to & control of the non invasive naturalized species (*Cirsium arvense*) at Pashia Livadi; population reinforcement & trimming of herbaceous vegetation at Almyrolivado
	Almyrolivado (Lemesos)	
6. *Euphorbia paralias*	Yialia (Paphos)	Reintroduction of the species
7. *Limonium mucronulatum*	Larnaca salt lake	Population reinforcement, soft fencing, control of invasive species (*Acacia saligna*) & the competing vegetation (*Phragmites australis*)
8. *Maresia nana* var *glabra*	Yialia (Paphos)	Population reinforcement & control of invasive species (*Acacia saligna*)
9. *Peganum harmala*	Nicosia old walls	Reintroduction of the species
10. *Dichoropetalum kyriakae*	Lemesos forest	Population reinforcement

*Short and long term monitoring of the conservation actions is included.

Map with localities of in situ actions (see Table for explanation of numbers)



Ex situ

121 germplasm accessions collected from 82 taxa

121 seedlots of 82 taxa stored in ARI Gene bank and 102 accessions from 71 taxa duplicated in Amiandos Botanical Garden gene bank

79 germination experiments performed for 79 taxa

Over 1372 plants of 11 taxa produced for the *in situ* actions

EXAMPLE OF CONSERVATION ACTION

Reinforcement of *Allium marathasicum* population at Troodos mountain

Allium marathasicum is an endemic species to Cyprus. It is found at one location, between Prodromos village and Trikoutsia monastery, at Troodos mountain. Total population size is ~500-1200 individuals, with some fluctuations every year due to irregular removal of weeds, which affects the species. It is a perennial bulbous herb, flowering from May to August and fruiting from August until the end of September. It grows in irrigated tree orchards and at their edges, from 1300-1400m altitude.

The species is included in the Red Data Book of the Flora of Cyprus and in the IUCN Red list at Global Level as Critically Endangered (CR). It is an apparently synanthropic species, threatened by land development. Most importantly, the rapid abandonment of the agricultural land observed in the area during the last years, in combination with the intensive use of herbicides in most of the remaining orchards, impose immediate actions for the *in situ* conservation of this species.

Bulbs and bulbils were collected during 2016 and 2017 and were grown at the Agricultural Research Institute greenhouse. Plants were established in four sites within the Troodos wider area, Prodromos Forest college, Trikoutsia monastery, Amiantos Botanical Garden and Platania Forest Nursery.

A monitoring plan has been implemented since spring 2017, measuring the survival rate and checking the sustainability of the habitat on regular intervals throughout the year. The results of the first two years were encouraging. Particularly, the collaboration with Trikoutsia monastery was extremely fruitful. Nuns showed great interest for the conservation of the species and also for raising public awareness. The collaboration with the monastery stresses the importance of involving local communities in conservation actions, especially when those are implemented outside state land.

Allium marathasicum from the established plants in Prodromos forest college

Established plants at Trikoutsia monastery

Establishement of the plant at Platania forest station

COLLABORATORS FOR CONSERVATION ACTIONS IN CYPRUS

- Cyprus Forest Association
- Municipality of Nicosia
- Municipality of Larnaca
- Municipality of Dromolaxia – Meneou
- Trikoutsia monastery
- Department of Environment. Ministry of Agriculture, Rural Development and Environment
- Department of Antiquities. Ministry of Transport, Communications and Works

Project plant list

CARE-MEDIFLORA conservation actions were implemented for 436 taxa.

Plant taxon only for *ex situ* conservation: regular font; taxon only for *in situ* conservation: **bold font**; taxon both for *ex situ* and *in situ* conservation: **bold font** and *

Island abbreviations: Balearic Islands (Ba), Corsica (Co), Sardinia (Sa), Sicily (Si), Crete (Cr), Cyprus (Cy) – that conservation measures have been implemented in this (these) island(s).

Acer obtusatum Willd. subsp. *aetnense* (Tineo ex Strobl) C. Brullo & Brullo – Si
Acer granatense Boiss. – Ba
Achillea cretica L. – Cy
Acinos troodi (Post) Leblebici subsp. *troodi* – Cy
Acis autumnalis (L.) Sweet
Aconitum napellus L. subsp. *corsicum* (Gáyer) W. Seitz – Co
Aethionema saxatile (L.) R. Br. – Si
Agrimonia eupatoria L. – Cy
Allium commutatum Guss. – Ba,Si
Allium marathasicum* Brullo, Pavone & Salmeri – Cy
Allium autumnale P. H. Davis – Cy
Allium cyprium Brullo, Pavone & Salmeri subsp. *cyprium* – Cy
Allium exaltatum (Meikle) Brullo, Pavone, Salmeri & Venora – Cy
Allium guttatum Steven subsp. *guttatum* – Cy
Alyssum baldaccii Vierh. ex E.I.Nyár. – Cr
Alyssum fragillinum (Bald.) Rech.f. – Cr
Alyssum troodi Boiss. – Cy
Ammophila arenaria (L.) Link – Cy
Anagyris foetida L. – Si
Anchusa cespitosa Lam. – Cr
Anchusa crispa Viv. subsp. ***crispa**** – Co,Sa
Anchusa crispa Viv. subsp. *maritima* (Vals.) Selvi & Bigazzi – Sa
Anchusa sardoa (Illario) Selvi & Bigazzi – Sa
Anchusa undulata L. subsp. *hybrida* (Ten.) Cout. – Co
Androcymbium rechingeri* Greuter – Cr
Andryala cossyrensis Guss. – Si
Anthemis aetnensis Schouw in Sprengel – Si
Anthemis cupaniana Tod. ex Nyman – Si
Anthemis glaberrima (Rech. fil.) Greuter – Cr
Anthemis intermedia Guss. – Si
Anthemis pignattiorum Guarino, Raimondo & Domina – Si
Anthemis tomentosa* L. – Cy
Anthyllis barba-jovis L. – Co,Si
Anthyllis barba-jovis L. x *A. hermanniae* L. subsp. *corsica* Brullo & Giusso – Co
Anthyllis hermanniae L. subsp. *ichnusae* Brullo & Giusso – Sa
Anthyllis hystrix (Willk. ex F.Barceló) Cardona, Contandr. & E.Sierra – Ba
Antirrhinum siculum Mill. – Sa
Aquilegia barbaricina Arrigoni & E.Nardi – Sa
Aquilegia bernardii Gren. & Godr. – Co
Aquilegia cremnophila Bacch., Brullo, Congiu, Fenu, J. Garrido & Mattana – Sa
Aquilegia litardierei Briq. – Co
Aquilegia nugorensis Arrigoni & E.Nardi – Sa
Arenaria grandiflora L. – Si
Armeria pungens (Link) Hoffmanns. & Link – Co
Armeria sardoa Spreng. subsp. *genargentea* Arrigoni – Sa
Armeria soleirolii (Duby) Godr. – Co
Armeria sulcitana Arrigoni – Sa
Arrhenatherum album (Vahl) Clayton subsp. *cypricola* H. Scholz – Cy
Artemisia campestris L. subsp. *variabilis* (Ten.) Greuter – Sa
Artemisia inculta Delile – Cr
Arum purpureospathum P.C. Boyce – Cr
Arum rupicola Boiss. – Cy
Arum sintenisii* (Engl.) P.C.Boyce – Cy
Aster tripolium L. subsp. *pannonicus* (Jacq.) Soó – Ba
Astragalus alopecurus Pall. – Co
Astragalus balearicus Chater – Ba
Astragalus creticus Lam. subsp. *minoicus* Brullo & Giusso – Cr
Astragalus genargenteus Moris – Sa
Astragalus gennarii* Bacch. & Brullo – Sa
Astragalus greuteri Bacch. & Brullo - Co
Astragalus huetii Bunge – Si
Astragalus idaeus Bunge – Cr
Astragalus kamarinensis C. Brullo, Brullo, Giusso, Miniss. & Sciandr. – Si
Astragalus macrocarpus DC. subsp. *lefkarensis* Kirchhoff & Meikle – Cy
Astragalus nebrodensis (Guss.) Strobl – Si
Astragalus rapahelis* G. Ferro – Si
Astragalus suberosus* Banks & Sol. – Cy
Astragalus siculus Biv. – Si
Athamanta sicula L. – Si
Aubrieta deltoidea (L.) DC. subsp. *sicula* (Strobl) Phitos – Si
Bellevalia brevipedicellata* Turril. – Cr
Bellevalia juliana Bareka, Turland & Kamari – Cr
Bellevalia romana (L.) Rchb. – Co
Berberis vulgaris L. subsp. *aetnensis* (C.Presl) Rouy & Foucaud – Sa,Si
Betula aetnensis* Rafin. – Si
Biarum dispar (Schott) Talavera – Sa
Biscutella rotgesii Foucaud – Co
Bituminaria morisiana (Pignatti & Metlesics) Greuter – Sa
Bolanthus creutzburgi Greuter subsp. ***Zaffranii**** Phitos, Turland & Bergmeier* – Cr
Brachypodium sylvaticum (Huds.) P.Beauv. – Si
Brassica incana Ten. – Si
Brassica insularis Moris – Co,Sa
Brassica villosa Biv. subsp. *brevisiliqua* (Raimondo & Mazzola) Raimondo & Geraci – Si
Brassica hilarionis Post – Cy
Briza maxima L. – Si
Bupleurum fruticosum L. – Si
Bupleurum gaudianum Snogerup – Cr
Buxus balearica Lam. – Ba
Calamintha cretica (L.) Lam. – Cr
Calicotome spinosa (L.) Link – Sa
Callitriche pulchra Schotsman – Cr
Campanula forsythii (Arcangeli) Podlech – Sa
Campanula laciniata L. – Cr
Campanula saxatilis L. subsp. *saxatilis* – Cr
Campanula podocarpa Boiss. – Cy
Carlina macrocephala Moris subsp. *macrocephala* – Sa
Castroviejoa frigida (Labill.) Galbany, L. Sáez & Benedí – Co
Celtis aetnensis (Tornab.) Strobl – Si
Celtis asperrima Lojac. – Si
Centaurea argentea L. subsp. *chionantha* (Turland & L. Chilton) Greuter – Cr
Centaurea baldaccii Degen ex Bald. – Cr
Centaurea giardinae Raimondo & Spadaro – Si
Centaurea magistrorum* Arrigoni & Camarda – Sa
Centaurea parlatoris Heldr. subsp. *parlatoris* – Si
Centaurea poculatoris Greuter – Cr
Centaurea pumilio L. – Cr
Centaurea sphaerocephala L. – Si
Centranthus amazonum* Fridl. & A.Raynal – Sa
Centranthus trinervis* (Viv.) Bég. – Co
Cerastium supramontanum Arrigoni – Sa
Cerastium tomentosum L. – Si
Cerinthe major L. subsp. *major* – Co
Cerinthe tenuiflora Bertol. – Co
Chaenorhinum rubrifolium (DC.) Fourr. – Cy
Chaerophyllum creticum* Boiss. & Heldr. – Cr
Chamaerops humilis L. – Ba
Cistus albidus L. – Sa
Cistus clusii Dunal – Ba
Cistus creticus L. – Ba
Cistus salviifolius L. – Si
Cladium mariscus (L.) Pohl – Ba
Clinopodium sardoum (Asch. & Levier) Peruzzi & F.Conti – Sa
Colymbada tauromenitana (Guss.) Holub – Si
Convolvulus valentinus Cav. – Ba
Cornus sanguinea L. – Sa
Cotoneaster nebrodensis (Guss.) K. Koch – Si
Crambe hispanica L. – Cy
Crataegus orientalis M.Bieb subsp. *orientalis* – Si
Crepis auriculifolia Sieber ex Spreng. – Cr
Crepis pusilla (Sommier) Merxm. – Cy
Crepis sibthorpiana Boiss. & Heldr. – Cr
Crithmum maritimum L. – Ba
Crocus cyprius Boiss. & Kotschy – Cy
Crocus hartmannianus Holmboe – Cy
Crucianella maritima L. – Ba,Sa
Crypsis hadjikyriakou* Raus & H.Scholz – Cy
Cyanus segetum Hill – Co
Cyclamen graecum Link subsp. *anatolicum* Ietsw. – Cy
Cynanchum acutum L. – Cy
Cynara cyrenaica Maire & Weiller – Cr
Cynara makrisii Hand & Hadjik. – Cy
Cynoglossum troodi H. Lindb. – Cy
Cytisus villosus Pourr. – Si
Damasonium bourgaei Coss. – Ba,Si
Daphne laureola L. – Si
Datisca cannabina* L. – Cr,Cy
Delphinium pictum Willd. – Sa
Dianthus genargenteus Bacch., Brullo, Casti & Giusso – Sa
Dianthus gyspergerae Rouy – Co
Dianthus juniperinus Sm. subsp. *kavusicus* Turland – Cr
Dianthus morisianus* Vals. – Sa
Dianthus rupicola Biv. subsp. ***rupicola**** – Si
Dianthus siculus C.Presl – Si
Dianthus xylorrhizus Boiss. & Heldr. – Cr
Dianthus tripunctatus Sm. – Cy
Dichoropetalum kyriakae* (Hadjik. & Alziar) Hand & Hadjik. – Cy
Digitalis minor L. – Ba
Digitalis purpurea L. var. *gyspergerae* (Rouy) Fiori – Sa
Dioscorea communis (L.) Caddick & Wilkin – Si
Diplotaxis crassifolia (Rafin.) DC. – Si
Diplotaxis ibicensis (Pau) Gómez Campo – Ba
Dipsacus ferox Loisel. – Sa
Doronicum corsicum (Loisel.) Poir. – Co
Dorycnium fulgurans* (Porta) Lassen – Ba
Echium judaeum Lacaita – Cy
Elatine alsinastrum L. – Si
Elatine brochonii Glavaud. – Co
Elatine macropoda Guss. – Ba
Elymus corsicus (Hackel) Kerguélen – Sa,Co
Enarthrocarpus arcuatus Labill. – Cy
Ephedra fragilis Desf. – Si
Erica manipuliflora Salisb. – Cy
Erodium corsicum Léman – Co
Erucastrum virgatum (J. & C.Presl) C.Presl – Si
Eryngium pusillum L. – Co
Eryngium ternatum Poir. – Cr
Erysimum brulloi G. Ferro – Si
Erysimum etnense Jordan – Si
Euphorbia aleppica L. – Cy
Euphorbia bivonae Steud. – Si
Euphorbia dendroides L. – Si

Euphorbia dracunculoides Lam. subsp. *inconspicua* (Ball) Maire – Ba
Euphorbia maresii Knoche – Ba
Euphorbia paralias* L. – Cy,Ba
Ferula arrigonii Bocchieri – Co,Sa
Ferula cypria Post – Cy
Filago mareotica Delile – Cy
Fritillaria persica L. – Cy
Galium lucidum All. – Si
Galium tenuissimum M. Bieb. – Cy
Genista aetnensis (Biv.) DC. – Co,Sa
Genista cupanii Guss. – Si
Genista demarcoi Brullo, Scelsi & Siracusa – Si
Genista dorycnifolia Font Quer – Ba
Genista thyrrhena Vals. subsp. *pontiana* Brullo & de Marco – Co
Genista lucida Cambess. – Ba
Gentiana lutea* L. subsp. *lutea* – Sa
Geum urbanum L. – Cy
Globularia alypum L. – Sa
Globularia bisnagarica L. – Co
Gundelia tournefortii L. – Cy
Halimione portulacoides (L.) Aellen – Si
Halopeplis amplexicaulis (Vahl) Ces., Pass. & Gibelli – Sa
Haplophyllum buxbaumii (Poir.) G. Don – Cy
Hedysarum cyprium Boiss. – Cy
Helianthemum caput-felis Boiss. – Ba,Sa
Helianthemum nummularium (L.) Mill. – Si
Helianthemum marifolium (L.) Mill. subsp. *origanifolium* (Lam.) G.López – Ba
Helichrysum doerfleri Rech. f. – Cr
Helichrysum heldreichii Boiss. – Cr
Helichrysum massanellanum Herrando, J. M. Blanco, L. Sáez & Galbany – Ba
Helichrysum microphyllum Willd. subsp. *tyrrhenicum* Bacch., Brullo & Giusso – Sa
Helichrysum pendulum (C. Presl) C. Presl – Si
Helichrysum saxatile Moris subsp. *saxatile* – Sa
Helichrysum stoechas (L.) Moench – Ba
Helicodiceros muscivorus (L. f.) Engl. – Co
Helleborus lividus Aiton ex Curtis – Ba
Helleborus lividus Aiton subsp. *corsicus* (Briq.) P.F.Yeo – Sa
Holcus lanatus L. – Si
Horstrissea dolinicola* Greuter, P. Gerstberger & B. Egli – Cr
Hypecoum pendulum L. – Cy
Hypericum hircinum L. subsp. *albimontanum* (Greuter) N. Robson. – Cy
Hypericum hircinum L. subsp. *hircinum* – Sa
Hypericum hircinum L. subsp. *cambessedesii* (Coss. ex Nyman) Sauvage – Ba
Hypericum jovis Greuter – Cr
Hypericum kelleri Bald. – Cr
Hypericum lanuginosum Lam. – Cy
Hypericum perfoliatum L. – Cy
Hypericum scruglii Bacch., Brullo & Salmeri – Sa
Iberis semperflorens L. – Si
Ifloga spicata (Forssk.) Sch. Bip. – Cy
Isoetes histrix Bory & Durieu – Ba
Jasione montana L. – Si
Juncus acutus L. – Si
Juncus subulatus Forssk. – Si
Juniperus communis L. subsp. *hemisphaerica* (J. & C. Presl) Arcang. – Si
Juniperus nana Willd. var. *corsicana* Lebreton, Mossa & Gallet – Sa
Juniperus turbinata Guss. – Ba,Si
Juniperus macrocarpa Sm. – Ba,Co
Jurinea bocconei (Guss.) Guss. – Si
Kosteletzkya pentacarpos* (L.) Ledeb. – Co
Lactuca undulata Ledeb. – Cy
Lamyropsis microcephala (Moris) Dittrich & Greuter – Sa
Laserpitium siculum Sprengel – Si
Lathyrus neurolobus Boiss. & Heldr. – Cr
Lavatera agrigentina Tineo – Si
Lavatera maritima Gouan. – Ba,Sa
Lavatera triloba L. subsp. *pallescens* (Moris) Nyman – Sa
Lavatera triloba L. subsp. *triloba* – Sa
Leontice leontopetalum L. subsp. *leontopetalum* – Cr
Leopoldia gussonei Parl. – Si
Leucanthemum flosculosum (L.) P. Giraud – Sa
Leucojum aestivum L. subsp. *pulchellum* (Salisb.) Briq. – Co
Lilium martagon L. – Co
Limbarda crithmoides (L.) Dumort. – Si
Limoniastrum monopetalum (L.) Boiss. – Si
Limonium algarvense Erben – Ba
Limonium avei (De Not.) Brullo & Erben – Sa
Limonium calliopsium A.Mayer – Cr
Limonium creticum* R. Artelari – Cr
Limonium elaphonisicum* A. Mayer – Cr
Limonium fontqueri (Pau) L.Llorens – Ba
Limonium marisolii L.Llorens – Ba
Limonium mucronulatum* (H.Lindb.) Greuter & Burdet – Cy
Limonium narbonense Mill. – Si
Limonium pseudodyctiocladum L.Llorens – Ba
Limonium sougiae Erben & Brullo – Cr
Limonium strictissimum (Salzm.) Arrigoni – Co
Limonium wiedmannii Erben – Ba
Linaria aeruginea (Gouan) Cav. subsp. *pruinosa* (Sennen & Pau) Chater & Valdés – Ba
Linaria arcusangeli Atzei & Camarda – Sa
Linaria cossoni Barratte – Sa
Linaria flava (Poir.) Desf. subsp. *sardoa* (Sommier) A.Terracc. – Co
Linum maritimum L. – Ba
Linum strictum L. – Si
Lomelosia crenata (Cirillo) Greuter & Burdet – Si
Lomelosia cretica (L.) Greuter & Burdet - Si
Lonicera pyrenaica L. subsp. *majoricensis* (Gand.) Gand. – Ba
Lotus cytisoides L. – Cy
Lythrum borysthenicum (Schrank) Litv. – Si
Malus crescimannoi Raimondo – Si
Malvella sherardiana (L.) Jaub. & Spach – Cy
Maresia nana (DC.) Batt var. ***glabra**** (Meikle) Christodoulou & Hand – Cy
Matthiola incana (L.) R.Br. subsp. *incana* – Si
Medicago arborea L. – Sa
Medicago arborea L. subsp. *strasseri* (Greuter, Matthäs & Risse) Sobr.-Vest. & Ceresuela – Cr
Micromeria filiformis (Aiton) Benth. subsp. *cordata* (Moris) Pignatti – Sa
Micromeria sphaciotica Boiss. & Heldr. ex Benth. – Cr
Moluccella spinosa L. – Cr
Morisia monanthos (Viv.) Asch. – Co
Myosotis solange Greuter & Zaffran – Cr
Myosurus minimus* L. – Ba
Myrtus communis L. - Ba
Nepeta foliosa Moris – Sa
Nepeta sphaciotica P.H. Davis – Cr
Nepeta troodi Holmboe – Cy
Nerium oleander L. – Co
Neurada procumbens L. – Cy
Nigella ciliaris DC. – Cy
Nigella damascena L. – Co
Noccaea zaffranii F. K. Mey. – Cr
Ochthodium aegyptiacum (L.) DC. – Cy
Ononis crispa* L. – Ba
Ononis zschackei* F. Herm.* – Ba
Onosma gigantea Lam. – Cy
Ophioglossum vulgatum L. subsp. ***vulgatum*** – Sa
Origanum dictamnus L. – Cr
Origanum onites* L. – Si
Ostrya carpinifolia Scop. – Sa,Si
Otanthus maritimus (L.) Hoffmanns. & Link – Ba
Paeonia cambessedesii (Willk.) Willk. – Ba
Paeonia corsica Sieber ex Tausch – Sa,Co
Paeonia mascula (L.) Mill. subsp. *mascula* – Co
Paeonia morisii Cesca, Bernardo & n.g.Passal. – Co
Pancratium illyricum L. – Co
Pancratium maritimum L. – Ba
Pastinaca kochii Duby subsp *latifolia* (Duby) Reduron – Co
Peganum harmala* L. – Cy
Peucedanum paniculatum Loisel – Co
Phagnalon rupestre (L.) DC. – Si
Phlomis fruticosa L. – Si
Phoenix theophrasti Greuter – Cr
Pimpinella bicknellii Briq. – Ba
Pimpinella cypria Boiss. – Cy
Pimpinella lutea Desf. – Co
Pinguicula crystallina Sm. – Cy
Pinguicula sehuensis Bacch., Cannas & Peruzzi – Sa
Pistacia lentiscus L. – Si
Pistacia terebinthus L. subsp. *terebinthus* – Sa,Si
Pisum fulvum Sm. – Cy
Plagius flosculosus (L.) Alavi & Heywood – Co
Plantago cupanii Guss. – Si
Platanus orientalis L. – Si
Polygonum idaeum Hayek – Cr
Potentilla calabra Ten. – Si
Potentilla recta L. – Cy
Primula acaulis (L.) L. subsp. *balearica* (Willk.) Greuter & Burdet – Ba
Primula vulgaris Huds. subsp. *balearica* (Willk.) W.W.Sm. & Forrest – Ba
Prospero depressum Speta – Cr
Prospero idaeum Speta – Cr
Prospero minimum Speta – Cr
Prospero rhadamanthi Speta – Cr
Ptilostemon casabonae (L.) Greuter – Sa
Ptilostemon niveus (C. Presl) Greuter – Si
Ptychotis sardoa Pignatti & Metlesics – Sa
Pyrus castribonensis Raimondo, Schicchi & Mazzola – Si
Pyrus ciancioi Marino, Castellano, Raimondo & Spadaro – Si
Pyrus sicanorum Raimondo, Schicchi & Marino – Si
Pyrus vallis-demonis Raimondo & Schicchi – Si
Ranunculus bullatus* L. – Ba
Ranunculus elisae Gamisans – Co
Ranunculus sylviae* Gamisans – Co
Ranunculus veronicae N. Böhling – Cr
Ranunculus weyleri Marès ex Willk. – Ba
Ranunculus rumelicus Griseb. – Cy
Reseda minoica* Martín-Bravo & Jiménez-Mejías – Cr
Rhamnus alaternus L. – Ba,Si
Rhamnus alpina L. subsp. *alpina* – Sa
Rhamnus ludovici-salvatoris Chodat – Ba
Rhamnus persicifolia* Moris – Sa
Rhus tripartita (Ucria) Grande – Si
Ribes multiflorum Kit. ex Roem. & Schult. subsp. ***sandalioticum*** Arrigoni – Sa
Ribes sardoum* Martelli – Sa
Romulea ligustica Parl. – Co
Rosa serafinii Viv. – Sa
Rosa sicula Tratt. – Si
Rouya polygama (Desf.) Coincy – Co
Rumex scutatus L. subsp. *glaucescens* (Guss.) Brullo, Scelsi & Spampinato – Sa
Rumex aetnensis C.Presl – Si
Ruscus aculeatus L. – Ba
Ruta lamarmorae Bacch., Brullo & Giusso del Galdo – Sa
Salix pedicellata Desf. – Si
Salsola oppositifolia Desf. – Si
Salsola soda L. – Ba
Salvia hierosolymitana Boiss. – Cy
Salvia veneris Hedge – Cy
Sambucus nigra L. – Sa,Si
Santolina corsica Jord. & Fourr. – Co,Sa
Santolina insularis (Gennari & Fiori) Arrigoni – Sa
Saponaria orientalis L. – Cy
Saponaria cypria Boiss. – Cy
Saponaria sicula Raf. – Si
Sarcopoterium spinosum (L.) Spach. – Sa,Si
Satureja thymbra L. – Sa,Cy
Scilla lochiae (Meikle) Speta – Cy
Secale strictum (C. Presl) C.Presl – Si
Securigera cretica (L.) Lassen – Cy
Senecio glaucus L. subsp. *cyprius* Meikle – Cy
Senecio morisii* J.Calvo & Bacch. – Sa
Seseli praecox (Gamisans) Gamisans – Sa,Co
Sesleria doerfleri Hayek – Cr
Sesleria insularis Sommier subsp. *barbaricina* Arrigoni – Sa
Sesleria insularis Sommier subsp. *morisiana* Arrigoni – Sa
Sibthorpia europaea L. – Cr
Sideritis cypria Post – Cy
Silene ammophila Boiss. & Heldr. subsp. *ammophila* – Cr
Silene dichotoma Ehrh. subsp. *racemosa* (Otth) Hayek – Cy
Silene fruticosa L. – Si
Silene galataea Boiss. – Cy
Silene hicesiae Brullo & Signorello – Si
Silene ichnusae Brullo, De Marco & De Marco fil. – Sa
Silene nodulosa Viv. – Sa
Silene sericea All. – Ba
Silene succulenta Forssk. subsp. *succulenta* – Cr
Silene velutina* Loisel – Co,Sa
Silene italica (L.) Pers. subsp. *sicula* (Ucria) Jeanm. – Si
Smilax aspera L. – Si
Soleirolia soleirolii (Req.) Dandy – Ba
Solenopsis antiphonitis Hadjik. & Hand – Cy
Sorbus aria (L.) Crantz – Si
Stachys maritima Gouan. – Co
Stipagrostis lanata (Forssk.) de Winter – Cy
Tamarix minoa J. L. Villar, Turland, Juan, Gaskin, M.A. Alonso & M.B.Crespo – Cr
Tanacetum audibertii (Req.) DC. – Sa
Telephium imperati L. subsp. *orientale* (Boiss.) Nyman – Cy
Teucrium asiaticum L. – Ba
Teucrium balearicum (Coss. ex Pau) Castrov. & Bayon – Ba
Teucrium capitatum L. subsp. *majoricum* (Rouy) T. Navarro & Rosúa – Ba
Teucrium cuneifolium Sm. – Cr
Teucrium fruticans L. – Co
Thymbra calostachya (Rech.f.) Rech.f. – Cr
Thymus herba-barona Loisel. subsp. *herba-barona* – Sa
Trachelium lanceolatum Guss. – Si
Triplachne nitens (Guss.) Link – Cy
Tripolium pannonicum* (Jacq.) Dobrocz. – Si
Tulipa cypria Stapf – Cy
Umbilicus horizontalis (Guss.) DC. – Si
Urtica bianorii (Knoche) Paiva – Ba
Urtica rupestris* Guss. – Si
Verbascum conocarpum Moris subsp. *conocarpum* – Sa
Verbascum plantagineum Moris – Sa
Viburnum tinus L. – Ba,Cy
Viola corsica Nyman – Co
Viola jaubertiana Marès & Vigin. – Ba
Viola scorpiuroides* Coss. – Cr
Vitex agnus-castus L. – Ba

Lessons Learnt & Recommendations

The priorities of conservation vary at local level.

A plant species needs different conservation interest depending on the particular conditions of the island or the locality on which it grows, thus conservation measures have to be planned on a local scale.

When initiating *in situ* plant conservation actions, it is important to:

- have a clear idea of what is planned (biological and ecological implications but also time and costs involved)
- have adequate knowledge of the seed germination, propagation and growing of the species in the nursery / botanical garden
- select a suitable site for the species that is preferably not too difficult to manage and control
- have acceptance from / collaboration with local institutions and stakeholders
- be aware that such actions could take a very long time
- be aware that monitoring activities should be continuous in order to check the effectiveness of the actions over time.

Project collaborative field trip in Sicily, July 2017

Project information day at Sóller Botanic Garden, March 2018

Project collaborative field trip in Balearic Islands, May 2018

CARE-MEDIFLORA presented at 1st Mediterranean Plant Conservation Week (October 2016), 6th Global Botanic Gardens Congress (June 2017) and 2nd Mediterranean Plant Conservation Week (November 2018)

Networking and communication

Exchange experiences within the partnership and among other stakeholders so as to improve collaboration and networking on plant conservation in the Mediterranean area:

- Partner collaborative meetings & field trips on all 6 islands
- Meetings with relevant stakeholders on all 6 islands
- Trainings
- Contribution to national reporting for the Convention on Biological Diversity (CBD) & Global Strategy for Plant Conservation (GSPC).

Securing the sustainability of the partnership by supporting and enlarging the existing Network of Mediterranean Plant Conservation Centres "GENMEDA":

- GENMEDA network new website (http://genmeda.net/) & database
- 3 meetings organized for GENMEDA & 9 new members added since 2016 reaching a total of 22 members of the network.

Dissemination of project aims and results:

- Project website (http://www.care-mediflora.eu/)
- Project leaflet in English and local languages
- Organization of 6 local dissemination events
- Participation in international and national external events, conferences, workshops
- Local communication (newspapers, TV, radio, etc.) & social media
- 3 scientific papers published
- Participation in 1st Mediterranean Plant Conservation Week
- Co-organization and participation in 2nd Mediterranean Plant Conservation Week (http://www.medplantsweek.uicnmed.org/)
- Edition of the project summary for the wide public and a final project report for specialised audience.

2nd Mediterranean Plant Conservation Week field trip; photo by Pilar Valbuena for the IUCN Centre for Mediterranean Cooperation

GENMEDA meeting in Rome, May 2019

FIND OUT MORE AND DOWNLOAD ALL PROJECT PUBLICATIONS AT

http://www.care-mediflora.eu/en/news

http://www.care-mediflora.eu/en/publications

Partners

Mediterranean Plant Specialist Group – IUCN/SSC

Sóller Botanical Garden Foundation, Balearic Islands

Office of the Environment of Corsica Conservatoire Botanique National de Corse

Hortus Botanicus Karalitanus, University of Cagliari, Sardinia

Department of Biological, Geological and Environmental Sciences, University of Catania, Sicily

CIHEAM Mediterranean Agronomic Institute of Chania, Crete (Lead Partner)

Agricultural Research Institute, Cyprus

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CARE MEDIFLORA

Conservation Actions for Threatened Mediterranean Island Flora: *ex situ* and *in situ* joint actions

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Cover photo: Field work on Gramvousa Islet, Crete, ©Mediterranean Plant Conservation Unit of CIHEAM - Mediterranean Agronomic Institute of Chania (MAICh)